Comments from Councilman TimBen Boydston a representative from the City of Santa Clarita speaking on behalf of himself and other concerned taxpayers of the State of California

- The unfunded mandate is a result of the abuse and misuse of the Federal Clean Water Act.
- There has never been any crop damage recorded from chloride salt in the irrigation water coming from the Santa Clarita Valley Watershed.
- The demand by the State to spend hundreds of millions of dollars to remove chloride salt is based on the claim of one farmer who had "leaf tip burn" on some avocado trees. No reduction in the size of the fruit or crop yield was recorded, only a condition (not seen on the site visit) which can also be caused by heat, too much fertilizer, and other impurities.
- The amount of chloride salt allowed by the State in the Calleguas Watershed, which is the next door valley, is 150mg/liter and the avocado crops there are thriving.
- A literature survey (no actual laboratory or field studies) was conducted by a group of scientists (several with conflicts of interest since they worked for the downstream agricultural interests) which resulted in a range of "safety" for avocado crops of between 100mg/liter and 270 mg/liter.
- The Scientists recommended further studies to get a more precise number, but the Sanitation District said that the State will not allow us the time to conduct these studies.
- The desire for large quantities of very low chloride water by the agricultural interests downstream stems from their need to leach chloride salts from their soil and refill their aquifers with more water from inland sources. This is needed because they have over pumped their aquifer for years and saltwater intrusion from the ocean (34,000mg/liter) has spoiled much of their supply.
- The State is mandating that we pay for the removal of chloride salt because of a TMDL that was established by a State agency, but the TMDL is not based on scientific studies, rather it is a result of the lobbying of staff and members of the Regional Water Quality Control Board.
- As a taxpayer of California I am asking for one thing. Reject this demand by the State that we as taxpayers of Santa Clarita pay for any chloride salt removal facilities until we are given the time and permission to conduct actual scientific studies. This will result in knowing what level of chloride salt in irrigation water actually harms avocado crops in our watershed.

Boydston challenges data

Councilman speaks out as a citizen during chloride meeting in Saugus

By Jim Holt
Signal Senior Staff Writer

Santa Clarita City Councilman TimBen Boydston called the whole issue of chloride cleanup a scam Wednesday night after local sanitation officials presented their plan for reducing how much of the salty compound the sanitation district discharges into the Santa Clara River.

"I've been fighting this scam for five years," said Boydston, speaking as a civilian.

"I'm curious about where the strawberry crops are that we are harming," he said, referring to Ventura County farmers downstream.

Farmers of salt-sensitive crops such as strawberries and avocados are considered by state water regulators to be "beneficial users" of water in the Santa Clara River.

As such, they are protected under state and federal laws to receive uncontaminated water, including water not contaminated by salty sodium chloride in the natural water of the Santa Clara River.

Nine Regional Water Quality Control Boards throughout the state enforce those laws. It was

See CHLORIDE, A5

Sparse turnout in second of six city meetings on water quality

CHLORIDE from A1

the Los Angeles board that fined the Santa Clarita Valley Sanitation District $225,000 in November for having failed to meet the obligations of its permit to discharge chloride into the Santa Clara River.

On Wednesday, local sanitation officials held their second of six Santa Clarita Valley public hearings in Saugus at Rosedell Elementary School in an effort to gauge which plan they should pursue in reducing the amount of chloride discharged into the Santa Clara River.

Their first meeting was held in Castaic on Tuesday where a sparse crowd of about a dozen civilians showed up.

Their follow-up meeting in Saugus elicited the same sparse turnout — less than a dozen interested parties.

District spokesman Phil Friess answered Boydston's question, saying: "Based on what I know, I don't believe the crops are being harmed."

Boydston continued to challenge district officials about the fundamental premise on which the chloride debate hinges — the scientific data which dictates what concentration of chloride in the water is detrimental to salt-sensitive crops.

"What I have here," he said patting an open binder he placed on the public comment podium, "is the study which is part of the fantasy called 'the science.'"

To verify the veracity of the binder and its contents, Boydston showed the binder to Friess, who said he recognized the document.

Boydston continued to rail against the findings of the sanitation district.

In reading from the document, he said: "We were unable to determine an appropriate threshold for chloride (concentration in water)."

Through meetings such as the one held Tuesday night, sanitation officials are hoping the public will help them choose one of the four chloride-removal options they've devised.

The district is expected to comply with state mandates for discharged chloride into the Santa Clara River so that the concentration does not exceed 100 milligrams of chloride per liter of natural river water.

If they fail to adopt a plan for compliance by Oct. 31 then the state is expected to issue more fines.

Boydston cited chloride concentration levels expected by each of the other regional water boards in California, noting that Santa Clarita Valley is set with the lowest expectation of 100 mg/L.

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The watershed-based approach is known as the Alternative Water Resources Management Plan (AWRM), which was described in Section 6.6.4. As previously discussed in Response to Comment P6-1, the need or appropriateness of the Chloride TMDL limit for the SCR is not under evaluation in the Draft Facilities Plan and EIR. The Santa Clarita Valley Sanitation District (SCVSD) is not responsible for establishing or justifying these limits. For more than a decade, the SCVSD repeatedly challenged the Chloride TMDL, but was unsuccessful. The SCVSD is now responsible for complying with these limits. Therefore, as stated in Section 1.4, the first project objective is to provide compliance with the Chloride TMDL for SCVSD wastewater treatment and discharge facilities.

The Executive Summary for the Draft Facilities Plan and EIR was prepared in accordance with §15123 of the California Environmental Quality Act (CEQA) Guidelines, which states that a summary should "be as clear and simple as reasonably practical." In an effort to provide a clear and simple description of the highly technical Chloride TMDL, the Executive Summary used the following language: "The State of California has determined that high levels of chloride (salt) harm salt-sensitive avocado and strawberry crops along Highway 126, downstream from the Santa Clarita Valley's (Valley's) two wastewater (sewage) treatment plants owned and operated by the Santa Clarita Valley Sanitation District (SCVSD)." This sentence does not say that there are currently salt-sensitive crops along Highway 26 that are being damaged by chloride levels in the SCR.

No revisions to the Draft Facilities Plan and EIR are required in response to this comment.

Response to Comment P6-3

The comment suggests that the chloride limit exists because of agricultural coalition lobbying and is not supported by science.

As previously discussed in Response to Comment P6-1, the RWQCB-LA is responsible for regulating discharges to the SCR to protect beneficial uses. As discussed in Section 3.3.3, in 1997, the RWQCB-LA staff was directed to conduct a 3-year study to determine appropriate chloride objectives that would protect salt-sensitive crops. During the 3-year study, the RWQCB-LA proposed listing several reaches of the SCR on the 303(d) list of Water Quality Limited Segments for chloride. In May 1999, the Environmental Protection Agency listed Reaches 5 and 6 of the SCR, which are discharge points for the Valencia Water Reclamation Plant and Saugus Water Reclamation Plant, respectively. This resulted in the development of the Chloride TMDL by the RWQCB-LA. In 2002, Resolution No. 02-018 was adopted, which set a Waste Load Allocation (WLA) limit of 100 mg/L for these reaches.

In 2004, the RWQCB-LA adopted Resolution No. 04-004, which revised the interim WLA and Implementation Plan for the Chloride TMDL. The Implementation Plan required the SCVSD to fund scientific studies to re-assess the chloride limit. The studies were conducted by expert consultants selected jointly by the SCVSD, the RWQCB-LA, and Ventura County interests. The result of the studies, which was reviewed by an independent Technical Advisory Panel (TAP), was that a chloride range of 100 to 117 mg/L would be protective of avocados and most other salt-sensitive crops.

Regarding the need for an experimental study (i.e., field study), the TAP found that while it would be possible to conduct greenhouse or laboratory studies, it would be difficult to extrapolate those lab results to the field. In addition, multiple members of the TAP felt that performance of extended field studies would not be useful in refining the protective threshold. In 2006, the

3

shallow as 150 to 175 feet or as deep as 500 to 600 feet. Cost to pump water from this depth is more expensive than surface-water diversion; therefore, surface-water diversion is used as much as possible.

Avocado Production on Camulos Ranch

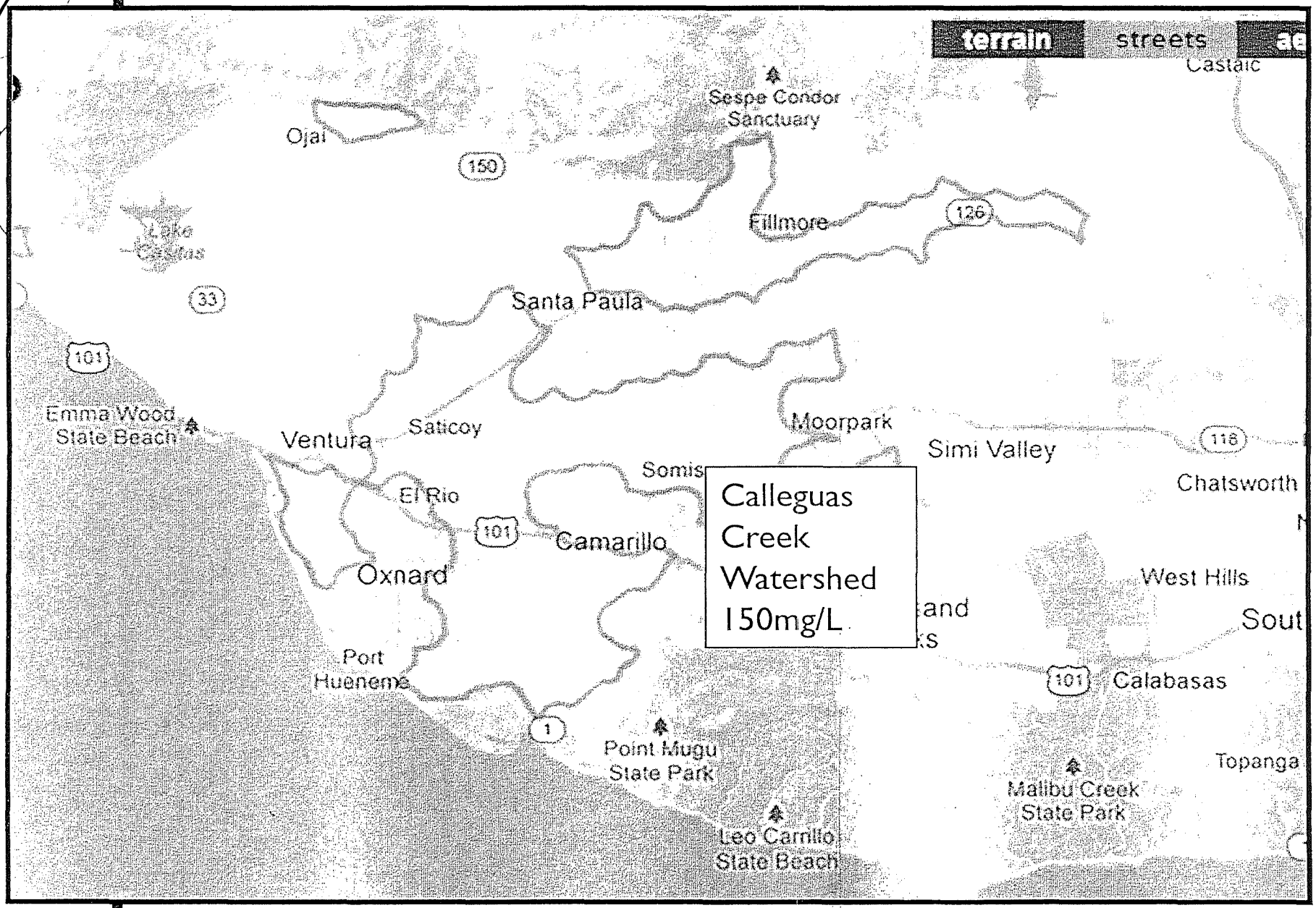
Avocado production has been conducted on Camulos Ranch for nearly 60 years. A 12-acre orchard exists that has been in production for approximately that duration. This orchard contains many varieties of avocado; however, most are on Mexican rootstock. Another 60-acre orchard is about 3 to 4 years old. The goal of Camulos Ranch is to have 150 to 200 acres of avocados in the future. Mr. Freeman said that "diversity of agricultural production and crop type on Camulos Ranch is essential to a sustainable farming operation, and avocados are an essential part of that." He was hired as ranch manager, partly, to provide that diversity.

The avocado trees on Camulos Ranch "commonly have tip burn" (see photographic documentation provided to the interviewer by Mr. Freeman). In addition, Mr. Freeman said that he believes the citrus trees are also experiencing burn and yield loss because of unsuitable irrigation water quality. At the time of the site visit, the avocado trees on Camulos Ranch essentially did not have leaf-tip burn. It was mentioned that "very little leaf tip burn was visible at this time due to the excessive leaching provided by the winter and spring rains of this past year." However, older leaves (<1 year old) did show signs of past leaf-tip burn.

One hundred seventeen acres of avocados were recently planted in Piru Canyon owned by Rancho Temiscal.

Mr. Freeman indicated that in his experience "most people actually under-irrigate avocados." Applied water for avocado irrigation in the area can range from "3 to 5 feet," but mostly on the lower end of this range.

In general, avocado production on Camulos Ranch does not vary significantly from other areas visited with respect to irrigation method and cultural practices.


terrain
streets
Sespe Condor Sanctuary
Ojai
150
Fillmore
126
Lake Casitas
33
Santa Paula
101
Emma Wood State Beach
Ventura
Saticoy
Moorpark
Simi Valley
118
Somis
El Rio
Chatsworth
101
Camarillo
Calleguas Creek Watershed 150mg/L
Oxnard
West Hills
Port Hueneme
101
Calabasas
1
Point Mugu State Park
Topanga
Malibu Creek State Park
Leo Carrillo State Beach

University of Idaho; M.S. from the University of Nebraska, B.S. from Latvia University of Agriculture. He is the author and co-author of 4 technical publications, 4 abstracts, and 6 technical proceedings.

Ben A. Faber, Ph.D.

Dr. Faber works with the Ventura County Cooperative Extension, serving as the soils/water/subtropical horticulture advisor in Ventura County. He has research experience in plant nutrition and soil management. His current research focuses on irrigation requirements of avocado and citrus, methods of controlling groundwater nitrate pollution, effects of yard waste mulches on citrus production and various methods for controlling micronutrient deficiencies in avocado. Dr. Faber received his Ph.D. from the University of California, Davis; M.S. Soil Fertility, University of California, Davis; B.S. Biology, University of California, Santa Cruz. He is the author and co-author of multiple technical papers and publications, including 18 publications developed over the last six years.

S.R. Grattan, Ph.D.

Dr. Grattan is a professor at the University of California, Davis, where he serves as the plant-water relations specialist in the Department of Land, Air, and Water Resources, Hydrologic Science Division. His research areas include irrigation management with saline water; plant response in saline environments; uptake of nutrients and trace elements by plants in saline environments; and crop water use. He also performs international consulting work with the World Bank, USDA/OICD, and USAID, and has previously served as a research assistant with the University of California, Riverside, and as a research plant physiologist at the USDA/ARS Salinity Laboratory. Dr. Grattan received his Ph.D. in Soil Science from the University of California, Riverside; M.S. in Soil Science from the University of California, Riverside; B.S. Soil and Water Science from the University of California, Davis. He is the author and co-author of 15 technical proceedings/presentations, 74 refereed publications, and over 100 reports.

John Letey, Jr. Ph.D.

Dr. Letey is Professor Emeritus of Soil Science, Soil and Water Sciences Unit, University of California, Riverside and Director of the Center for Water Resources, University of California, Riverside. He has also served as the Chair, Department of Soil and Environmental Sciences; Director, University of California Kearney Foundation of Soil Science; Associate Director, University of California Water Resources Center; California State Water Quality Coordinator; and Director, University of California Salinity/Drainage Program. His research areas include irrigation, salinity, drainage, and plant-water relationships. He received his Ph.D. in Soil Science from the University of Illinois, and his B.S. in Agronomy from Colorado State University, and has served on numerous state, federal and international advisory committees; University of California and Soil Science Society of America task forces and committees; and editorial boards. He is the author and co-author of over 80 international presentations, technical papers, publications and reports.

Darrell H. Nelson, B.S.

Mr. Nelson is a consultant with Fruit Growers Laboratory, and a farm operations manager and farmer in Ventura County. He is the former President and Laboratory Director of the Santa Paula and Stockton Fruit Growers Laboratory. He received his B.S. in Soil and Water Science from the University of California, Davis, and has made presentations on the use of scientific information to implement best management practices and the use of nutrient budgets. He has also been active in the appraisal of drinking water quality for regulatory purposes and irrigation water for suitability to specific crops. He has advised the Los Angeles Regional Water Quality Control Board on Best Management Practices and the use of Nutrient Budgets as they relate to Total Maximum Daily Loads (TMDLs), and is currently serving on the California Avocado Commission Research Committee as co-chairman of the management and physiology sub committee.

I. Introduction and Summary of Key Findings

A. Purpose

The Upper Santa Clara River (USCR) Chloride TMDL Collaborative Process was instituted to determine a threshold for chloride in the eastern end of reach 4, as well as the entirety of reaches 5 and 6 of the Santa Clara River. As part of the Collaborative Process, an Agricultural Chloride Threshold Study (ACT Study) was conducted. This study consisted of a Literature Review and Evaluation (LRE) prepared by CH2M Hill, which was then examined by a panel of experts in the fields of agriculture, chemistry, and soil science. This panel of experts, known as the Technical Advisory Panel (TAP) met several times over the course of the study to provide oversight and advice to the stakeholders and consulting teams. In their final meeting on July 11th 2005, they were asked to examine a draft of the LRE, and come to a decision as to its accuracy. During their deliberation, six key questions were developed. These questions served to guide the overall discussion of the TAP as they made their decision.

The TAP identified six key scientific issues to structure their discussion:

1. *Please comment on the adequacy of the literature for supporting an interim number or guideline for the level of chloride that will reduce plant yields. Please comment specifically on the adequacy of the literature to justify the avocado threshold recommendations in the Literature Review Evaluation and provide your opinion on the accuracy of CH2M Hill's conclusion that there is insufficient literature to provide a recommended number or range for strawberries and nursery crops. If you are not in agreement with the range provided in the LRE, how would you modify it to feel the guideline concentration range would prevent detrimental impacts on avocado yields?*
2. *What are the relative impacts of TDS and chloride on avocado yield? Do you believe that it is scientifically possible to separate the effects of the two stresses? Please document the evidence supporting your conclusions.*
3. *Would you recommend that an experimental study be conducted to produce more meaningful information than is available in the current literature? Why or why not? If yes, what elements or characteristics should such a study include?*
4. *How can local knowledge best be integrated into the study? Describe, "what works" based on information from local experience.*
5. *Please discuss the validity of plant injury, growth, and yield as metrics of injury. Do you conclude that if there is plant injury there will be a reduction in yield? On what do you base your conclusion?*
6. *Please provide any general comments on the Literature Review Evaluation.*

The TWG, which is comprised of a variety of stakeholders representing growers, water purveyors, elected officials, public agencies, environmental organizations, and other interested parties, examined the Literature Review Report and then generated a list of comments which were then forwarded to the TAP for their consideration. The TAP response to comments is included as an appendix to this document.

B. TAP Membership Information

Oleg Daugovish, Ph.D.

Dr. Daugovish works with the Ventura County Cooperative Extension, where he serves as the farm advisor for strawberry and vegetable crops in Ventura County. He conducts research and educational programs with emphases on pest control and environmental quality of production, addressing the needs of organic farmers in Ventura County. He has also served as a research assistant with the Department of Plant, Soil and Entomological Sciences at the University of Idaho; Department of Agronomy at the University of Nebraska; and the Stensund Ecological Center. Dr. Daugovish received his Ph.D. from the

Kenneth K. Tanji, Sc.D.

Dr. Tanji is Professor Emeritus of Hydrology, Department of Land, Air and Water Resources, University of California, Davis. He has also served as the Senior and Principal Laboratory Technician, Department of Irrigation; Lecturer in Water Science, Department of Water Science and Engineering; Professor of Water Science, Department of Land, Air and Water Resources; Vice Chair and Chair, Department of Land, Air and Water Resources; and Professor of Hydrology, Department of Land, Air and Water Resources. He has more than 45 years of research experience dealing with salinity in agricultural lands in California, the Western U.S. and foreign countries, and is currently involved with developing a salinity management guide for irrigation of landscapes using recycled water. Dr. Tanji received his Sc.D. in Agricultural Science-Irrigation, Drainage and Hydrological Engineering from Kyoto University; M.S. in Soil Science-Soil Chemistry from the University of California, Davis; B.S. in Chemistry from the University of Hawaii. He is the author and co-author of 6 books, 28 book chapters, 158 papers, and more than 200 technical reports and proceedings.

C. Definitions

In an effort to clarify the work of the Agricultural Chloride Study, the TAP developed the following definitions to differentiate the terms "Threshold" and "Guideline":

Threshold Concentration for Chloride Injury: A specific and absolute numerical value of chloride concentration beyond which, according to the scientific literature, plant injury will occur. In the case of avocados this refers to the concentration beyond which leaf injury will occur.

Guideline Concentration for Chloride Injury: A range of numerical values of chloride concentration beyond which, according to the scientific literature, plant injury is likely to occur. The range establishes the likely lowest value at which injury might begin to occur and the likely highest value at which injury might begin to occur. For example, a guideline range for a hypothetical constituent might begin at 3 ppm as the lower bound or 5 ppm as the upper, depending on conditions.

D. Summary of Findings

The key differences between the majority report and the two minority reports center on three key issues: threshold value, the importance of TDS and ion-specific effects, and handling the need for incorporating local knowledge into the study. The chart below summarizes the positions of the majority and two minority reports on each of these issues.

	Threshold Value	TDS Vs. Ion-Specific Effects	Local Conditions
Majority Report	The lower limit at which chloride would be unlikely to cause damage to avocados on Mexican rootstock is somewhere around 100 mg/L. The upper limit, however, is much less clear to the panelists. The TAP majority suggests that 117 mg/L would be a conservative upper-protective limit and a limit of 140 mg/L may be protective but only under ideal, non-restricting conditions.	It seems clear that TDS has a negative impact on avocado as it does with other salt-sensitive crops. Chloride is a contributor to salinity, and studies have shown that avocado is sensitive to this specific ion. Separating the two effects (TDS and chloride) might be possible by controlled experiments, but it would be extremely difficult and long-term in nature. Extrapolating the results back to irrigation water Cl guidelines would again be difficult.	A correlational survey of local water quality, yield and management practices would provide useful information. However, establishing a precise relationship between chloride and yield may not be possible in light of the large number of management and environmental factors that can impact tree yield.
Minority Report 1	Using the soil concentration range of 355 to 540 mg/L from table 4 results in a range of 177 to 270 mg/L in the irrigation water.	All of the experimental evidence strongly leads to the conclusion that TDS is the critical factor for avocados and chloride is minor except to the extent that it contributes to TDS.	Although I agreed that a survey-based study to document local information on water quality and yield would be helpful, the probability of gaining definitive information is very low.
Minority Report 2	To utilize a level above 100 mg/l, which has been used successfully for the past 40 plus years, would be detrimental to the continued health of these crops.	I feel that the difference between the effects of chloride and total dissolved solids (TDS) are easily observed in the field and can therefore be separated in research trials.	Local knowledge and experience must be integrated into the study process for the determination of chloride thresholds for the plants in question.

II. Majority Report

Four of the members of the TAP, Steve Grattan, Ken Tanji, Ben Faber, and Oleg Daugovish reached a consensus decision on their response to the LRE. Ben Faber and Steve Grattan prepared an overall response representing this consensus that appears below. This group will be referred to as the TAP Majority. In addition, the majority report section contains supplemental information presented by Steve Grattan and Ken Tanji, as well as the individual responses of each of the four TAP members.

A. Overall Responses to Key Issues

Steve Grattan and Ben Faber wrote the following responses to the six key issues on behalf of the TAP Majority. The individual members of the TAP Majority approved each response before it was included in the majority report.

S.R. Grattan and Ben Faber
Agricultural Chloride Threshold Study Technical Advisory Panel

1: Adequacy of the Literature

The TAP majority concurs with the findings of the LRE that there is very little scientific literature to base an interim guide for a TMDL on strawberry and nursery crops. The TAP majority believes however that there is sufficient documentation for avocado to set an interim guideline. In the process of setting such a guideline for avocado, because of this tree's very sensitive nature, it would be protective for most other sensitive crops as well. However, it is uncertain that all nursery crops would be protected. The lower limit at which chloride would be unlikely to cause damage to avocado is somewhere around 100 mg/L. The upper limit, however, is much less clear to the panelists. The TAP majority suggests that 117 mg/L would be the conservative upper-protective limit. Of these three panelists, one suggested that a range of 100 to 140 mg/l is appropriate depending upon site specific conditions where a higher value is more appropriate where other factors affecting avocado are not restricting while a lower value is more appropriate where the trees are prone to additional stresses, inflexibilities in water delivery, and poorer management. The other TAP majority members concur with this assessment. The panelists indicate that these are not threshold values but guideline ranges that would be acceptable.

2: Relative Impacts of TDS and Chloride

It seems clear that TDS has an impact on avocado as it does with other salt-sensitive crops. Chloride can be a contributor to salinity and a number of studies have shown that avocado is sensitive to this specific ion producing tree injury. The TAP majority is uncertain whether chloride or TDS is the most the limiting factor and feel the current literature is insufficient to make this distinction. Separating the two effects (TDS and chloride) might be possible by controlled experiments, but it would be extremely difficult and long-term in nature. Moreover, there would be uncertainty regarding extrapolation of the results to develop irrigation water-quality guidelines.

3: Need for an Experimental Study

The TAP majority believe it would be possible to do controlled greenhouse or laboratory studies that would give a correct range of chloride values that caused damage to avocados with a particular scion/rootstock combination. Nevertheless, TAP majority members indicated that it would be difficult to extrapolate those lab results to the field.

In 2004, the RWQCB-LA adopted Resolution No. 04-004, which revised the interim WLA and Implementation Plan for the Chloride TMDL. The Implementation Plan required the SCVSD to fund scientific studies to re-assess the chloride limit. The studies were conducted by expert consultants selected jointly by the SCVSD, the RWQCB-LA, and Ventura County interests. The result of the studies, which was reviewed by an independent Technical Advisory Panel (TAP), was that a chloride range of 100 to 117 mg/L would be protective of avocados and most other salt sensitive crops.

Regarding the need for an experimental study (i.e., field study), the TAP found that while it would be possible to conduct greenhouse or laboratory studies, it would be difficult to extrapolate those lab results to the field. In addition, multiple members of the TAP felt that performance of extended field studies would not be useful in refining the protective threshold. In 2006, the RWQCB-LA elected not to extend the chloride implementation schedule to allow for the completion of additional field studies and revised the Chloride TMDL to shorten the scientific study schedule. In 2007, the SCVSD appealed the Chloride TMDL to the State Water Resources Control Board (SWRCB), but the appeal was unsuccessful and the revision was upheld.

Depending on the length (between 2 and 10 years) and type (strawberry and/or avocado) of field study, the estimated cost to conduct a field study would range from approximately $0.5 million to $4.2 million. Because the overall schedule was condensed by the RWQCB-LA, which was upheld by the State Water Resources Control Board in 2007, it would not have been feasible to perform a field study and meet the shortened implementation deadline of May 15, 2015.

No revisions to the Draft Facilities Plan and EIR are required in response to this comment.

Response to Comment A13-6

The comment questions whether any source control measures in addition to the elimination of the automatic water softeners (AWS) are available.

A chloride source report for the SCV was developed in 2002 and, since 2005, is updated annually by the SCVSD. In 2002, approximately 45 percent of the chloride in wastewater was from the water supply, while approximately 29 percent was from AWS. Other sources included industrial, commercial, wastewater disinfection, and residential at approximately 2, 3, 8, and 13 percent, respectively. Procedures have been instituted whereby industrial and commercial sources must meet a 100 mg/L chloride limit or control their chloride discharges to the extent technologically and economically feasible. Chloride contributed through wastewater disinfection is being addressed with the proposed change to UV disinfection in Alternatives 2, 3, and 4 (see Section 6 of the Draft Facilities Plan and EIR). Residential sources identified were human waste, laundry products, other cleaning products, and swimming pool backwash. Of these sources, either (1) there is no feasible manner in which the source can be removed or (2) the source does not contribute a large enough amount of chloride such that removal of the source would significantly reduce the chloride loading in the treated wastewater discharged to the SCR.

No revisions to the Draft Facilities Plan and EIR are required in response to this comment.

Response to Comment A13-7

The comment requests additional cost information for treating potable water rather than wastewater to remove chlorides.

U.S. Department of the Interior
U.S. Geological Survey

Seawater Intrusion in a Coastal California Aquifer

This report is a summary of recent work on seawater intrusion in aquifers underlying the Oxnard Plain, Ventura County, California. It is part of a series of reports describing the results of the U.S. Geological Survey's Southern California Regional Aquifer-System Analysis (RASA) study of a southern California coastal ground-water basin. The geologic setting and hydrologic processes that affect seawater intrusion in aquifers underlying the Oxnard Plain are similar to those in other coastal basins in southern California.

Introduction

Seawater intrusion in aquifers underlying the Oxnard Plain, Ventura County, California, was first observed in the early 1930's and became a serious problem in the mid-1950's (California Department of Water Resources, 1965) (fig. 1). Historically, local agencies responsible for the management of ground water used a criterion of 100 milligrams per liter (mg/L) chloride to define the leading edge of the seawater front. It was assumed that all high-chloride water from wells behind the front originated from seawater that entered aquifers through outcrop areas in submarine canyons. Recent work (Izbicki, 1991; Stamos and others, 1992) showed that other sources of high-chloride water to wells are present and that the areal extent of seawater intrusion in the upper aquifer system is smaller than previously believed.

Hydrogeology

The Oxnard Plain, 60 miles northwest of Los Angeles, has an area of 120-square miles (mi^2) and is underlain by a complex system of aquifers more than 1,400 feet thick. These aquifers (like many similar coastal aquifers in southern California) can be divided into an upper and a lower aquifer system (fig. 2).

The upper aquifer system consists of relatively flat-lying alluvial deposits about 400 feet thick and contains two aquifers that have been developed for water supply—the Oxnard and Mugu aquifers. The Oxnard aquifer, about 180 feet below land surface, is the primary water-yielding zone. The Oxnard aquifer is underlain by the Mugu aquifer and overlain by a thick, areally extensive clay deposit. This clay deposit separates the Oxnard aquifer from a shallow unconfined aquifer that previous researchers have referred to as the 'perched aquifer.' (Use of this name in this report does not imply that perched conditions exist in the Oxnard Plain.) The Oxnard and Mugu aquifers crop out in Hueneme and Mugu submarine

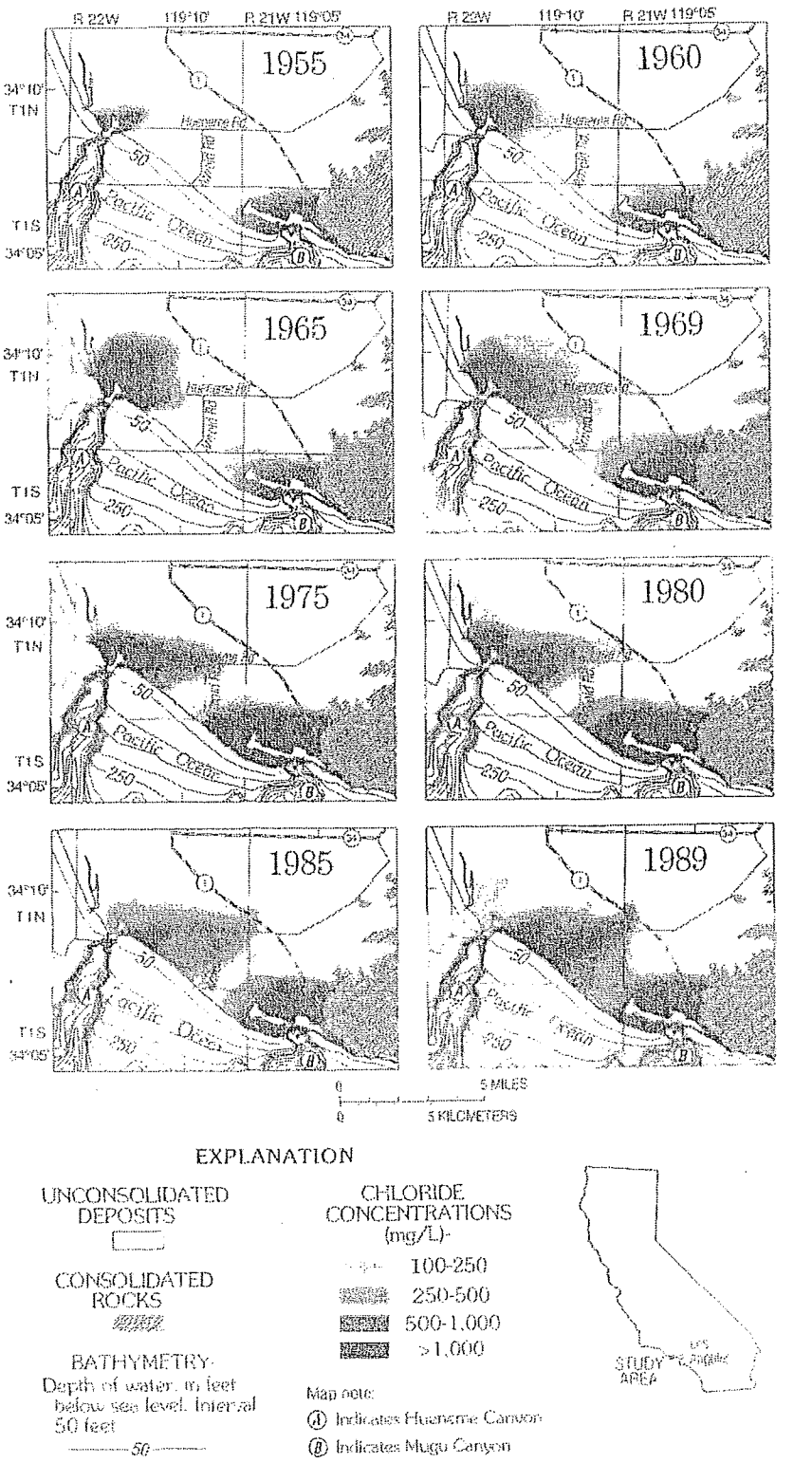


Figure 1. Chloride concentrations in water from wells in the upper aquifer system in the Oxnard Plain, 1955-89. (Data from California Department of Water Resources and County of Ventura Public Works Agency.)

MORE STORIES ABOUT
Wells
Salt Water
Water Pollution
Ventura County

Beyond current water replenishment projects -- such as a Santa Clara River diversion dam, settling ponds and recharge basins near Saticoy -- Hanson said Ventura County water agencies need to end coastal pumping during droughts that draws down water tables and allows greater saltwater intrusion.

"I think they're on the right track; they're one of the better sets of water agencies [in California] as far as trying to get something going," Hanson said. "What they still need to do is align their management strategies with climatic cycles."

For example, during the last big drought from 1985 to 1991, well pumping in some coastal areas increased 11%, Hanson said. He said a better response would have been for farmers and water agencies to sharply cut back on pumping near the coast, because freshwater basins there were already low from lack of rain.

Of course, farmers need to pump more water during droughts because so little rain bathes their fields in the winter and spring. So local water officials have built a dam-and-pipeline system designed to capture Santa Clara River water five miles inland and deliver it to the coastal Oxnard Plain and the over-pumped Pleasant Valley area south of Camarillo.

"Replacing water near the coast with inland well water has been our strategy for a long time," said Steve Bachman, groundwater manager for the United Water Conservation District. "The USGS is just confirming what we're attempting to do. We've been working with them."

Getting that done has been a costly and lengthy process.

The centerpiece of the United system is the $31-million Freeman Diversion Dam, completed in 1990, and a two-pronged set of pipelines that deliver river water either directly to coastal farms for immediate use or to settling ponds or gravel pit reservoirs, where the water filters down into underground basins for storage.

The dam is designed to capture about 12,700 acre-feet of Santa Clara River water each year. An acre-foot is 326,000 gallons, or enough water to supply two typical homes for 12 months. The county uses about 480,000 acre-feet of water a year, two-thirds of it on agriculture.

In recent years, much of the captured water has been funneled into the shallow Oxnard Aquifer, which has been substantially replenished in the last decade, Bachman said.

The problem now is United's inability to pump the water out when needed, because the district's wells have traditionally reached into deeper basins where water would still be available during drought. So United last year began a $2-million project to drill four new wells into the Oxnard basin near Saticoy.

Pumping from the shallow basin will allow the area's deeper basins -- which are seriously over-pumped -- to refill, Bachman said. In time, both shallow and deep basins will be replenished, he said. "You just hope that during the good times, you've done enough water management that you can survive a prolonged drought," Bachman said. "If we're not pumping from the coast during wet years, that will slow the [saltwater] intrusion during dry ones."

Very wet years in 1992, 1995 and 1998 have helped Ventura County's water basins. Bachman said conversion of three additional gravel pits near the river as part of the huge RiverPark community planned along Vineyard Avenue will add 10,000 to 15,000 acre-feet of storage.

A state-authorized groundwater management agency has also imposed pumping limits and fines on cities and farmers, cutting pumping substantially from historic levels.

12

Agricultural Chloride Thresholds by Regional Board

Region	No.	AGR Cl Threshold
North Coast	1	None
San Francisco	2	< 142 mg/L Cl
San Luis Obispo	3	< 142 mg/L Cl
Los Angeles	4	100 - 355 mg/L Cl *
Central Valley	5	None
Lahontan	6	None
Colorado River	7	None
Santa Ana	8	< 175 mg/L Cl
San Diego	9	< 140 mg/L Cl

* The 100 mg/L threshold is located in the Santa Clara River watershed.