SANTA CLARITA VALLEY SANITATION DISTRICT

UPPER SANTA CLARA RIVER CHLORIDE TMDL

Site Specific Objective and Anti-Degradation Analysis

July 2014

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Acronyms and Abbreviations

AGR	LARWQCB acronym for the beneficial use of water for farming, horticulture, or ranching
AGTAP	Agricultural Technical Advisory Panel
BPA	Basin Plan Amendment
CFR	Code of Federal Regulations
CLWA	Castaic Lake Water Agency
District	Santa Clarita Valley Sanitation District of Los Angeles County
DWR	California Department of Water Resources
GSWIM	Groundwater Surface Water Interaction Model
GWR	LARWQCB acronym for the use of water for natural or artificial recharge of ground water
LARWQCB	Los Angeles Regional Water Quality Control Board
LRE	Literature Review Evaluation
LWA	Larry Walker Associates
Maf	Million acre-feet
MCL	Maximum Contaminant Level
MF	Microfiltration
MF/RO	Microfiltration followed by Reverse Osmosis
mg/L	Milligram per liter
MUN	LARWQCB acronym for the beneficial use of water for municipal and domestic supply.
MWH	Montgomery Watson Harza
NPDES	National Pollution Discharge Elimination System
OAL	Office of Administrative Law
RO	Reverse Osmosis
RWQCB	Regional Water Quality Control Board
SCR	Santa Clara River
SCVSD	Santa Clarita Valley Sanitation District
SJVI	San Joaquin Valley Index
SRWS	Self-regenerating Water Softeners

SSO	Site Specific Objective
SVI	Sacramento Valley Index
SWP	State Water Project
TDS	Total Dissolved Solids
TES	Threatened and Endangered Species
TMDL	Total Maximum Daily Load
USCR	Upper Santa Clara River
USEPA	United States Environmental Protection Agency
USFWS	US Fish and Wildlife Service
USGS	United States Geological Survey
UTS	Unarmored threespine stickleback
UV	Ultra-violet
UWMP	Urban Water Management Plan
WLA	Waste Load Allocation
WQO	Water Quality Objective
WRP	Water Reclamation Plant

Executive Summary

The Santa Clarita Valley Sanitation District retained Larry Walker Associates (LWA) to develop a technical analyses and an anti-degradation analysis that the Regional Board may use to develop a Basin Plan Amendment for the consideration of site-specific objectives (SSOs) for chloride as part of the Upper Santa Clara River Chloride TMDL (USCR Chloride TMDL). The purpose of this document is to provide the technical and regulatory basis for consideration of SSOs for surface water in Reaches 4B, 5, and 6 of the Santa Clara River.

INTRODUCTION

The SSOs being developed are based on protection of beneficial uses, re-analysis of historic water quality information using updated tools (models), and consideration of the factors set forth in California Water Code section 13241, 40 CFR 131.12, and 48 F.R. 51400. The determination of appropriate water quality objectives for chloride requires the consideration of both technical data and regulatory requirements. In part, some of the regulatory requirements have guided the scope of the evaluation of technical factors in the SSO analysis.

A key regulatory consideration is the Chloride Policy. In 1997, the Los Angeles Regional Water Quality Control Board (Regional Board) adopted Resolution No. 97-02, a Basin Plan Amendment (BPA) that adjusted the chloride objectives for waterbodies in the Los Angeles region. The BPA did not adjust chloride objectives for the Santa Clara or Calleguas Creek watersheds, but laid out a process for adjusting the objectives in the future based on further study of the objectives necessary to protect the most sensitive beneficial use, agriculture supply. The BPA identified the following factors to be considered when evaluating potential revisions to the water quality objectives:

1. Chloride levels in supply waters (including fluctuations that may be due to future drought conditions).
2. Reasonable loading factors during beneficial use and treatment of supply waters and wastewaters.
3. Methods to control chloride loading.
4. Associated costs and effectiveness of various loading control measures.

The development of SSOs discussed in this report considers each of these factors.

COMPLIANCE MEASURE SCENARIOS SUMMARY

The current water quality objectives in the USCR are 100 mg/L implemented as an instantaneous maximum. To comply with the instantaneous 100 mg/L objective, the wastewater treatment facilities in the USCR (Valencia Water Reclamation Plant and Saugus Water Reclamation Plant) will need to be upgraded. This alternative includes installing sufficient advanced treatment (microfiltration and reverse osmosis) to ensure that the entire discharge volume (blend of advanced treated and tertiary treated) meets 100 mg/L at all times at both WRPs. Because it is more cost effective to construct and operate a single advanced treatment facility, this scenario would require the construction of a pump station and pipeline from the Valencia WRP to the Saugus WRP. Additionally, to reduce the amount of chloride in the discharge at the Valencia

and Saugus WRPs, these WRPs will be upgraded to utilize UV disinfection. This alternative is referred to throughout the report as Scenario 1.

The District developed an alternative compliance scenario that would only be feasible if SSOs are adopted. Similar to Scenario 1 discussed above, this option consists of constructing and operating an advanced treatment facility at the Valencia WRP consisting of microfiltration and reverse osmosis. However, to support the discharge of higher quality RO permeate water in reaches closer to beneficial uses that need to be protected, the effluent from this advanced treatment facility would be entirely discharged at the Valencia WRP's discharge location, instead of pumping part of it to Saugus WRP to meet 100 mg/L at both WRPs. Scenario 2 also differs from Scenario 1 in that the advanced treatment facility would not be designed to ensure that the entire discharge volume met 100 mg/L at all times. Instead, this alternative includes installing a smaller amount of advanced treatment, which would result in the flow-weighted 3-month average concentration of chloride from the combined Valencia and Saugus discharges meeting 100 mg/L. Concentrations in the discharges from Valencia would be lower than 100 mg/L as a 3-month average to ensure the flow-weighted average of the combined discharges from both WRPs will meet the objective. This option avoids the cost and potential environmental impacts of installing additional advanced treatment at the Valencia WRP. Upgrading the Valencia and Saugus WRPs to utilize UV disinfection will also be implemented as a part of this option. This alternative is referred to throughout the report as Scenario 2.

Scenario 2 is the proposed compliance option because it provides many benefits in comparison with the other options that have been identified. However, it will not result in compliance with the instantaneous 100 mg/L water quality objective at all times and in all locations for Reaches 4B, 5, and 6 of the USCR. As a result, conditional site-specific objectives are necessary to support implementation of Scenario 2, with the 150 mg/L site-specific objective that applies to the Saugus WRP discharge being conditioned on the Valencia WRP meeting a 100 mg/L flow-weighted wasteload allocation calculated based on the Saugus and Valencia WRP discharges.

SUMMARY OF PROPOSED SSOS

Table ES-1 summarizes the proposed surface water site-specific objectives and associated averaging periods to support Scenario 2.

Table ES- 1. Proposed Surface Water SSOs

Reach	Proposed Chloride Objective (mg/L)	Proposed Averaging Period
6	150	3-month rolling average
5 (Upstream of Valencia WRP)	150	3-month rolling average
5 (Downstream of Valencia WRP)	100	3-month rolling average
4B	100	3-month rolling average

TECHNICAL SUPPORT FOR THE PROPOSED SSOS

The technical analyses conducted to develop the proposed SSOs were based primarily on the protection of the agricultural (AGR) and groundwater recharge (GWR) beneficial uses. Consideration was given to protection of other beneficial uses that could be impacted by salt concentrations (aquatic life and municipal drinking water beneficial uses). However, in both cases, the salt concentrations necessary to protect the other beneficial uses are higher than the objectives required to protect the AGR and GWR beneficial uses in all reaches. As a result, the summary of the technical support for the proposed SSOs focuses on the analysis necessary to protect the AGR and GWR beneficial uses.

Reaches 5 and 6 Chloride Surface Water Objectives

For Reach 5 upstream of the Valencia WRP and Reach 6, the development of a chloride SSO is supported by findings that the use of surface water from Reaches 5 and 6 and groundwater that could be impacted by surface waters from Reaches 5 and 6 for irrigation of salt sensitive crops is not a past, present, or probable future use. As a result, from the point of view of beneficial use protection, chloride water quality objectives higher than the current 100 mg/L water quality objective for these reaches can be justified. Analysis and justification of the protection of beneficial uses by the proposed chloride water quality objectives in Reach 5 upstream of the Valencia WRP and Reach 6 is supported by the following findings:

- Salt sensitive agriculture is not a beneficial use in these reaches.
- The Threatened and Endangered Species (TES) Study demonstrated that the USEPA aquatic life criteria, which is higher than the proposed site-specific objectives, is protective of the species present in the Upper Santa Clara River.
- The GWR beneficial use is utilized to ensure groundwater quality is protected for other purposes. In this case, the objectives are being developed to ensure recharge of groundwater does not impact the use of the groundwater basin for agricultural uses. As a result, the proposed SSOs protect the GWR use as well.
- Downstream beneficial uses were considered in the analysis to ensure the SSOs were protective of downstream use. Reach 5 above Valencia WRP and Reach 6 are not immediately upstream of a reach where salt-sensitive crops exist and significant sources (Valencia WRP) that impact the quality of the receiving water exist between these reaches and the reaches where salt-sensitive agriculture occurs. As a result, higher objectives can be used in Reach 5 upstream of Valencia and Reach 6 and not result in an impact on downstream salt-sensitive reaches. Reach 5 downstream of Valencia WRP is immediately upstream of Reach 4B, a reach were salt sensitive agriculture does occur. As a result, discharges to Reach 5 below Valencia must ensure protection of downstream beneficial uses. To ensure this protection, the proposed SSO for Reach 5 below Valencia WRP is set equal to the proposed SSOs for Reach 4B.
- The updated GSWIM modeling results demonstrate that flow-weighted discharges designed to meet a 100 mg/L chloride objective with a 3-month rolling average period at the Valencia and Saugus WRPs would result in chloride concentrations less than 100 mg/L with a 3-month averaging period in the Santa Clara River near the Los Angeles-

Ventura County Line at Blue Cut gaging station (Blue Cut), which is within the range deemed protective by the LRE studies.

Reach 4B, 5, and 6 Averaging Period

The development of an averaging period for the chloride water quality objective applicable in Reaches 4B, 5 and 6 is supported by the results of the LRE study that evaluated objectives for areas with salt-sensitive agriculture. The development of an averaging period for the objectives also considers the factors identified in the Chloride Policy and the LRE averaging period study. Chloride concentrations between 100 mg/L and 117 mg/L with a three month averaging period were deemed to be protective of salt sensitive agriculture based on the LRE study and associated averaging period study. In studies cited in the LRE averaging period study, exposure periods of weeks to months at concentrations significantly higher than the LRE thresholds were necessary to see impacts to salt-sensitive agriculture. In addition, the following findings support the use of an averaging period:

- The updated Groundwater Surface-Water Interaction Model (GSWIM) modeling results show that peak chloride concentrations near the concentrations deemed hazardous to salt-sensitive crops will not occur
- Even where salt sensitive agriculture is a beneficial use, the literature review and evaluation (LRE) averaging period study, supports the application of an average concentration over a longer period as it found that exposure periods of 2 to 9 weeks at higher concentrations than 150 mg/L were necessary to see signs of visible impacts (Newfields, 2007).
- The updated GSWIM results show that there is much less variability during the future projection period as compared with the model calibration period (1975-2005).
- The influence that fluctuating chloride levels in the water supply have on the final effluent chloride concentrations at the Saugus and Valencia WRPs suggests that an averaging period is warranted given that the Chloride Policy identified consideration of chloride levels in supply waters (including fluctuations that may be due to future drought conditions) as a factor in evaluating revisions to chloride objectives.

REGULATORY ANALYSIS SUMMARY

Various regulatory analyses are required to support the adoption of the proposed site-specific objectives (SSOs). These analyses are intended to fulfill Basin Plan, statutory, and state and federal policy requirements in relation to site-specific objectives. Specifically, the analyses implement the requirements contained in Section 3 of the Basin Plan, Water Code Section 13241, and state and federal anti-degradation policies.

Basin Plan Requirements

The Basin Plan provides that several elements should be addressed to justify the need for an SSO. These elements and the results of the analyses for each are summarized below.

The current and achievable technology and technology-based limits to comply with existing WQOs:

A number of studies have demonstrated that compliance with the current instantaneous chloride objective of 100 mg/L at the point of discharge would require construction of a reverse osmosis facility treating a significant portion of the discharge of the Valencia WRP, a pump station, and a pipeline from the Valencia WRP to the Saugus WRP. Although the installation of reverse osmosis is an available technology, treating to allow full discharge at 100 mg/L from the two WRPs at all times would be significantly more costly than compliance with the proposed SSOs and would not be necessary to protect beneficial uses (See Section 2). Further, constructing a pump station and pipeline from the Valencia WRP to the Saugus WRP to comply at each WRP separately could have unintended environmental consequences. In addition, Scenario 1 would require more reverse osmosis filtration and thus would produce more brine waste which would need disposal via a pipeline and deep wells for injection. The environmental impacts of the construction of this brine disposal infrastructure are estimated to be greater due to the larger RO and the quantity of brine in need of disposal.

A thorough review of historical limits and compliance with these limits at facilities in the study reach:

The Saugus and Valencia WRP have been subject to a number of different chloride effluent limitations since the facilities began discharging to the Santa Clara River. The WRPs generally complied with the chloride limits during periods when permit-based or regional policy-based limits exceeded 100 mg/L. Policy-based limits such as the variable Drought Policy limit (which averaged around 148 mg/L) and the subsequent 190 mg/L limit adopted in Resolution 97-02 were imposed in recognition of the fact that statewide drought conditions made it unreasonably difficult for POTWs in Southern California to comply with the water quality based limitations. Both reclamation plants generally complied with their initial limits that depended on domestic supply chloride levels or 125 mg/L, whichever was greater. The WRPs also complied with subsequent permit-based limits that exceeded 100 mg/L and ranged from 175 mg/L to 250 mg/L. Despite the above observations, with limited exceptions, the discharged chloride concentrations from both WRPs have consistently exceeded the 100 mg/L water quality objective over the discharge period reviewed.

A detailed economic analysis of compliance with existing objectives

The costs necessary to implement an advanced treatment alternative were evaluated for compliance with instantaneous final effluent chloride limits of 100 mg/L for the Saugus and Valencia WRPs. Scenario 1 would involve constructing sufficient advanced treatment (microfiltration and reverse osmosis) to ensure that the entire discharge volume (blend of advanced treated and tertiary treated effluent) meets 100 mg/L at all times. Since it is more cost effective to construct and operate a single advanced treatment facility, this scenario would require the construction of a pump station and pipeline from the Valencia WRP to the Saugus WRP. Additionally, to reduce the amount of chloride in the discharge at the Valencia and Saugus WRPs, these WRPs will be upgraded to utilize UV disinfection.

Scenario 1 would require the construction of an 8.8 MGD MF/RO facility at the Valencia WRP, a RO product line to the Saugus WRP, and a brine disposal pipeline to a series of deep wells for injection disposal. The capital costs for constructing the facility at the Valencia WRP and the pipelines were estimated at $145,000,000. An additional $5,000,000 in annual costs would be needed to operate and maintain the advanced treatment and brine disposal systems.

A detailed economic analysis of compliance with the proposed objectives

The District prepared cost estimates for the key elements of Scenario 2. Table ES-2 shows the capital and O&M cost for each key element.

Table ES- 2. Summary of Project Capital and O&M Costs for Scenario 2

Scenario 2 Element	Capital Cost	Annual O&M
UV Disinfection Facility*	$30,000,000	$100,000
Advanced Treatment	$48,400,000	$3,170,000
Brine Disposal	$42,000,000	$900,000
TOTAL PROPOSED SCENARIO 2	**$120,400,000**	**$4,170,000**

*Both Scenarios would incorporate UV disinfection at both WRPs.

An analysis of compliance and consistency with all federal, state, and regional plans and policies:

This Basin Plan element was fulfilled by considering the above required Basin Plan elements, as well as the State Antidegradation Policy contained in State Water Resources Control Board Resolution 68-16 and the federal antidegradation requirements the state policy incorporates. The adoption of the proposed SSOs would be consistent with all relevant federal, state, and regional plans, and policies including antidegradation considerations.

Water Code Section 13241 Requirements

Water Code section 13241 requires the Regional Board to consider the following when establishing a water quality objective:

1. The past, present, and probable future beneficial uses of water
2. The environmental characteristics of the hydrographic unit under consideration,
3. Water quality conditions that could reasonably be achieved through the coordinated control of all factors which affect water quality in the area.
4. Economic considerations.
5. The need for developing housing within the region.
6. The need to develop and use recycled water.

Past, Present, and Probable Future Beneficial Uses of Water

The 1975 Basin Plan designated nine beneficial uses to the Santa Clara River including agricultural supply (AGR), industrial process supply (PROC), industrial service supply (IND), groundwater recharge (GWR), freshwater replenishment (FRSH), cold freshwater habitat (COLD), wildlife habitat (WILD), water contact recreation (REC-1) and non-contact water recreation (REC-2). The 1994 Basin Plan designated additional beneficial uses including municipal and domestic supply (MUN), migration of aquatic organisms (MIGR), warm freshwater habitat (WARM), wetland habitat (WET), and rare, threatened, and endangered species habitat (RARE).

The potential future beneficial uses of the surface waters in the USCR are likely to remain the same as existing uses with the exception of agriculture supply (AGR). The agricultural beneficial use of water has been determined to be the most sensitive use under the chloride TMDL and SSOs designed to protect this use will be protective of other uses in the waterbody.

As a result of land use changes in Reaches 5 and 6, the area currently used for agriculture is likely to decline over time. In Reach 4B, the agricultural area will likely remain constant.

The proposed SSOs and averaging periods for surface water within Reaches 5 and 6 are protective of the AGR beneficial use because surface waters and groundwater potentially impacted by these surface waters are not currently and have not historically been used as an irrigation supply for salt-sensitive crops. This situation is unlikely to change due to climatic conditions that impact the ability to grow salt sensitive crops and because the use of irrigation water for crops is anticipated to decline in Reaches 5 and 6 due to planned urban development.

The irrigation of salt-sensitive crops is a past, present, and probable future beneficial use of Reach 4B surface water. The proposed SSO and averaging periods in Reach 4B will be fully protective of salt-sensitive agricultural uses in the area.

The environmental characteristics of the hydrographic unit

The environmental characteristics of the USCR were considered, as well as the impact this rulemaking would have on in-stream and riparian species and habitat. The proposed SSOs, when implemented with Scenario 2, will result in reduced chloride discharges from the primary point sources in the USCR. The 100 mg/L chloride surface WQOs in Reaches 4B and 5 and the 150 mg/L chloride surface WQO in Reach 6 are more stringent than the effluent limitations that have applied to the Saugus and Valencia WRPs over a significant portion of their operating histories. In addition, the proposed SSOs are substantially below the existing USEPA aquatic life chloride criteria, which according to the Threatened and Endangered Species (TES) Study are protective of the most chloride-sensitive organisms for which data are available. Therefore, it is not expected that this rulemaking will result in any harm to in-stream or riparian species or habitat. Finally, consideration of the surface water/groundwater interaction and the impact on the groundwater recharge beneficial use demonstrated that the proposed SSOs are protective of the GWR beneficial use.

Water quality conditions that could reasonably be achieved through the coordinated control of all factors, which affect water quality in the area.

The Upper Santa Clara River Chloride TMDL identified the discharges from Saugus and Valencia WRPs as the primary sources of chloride to the Upper Santa Clara River. Chloride entering the treatment plants comes from two primary sources, the water supply and chloride added by residential, commercial and industrial users of the water. Brine from self-regenerating water softeners was identified as a specific source of chloride added by the residential, commercial and industrial users. In addition, infiltration and wastewater disinfection were identified as sources of chloride.

Source control measures for the various sources were evaluated to determine the conditions that could be achieved through coordinated control of all factors. SRWS control measures have been implemented in the watershed and include development of a ban on existing and future SRWS and a buy-back program to encourage removal of existing SRWS. UV disinfection was identified as a control measure for wastewater disinfection and is included in Scenario 2 for implementation along with end-of-pipe microfiltration/reverse osmosis treatment to remove the remaining chloride necessary to meet the proposed SSOs. Given the potential negative impacts of the additional RO, pipe, and associated pumping that would result from implementation of

Scenario 1 and the environmental and water resource benefits of Scenario 2, it is the preferred compliance measure for meeting the proposed SSOs.

The coordinated control of all factors in the manner described above will result in compliance with the proposed SSOs in this document. Therefore, the conditions that can be achieved by Scenario 2 and the SRWS controls are those that can be reasonably achieved.

Baseline Economic Considerations

Baseline economic conditions are summarized above in the Detailed Economic Analysis of Compliance with the Proposed Objectives section.

The Need to Develop Housing

The proposed water quality objectives would not restrict the development of housing near the reaches of the Santa Clara River affected by the proposed SSOs because they do not result in discharge requirements that affect housing or any economic costs related to housing development. Much of the development needs for housing in the Upper Santa Clara River watershed will be accommodated by the planned Newhall development which has its own treatment facility with a planned discharge limit of 100 mg/L.

The proposed water quality objectives and implementation of Scenario 2 supports housing development as it enables further water recycling and provides a greater quantity of recycled water to support housing as compared to Scenario 1. Additionally, adopting the proposed SSOs would result in lower connection fees than under Scenario 1.

The Need to Develop and Use Recycled Water

The proposed SSOs including their averaging periods will not cause any reduction in the amount of recycled water available for use in the Santa Clarita Valley and will support achieving the objectives of the Castaic Lake Water Agency's (CLWA) 2010 Urban Water Management Plan (UWMP). Additionally, the proposed SSOs are consistent with the secondary MCLs in Title 22 and will not result in chloride concentrations that exceed these levels. However, without the proposed SSOs, additional advanced treatment would be required, leading to the loss of up to 0.13 MGD of available recycled water supplies to brine disposal for deep well injection.

Antidegradation Policy

The adoption of the proposed SSOs would be consistent with the State's Antidegradation Policy as contained in State Water Resource Control Board Resolution 68-16, as well as the federal antidegradation policy it incorporates. When implemented with existing efforts to reduce chloride discharges from residences, the revised water quality objectives will be protective of all beneficial uses that apply to the affected waters. This assessment is based on the following findings:

- While the proposed SSOs allow for an increase in chloride loading and higher instream concentrations above existing water quality objectives, the increased loading will not adversely affect existing or probable beneficial uses of the Santa Clara River.
- The additional chloride loading and higher allowable instream concentrations resulting from the proposed SSOs are offset by important economic and social development gained

through the implementation of Scenario 2 projects as compared to Scenario 1 projects. These benefits include:

- Reduced costs and associated impacts from higher sewer rates.
- Reduced environmental impacts from the construction of additional RO capacity and the additional pump station and pipeline from the Valencia WRP to the Saugus WRP.
- Reduced energy use and greenhouse gas emissions, which will support reduction goals for greenhouse gases outlined in AB32.
- Providing additional water resources for recycled water and/or salt-sensitive agriculture and aquatic habitat through the reduction of water loss to brine waste and the discharge of high quality RO permeate in Reach 5, just upstream of salt-sensitive agriculture.

1 Introduction

1.1 BACKGROUND

The Santa Clarita Valley Sanitation District retained Larry Walker Associates (LWA) to develop technical analyses and an antidegradation analysis that the Los Angeles Regional Water Quality Control Board (Regional Board) may use to develop a Basin Plan Amendment for the consideration of site-specific objectives (SSOs) for chloride as part of the Upper Santa Clara River Chloride TMDL (USCR Chloride TMDL). In 2008, an analysis was prepared to meet the requirements of Task 7 and 8 of the USCR Chloride TMDL that resulted in the adoption of conditional site-specific objectives for reaches 4B, 5 and 6 of the Santa Clara River. Since the adoption of the conditional site-specific objectives, the selected project that necessitated those conditional site specific objectives was not implemented. Instead, SCVSD identified an alternative compliance option that would require new and different site-specific objectives. The purpose of this document is to provide the technical and regulatory basis for consideration of revised SSOs for surface water in Reaches 4B, 5 and 6 of the Santa Clara River based on the new information and compliance options.

The SSOs being developed are based on protection of beneficial uses, re-analysis of historic water quality information using updated tools (models), and analysis of the Porter Cologne Factors necessary to determine the appropriate water quality objective. The analysis of the appropriate water quality objectives for chloride requires the consideration of both technical data and regulatory factors to determine the objectives that meet the requirements of the Porter Cologne Water Quality Control Act. As such, the technical and regulatory factors are linked in this SSO analysis. Additionally, an antidegradation analysis was conducted to ensure the proposed SSOs are in compliance with both State and Federal antidegradation requirements. The following sections provide a summary of regulatory and technical background information that will be used throughout this report for the analysis.

1.1.1 Chloride Policy

In 1997, the Regional Board adopted Resolution No. 97-02, a Basin Plan Amendment (BPA) that adjusted the chloride objectives for waterbodies in the Los Angeles region. The BPA did not adjust chloride objectives for the Santa Clara River or Calleguas Creek watersheds, but laid out a process for adjusting the objectives in the future based on further study to determine the objectives necessary to protect the agricultural beneficial use. The BPA required a number of studies to be completed and based on the results of the studies "the Regional Board may reconsider revisions to water quality objectives for chloride in the Santa Clara River and Calleguas Creek watersheds" (LARWQCB, 1997). The revisions to the water quality objectives were required to be based on consideration of the following factors:

1. Chloride levels in supply waters (including fluctuations that may be due to future drought conditions).
2. Reasonable loading factors during beneficial use and treatment of supply waters and wastewaters.
3. Methods to control chloride loading.
4. Associated costs and effectiveness of various loading control measures.

The development of SSOs discussed in this report is in part based on the required considerations outlined in the Chloride Policy.

1.1.2 Current Water Quality Objectives

The current Basin Plan objectives for chloride for the USCR are shown in Table 1. Objectives with proposed SSOs discussed in this report are noted in bold.

Table 1. Surface Water Basin Plan Objectives[1]

Basin Plan Name	Reach	Chloride (mg/L)
Above Lang gauging station	8	50
Between Lang gauging station and Bouquet Canyon Road Bridge	7	100
Between Bouquet Canyon Road Bride and West Pier Hwy 99	6	**100**
Between West Pier Hwy 99 and Blue Cut gauging station	5	**100**
Between Blue Cut gauging station and Piru Creek	4B	**100**

1. No averaging period applies to any of the objectives.

1.1.3 Beneficial Uses

The USCR Chloride TMDL is based primarily on the protection of the agricultural beneficial use. In the Los Angeles Region Water Quality Control Plan (Basin Plan), the agricultural beneficial use is defined as follows:

> Uses of water for farming, horticulture, or ranching including, but not limited to, irrigation, stock watering, or support of vegetation for range grazing.

However, the range of activities protected under the agricultural beneficial use includes the cultivation of crops that are sensitive to the concentration of chloride in irrigation water and other agricultural activities that are not as sensitive to chloride concentrations. As a result, a distinction is made throughout this document between the protection of the cultivation of salt-sensitive agricultural crops and the remaining agricultural beneficial uses. For the purposes of this document and the discussion of site-specific objectives, salt sensitive agriculture is considered to be the cultivation of avocados, strawberries and nursery crops.

1.1.4 Technical Studies

As required in the Chloride TMDL implementation plan, three key technical studies were developed:

1. Chloride Threshold Study for Protection of Sensitive Agricultural Supply Use (TMDL Implementation Task Nos. 4 and 6)
2. Chloride Threshold Study for Protection of Endangered Species (TMDL Implementation Task No. 6)
3. Groundwater/Surface Water Interaction Model (TMDL Implementation Task No. 5)

The studies provide information that can be used to satisfy the study requirements in the Chloride Policy (evaluation of appropriate chloride standards for agriculture, sources of chloride, and loading from sources).

In addition to these three major studies, additional technical analyses have been completed to address specific questions or issues. The results of the three studies as well as other supporting technical efforts have been summarized in a number of technical reports and memorandums. The reports are summarized in Table 2 and included as appendices to this report.

Table 2. Chloride TMDL Study Reports Summary

Study	Reports and Tech Memos	Contents	Appendix #
Agricultural Chloride Threshold Study	Literature Review and Evaluation (LRE)[1]	Review of available literature on sensitivity of crops to chloride	1
	LRE Averaging Period technical memorandum[2]	Analysis of LRE studies to determine a potential averaging period for the water quality objective	1
	Comment Change Report for the LRE Averaging Period technical memorandum[3]	Response to comments on the LRE averaging period technical memorandum	1
	LRE AG TAP technical memorandum[4]	Summary of AG TAP review of LRE averaging period technical memorandum	1
Endangered Species Chloride Threshold Study	Chloride Water Quality Criteria Protectiveness of Upper Santa Clara River Threatened and Endangered Species[5] (TES)	Evaluation of USEPA aquatic life criteria for protection of threatened and endangered species in the USCR	2
	TES TAP Critical Review Report[6]	Independent technical review and evaluation of Endangered Species Chloride Threshold Study Report.	2
	Executive Summary and Addendum to Evaluation of Chloride Water Quality Criteria Protectiveness of Upper Santa Clara River Threatened and Endangered Species[7]	Response to comments and revisions based on TES TAP review.	2

[1] CH2M Hill, 2005. *Final Report: Literature Evaluation and Recommendations, Upper Santa Clara River Chloride TMDL Collaborative Process.* September 2005.

[2] NewFields Agricultural and Environmental Resource, 2007. *Technical Memorandum: Compliance Averaging Period for Chloride Threshold Guidelines in Avocado.* December 2007.

[3] NewFields Agricultural and Environmental Resources, 2008. *Comment Change Report for the DRAFT Technical Memorandum Compliance Averaging Period for Chloride Threshold Guidelines in Avocado*. June 2008.

[4] Moore Iacofano Goltsman, 2008. Memorandum: *Final Comments by the Co-Chairs of the Agricultural Chloride Threshold Study Technical Advisory Panel on the Technical Memorandum "Compliance Averaging Period for Chloride Threshold Guidelines in Avocado*. February 2008.

[5] Advent-Environ, 2007. *Evaluation of Chloride Water Quality Criteria Protectiveness of Upper Santa Clara River Aquatic Life: An Emphasis on Threatened and Endangered Species*. May 2007.

[6] Upper Santa Clara River Collaborative Process, 2007. *Threatened and Endangered Species Study – Technical Advisor Panel Critical Review Report*. November 2007.

[7] Advent-Environ, 2007. *Executive Summary and Addendum to Evaluation of Chloride Water Quality Criteria Protectiveness of Upper Santa Clara River Threatened and Endangered Species.* November 2007.

Study	Reports and Tech Memos	Contents	Appendix #
Groundwater/ Surface Water Interaction Model (GSWI)	Task 1A[8]	Summary of available information	3
	Task 2A[9]	Conceptual model development	4
	Task 2B-1[10,11]	Numerical model development, calibration and initial scenario modeling results	5
	Task 2B-2/Task 9[12]	Identification and evaluation of initial alternative compliance measures	6
Other Supporting Technical Documents	White Paper No. 2A[13]	Analysis of past, present and probable future salt sensitive agricultural beneficial uses in Reaches 5 and 6 of the USCR	7
	Technical Memos: Monitoring Wells in the Vicinity of Blue Cut[14]	Series of memos discussing the selection and installation of new alluvium monitoring wells in the Blue Cut area.	8

In addition to these documents that were included in the SSO analysis in 2008, further modeling using the Groundwater/Surface Water Interaction Model (GSWIM) has been done to evaluate new compliance options. Water supply concentrations were adjusted to simulate an extreme scenario where discharges from Saugus resulted in effluent chloride concentrations near the proposed site-specific objectives. Information and analysis from this additional modeling effort (updated GSWIM) are utilized in this report to generate simulated future waterbody conditions resulting from the implementation of the new compliance options.

The results of these special studies and other supporting technical documentation provide much of the technical information used to develop SSOs for the chloride TMDL. Short summaries of the key findings are presented in the text of this report, but the full reports located in the Appendices referenced above should be reviewed for a complete understanding of the technical findings of the documents.

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[8] CH2M Hill and HGL, 2006. *Literature Review and Data Acquisition - Task 1A-Evaluate Existing Models, Literature, and Data, Upper Santa Clara River Chloride TMDL Collaborative Process.* March 2006.

[9] CH2M Hill and HGL, 2006. *Task 2A-Conceptual Model Development East and Piru Subbasins, Upper Santa Clara River Chloride TMDL Collaborative Process*. October 2006.

[10] CH2M Hill and HGL, 2008. *Task 2B-1-Numerical Model Development and Scenario Results East and Piru Subbaasins, Upper Santa Clara River Chloride TMDL Collaborative Process*. February 2008.

[11] Geomatrix, 2008. *Supplement to Task 2B-1 – Numerical Model Development and Scenario Results, East and Piru Subbasins.* February 2008.

[12] Geomatrix, 2008. *Task 2B-2 Report-Assessment of Alternatives for Compliance Options Using the Groundwater/Surface Water Interaction Model, Upper Santa Clara River Chloride TMDL Collaborative Process*. June, 2008.

[13] Sanitation Districts of Los Angeles County, 2007. *Santa Clarita Valley Sanitation Districts, Upper Santa Clara River chloride TMDL. White Paper No. 2A Agricultural Beneficial Use Considerations Santa Clara River-Reaches 5 and 6.*

[14] Geomatrix, 2007. *Memorandum: Monitoring Wells in the Vicinity of Blue Cut.* Groundwater/Surface Water Interaction Modeling Subcommittee. August 16, 2007.

1.2 NEED FOR SITE-SPECIFIC OBJECTIVES

As discussed above, a variety of technical studies and regulatory analysis have been completed as required in the USCR Chloride TMDL Implementation Plan, and in accordance with the Chloride Policy 97-02. In addition to the technical studies (TMDL Implementation Task Nos., 4, 5 and 6), analysis of potential compliance measures (TMDL Implementation Task No. 9) has been conducted. Since the completion of those studies, additional evaluations have been conducted to identify preferred compliance measures and the potential impacts of those compliance measures. Based on the results of the technical, regulatory, and compliance measure analyses, a need to develop site-specific objectives has been identified to support preferred compliance measures with less impacts on the environment and incorporate technical information regarding the protection of beneficial uses.

Based on these analyses (as will be discussed further in Section 2 and 3) the following conclusions support the development of SSOs:

- Salt sensitive agriculture is not a past, present or probable beneficial use for some reaches of the USCR.
- Alternative compliance measures that result in benefits for the environment, water resources and agriculture, while protecting beneficial uses, require certain site-specific objectives to be feasible compliance measures.

Each of these conclusions support the development of site-specific objectives and are derived from the technical analyses that are discussed in more detail in the remaining sections of the document. However, though not a technical or regulatory justification, the consideration of an alternative compliance measure that requires certain site-specific objectives is the major impetus for developing the site-specific objectives. As such, a summary of the potential compliance measures is provided here.

The current water quality objectives in the USCR are 100 mg/L implemented as an instantaneous maximum. To comply with the instantaneous 100 mg/L objective, there is basically one alternative for upgrades to the wastewater treatment facilities in the USCR (Valencia Water Reclamation Plant and Saugus Water Reclamation Plant). This alternative includes installing sufficient advanced treatment (microfiltration and reverse osmosis) to ensure that the entire discharge volume (blend of advanced treated and tertiary treated effluent) meets 100 mg/L at all times. Since it is more cost effective to construct and operate a single advanced treatment facility, this scenario would require the construction of a pump station and pipeline from the Valencia WRP to the Saugus WRP. Additionally, to reduce the amount of chloride in the discharge at the Valencia and Saugus WRPs, these WRPs will be upgraded to utilize UV disinfection. This alternative is referred to throughout the report as Scenario 1.

The District developed an alternative compliance scenario that would require the adoption of SSOs to become feasible. This alternative is meant to comply with the current 100 mg/L numeric water quality objectives in Reaches 4B and 5 below Valencia WRP; however, instead of implementing the objectives instantaneously, the objectives would be implemented over an averaging period. Similar to the scenario discussed above, this scenario consists of constructing and operating an advanced treatment facility at the Valencia WRP using microfiltration and reverse osmosis. This option differs from Scenario 1 in that the advanced treatment facility would not be designed to ensure that the entire discharge volume met 100 mg/L at all times.

Instead, this alternative includes installing a smaller amount of advanced treatment, which would result in the flow-weighted 3-month average concentration of chloride from the Valencia and Saugus discharges meeting 100 mg/L. Concentrations in the discharges from Valencia would be lower than 100 mg/L on a 3 month average to ensure the flow-weighted average of discharges from both WRPs will meet the objective. To provide more water to reaches with the salt sensitive beneficial uses that need to be protected, the effluent from this advanced treatment facility could be entirely discharged at the Valencia WRP's discharge location instead of a portion being pumped to the Saugus WRP. This option also avoids the cost and potential environmental impacts of installing additional advanced treatment at the Valencia WRP, reduces the amount of brine generated from the advanced treatment, and could make more recycled water available for use. Upgrading the Valencia and Saugus WRPs to utilize UV disinfection will also be implemented as a part of this option. This alternative is referred to throughout the report as Scenario 2.

Scenario 2 provides benefits in comparison with the other compliance option and still provides full protection of beneficial uses. However, it will not result in compliance with the 100 mg/L water quality objectives at all times and in all locations for Reaches 4B, 5, and 6 of the USCR.

Table 3 shows the proposed SSO and averaging periods for Reaches 4B, 5, and 6 of the Santa Clara River based on the technical reports and Scenario 2 discussed above.

Table 3. Proposed Revisions to Surface Water WQOs

Reach	Current Instantaneous Chloride Objective (mg/L)	Proposed Chloride Objective (mg/L)	Averaging Period
6	100	150	3 month rolling average
5 (Upstream of Valencia WRP)	100	150	3 month rolling average
5 (Downstream of Valencia WRP)	100	100	3-month rolling average
4B	100	100	3-month rolling average

The remainder of the report provides the technical and regulatory analysis to support the proposed SSOs and averaging periods shown above.

2 Technical Analysis for Site-Specific Objectives

This section provides the technical analysis to support revisions to the surface water objectives in Reaches 4B, 5, and 6 of the USCR. The technical basis for the proposed SSOs varies by reach and includes a discussion of numeric changes to the objectives and the associated averaging periods. The analysis is organized in various sub-sections as follows:

2.1 Reaches 5 and 6 Numeric Surface Water Objectives

2.2 Reach 4B, 5 and 6 Surface Water Objectives Averaging Period

2.3 Summary of Proposed SSOs and Averaging Periods

2.4 Comparison of Historical and Projected Water Quality with Existing WQOs and Proposed SSOs and Averaging Periods in Reach 4B, 5, and 6.

Within each sub-section, a brief summary of the rationale for developing an SSO for the reach is followed by a discussion of the analysis process, the analysis conducted, alternatives considered, and the recommended alternative.

2.1 REACHES 5 AND 6 NUMERIC SURFACE WATER OBJECTIVES

The compliance alternative identified (Scenario 2) requires surface water quality objective changes between the Saugus and Valencia WRPs (Reach 5 above Valencia WRP and Reach 6) that would allow Saugus WRP to discharge effluent without RO treatment. Considering projected climate and State Water Project chloride levels, a water quality of objective of 150 mg/L is needed. Given this consideration, the following sub sections consider the protectiveness of this number in the context of local beneficial uses.

2.1.1 Salt Sensitive Agriculture Beneficial Uses in Reach 5 and 6

As mentioned above, the USCR Chloride TMDL is based primarily on the protection of the agricultural beneficial use. In particular, salt sensitive crops that are present in the Santa Clara watershed require especially low levels of chloride in order to be fully protected. The LRE study concluded that a range of chloride concentrations between 100 mg/L to 117 mg/L is appropriate for salt-sensitive crops; therefore, the current basin plan water quality objectives of 100mg/L are protective of these uses.

However, as part of the technical analysis in support of the 2008 SSOs, the District developed a white paper on the presence of historic, current, and probable future salt-sensitive agriculture in Reaches 5 and 6 of the USCR. The White Paper No. 2A is included as Appendix 7. The information in the White Paper finds that the use of surface water from Reaches 5 and 6 or groundwater that could be impacted by surface waters from Reaches 5 and 6 for irrigation of salt sensitive crops is not a past, present, or probable future use. This finding is based on the following:

- No surface water diversions have taken place or are taking place in these reaches.
- No claims of riparian water rights by riparian landowners have been made in these reaches.
- Of the seven riparian landowners within the reaches, only Newhall Land and Farm conducts agricultural operations. This company does not, however, irrigate salt-sensitive crops with surface water or groundwater within Reaches 5 and 6.

- None of the current riparian landowners will be irrigating salt-sensitive crops in the future with surface water from the Santa Clara River.
- Land use records reflect the continued transition from agricultural to residential/urban uses in the riparian land within Reaches 5 and 6.
- There are no landowners who cultivate salt-sensitive crops irrigated with groundwater that could be impacted by surface water from Reaches 5 and 6.

Based on this information, within Reaches 5 and 6 of the USCR, salt-sensitive crops are not an existing AGR beneficial use and are not likely to be a potential AGR beneficial use. Based on this finding, a water quality objective higher than the current Basin Plan chloride objective of 100 mg/L could still be protective of the non-salt sensitive AGR uses present in Reaches 5 and 6.

2.1.2 Threatened and Endangered Species (TES) Study

The TES study found that the existing USEPA aquatic life chloride criteria are protective of threatened and endangered species in the Santa Clara River. Following is an excerpt from the executive summary discussing the results of the evaluation.

> "Comparison of toxicity data used in the development of the 1988 Ambient Water Quality Criteria (AWQC) for chloride and more recent data generated after 1988 found that the USEPA acute and chronic chloride criteria (860 mg/L and 230 mg/L, respectively) are protective of the most chloride-sensitive organisms for which data are available, including a highly chloride- sensitive species (*Ceriodaphnia dubia*) for which data were not available in 1988. Toxicity data using surrogate amphibian genera (*Bufo americanus*, *Rana clamitans*, *R. pipiens*, and chorus frog tadpoles *Pseudachris triseriata*) and a surrogate fish species (threespine stickleback, *Gasterosteus aculeatus*) for T&E species identified in the USCR watershed indicated that they are not particularly sensitive to chloride, and the 1988 USEPA AWQC for chloride would be protective of them as well. Comparisons of literature-reported toxicity data for other T&E species to that of conventionally-tested organisms for other water quality constituents indicated that T&E species are not generally more sensitive than the conventionally-tested organisms (which are the basis for all AWQC derivations)." (Advent-Environ, 2007, Appendix 2)

In conclusion, the existing aquatic life criteria of 230 mg/L as a four-day average and 860 mg/L as a one-hour average are protective of the TES of the Santa Clara River. These thresholds are significantly higher than the potential 150mg/L threshold considered for Scenario 2.

2.1.3 Surface Water Impacts on GWR Beneficial Use

In addition to the regulatory approaches, consideration of the impacts of surface water recharge on groundwater basins was evaluated. Given that salt-sensitive agriculture is not a past, present or probable future use of the surface water, the focus shifts to ensuring that the Groundwater Recharge beneficial use of surface water is protected. In this section, flow information was reviewed to determine if groundwater recharge is occurring in Reaches 5 and 6.

Results from the GSWIM provide insight into the flow characteristics of the Upper Santa Clara River. "Reach 6 of the SCR to near the beginning of Reach 5 marks a transition from losing to gaining stream conditions. Reach 5 is predominantly gaining. Groundwater discharge to the SCR increases in a westerly direction along Reaches 6 and 5 as the SCR channel decreases in elevation

and intersects the groundwater table. So, stream infiltration in the SCR decreases in a westerly direction along Reaches 6 and 5" (CH2M Hill email, 2008).

A USGS Study also demonstrated that Reach 5 was a gaining reach. Tracer and flow studies conducted in 1999 and 2000 showed that the Santa Clara River was gaining groundwater from upstream of the Valencia WRP discharge to approximately the Blue Cut gauging station (USGS, 2003). Discussion in the 1993 DWR report also states that the Santa Clara River has rising groundwater from Old Road Bridge to Blue Cut (DWR, 1993).

Since groundwater recharge is occurring in the Upper Santa Clara River, consideration of protection of the GWR beneficial use is needed. The GWR beneficial use is utilized to ensure groundwater quality is protected for other purposes. In this case, the objectives are being developed to ensure recharge of groundwater does not impact the use of the groundwater basin for agricultural uses or municipal drinking water beneficial uses. Compliance with the secondary maximum contaminant level for chloride is measured using an annual average and the objective of 250 mg/L is much higher than the value needed to protect agriculture. As a result, the proposed surface water objectives in Reaches 5 and 6 will be protective of the GWR beneficial use as well.

2.1.4 Reaches 5 and 6 Surface Water Chloride SSO Alternatives and Recommendations

Following these considerations, two alternatives were considered as site-specific objectives for Reaches 5 above Valencia WRP and Reach 6 of the Santa Clara River:

1. Maintain 100 mg/L.
2. Use 150 mg/L as the SSO to allow for the implementation of Scenario 2.

Alternative 1 was not selected because it was considered to be overly conservative for reaches that do not contain salt-sensitive crops. The LRE study provided a range of chloride guidelines that were appropriate for salt-sensitive crops (100 mg/L to 117 mg/L) and utilizing the low end of the range for a reach where salt-sensitive crops do not currently exist and are not likely to exist in the future, and that is not immediately upstream of such a reach, is considered to be overly conservative.

Alternative 2 is the proposed alternative based on consideration of the uses within Reaches 5 and 6 of the Santa Clara River. A chloride objective of 150 mg/L for Reach 5 above Valencia WRP and Reach 6 is consistent with the water quality objectives for the Santa Clara River Reach 2 and the Calleguas Creek watershed above Potrero Road. Both of these areas have designated agricultural beneficial uses and a variety of crops are grown. The crop types grown in Reach 2 (strawberries, row crops, and citrus) as well as in the Calleguas Creek watershed (avocados, citrus, strawberries, row crops, nurseries) cover the types of crops that are present in Reaches 5 and 6. Although information about the irrigation practices in Santa Clara River Reach 2 is not available, in the Calleguas Creek watershed, growers do not generally use surface water from the Calleguas Creek watershed to irrigate their crops. The primary water supply sources for agriculture in the Calleguas Creek watershed are similar to Reaches 5 and 6 of the USCR (local groundwater, imported water, and reclaimed wastewater). Additionally, an objective of 150 mg/L will support the implementation of Scenario 2. As a result, higher quality RO permeate will be discharged to water in reaches closer to beneficial uses that need to be protected. Discharging higher quality RO permeate water in Reach 6 will not have as great a benefit for Reach 4B due to surface water incidentally recharging groundwater underlying Reach 6. Finally, 150 mg/L is

consistent with guidance used throughout California for protection of the AGR beneficial use (and lower than the values used for some regions) and is within the agricultural guidelines outlined in the Los Angeles Basin Plan. Based on the analysis that salt sensitive agricultural is not present in Reaches 5 and 6, the application of 150 mg/L as an objective to protect agricultural beneficial uses with similar crop types and water supplies, and the ability of the objectives to support more beneficial compliance options, 150 mg/L is the recommended alternative for Reaches 5 above Valencia WRP and Reach 6. Although an objective of 150 mg/L is the proposed alternative for both Reach 6 and a small portion of Reach 5 upstream of Valencia WRP, consideration of the impact of that objective on downstream uses is needed. Reach 6 and Reach 5 upstream of Valencia WRP are not immediately upstream of a reach where salt-sensitive crops exist. Additionally, significant sources (Valencia WRP) that impact the quality of the receiving water exist between the upper portion of Reach 5 and Reach 6 and the reaches where salt-sensitive agriculture occurs. As a result, discharges to Reach 5 upstream of Valencia WRP and Reach 6 can occur at 150 mg/L and not result in an impact on downstream salt-sensitive reaches. Reach 5 below Valencia WRP is immediately upstream of Reach 4B, a reach were salt sensitive agriculture does occur. As a result, discharges to Reach 5 downstream of Valencia WRP must ensure protection of downstream beneficial uses. To ensure this protection, the water quality objectives for Reach 5 downstream of the Valencia WRP remain equal to the current basin plan water quality objective of 100mg/L. Given that Reach 5 downstream of the Valencia WRP is immediately upstream of Reach 4B, where the irrigation of salt-sensitive crops is an existing beneficial use, chloride objectives of 100 mg/L ensure that the irrigation of salt-sensitive crops beneficial use of Reach 4B surface water is protected. The 100 mg/L objective will also be maintained in Reach 4B.

2.2 REACHES 4B, 5 AND 6 SURFACE WATER OBJECTIVES AVERAGING PERIOD

The literature review and evaluation (LRE) averaging period study found that exposure periods of 2 to 9 weeks at higher concentrations than 150 mg/L were necessary to see signs of visible impacts on salt sensitive crops (Newfields, 2007). Thus the technical advisory group recommended the use of a 3-month averaging period instead of an instantaneous limit. As demonstrated in the previous section, salt sensitive agriculture is not a beneficial use in Reaches 5 and 6, and even though it is present in Reach 4B, the LRE findings show that the use of an averaging period may be appropriate.

Based on this information, consideration of the appropriate averaging period for the Reach 4B, 5 and 6 SSO was evaluated. The evaluation considered:

1. Historical and current regulatory approaches to determining averaging periods to protect AGR and GWR beneficial uses.
2. The averaging periods necessary to protect salt sensitive agriculture as outlined in the LRE averaging period study and the impacts of projected future variability on the LRE averaging period analysis.
3. The appropriate GWR averaging period.

Each of these analyses is discussed in detail in the following sub-sections.

2.2.1 LRE Averaging Period Studies

As a supplement to the LRE, an averaging period analysis memorandum was prepared (Newfields, 2007). As part of the analysis, relevant information from the LRE and the responses to the Agricultural Technical Advisory Panel's (AGTAP) supplemental request were reviewed to determine what factors should influence a compliance averaging period for chloride. In studies cited in this analysis, exposure periods of weeks to months at concentrations significantly higher than the LRE thresholds were necessary to see impacts to salt-sensitive agriculture. According to the AGTAP responses, the compliance averaging period should be as short as possible, but the degree of variability in chloride concentration could be considered in determining the averaging period. Based on the relevant literature in the LRE, a number of findings were identified.

- The period to injury ranged from 2 weeks to 9 weeks, but the concentrations used in the study were generally higher than the avocado threshold from the LRE.
- Injury due to chloride continued past the point of initial exposure.
- Short, intense periods of stress have been shown to affect growth; therefore the compliance period needs to be short enough to represent the fluctuations of Cl concentrations in the waters, and not entirely average out the fluctuations.

Based on these findings, the historic variability of the receiving water data (2000-2006) was examined and was used in combination to the literature findings to identify the recommended averaging period. Ultimately, a three-month averaging period was recommended for Cl in the Upper Santa Clara River.

Since the LRE averaging period analysis considered both literature and historic variability in chloride concentrations, impacts from the implementation of the proposed scenarios was considered for impacts on the variability assumptions included in the LRE study. Implementation of Scenario 2 will result in more consistent concentrations being discharged from the major source of water to Reach 4B, the Valencia WRP, because the impact of the variability seen in historical water supply concentrations will be dampened due to the reliability of advanced treatment processes. As a result, the variability can be expected to be reduced (in addition to the mean). Figure 1 compares the amount of variability in the 3-month average of the GSWIM calibration period simulation results at the Reach 4B Blue Cut monitoring station with the amount of variability in the 3-month average of Scenario 2 GSWIM scenario results for the future projection period at this same station.

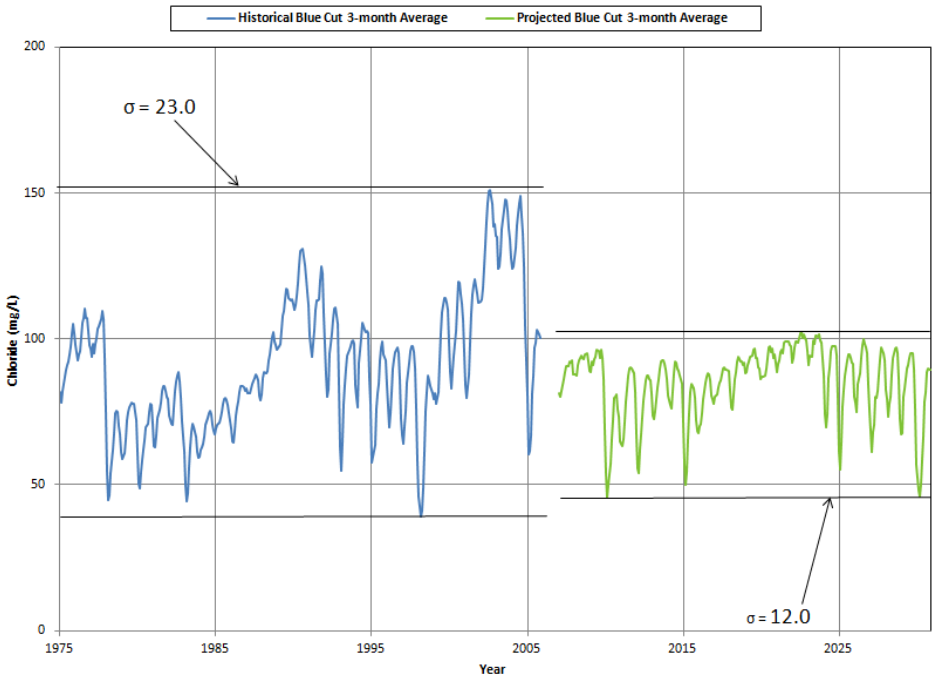

Figure 1. Three-month Average of GSWIM Calibration Simulation Results and Scenario 2 GSWIM Simulation Projected Chloride Concentrations at Blue Cut and Associated Standard Deviations.

Figure 1 illustrates that there is less variability in Scenario 2 GSWIM Simulation results during the future projection period as compared with the model calibration period. The standard deviation for the 3-month average future projection period data is less than the standard deviation for the 3-month average model calibration period data by a factor of almost two. Also, Figure 1 shows that the maximum of the 3-month average future projection period data is near the most conservative end of the range of values that the LRE study deemed protective of the salt-sensitive agricultural beneficial use and does not approach the upper range of these values. As discussed above, variation within the range of values that the LRE study deemed protective of the salt-sensitive agricultural beneficial use is not a concern and an averaging period can be considered.

2.2.2 GWR Averaging Period

To evaluate the impact of an averaging period on the GWR beneficial use, an analysis of the flow results from the model was used to assess the typical flow conditions in the stream. Between the Old Road Bridge and Blue Cut, the modeled flow indicates a general increase in flows in the reach. For greater than 99% of the modeled period, the flows at Blue Cut were greater than the flows downstream of the Valencia WRP. As such, this reach can be considered to be a gaining reach and the groundwater recharged by overlying surface water is minimal. Hence, an averaging period for Reach 5 is not expected to impact the GWR beneficial use in this reach because there is minimal recharge occurring. Considering the finding that salt sensitive agriculture is also not a past, present or future use in this reach, any averaging period would be considered protective of beneficial uses and could be used for Reach 5.

The flow analysis for Reach 6 indicates that this reach is transitioning from a losing to a gaining reach. Depending on the height of the water table, incidental groundwater recharge from surface water may occur in this reach. A comparison of the modeled flows from the Saugus WRP to the gauging station at Old Road Bridge for model calibration period (1975-2005) shows that for 21% of the modeled period, the flows at Old Road Bridge are less than the flows at the Saugus WRP. The flow loss was up to 3.3 cfs on one occasion, but the remainder of the time was below 2.5 cfs. The average flow loss was 1.2 cfs. Incidental groundwater recharge appears to occur during some periods in this reach. As a result, alternatives for averaging period in Reach 6 discussed in Section 2.2.3 will consider the groundwater recharge beneficial uses for this reach.

2.2.3 Reaches 4B, 5 and 6 Chloride Surface Water SSO Averaging Period Alternatives and Recommended Averaging Periods

Two alternatives were considered as averaging periods for the chloride surface water objectives for Reaches 4B, 5 and 6 of the Santa Clara River:

1. Maintain current instantaneous averaging period.
2. Use a 3 month rolling average period

Based on the evaluation presented above, Alternative 1 was not selected as the preferred alternative. As discussed in the rationale for developing an averaging period, instantaneous objectives are not necessary to protect beneficial uses in Reaches 4B, 5 and 6. Additionally, this alternative would require Scenario 1 to be implemented. The Scenario 1 option requires the construction of additional RO capacity at the Valencia WRP. The additional RO capacity will result in more energy use, GHG production, an additional cost of compliance without a corresponding beneficial use benefit, and less flow being available to be discharged to the river.

Alternative 2 is the preferred alternative. While an annual average would likely be protective of beneficial uses in Reaches 5 and 6, it would not be protective of beneficial uses in Reach 4B. As a result, a 3 month rolling average was selected as the preferred alternative for Reaches 4B, 5 and 6. In studies cited in the LRE averaging period analysis, exposure periods of weeks to months at concentrations significantly higher than the LRE thresholds were necessary to see impacts to salt-sensitive agriculture. Additionally, the updated GSWIM modeling results show that peak chloride concentrations near the concentrations deemed hazardous to salt-sensitive crops will not occur. The modeling results also demonstrate that discharges designed to meet a 100 mg/L chloride objective with a 3 month rolling average period at Blue Cut would result in chloride concentrations less than 100 mg/L with a 3-month averaging period at Blue Cut, which is well within the range deemed protective by the LRE studies. The selection of this objective is also protective of downstream beneficial uses. Using 100 mg/L is consistent with the downstream objectives. Additionally, between Reach 4B and 4A, two significant features are present that influence the quality of receiving water in the downstream reaches; the dry gap and Piru Creek.

2.3 SUMMARY OF PROPOSED SSOS AND AVERAGING PERIODS

Table 4 summarizes the proposed surface water objectives and averaging periods resulting from the analysis provided in the previous sections.

Table 4. Proposed Surface Water SSOs

Reach	Proposed Chloride Objective (mg/L)	Proposed Averaging Period
6	150	3 month rolling average
5 (Upstream of Valencia WRP)	150	3 month rolling average
5 (Downstream of Valencia WRP)	100	3 month rolling average
4B	100	3 month rolling average

2.4 COMPARISON OF HISTORICAL AND PROJECTED WATER QUALITY WITH EXISTING WQOS AND PROPOSED SSOS AND AVERAGING PERIODS IN REACH 4B, 5 AND 6

2.4.1 Comparison of Historic Water Quality with Existing WQOs and Proposed SSOs and Averaging Periods

Historical (1975-2005) chloride concentrations for surface water were compared with the existing WQOs and proposed SSOs for Reaches 4B,5, and 6 to ensure that the proposed SSOs and averaging periods are consistent with observed concentrations. Receiving water data are limited for the analysis with only the Blue Cut monitoring station having a sufficient amount of data from before 2000 to use in the comparison. As a result, simulation results from the GSWIM calibration were used to represent the historical chloride concentrations in this analysis. Based on GSWIM calibration results, an estimate of the percentage of time that the water quality has exceeded the proposed SSOs for the periods 1975 -2005 (GSWIM calibration period) was developed. Table 5 summarizes the estimated percentage of time that the existing and proposed numeric chloride objectives for Reaches 5 and 6 have been exceeded based on the model calibration results (1975-2005) period.

Table 5. Summary of Exceedances of Water Quality Objectives in Reaches 4B, 5 and 6 (1975-2005)

Reach	Location	Percent exceedance Instantaneous 100 mg/L	Percent exceedance 100 mg/L as 3-month Average	Percent exceedance 150 mg/L as 3-month Average
6	Downstream Saugus (RB)	79%	N/A	16%
5	Upstream Valencia (RC)	28%	N/A	0%
5	Downstream Valencia (RD)	56%	54%	N/A
5	Near Castaic (RE)	42%	40%	N/A
4B	Blue Cut	35%	34%	N/A
4B	RF	35%	34%	N/A

Figure 2 through Figure 6 show the GSWIM calibration period output over time for the receiving water stations identified in Table 5. Figure 2 compares the daily GSWIM calibration period output for all stations in Reaches 5 and 6 to the existing water quality objective of 100 mg/L implemented as an instantaneous maximum. Figure 3 compares the 3 month rolling average of GSWIM calibration period output for Reach 5 upstream of Valencia WRP and Reach 6 with the proposed SSO for these reaches. Figure 4 compares the 3-month average of GSWIM calibration period output for Reach 5 downstream of the Valencia WRP with the proposed 3-month average SSO for this reach. Figure 5 shows the instantaneous GSWIM calibration output for Reach 4B. Figure 6 shows the 3 month average of the GSWIM calibration output over time for Reach 4B.

The figures include highlighted lines to show how historical chloride concentrations compare with the existing chloride objective and the proposed SSO.

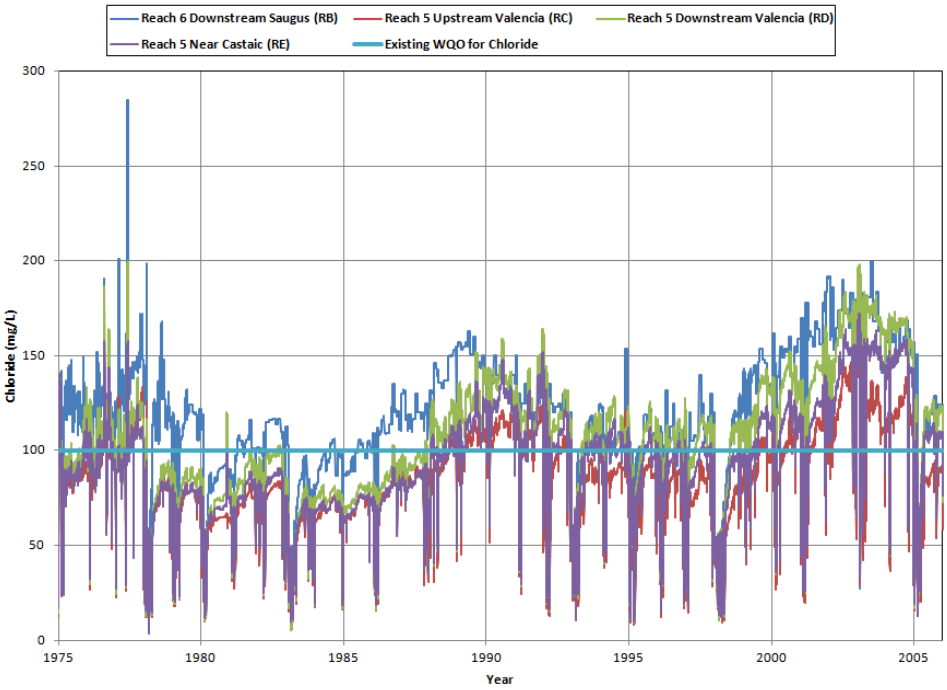

Figure 2. Instantaneous GSWIM Calibration Simulation Chloride Concentrations in Reaches 5 and 6 Compared With the Existing Water Quality Objective.

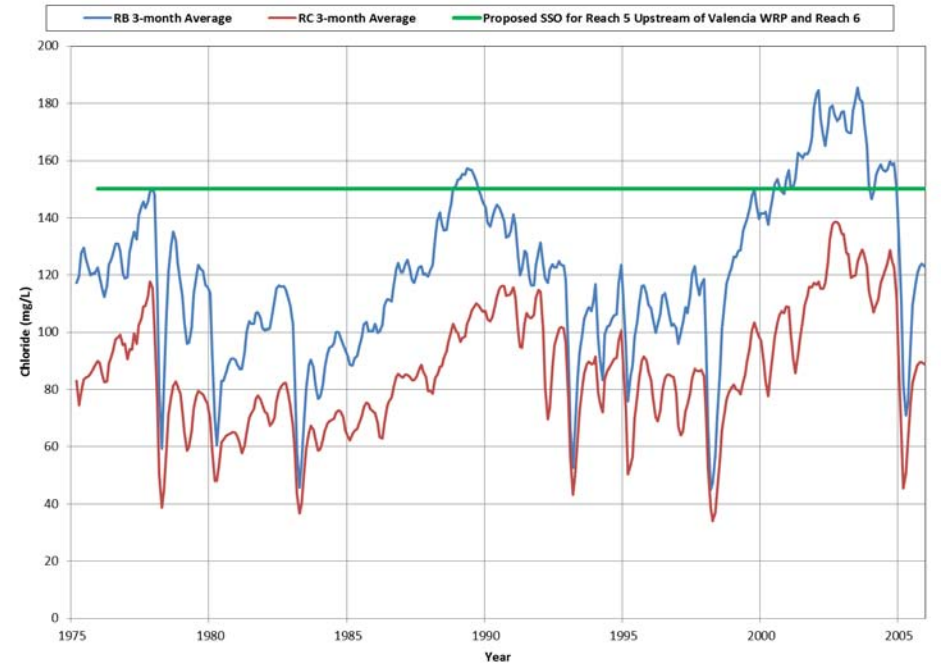

Figure 3. Three Month Average of GSWIM Calibration Simulation Chloride Concentrations in Reach 5 Upstream of Valencia WRP and Reach 6 Compared With the Proposed SSO for These Reaches.

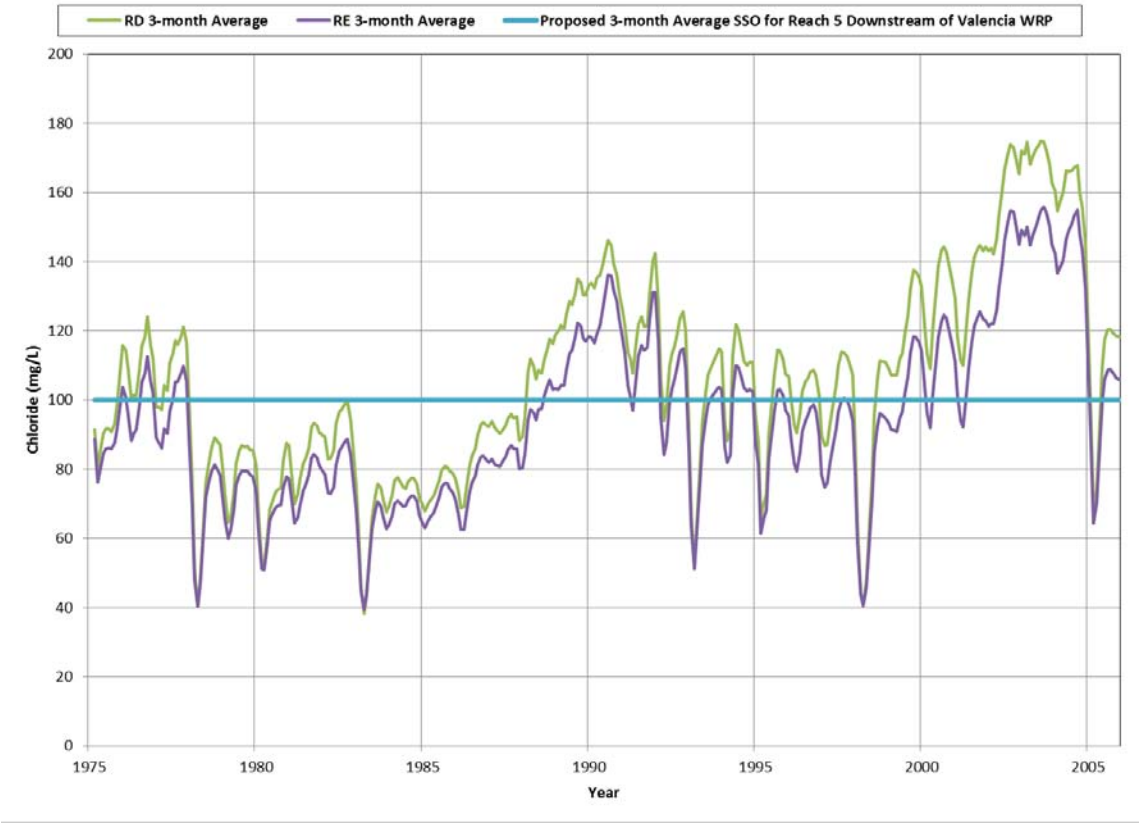

Figure 4. Three Month Average of GSWIM Calibration Simulation Chloride Concentrations in Reach 5 Downstream of Valencia WRP Compared With the Proposed Three Month Average SSO for This Reach.

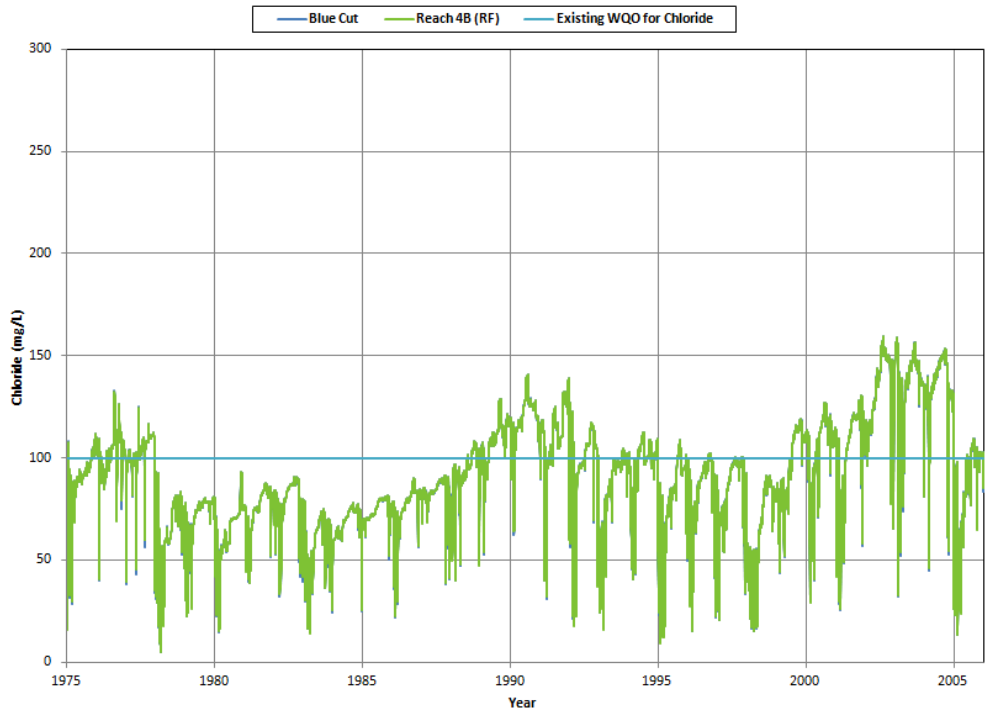

Figure 5. Instantaneous GSWIM Calibration Simulation Chloride Concentrations in Reach 4B Compared With the Existing Water Quality Objective.

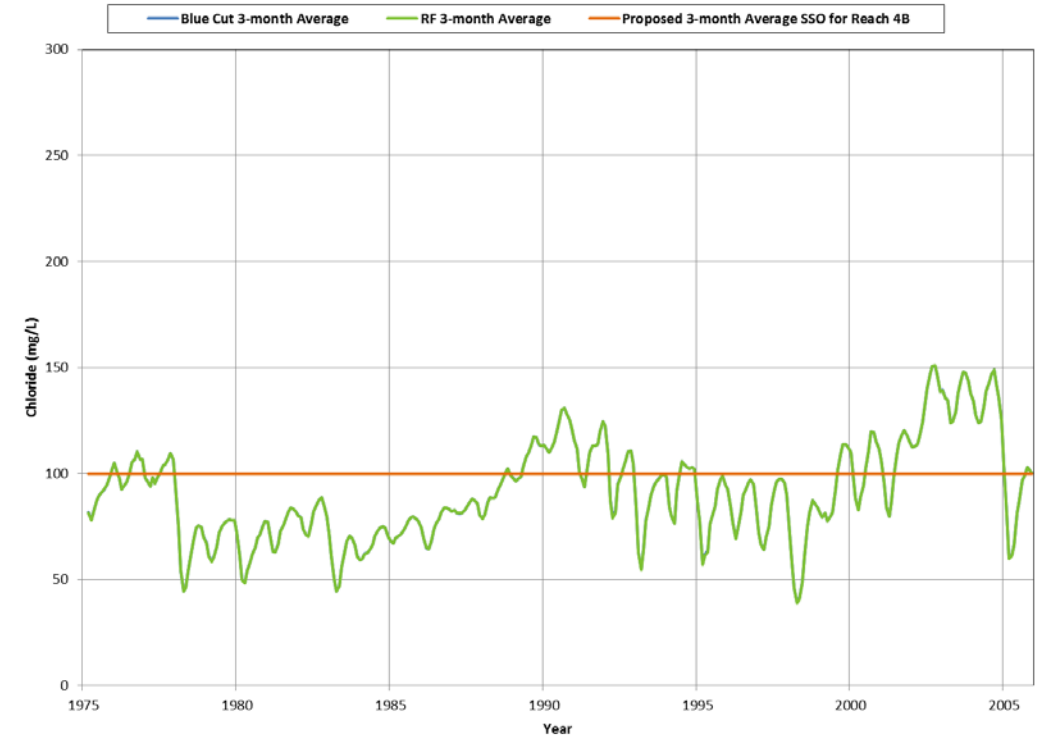

Figure 6. Three-month Average of GSWIM Calibration Simulation Chloride Concentrations in Reach 4B Compared With the Proposed Three-month Average SSO for This Reach.

In conclusion, the analysis shows that the 100 mg/L water quality objective has been exceeded historically, especially during dry and critically dry periods. Additionally, there are periods in the more recent historical record (e.g., in 2003 time period), where chloride concentrations in the receiving waters in Reach 6 have exceeded the proposed SSO of 150 mg/L for Reach 6. Historical exceedances in the Reaches were also influenced by the use of water softeners and development within the watershed. Additionally, as shown in Section 3.1.2, the effluent water quality from Valencia and Saugus WRPs has exceeded 150 mg/L on numerous occasions historically. It should be noted that source control measures for SRWS have been developed and implemented in the watershed, which have improved effluent water quality and decreased effluent chloride concentrations. As a result, compliance with the proposed 100 mg/L 3-month rolling average SSO for Reach 5 downstream of the Valencia WRP discharge and Reach 4B and 150 mg/L 3 month rolling average SSO in Reach 6 and Reach 5 upstream of the Valencia WRP discharge will require actions to reduce chloride discharges (as discussed in the description of Scenario 2).

2.4.2 Comparison of Projected Water Quality with Existing WQOs and Proposed SSOs and Averaging Periods

Projected chloride concentrations from Scenario 2 over the 24-year GSWIM simulation period were compared with the existing WQOs and proposed SSOs for Reaches 4B, 5, and 6 to ensure that the proposed SSOs are consistent with the projected receiving water concentrations resulting from the planned implementation projects. Based on results from the Scenario 2 GSWIM simulation, an estimate of the percentage of time that the water quality will exceed the proposed SSOs for the 24-year GSWIM simulation period was developed. Table 6 summarizes the estimated percentage of time that the existing chloride objectives will be exceeded based on the future projection period and shows that the proposed SSOs for Reaches 5 and 6 are not projected to be exceeded. The projected water quality is based on simulated chloride concentrations based on Scenario 2.

Table 6. Summary of Expected Exceedances of Water Quality Objectives in Reaches 5 and 6 during the 24-year GSWIM Simulation Period After Scenario 2 Has Been Implemented

Reach	Location	Percent exceedance Instantaneous 100 mg/L	Percent exceedance 100 mg/L as 3-month Average	Percent exceedance 150 mg/L as 3-month Average
6	Downstream Saugus (RB)	38%	N/A	0%
5	Upstream Valencia (RC)	22%	N/A	0%
5	Downstream Valencia (RD)	0.4%	0%	N/A
5	Near Castaic (RE)	0.3%	0%	N/A
4B	Blue Cut	0.4%	0%	N/A
4B	RF	0.4%	0%	N/A

Figure 7 through Figure 11 show the Scenario 2 GSWIM simulation results over time for the receiving water stations identified in Table 6. For all of these figures, the Scenario 2 GSWIM simulation results reflect the conditions that would exist after Scenario 2 has been implemented. Figure 7 compares the daily Scenario 2 GSWIM simulation results for all stations in Reaches 5 and 6 to the existing water quality objective of 100 mg/L implemented as an instantaneous maximum. Figure 8 compares the 3 month rolling average of the Scenario 2 GSWIM simulation results for Reach 5 upstream of Valencia WRP and Reach 6 with the proposed SSO for these

reaches. Figure 9 compares the 3 month average of the Scenario 2 GSWIM simulation results for Reach 5 downstream of the Valencia WRP with the proposed 3-month average SSO for this reach. Figures 10 and 11 show the Scenario 2 GSWIM simulation results over time for the receiving water stations in Reach 4B. The figures include highlighted lines to show how model projections compare with the existing WQO of 100 mg/L implemented as an instantaneous maximum, and the proposed 3-month average SSO for this reach.

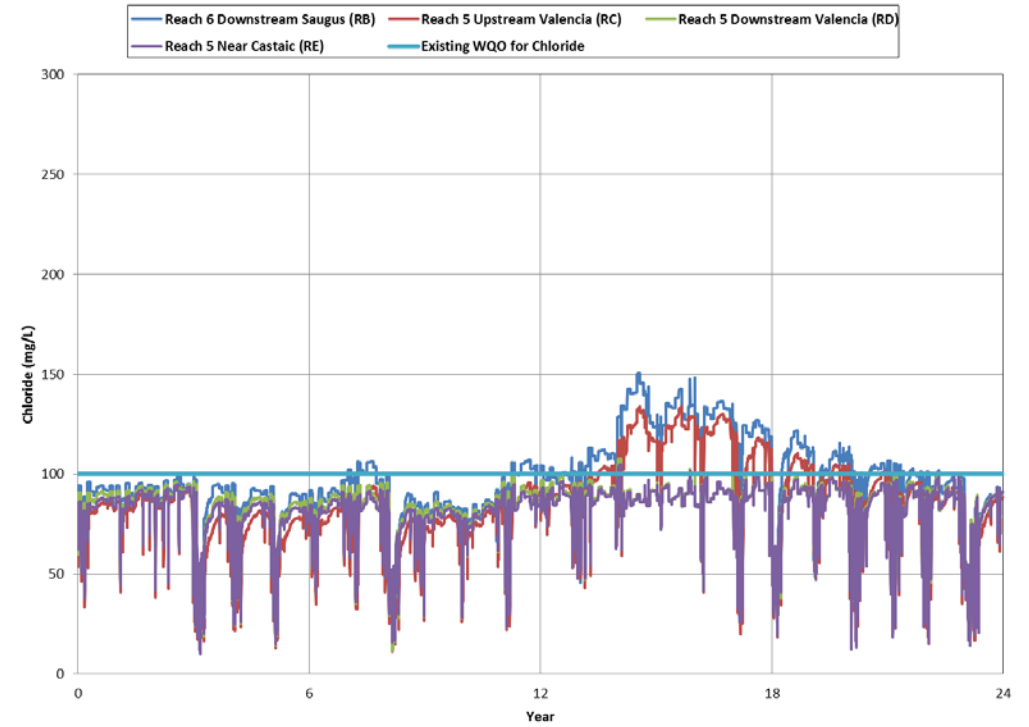

Figure 7. Scenario 2 GSWIM Scenario Projected Instantaneous Chloride Concentrations in Reaches 5 and 6 Compared With the Existing Water Quality Objective.

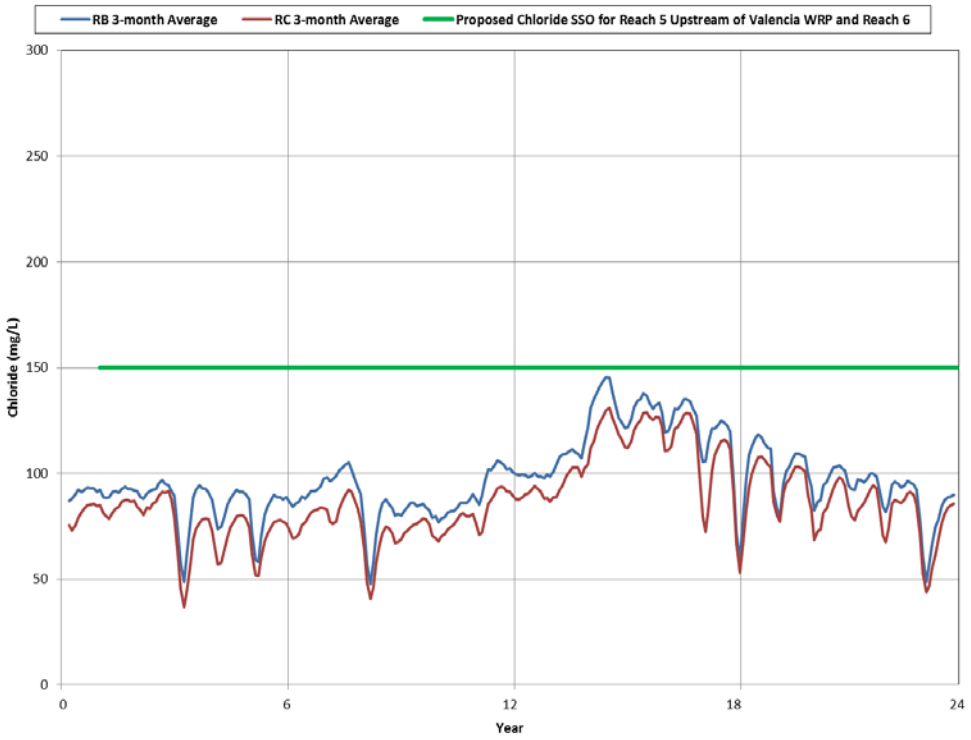

Figure 8. Scenario 2 GSWIM Scenario Projected 3-month Rolling Average Chloride Concentrations in Reach 5 Upstream of Valencia WRP and Reach 6 Compared with the Proposed SSO for These Reaches.

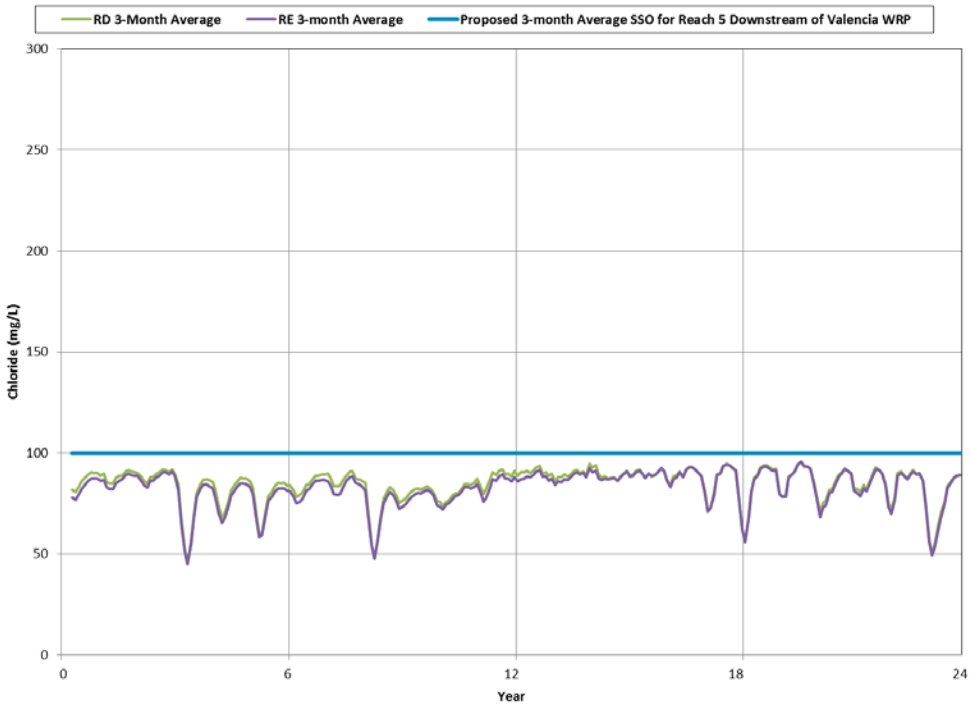

Figure 9. Scenario 2 GSWIM Scenario Projected Three-month Rolling Average Chloride in Reach 5 Downstream of Valencia WRP Compared with the Proposed Three-month Average SSO for This Reach.

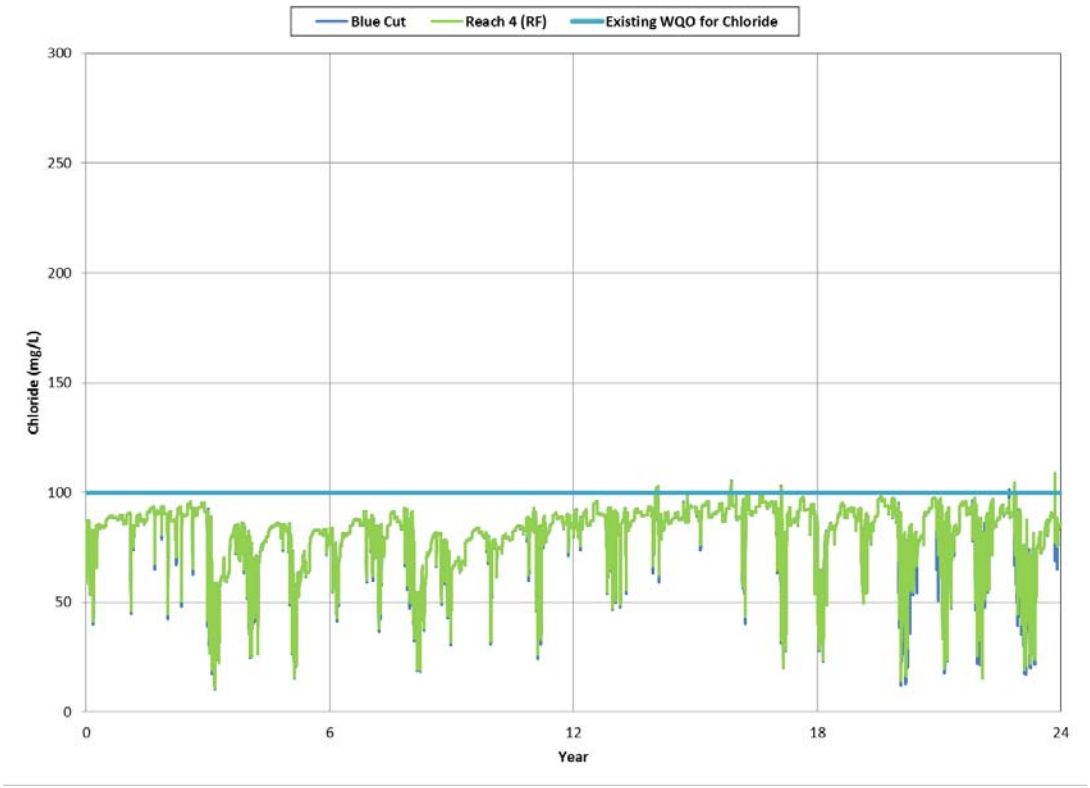

Figure 10. Scenario 2 GSWIM Scenario Projected Instantaneous Chloride Concentrations at Blue Cut and SCR-RF Compared with the Existing Water Quality Objective.

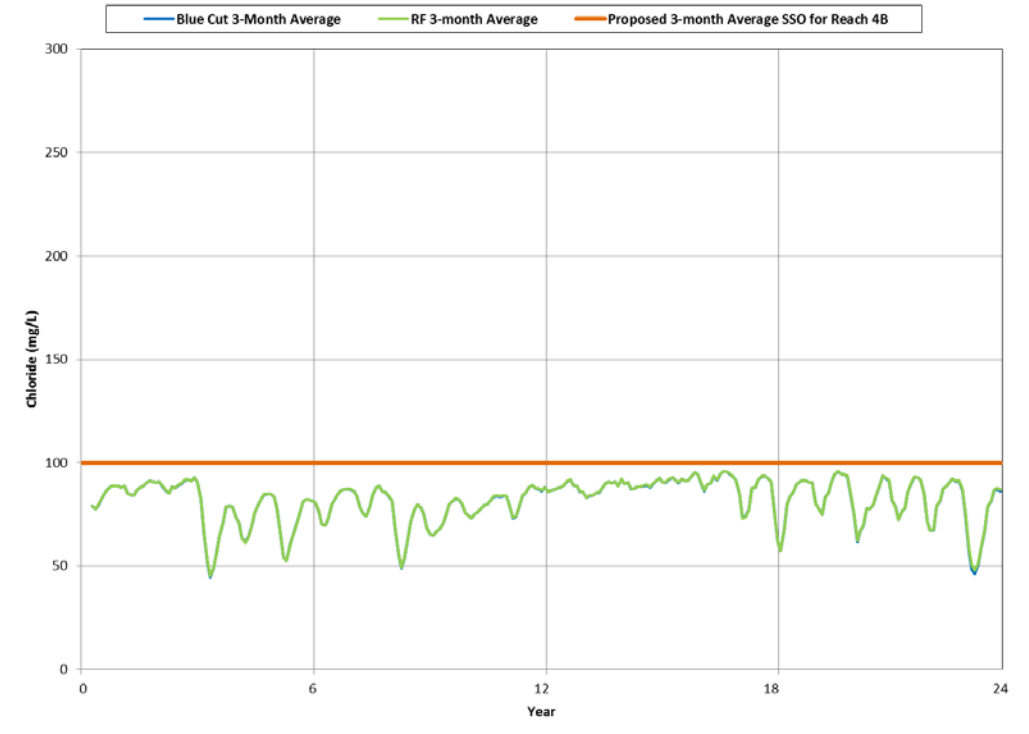

Figure 11. Scenario 2 GSWIM Scenario Projected Three-month Average Chloride in Reach 4B Compared with the Proposed Three-month Average SSO for This Reach.

The figures show that the projected chloride concentrations at the receiving water stations are significantly lower than the historical chloride concentrations at these stations. The updated GSWIM results indicate that Scenario 2 will comply with the proposed SSOs and averaging periods for Reaches 4B, 5 and 6. Additionally, these figures show that the degree of variability in chloride concentrations after Scenario 2 has been implemented is such that a 3-month averaging period will be protective of salt sensitive agriculture. Figure 10 shows that peak chloride concentrations near the concentrations deemed hazardous to salt-sensitive crops according to the LRE will not occur. Figure 11 demonstrates that, Scenario 2, designed to meet a 100 mg/L chloride objective with a 3 month rolling average period, would also result in chloride concentrations less than 100 mg/L with a 3 month rolling average period at Blue Cut, which is well within the range deemed protective by the LRE studies.

2.4.3 Evaluation of Protection of Aquatic Life Beneficial Uses

Using 3-month average chloride objectives results in the potential for short term higher chloride concentrations to occur in the waterbody. An evaluation of historic and simulated future chloride concentrations from the GSWIM was used to determine if the one-hour aquatic life criteria of 860 mg/L or the 4-day average chloride criteria of 230 mg/L were likely to be exceeded. As discussed in Sections 2.4.1 and 2.4.2, compliance with the proposed SSOs and averaging periods in Reaches 5 and 6 will require reductions in chloride discharges. As a result, if historic and predicted future model results do not show exceedances of the aquatic life criteria, then the proposed SSOs and averaging periods in Reaches 5 and 6 will be protective of aquatic life beneficial uses. Figure 12 through Figure 14 show the 4-day average historic and predicted future chloride concentrations.

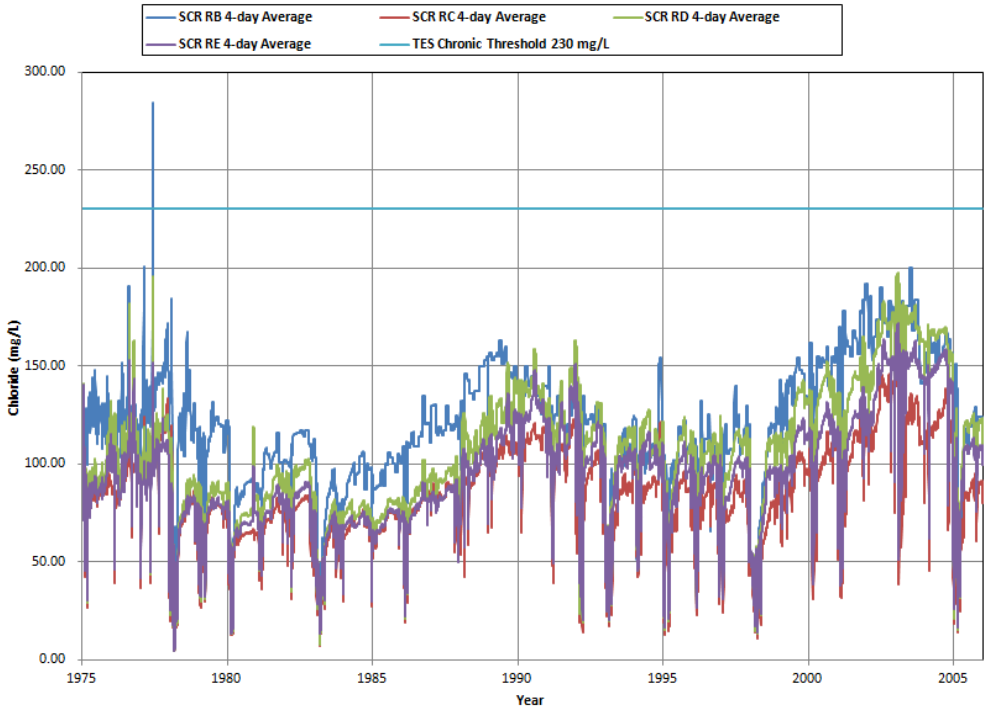

Figure 12. Four-day Averages of GSWIM Calibration Simulation Chloride Concentrations in Reaches 5 and 6 Compared with the Four-day Average TES Threshold.

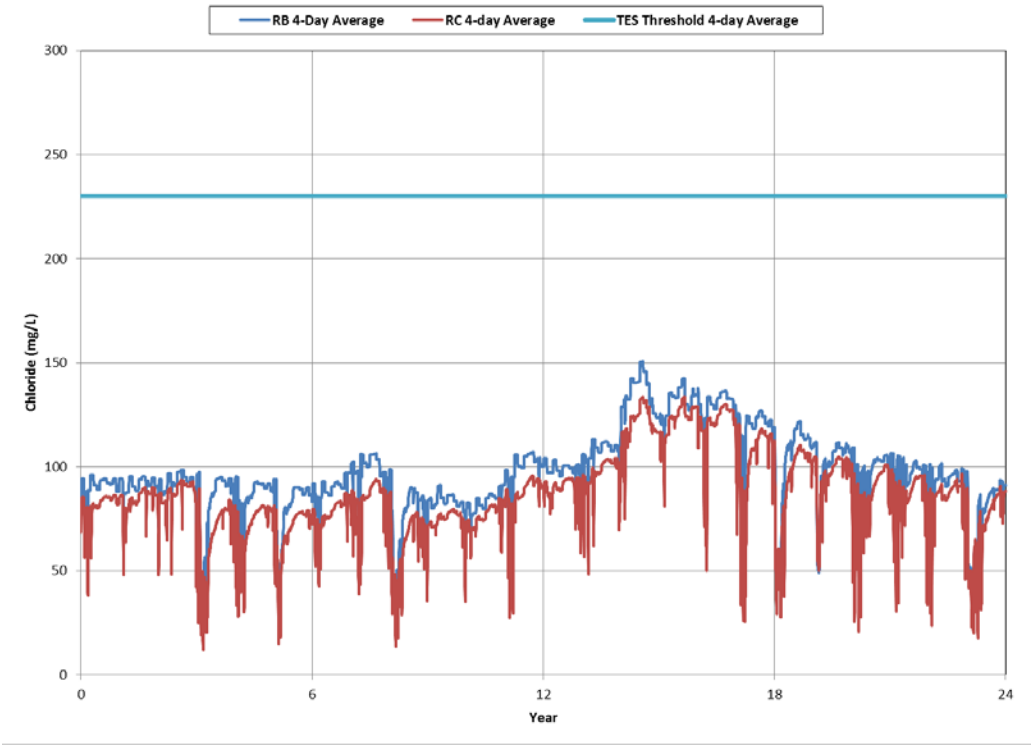

Figure 13. Scenario 2 GSWIM Scenario Projected Four-day Averages Chloride Concentrations (After Scenario 2 Has Been Implemented) in Reach 5 Upstream of Valencia WRP and Reach 6 Compared with the Four-day Average TES Threshold.

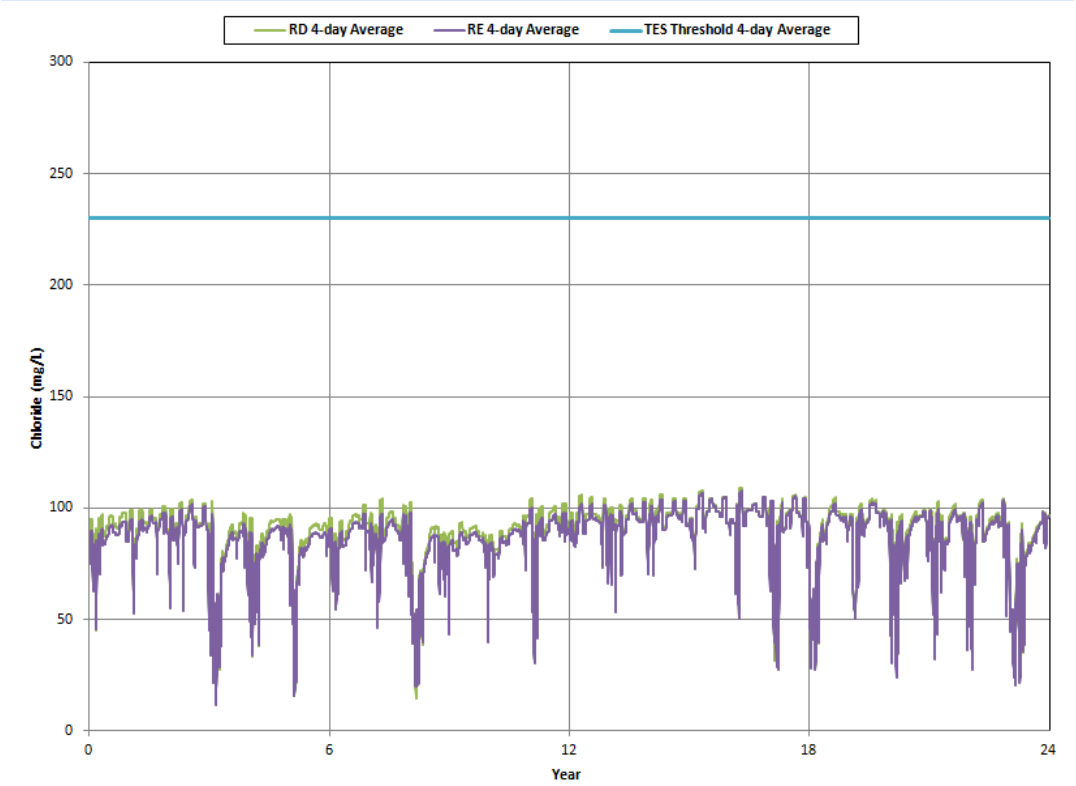

Figure 14. Scenario 2 GSWIM Scenario Projected Four-day Average Chloride Concentrations in Reach 5 Downstream of Valencia WRP Compared with the Four-day Average TES Threshold.

Figure 12 shows the modeling of historic data of chloride concentrations in Reaches 5 and 6 without the implementation of either Scenario, and shows an exceedance of the TES chronic level in 1977 when the 4-day averages on each day exceeded the threshold. Figures 13 and 14 show the modeling of future predicted chloride concentrations in Reaches 5 and 6 following the implementation of Scenario 2 and both show no exceedances of the 4-day average TES threshold. Based on Figure 12 through Figure 14 and as discussed in Sections 2.4.1 and 2.4.2, the 860 mg/L one-hour acute threshold was never exceeded in the historic or projected modeling periods. Therefore, a 3 month rolling average period is protective of aquatic life and TES in Reaches 5 and 6.

3 Regulatory Analyses

The technical analysis above supports the development of SSOs. As noted in the technical analysis, required regulatory analyses support some of the decisions that were made in developing the proposed SSOs. The required regulatory analyses are provided in this section. The first part of the analysis meets the requirements outlined in the Basin Plan Section 3 Water Quality Objectives, page 3-22, for developing site-specific objectives. The second part of the analysis provides information to address the factors in Porter Cologne Section 13241 that are to be considered in the establishment of water quality objectives. The final portion of the analysis discusses the consistency of the proposed SSOs with the state and federal antidegradation policies.

3.1 BASIN PLAN REQUIREMENTS

The Upper Santa Clara River Chloride TMDL authorizes the District to develop technical analyses supporting a Basin Plan amendment incorporating a site-specific objective (SSO) for chloride. The Basin Plan provides that several elements should be addressed to justify the need for an SSO. These include in part:

- A thorough review of current technology and technology-based limits to comply with the existing WQO, which can be achieved at the facilities on the study reach.
- A thorough review of historical limits and compliance with these limits at all facilities in the study reach;
- A detailed economical analysis of compliance with existing and proposed objectives.
- An analysis of compliance and consistency with all federal, state, and regional plans and policies.

3.1.1 Current Technology and Technology-Based Limits to Comply with the Existing WQO, Which Can Be Achieved at the Facilities on the Study Reach

Compliance with the existing water quality objective would require point sources in Reaches 5 and 6 of the USCR to meet the final waste load allocation in the Chloride TMDL of 100 mg/L. This limit is expressed as a daily maximum in Waste Discharge Orders No. R4-2009-0075 (Saugus WRP) and R4-2009-0074 (Valencia WRP), and will become effective upon the expiration of the interim effluent limits on May 4, 2015 (unless extended), barring action approving a site-specific objective for chloride and making the corresponding adjustments to the TMDL WLAs and permit limitations.

In response to the Chloride TMDL, Dr. David Jenkins evaluated historical chloride data from the Saugus WRP effluent to determine whether advanced treatment would be required to meet the chloride effluent limit.[15] The Jenkins report recommended the Saugus WRP be retrofitted with a microfiltration system followed by reverse osmosis (MF/RO) to meet the chloride effluent limit. RO has been identified as the best available technology (BAT) by EPA for salt removal, and has been used in other water reclamation facilities. RO removes dissolved solids by forcing

[15] See Dr. David Jenkins (April 2003). *Treatment Methods for Meeting Proposed Effluent Permit Limits Criteria at the Saugus Water Reclamation Plant (WRP)*

pressurized water through a membrane permeable to water but impermeable to dissolved solids. Approximately 95% of chloride ions are removed in a two stage RO system.

In addition to the Jenkins report, Montgomery Watson Harza (MWH) prepared a series of reports for the District to evaluate alternative compliance technologies and estimate the cost of compliance with the recommended technology. After identifying and evaluating various treatment technologies available for chloride removal, MWH determined that reverse osmosis is the most feasible treatment technology for chloride removal to achieve compliance with the Chloride TMDL's waste load allocation. To provide the necessary quality of feedwater to an RO process, MWH recommended the installation of a membrane microfiltration (MF) system based on previous studies conducted in San Diego. Based on this information, MWH proceeded with the design and cost of an MF/RO system for both Valencia and Saugus.

MWH also investigated disposing of the brine waste stream generated during RO treatment. Direct disposal of the RO reject stream was deemed most practical. Four disposal options were examined:

- A gravity pipeline to a new 3-mile dedicated ocean outfall that would be located in Ventura County;
- A pipeline and pump station to the Districts' Joint Water Pollution Control Plant (JWPCP) facility in the City of Carson, which has an existing discharge tunnel and ocean outfall;
- Trucking brine waste to JWPCP; and,
- Disposal via deep well injection.

In the 2002 and 2008 MWH studies, deep well injection and the two brine pipeline options were each considered feasible in concept with the understanding that further detailed investigation of the projects is necessary to determine the actual feasibility. Project constraints were identified for each of the options. The option of trucking brine waste was considered infeasible due to the quantity of brine that would be produced.

It should be noted that Trussell Technologies, Inc. has also evaluated technologies for desalination of reclaimed water as part of the District's efforts to comply with the TMDL.[16] Similar to MWH's conclusions, this firm has recommended that the best treatment train for chloride removal at the Saugus and Valencia WRPs would include a microfiltration or membrane bio-reactors (MBR) followed by reverse osmosis or nanofiltration.

Finally, the 2013 EIR identified installing microfiltration and reverse osmosis at the Valencia WRP as a preferred alternative to comply with the TMDL. Since it is more cost effective to construct and operate a single advanced treatment facility, this scenario includes the construction of a pump station and pipeline from the Valencia WRP to the Saugus WRP. Additionally, to reduce the amount of chloride in the discharge at the Valencia and Saugus WRPs, these WRPs will be upgraded to utilize UV disinfection.

[16] See Trussell Technologies, Inc. Technical Memorandum No. 6.002 – 008 (TM 8), Analysis of Treatment Costs for Chloride for the Santa Clarita Valley Joint Sewerage System (SCVJSS) (March 23, 2007). R. Shane Trussell, Ph.D., P.E. and Ramesh R. Sharma, Ph.D.

In summary, a number of studies have been completed that demonstrate compliance with the current water quality objective of 100 mg/L at the point of discharge would require implementation of reverse osmosis. GWSIM modeling results demonstrate that 100 mg/L will not be achieved through source control alone (CH2M Hill, 2008). Although the installation of reverse osmosis is an available technology, treating to allow full discharge at 100 mg/L from the two WRPs would be costly and constructing a pump station and pipeline from the Valencia WRP to the Saugus WRP could have unintended environmental consequences. As discussed throughout Section 2.4, these costs and environmental consequences would be incurred without resulting in any additional needed protection of beneficial uses.

3.1.2 A Thorough Review of Historical Limits and Compliance with These Limits at all Facilities in the Study Reach

The Saugus and Valencia WRPs are the most significant point source dischargers of chloride into Reaches 4, 5, and 6 of the Santa Clara River. Therefore, the historical limits discussed below concern only these facilities. The chloride effluent limits that appear in the historical waste discharge orders for Saugus and Valencia are shown below in Table 7and Table 8. Further explanation of these limits and compliance with them is explained in the following sections.

Table 7. Current and Historical Chloride Effluent Limits for the Valencia Water Reclamation Plant (mg/L)

Order No. or Res. No. (adoption date)	Monthly Average	Daily Maximum	12-Month Rolling Average	Notes
R4-2009-0074 (6/4/2009)	None	100[1] 230[2]	SWP treated water supply concentration + 134 mg/L[2]	[1] This is the WLA under Res. R04-004. This limit will serve as the effluent limit barring action approving an SSO. According to Resolution No. R4-2006-016, *Amendment to the Water Quality Control Plan for the Los Angeles Region through revision of the Implementation Plan for the Upper Santa Clara River Chloride TMDL*, which proposed to shorten the compliance period by two years, the WLA-based final effluent limit for chloride shall become operative 11 years after the effective date of the Upper Santa Clara River Chloride TMDL (May 4, 2016). [2] Interim limit is the SWP treated supply chloride + 134 mg/L not exceeding 230 mg/L as a daily max. Interim limit became effective upon EPA approval of Chloride TMDL. Interim limit will remain until superseded by the chloride WLA unless extended.
R4-2003-0145 (As amended by R4-2005-032 on 5/5/2005).	100[3]	100[4] 230[5]	SWP treated water supply concentration + 134 mg/L.[5]	[3] This is the chloride objective in Basin Plan. This limit applied from the effective date of the Order until EPA approved Res. R04-004 (Revising Res. 03-008) on April 28, 2005. The limit was superseded by the interim limit (note [5]), which became effective May 4, 2005 under Res. R4-2006-016. [4] This is the WLA under Res. R04-004. This limit will serve as the effluent limit barring action approving an SSO. According to Resolution No. R4-2006-016, *Amendment to the Water Quality Control Plan for the Los Angeles Region through revision of the Implementation Plan for the Upper Santa Clara River Chloride TMDL*, which proposed to shorten the compliance period by two years, the WLA-based final effluent limit for chloride shall become operative 11 years after the effective date of the Upper Santa Clara River Chloride TMDL (May 04, 2016). [5] This interim limit was effective from April 28, 2005 to July 23, 2009. It equals the SWP treated supply chloride + 134 mg/L not exceeding 230 mg/L as a daily maximum. The interim limit became effective upon EPA approval of Chloride TMDL and superseded the Basin Plan limit. (See Res. R4-2006-016, Attachment A Task 14)
R4-2003-0145 (11/6/2003)	100[6] 187[8]	100[7] 196[8]	None None	[6] This is the chloride objective in the Basin Plan. Interim limits of 187 mg/L (monthly avg.) and 196 mg/L (daily max) would have superseded this limit upon EPA approval but never became effective because they were revised prior to EPA approval. [7] This is the wasteload allocation adopted in the Chloride

Order No. or Res. No. (adoption date)	Monthly Average	Daily Maximum	12-Month Rolling Average	Notes
				[8] These were the interim limits in the Chloride TMDL adopted 10/24/02. These interim limits never became effective because they were revised prior to EPA approval. The interim limits were amended on 5/6/04 (Res. 04-04). EPA approved the revised TMDL on 4/28/2005.
95-081 as revised by 98-027 (4/13/1998)	None	190 to 8 Jan, 2001, thence 100[9]	None	[9] According to Order 98-027, this interim limit would expire on January 9, 2001.
95-081 (6/12/1995)	None	100	None	
89-129 (12/4/1989).	None	100[10]	None	[10] This limit was based on monthly 24-hr composites. The limit applied until Res. 90-004 was adopted. The limit was not considered violated unless the effluent chloride exceeded 250 mg/L or exceeded the water supply concentration plus 85 mg/L, whichever was less. (Res. 90-004; See Footnote 4/ on p. 7 of Order 95-081).
84-76[11] (9/17/1984)	None	None	None	[11] This Order accommodated the joint operation of the Saugus and Valencia WRPs; Subsequent Order 87-48 added limits for reclaimed water use.
79-126[12] (7/23/1979)	None	None	None	[12] Resolution 81-36 changed this permit to incorporate a Basin Plan amendment. The permit changes did not add chloride limitations for effluent discharged to the river.
74-181[13] (7/15/1974)	None	250	None	[13] This Order accommodated the fact that the WRP's discharge to the SCR percolated into the groundwater and added requirements pertaining to use of reclaimed water.
74-114 (5/20/1974)	None	250[14]	None	[14] This limit was a "Maximum" monitored using a 24-hour composite with a minimum weekly frequency of analysis.
72-27 (07/19/1972)	None	175[15] (monthly sampling)	None	[15] 8-hr composite with monthly monitoring.
Resolution 65-48 (11/15/1965)	None	"125 ppm, or the average weighted value of the domestic water supply, plus 50 ppm, whichever value is greater."[16]	None	[16] Compliance was determined based on composite sampling with monthly sampling.

Table 8. Current and Historical Chloride Effluent Limits for the Saugus Water Reclamation Plant (mg/L)

Order No. or Res. No. (adoption date)	Monthly Average	Daily Maximum	12-Month Rolling Average	Notes
R4-2009-0075 (6/4/2009)	None	100[1] 230[2]	SWP treated water supply concentration + 114 mg/L[2]	[1] This is the WLA under Res. R04-004. This limit will serve as the effluent limit barring action approving an SSO. According to Resolution No. R4-2006-016, *Amendment to the Water Quality Control Plan for the* Los *Angeles Region through revision of the Implementation Plan for the Upper Santa Clara River Chloride* TMDL, which proposed to shorten the compliance period by two years, the WLA-based final effluent limit for chloride shall become operative 11 years after the effective date of the Upper Santa Clara River Chloride TMDL (May 4, 2016[17]). [2] Interim limit is the SWP treated supply chloride + 114 mg/L not exceeding 230 mg/L as a daily max. Interim limit became effective upon EPA approval of Chloride TMDL. Interim limit will remain until superseded by the chloride WLA unless extended.
R4-2003-0143 (as amended by R4-2005-031 on 5/5/2005).	100[3]	100[4] 230[5]	SWP treated water supply concentration + 114 mg/L[5]	[3] This is the chloride objective in the Basin Plan. This limit applied from the effective date of the Order until EPA approved Res. R04-004 (Revising Res. 03-008*)* on April 28, 2005. The limit was superseded by the interim limit (note [5]), which became effective May 4, 2005 under Res. R4-2006-016. [4] This is the WLA under Res. R04-004. This limit served as the effluent because an SSO was not approved during this time. According to Resolution No. R4-2006-016, *Amendment to the Water Quality Control Plan for the* Los *Angeles Region through revision of the Implementation Plan for the Upper Santa Clara River Chloride* TMDL, which proposed to shorten the compliance period by two years, the WLA-based final effluent limit for chloride shall become operative 11 years after the effective date of the Upper Santa Clara River Chloride TMDL (May 4, 2016). [5] This interim limit was effective from April 28, 2005 to July 23, 2009. It equals the SWP treated supply chloride + 114 mg/L not exceeding 230 mg/L as a daily maximum. The interim limit became effective upon EPA

[17] The correct date for expiration of interim WLAs, as specified in the currently effective TMDL adopted by Resolution 2008-012, is May 4, 2015.

Order No. or Res. No. (adoption date)	Monthly Average	Daily Maximum	12-Month Rolling Average	Notes
				approval of Chloride TMDL and superseded the Basin Plan limit. (See Res. R4-2006-016, Attachment A Task 14)
R4-2003-0143 (11/6/2003)	100[6] 200[8]	100[7] 218 [8]	None	[6] This is the chloride objective in the Basin Plan. Interim limits of 200 mg/L (monthly avg.) and 218 mg/L (daily max) would have superseded this limit upon EPA approval but never became effective because they were revised prior to EPA approval. [7] This is the WLA adopted in the Chloride TMDL. [8] These were the interim limits in the Chloride TMDL adopted 10/24/02. These interim limits never became effective because they were revised prior to EPA approval. The interim limits were amended on 5/6/04 (Res. 04-04). EPA approved the revised TMDL on 4/28/2005.
95-080 as revised by 98-027 (04/13/1998)	None	190 mg/L to January 8, 2001, thence 100[9]	None	[9] According to Order 98-027, this interim limit would expire on January 9, 2001.
95-080 (6/12/1995)	None	100[10]	None	[10] This limit is based on monthly 24-hr composites. The limit was not considered violated unless the effluent chloride exceeded 250 mg/L or exceeded the water supply concentration plus 85 mg/L, whichever was less. (Res. 90-004; See Footnote 4/ on p. 7 of Order 95-080)
89-130 (12/4/1989)	None	100[11]	None	[11] Limit applied until Res. 90-004 was adopted on March 23, 1990. Under Res. 90-004, exceedances of the 100 mg/L limit were not considered violated unless the discharge exceeded 250 mg/L or the water supply concentration plus 85 mg/L.
84-077	None	None	None	

Order No. or Res. No. (adoption date)	Monthly Average	Daily Maximum	12-Month Rolling Average	Notes
(09/17/1984)				
79-127 (07-23-1979)	None	None	None	
74-113[12] (May 20, 1974)	None	250	None	[12] Order No. 74-113 appears to have been the first "permit" issued to the Saugus facility. Subsequent orders were adopted in 1974, which did not alter the 250 mg/L effluent limit for chloride.
Resolution 61-26[13] 04/19/1961)	None	"125 ppm or the average weighted value of the domestic water supply, plus 50 ppm, whichever value is greater."[14],	None	[13] This was the first instrument establishing waste discharge requirements. The Resolution was "not a permit" and did not "legalize [the] proposed waste disposal facility." [14] Compliance was determined based on composite sampling (p. 5 of permit). The language in the permit is slightly unclear as to the limit, but based on the wording in the Valencia WRP order, the effluent limit was construed to be 125 mg/L or the water supply chloride level plus 50 mg/L.

Initial Water Reclamation Plant Resolutions

The first Regional Board Resolutions in effect for the Saugus and Valencia Water Renovation Plants[18] established concentration-based chloride effluent limits for Saugus (Resolution 61-26) (04/19/1961) and Valencia (Resolution 65-48) (11/15/1965) as shown in Table 7 and Table 8.

Based on the absence of any reference to a chloride water quality objective for the Santa Clara River in these initial resolutions, these are the only concentration-based chloride limits applicable to the Saugus and Valencia facilities that existed at that time.[19]

The chloride effluent limit for Saugus, the first of the two plants to operate, was phrased as "125 ppm or the average weighted value of the domestic water supply, plus 50 ppm, whichever value is greater." Chloride data for the domestic water supply is unavailable for gauging compliance with this limit. However, assuming 125 mg/L represented the applicable limit, the Saugus WRP exceeded the limit only once in December 1970, as shown in Figure 15. The Valencia WRP's initial permit (Resolution 65-21) had a similar variable limit, but was more clearly defined as the greater of 125 mg/L or the supply water concentration plus 50 mg/L. Figure 16 shows that the Valencia WRP consistently complied with the 125 mg/L effluent limit.

[18] The Saugus and Valencia facilities were formerly known as "Water Renovation Plants."

[19] Resolutions 61-26 and 65-48 were adopted prior to the Porter Cologne Water Quality Control Act (1969), which initiated the basin planning process. At this time, the Regional Board adopted water quality objectives independent of basin plans. With adoption of the Interim Water Quality Control Plan on June 10, 1971, the Regional Board compiled all existing water quality objectives into one document. At that time, the two WRPs were subject to their original resolutions, which contained chloride effluent limits but no clear chloride objective for the Santa Clara River.

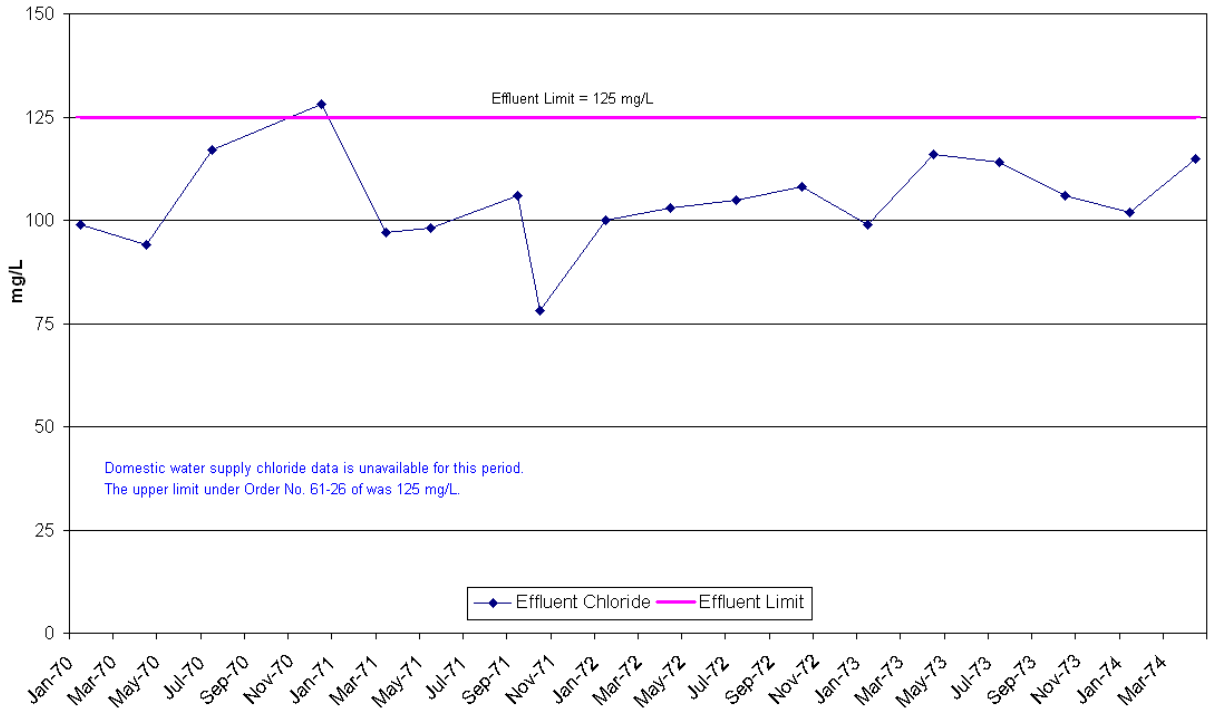

Figure 15. Chloride Concentration in Final Effluent at Saugus WRP (Resolution No. 61-26)

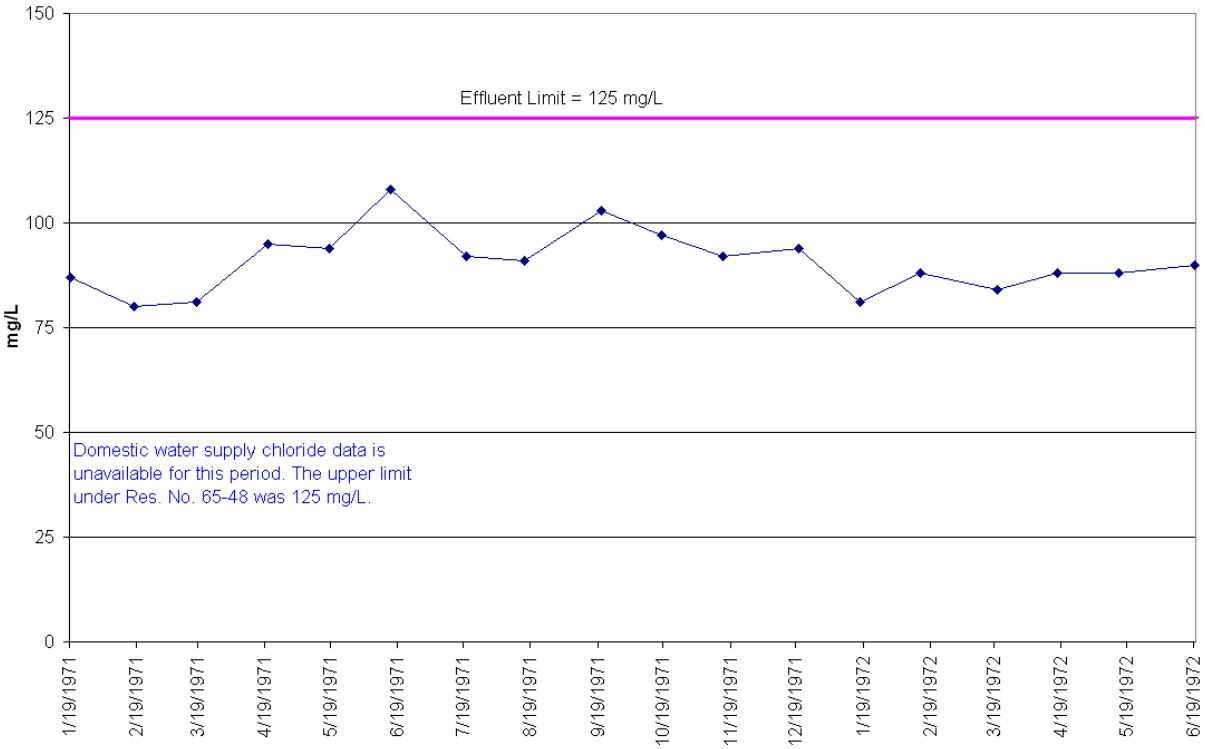

Figure 16. Chloride Concentration in Final Effluent at Valencia WRP (Resolution 65-48)

Waste Discharge Orders 72-27 (Valencia) and 74-113 (Saugus)

Order No. 72-27 (Valencia) and Order No. 74-113 (Saugus) were the first two operating permits that followed Resolution 61-26 and Resolution 65-48. These permits established effluent limitations of 175 mg/L (Valencia) and 250 mg/L (Saugus). The Valencia limit was subsequently revised to 250 mg/L in Order No. 74-114. Figure 17, Figure 18, and Figure 19 show the historical compliance with Orders No. 74-113, 72-27 and 74-114, respectively. During its initial permit, Valencia did not exceed its 175 mg/L limit (Figure 18). During the period when the 250 mg/L limits applied to the facilities, as stated above, Saugus exceeded the limit once in 1977 (Figure 17) and Valencia exceeded the limit three times (Figure 19). The 250 mg/L limits applied until 1979 when the chloride limits were removed from both permits under Order No. 79-126 (Valencia) and Order No. 79-127 (Saugus).

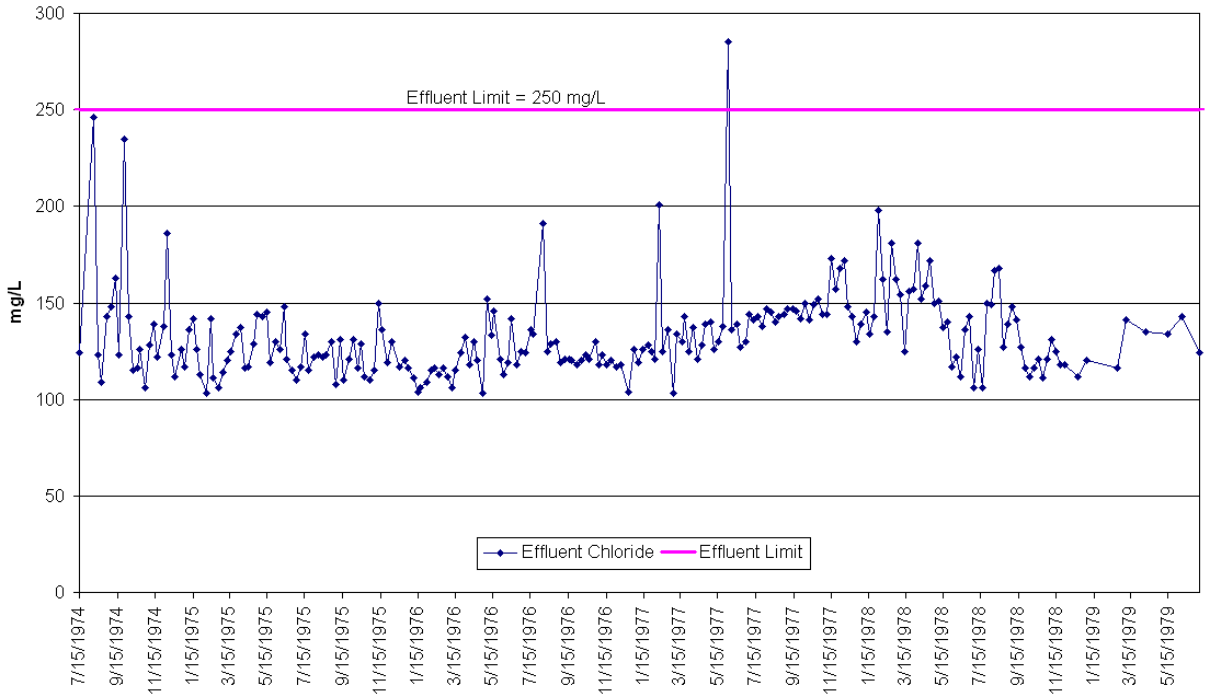

Figure 17. Chloride Concentration in Final Effluent at Saugus WRP (Order 74-113)

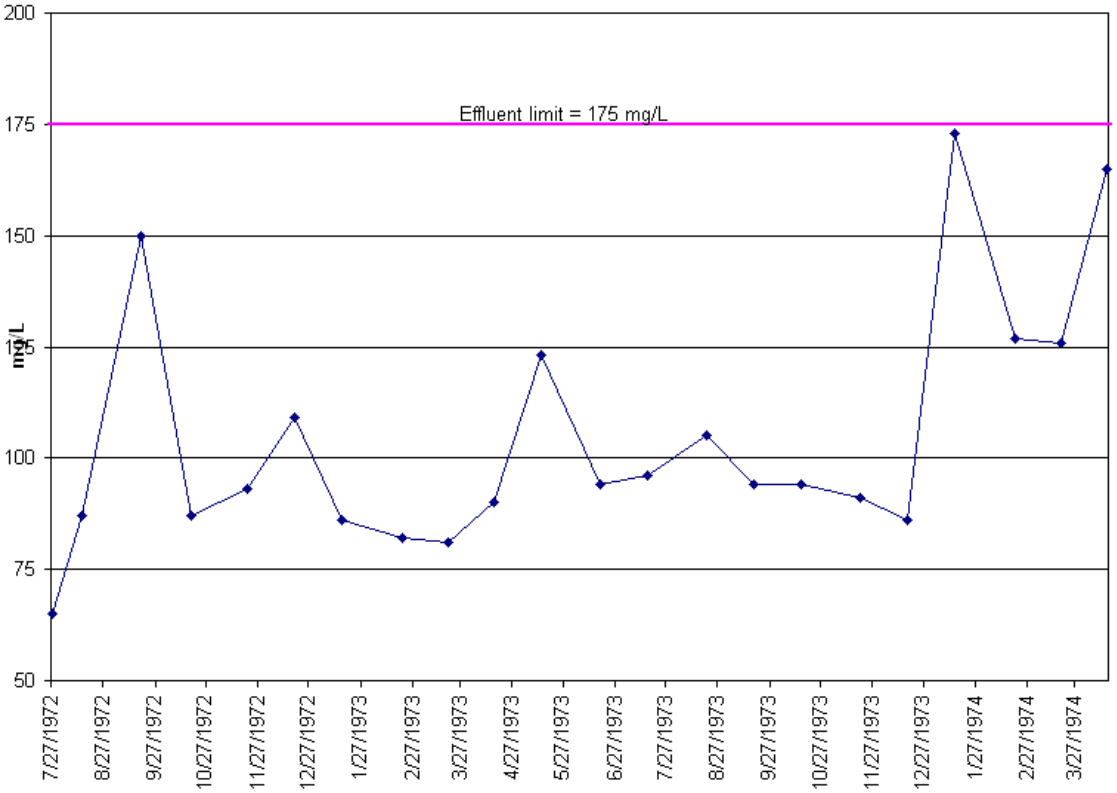

Figure 18. Chloride Concentration in Final Effluent at Valencia WRP (Order 72-27)

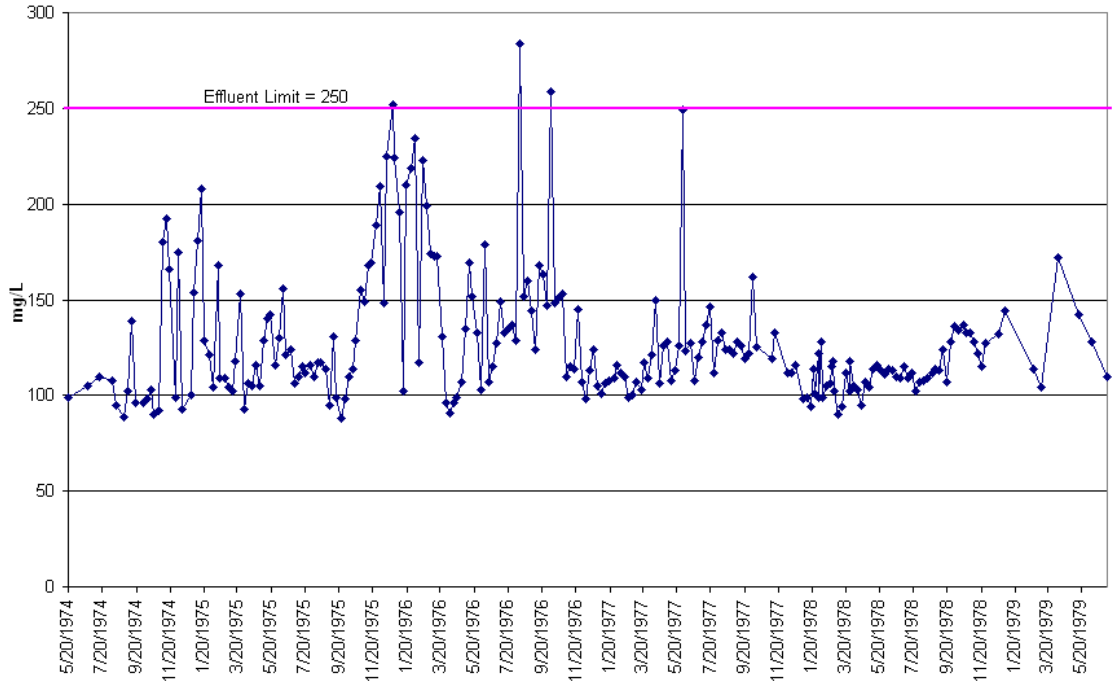

Figure 19. Chloride Concentration in Final Effluent at Valencia WRP (Order 74-114)

No Limit for 10 Years

No chloride effluent limit applied during the period July 23, 1979 to December 3, 1989 covering Orders 79-126 and 84-076 for Valencia and Orders No. 79-127 and 84-077 for Saugus. On December 4, 1989, the Regional Board adopted Orders No. 89-129 (Valencia) and 89-130 (Saugus) rescinding Orders 84-076 and 84-077, respectively. These permits each contained 100 mg/L limits as daily maximums, which neither WRP could meet during the three-month period the limits applied before being preempted by the 1990 Drought Policy as explained below.

The Drought Policy (Resolution 90-004)

The state-wide drought that persisted during water years 1987-88 through 1991-92 made compliance with chloride effluent limits difficult for many southern California dischargers due to the increased chloride levels in supply water sources resulting from the drought. In response to this concern, in 1990, the Regional Water Board authorized the Saugus and Valencia WRPs, among other dischargers, to apply for temporary relief. RWQCB Resolution 90-04 (March 26, 1990) known as the "Drought Policy" authorized an increase in effluent chloride limits to the lesser of (1) 250 mg/L or (2) the chloride concentration in supply waters plus 85 mg/L.[20]

The Drought Policy established conditions designed to ensure chloride effluent limitations were beyond the control of local dischargers and that dischargers would take measures to reduce chlorides from sources within their control. For example, the Sanitation Districts had to demonstrate by July1, 1990, and quarterly thereafter, that the increased chloride concentrations were due solely to changes in the character of the water supply related to drought conditions or water conservation measures or some combination thereof. The record indicates that the Sanitation Districts satisfied the Drought Policy's conditions throughout its duration. Therefore, on March 26, 1990 and until expiration of the Drought Policy, the Valencia and Saugus WRPs were subject only to the chloride limits established in Resolution 90-004.

The Drought Policy resolved that the Regional Board would reconsider the policy within one year after source water supplies returned to pre-drought conditions, or within three years, whichever came first. Although the statewide drought ended in water year 1991-92, in accordance with Resolution 90-004, the Regional Board extended the reconsideration period of the Drought Policy in 1993 and again in 1995 because the chloride levels in supply waters remained higher than the chloride levels before the onset of the drought.[21] The effective permits at the time of the Drought Policy in 1995 were Orders No. 89-129 and 95-081 (Valencia) and Orders No. 89-130 and 95-080 (Saugus). Each of these permits established chloride discharge limits of 100 mg/L, but the Drought Policy governed the compliance.

Figure 20 and Figure 21 show that the Saugus WRP generally met the limits under the Drought Policy except on limited occasions during the policy's seven-year span. The Valencia facility

[20] The 1990 Drought Policy does not explicitly state whether or not it granted relief for discharges under the existing waste discharge orders for exceedances occurring prior to the policy's adoption.

[21] The Regional Board renewed the Drought Policy on June 14, 1993 at its 365th regular meeting. (See Item 10 – June 14, 1993, "Reconsideration of Resolution 90-004 …") The Regional Board subsequently extended the reconsideration period for another two years on February 27, 1995. (See Item 8 - Reconsideration of Resolution 90-004… 381st Regular Meeting.)

had more difficulty meeting the Drought Policy, with exceedances more frequent than for Saugus as shown in Figure 22.

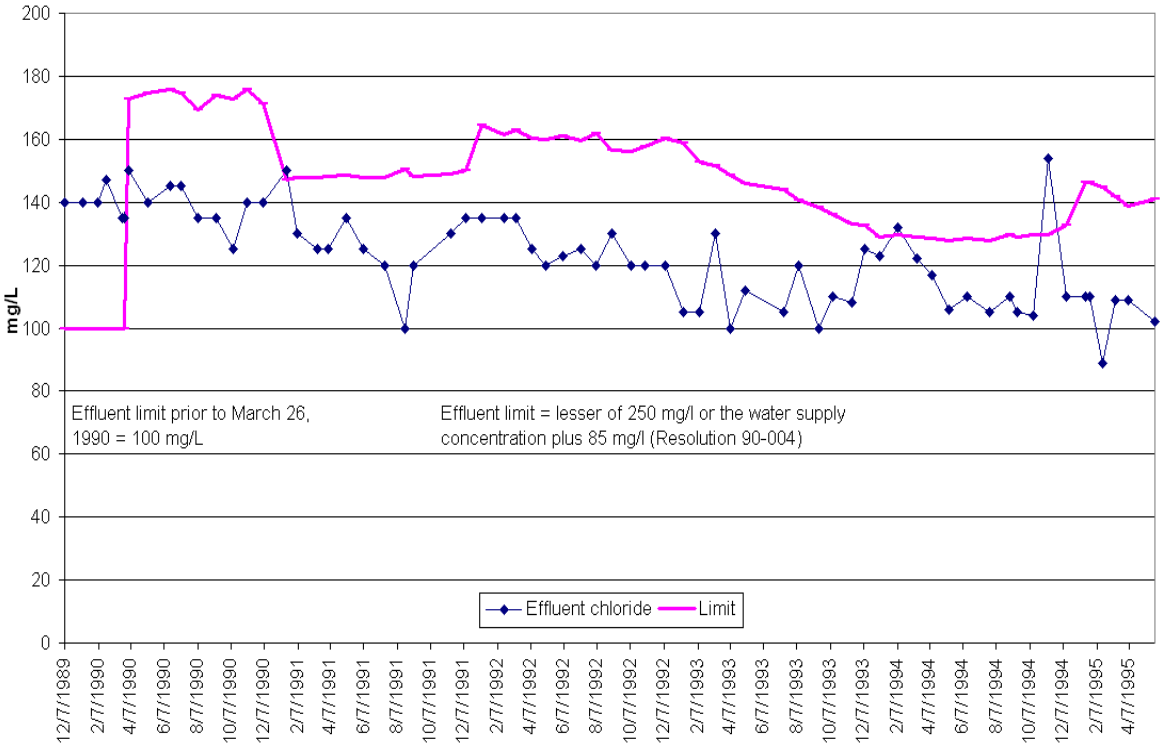

Figure 20. Chloride Concentration in Final Effluent at Saugus WRP (Order 89-130)

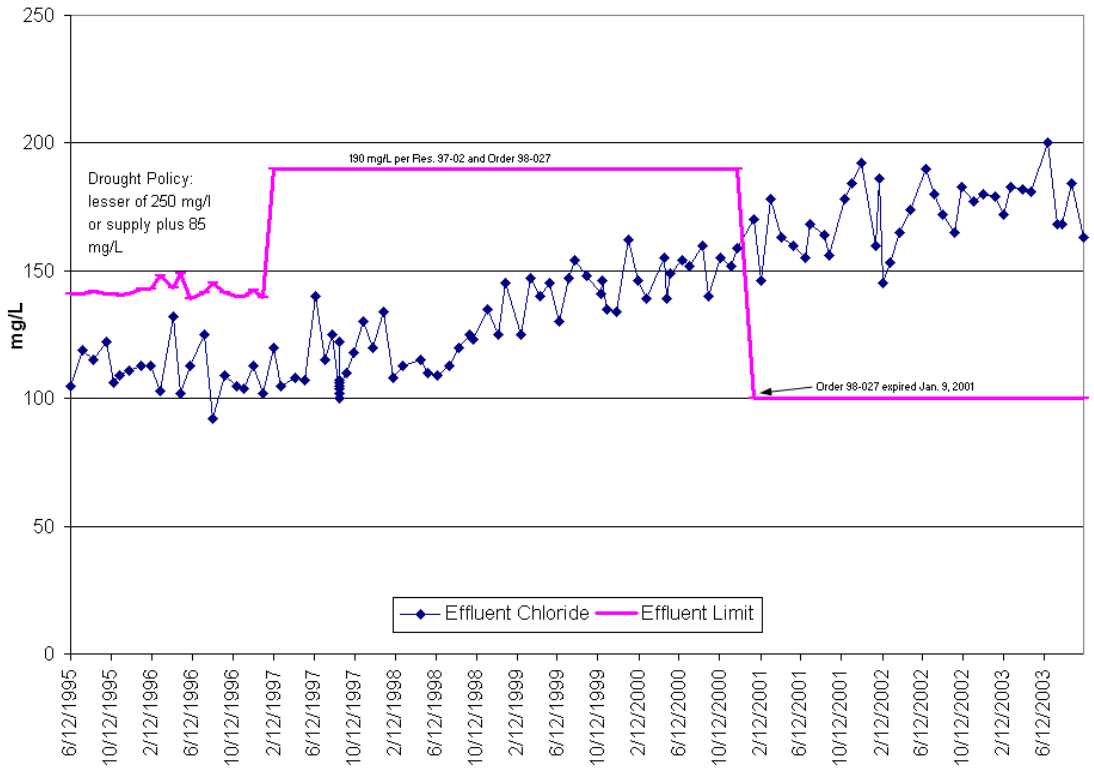

Figure 21. Chloride Concentration in Final Effluent at Saugus WRP (Order 95-80 & 97-02)

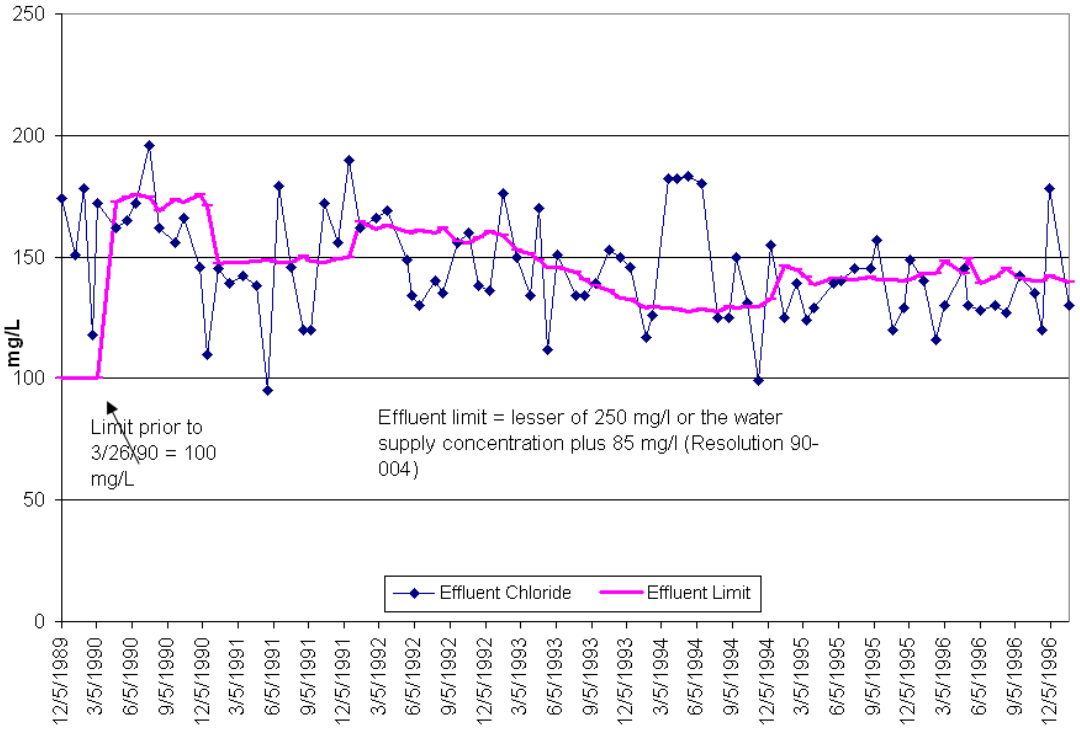

Figure 22. Chloride Concentration in Final Effluent at Valencia WRP (Orders 89-129 & 95-081)

Resolution 97-02 (190 mg/L)

The renewed Drought Policy was subject to reconsideration on the earlier of February 27, 1997 or when chloride levels in imported water had returned to pre-drought levels.[22] Accordingly, on January 27, 1997, the Regional Board adopted Resolution No. 97-02, which among other things granted a variance from the existing water quality objectives in the Santa Clara River and directed the Executive Officer to notify dischargers that they were subject to a surface water interim limit of 190 mg/L. This interim limit was to last for three years following final approval of the amendment. The Office of Administrative Law approved Resolution 97-02 on January 9, 1998.[23]

In response to Resolution No. 97-02, on April 13, 1998, under Order No. 98-027, the Regional Board revised the chloride effluent limits for the Saugus and Valencia WRPs to 190 mg/L (daily maximums), which would expire on January 9, 2001 consistent with the terms of Resolution 97-02.[24] Based on language in Resolution 97-02, the 190 mg/L limit applied prior to final approval of Resolution 97-02 on January 9, 1998.[25] Therefore, in summary, the Drought Policy limit (250 mg/L or SWP + 85 mg/L) applied during the period March 23, 1990 to January 26, 1997; and the 190 mg/L limit under Resolution 97-02 applied during the period January 27, 1997 to January 8, 2001. Orders in effect when Resolution 97-02's 190 mg/L limit expired were No. 95-081 (Valencia) and No. 95-080 (Saugus). The permit limit under the remaining periods of these permits was reinstated to 100 mg/L on January 9, 2001, which neither WRP could meet in any collected samples. The ensuing permits, R4-2003-0145 (Valencia) and R4-2003-0143 (Saugus) applied the 100 mg/L limit.

The Saugus WRP consistently met the 190 mg/L limit with no exceptions (Figure 21). With one exception, the Valencia WRP consistently met the Resolution 97-02's 190 mg/L limit over the period it applied (Figure 23).

[22] See Los Angeles Regional Water Quality Control Board Resolution No. 97-02, Finding No. 5.

[23] See LARWQCB Order No. 98-027, which amended chloride effluent limits for 14 municipal treatment plants including the Saugus and Valencia plants. At this time, the "Alaska Rule" as reflected in 40 CFR part 121, had not been adopted by EPA. Thus, "final approval" of regional resolutions was regarded as approval by the state Office of Administrative Law instead of EPA use for Clean Water Act purposes.

[24] *Ibid*.

[25] See Resolved Item 8 in Resolution 97-02, which states "the Regional Board will evaluate compliance consistent with the provisions set forth in this resolution" while the resolution are under review by the State Water Board and Office of Administrative Law.

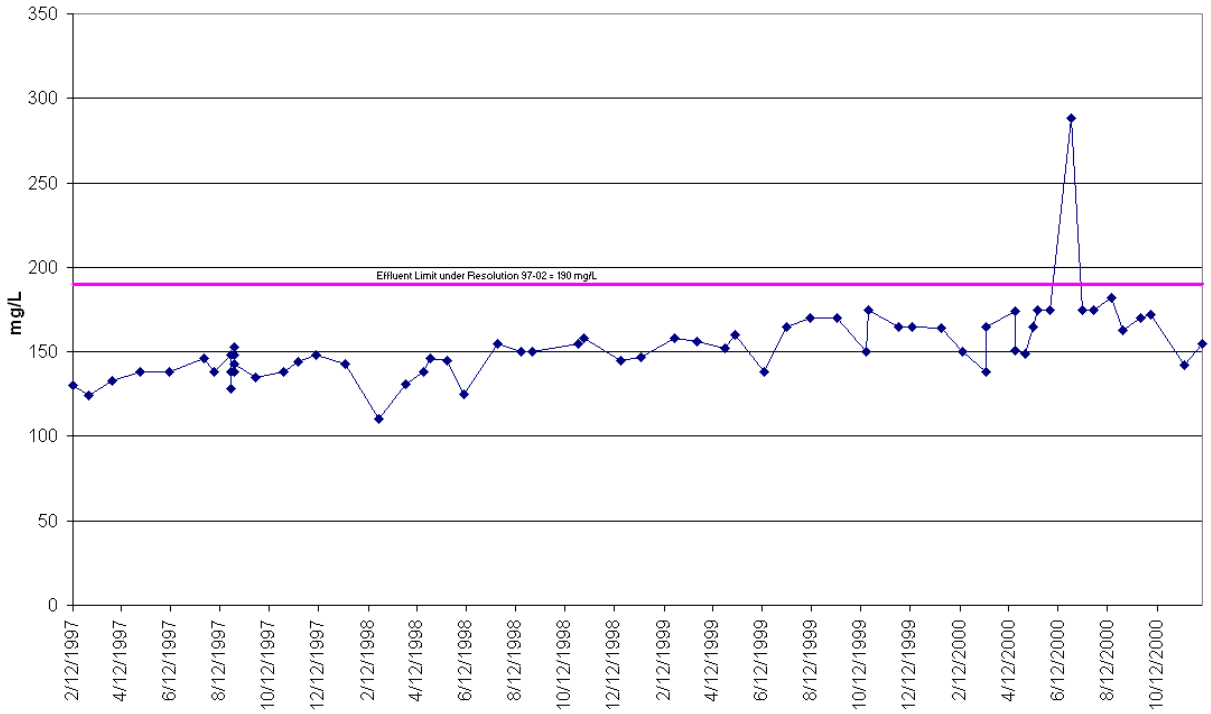

Figure 23. Chloride Concentration in Final Effluent at Valencia WRP (Resolution 97-02)

2003 and 2009 Permit Limits

Order Nos. R4-2003-0143 (Saugus) and R4-2003-0145 (Valencia) rescinded Order Nos. 95-080 and 95-081, respectively. These orders were amended by Order Nos. R4-2005-031 for Saugus and R4-2005-032 for Valencia.[26] For Saugus, Order Nos. R4-2003-0143 and R4-2005-0031 were superseded by Order No. R4-2009-0075 (the current NPDES permit for Saugus). For Valencia, Order Nos. R4-2003-0145 and R4-2005-0032 were superseded by Order No. R4-2009-0074 (the current NPDES permit for Valencia). Although the 2003 and 2009 permits contain the same chloride effluent limitations, the 2009 permits reflect the current limits and the 2003 permits no longer apply. These permits contain the following chloride effluent limitations:

- 100 mg/L as a *monthly* average, which no longer applies to either WRP. This limit reflected the water quality objective for chloride in the current Basin Plan and applied from the effective date of Orders R4-2003-0145 (Valencia) and R4-2003-0143 (Saugus) on November 6, 2003 until the day prior to April 28, 2005, when the Chloride TMDL for the Santa Clara River (Resolution No. R04-004) was approved by USEPA.

[26] On May 6, 2004, the Regional Board revised the Chloride TMDL to modify the interim waste load allocations within the TMDL to conform to the effluent limitations reflected in Time Schedule Orders (TSOs), which were adopted concurrently with Orders No. R4-2003-0145 (Valencia) and R4-2003-0143 (Saugus). These TSOs contained the same chloride interim limits subsequently adopted in Orders No. R4-2003-0145 (Valencia) and R4-2003-0143 (Saugus) as amended by R4-2005-031 (May 5, 2005) for Saugus and R4-2005-032 (May 5, 2005) for Valencia.

- Interim chloride effluent limits of the sum of the State Water Project treated water supply chloride concentration plus 114 mg/L for Saugus and 134 mg/L for Valencia, neither to exceed a daily maximum of 230 mg/L and measured as 12-month rolling averages. These limits became effective on April 28, 2005 [May 4, 2005 per Resolution R4-2006-016] according to the terms of the permit and will remain in effect until superseded by the final effluent limit reflected in the TMDL of 100 mg/L as a daily maximum barring an action adopting a site-specific objective(s) and subsequent actions to revise the TMDL WLAs and permit limits accordingly.[27] Both WRPs consistently meet their interim effluent limits.
- A 100 mg/L limit as a daily maximum reflecting the waste load allocation (WLA) in the Chloride TMDL was approved by EPA on April 28, 2005. According to R4-2009-0074 and R4-2009-0075, this limit will apply upon expiration of the current interim limits 11 years after the effective date of the TMDL (May 04, 2016[28]) unless extended or unless site-specific objectives derived under the terms of the TMDL are adopted.

In summary, a variety of effluent limitations for chloride have been effective since the WRPs began discharging. During some periods of discharge, the WRPs were in compliance with the limits and during others the limits were not achieved. However, the discharge concentrations have consistently exceeded 100 mg/L over the discharge period reviewed. Figure 24 shows a summary of the effluent limits as compared to discharge quality over time up until the expiration of the Drought Policy (Resolution 97-02), when the 100 mg/L limit was reinstated for both Saugus and Valencia. Reach 7 in the figure is the USEPA Reach designation for Reach 5 and Reach 8 is the USEPA designation for Reach 6.

[27] The State Water Resources Control Board Resolution No. 2007-0029 (May 22, 2007), which approved a Regional Board amendment to the chloride TMDL, indicates that the chloride TMDL became effective on May 5, 2005.

[28] The correct date for expiration of interim WLAs, as specified in the currently effective TMDL adopted by Resolution 2008-012, is May 4, 2015.

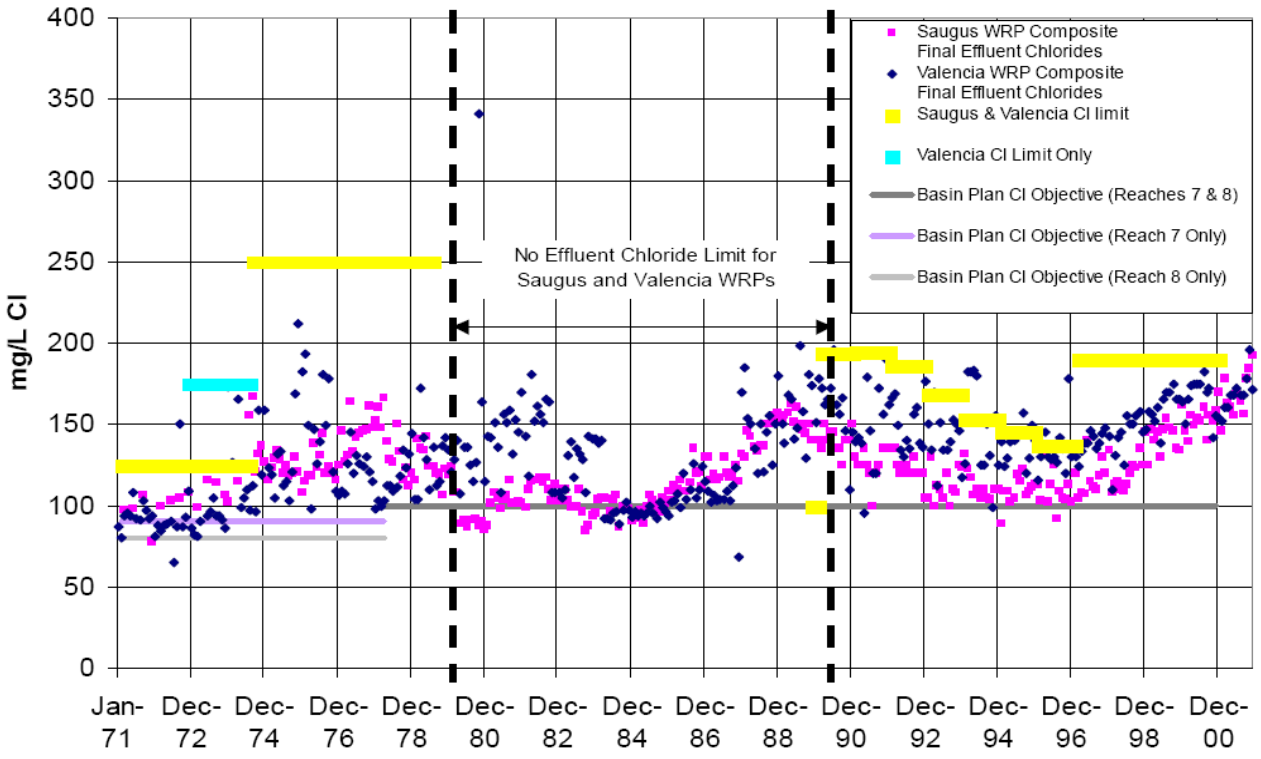

Figure 24. 1971-2001 Saugus and Valencia WRP Final Effluent Chloride Concentrations in Comparison with Historical Effluent Chloride Limits

3.1.3 A Detailed Economical Analysis of Compliance with Existing and Proposed Objectives

The Saugus and Valencia WRPs are the most significant chloride dischargers to Reaches 5 and 6. Therefore, the discussion below concerns the economic impacts associated with only facility upgrades to the Saugus and Valencia WRPs.

3.1.3.1 Economic Analysis of Compliance with an Instantaneous 100 mg/L Limit at each WRP

The current water quality objectives in the USCR are 100 mg/L implemented as an instantaneous maximum. To comply with the instantaneous 100 mg/L objective, there is basically one alternative for upgrades to the Saugus and Valencia WRPs, Scenario 1. This alternative includes installing sufficient advanced treatment (microfiltration and reverse osmosis) to ensure that the entire discharge volume (blend of advanced treated and tertiary treated effluent) meets 100 mg/L at all times. Since it is more cost effective to construct and operate a single advanced treatment facility, this scenario would require the construction of a pump station and pipeline from the Valencia WRP to the Saugus WRP. Additionally, to reduce the amount of chloride in the discharge at the Valencia and Saugus WRPs, these WRPs will be upgraded to utilize UV disinfection. This section evaluates the potential costs for implementing Scenario 1 to meet a final effluent chloride limit of 100 mg/L at both Saugus and Valencia WRPs.

The Saugus and Valencia WRPs provide primary, secondary, and tertiary treatment. These conventional treatment processes remove organic compounds and pathogens and produce high quality recycled water, but are not designed for the treatment or removal of dissolved salts such as chloride from wastewater. The District retained engineering consultant(s) to assess the various advanced treatment alternatives for compliance with the Chloride TMDL. The District's consultants evaluated the various alternative desalination technologies that would remove chloride in recycled water at the Valencia and Saugus WRPs, including membrane processes (reverse osmosis, nanofiltration, and electrodialysis), thermal process (multi-stage flash distillation (MFD), multi-effect distillation (MED or MEE), and mechanical vapor compression (VC) technologies), and ion exchange processes. Both Montgomery Watson Harza (2002) and Trussell Technologies (2007) evaluated potential chloride reduction technologies and concluded that reverse osmosis treatment achieves a high removal of chloride and is less costly than the other desalination technologies and was therefore the recommended treatment alternative if advanced treatment to remove chloride is necessary for compliance with the Chloride TMDL.

These studies also concluded that reverse osmosis treatment requires appropriate pretreatment of recycled water to prevent fouling of the membranes used in the reverse osmosis process, which would result in loss of treatment efficiency. The conventional treatment processes at the Saugus and Valencia WRPs are not sufficient for the direct treatment of tertiary recycled water with reverse osmosis membranes, without some form of pre-treatment. Both studies concluded that pretreatment, utilizing either microfiltration and/or a membrane bioreactor technology (which provides both biological treatment and low pressure membrane filtration) would be necessary at the Saugus and Valencia WRPs, prior to reverse osmosis treatment.

In addition, reverse osmosis technologies produce a brine waste that also requires disposal. Montgomery Watson Harza (2002) identified the use of a brine line and/or the use of deep well injection as potential means for the disposal of reverse osmosis brines. However, in both reports, MWH indicated that deep well injection disposal options would require extensive field exploration and testing in order to determine if such a brine disposal option was a technically feasible option.

In the 2013 EIR, various combinations of treatment technologies and brine disposal options identified in the MWH and Trussell Technologies studies were evaluated. Based on this evaluation, a proposed combination of infrastructure was identified. This combination (Scenario 1) consists of the installation and operation of advanced treatment facilities (MF/RO) and brine disposal facilities at the Valencia WRP, a pump station, and a pipeline to the Saugus WRP. The District would install sufficient advanced treatment capacity to discharge recycled water with chloride levels that would meet 100 mg/L for the full WRP discharge. Operation of Scenario 1 would result in waste brine that requires disposal. Given the volumes of brine waste generated by Scenario 1, the brine disposal alternative would be through a new brine conveyance pipeline to deep wells for injection disposal.

The District evaluated chloride data for the Valencia and Saugus WRPs and for the potable water supply in the Santa Clarita Valley to determine the size of advanced treatment facilities necessary to achieve compliance with the existing WQO and the estimated brine waste produced as a result of these treatment processes. Because the existing WQO is implemented as an instantaneous objective, the size of the advanced treatment, deep well injection facilities and brine conveyance pipeline required was based on the peak daily design flows for the Valencia

and Saugus WRP[29]. In order to comply with the existing WQO, the District determined that an 8.8 MGD MF/RO facility would need to be constructed at the Valencia WRP to produce a blended discharge meeting the objectives under all conditions. In addition, the District determined that part of the RO permeate water generated at the Valencia WRP would be conveyed to the Saugus WRP to produce a blended discharge meeting the objectives under all conditions. Assuming an RO recovery of 92.5%, the District estimates that approximately 0.7 MGD of brine waste would be generated at the Valencia WRP. Based upon these estimates, the District prepared cost estimates for brine disposal through a dedicated brine conveyance pipeline to a series of deep wells for disposal.

Based on the proposed treatment facility at the Valencia WRP, a pump station and pipeline to Saugus WRP, and the brine disposal conveyance pipeline, the District has prepared a construction cost estimate presented in Table 9. It should be noted that capital costs presented in Table 9 do not include the cost of land acquisition, utility relocation, permitting or environmental assessments.

Table 9. Project Capital Costs for Scenario 1

Facility	Cost
UV at Saugus &Valencia WRP	$30,000,000
MF/RO Facility at Valencia WRP	$53,600,000
RO Permeate Pipeline to Saugus WRP	$12,800,000
Brine Disposal Conveyance Pipeline	$49,000,000
TOTAL CAPITAL COST	**$145,400,000**

Cost estimates for Operations and Maintenance (O&M) for Advanced Treatment and Brine Disposals are summarized in Table 10.

Table 10. Project O&M Costs for Scenario 1

Facility	Annual Cost
UV at Saugus & Valencia WRP	$100,000
MF/RO Facility at Valencia WRP	$3,690,000
RO Permeate Pipeline to Saugus WRP	$140,000
Brine Disposal Conveyance Pipeline	$1,100,000
AVERAGE ANNUAL O&M Cost	**$5,030,000**

[29] Peak daily design flow for the Valencia and Saugus WRPs is assumed to be 23.8 MGD and 7.2 MGD, respectively

3.1.3.2 Economic Analysis of Compliance with Proposed Objectives

In order to comply with the proposed water quality objectives, an alternative option, Scenario 2, was developed to achieve compliance with SSOs at all times and at all locations. Scenario 2 consists of several key elements that include:

- UV disinfection at the Valencia and Saugus WRP to reduce chloride in the recycled water; and,
- Advanced treatment for a portion of the recycled water from the Valencia WRP.

Cost estimates were prepared by the District and its consultants for the various elements of Scenario 2.

Treatment Upgrades at the Saugus WRP

Scenario 2 consists of implementing measures to reduce the chloride levels in the recycled water discharged from the Saugus WRP. The reduction in chloride levels would be achieved through treatment upgrades, specifically the conversion of the disinfection processes at the Saugus WRP from the current bleach based process, which contributes approximately an additional 10 mg/L of chloride to the WRP recycled water, to ultra-violet disinfection technology. The District's costs estimates for this element of Scenario 2 are presented in Table 11.

Treatment Upgrades at Valencia WRP

In order to comply with the proposed water quality objectives, additional chloride reduction beyond that achieved from the UV treatment upgrade at the Valencia WRP will be required. Scenario 2 contemplates achieving this additional chloride removal through construction and operation of a 7.1-MGD advanced treatment facility using MF/RO treatment technology at the Valencia WRP. This facility would remove approximately 100,000 pounds per month of chloride from the WRP recycled water and reduce chloride levels in the SCR to achieve the proposed site-specific objectives.

Based on the cost estimates provided for Scenario 1 to comply with the existing water quality objectives, the District has estimated the cost for construction and operation of the smaller 7.1-MGD MF/RO facility. In addition, operation of this advanced treatment facility would produce a waste brine, which would require disposal. Assuming an RO recovery of 92.5%, the District estimates that the facility would produce approximately 0.5 MGD of brine waste. Based upon these estimates, the District prepared cost estimates for brine disposal through a dedicated brine conveyance pipeline to a series of deep wells for injection disposal.

The estimates for the capital and O&M costs for the UV disinfection facility, the 7.1-MGD MF/RO facility, and the brine disposal facilities contemplated as part of Scenario 2 are presented in Table 11.

Table 11. Project Capital and O&M Costs for Scenario 2

Scenario 2 Element	Capital Cost	Annual O&M
UV at Saugus & Valencia WRP	$30,000,000	$100,000
MF/RO Facility at Valencia WRP	$48,400,000	$3,170,000
Deep Well Injection Facilities and Brine Disposal Conveyance Pipeline	$42,000,000	$900,000
TOTAL SCENARIO 2 COST	**$120,400,000**	**$4,170,000**

3.1.4 An Analysis of Compliance and Consistency with All Federal, State, and Regional Plans and Policies

The proposed rulemaking complies with all relevant federal, state, and regional plans, and policies. The proposed water quality objectives are consistent with State and Federal antidegradation policies as discussed in Section 3.3, Antidegradation Analysis. In addition, the elements specified in the Basin Plan that should be addressed for site-specific objectives have been discussed and analyzed in previous sections. Finally, the proposed site-specific objectives will support increasing recycled water use consistent with the Recycled Water Policy and recommended water measures to reduce GHG emissions as discussed in the first update to the AB32 California Climate Change Scoping Plan.

3.2 WATER CODE SECTION 13241 REQUIREMENTS

Water Code section 13241 requires the Regional Board to consider the following when establishing a water quality objective:

- The past, present, and probable future beneficial uses of water.
- The environmental characteristics of the hydrographic unit under consideration.
- Water quality conditions that could reasonably be achieved through the coordinated control of all factors which affect water quality in the area.
- Economic considerations.
- The need for developing housing within the region.
- The need to develop and use recycled water.

3.2.1 Past, Present, and Probable Future Beneficial Uses of Water

Below is a brief discussion of the past, present, and probable future beneficial use designations in the Santa Clara River in the Basin Plan followed by a more in depth discussion of the past, present, and future use of waters from the USCR for irrigation of agriculture with emphasis on salt-sensitive crops.

Table 2-3. "Present and Potential Beneficial Uses in the Santa Clara River Basin" in the 1975 Basin Plan (p.I.2.7) delineated the present and potential beneficial uses of the Santa Clara River and Tributaries within the Eastern Sub-area of the Upper Santa Clara River Subunit. These 1975 designations included many of the current designations delineated in Table 2-1. "Beneficial Uses of Inland Surface Waters" in the 1994 Basin Plan including the following "existing" beneficial uses:[30]

- Agricultural Supply (AGR)
- Industrial Process Supply (PROC)
- Industrial Service Supply (IND)
- Ground Water Recharge (GWR)
- Freshwater Replenishment (FRSH)
- Cold Freshwater Habitat (COLD)
- Wildlife Habitat (WILD)
- Water Contact Recreation (REC-1)
- Non-contact Water Recreation (REC-2)

Since the adoption of the 1975 Basin Plan, the Regional Water Board has designated an additional six "existing" beneficial uses and one designation classified as Potential (P*) for the Upper Santa Clara River.[31] These include the following as defined in the 1994 Basin Plan, Chapter 2:

[30] These designations are defined in Chapter 2 of the 1994 Basin Plan.

[31] For background information on the P* category, see the Chapter 2 of the 1994 Basin Plan.

Existing Beneficial Water Uses

- Municipal and Domestic Supply (MUN)
- Migration of Aquatic Organisms (MIGR)
- Warm Freshwater Habitat (WARM)
- Rare, Threatened, or Endangered Species (RARE)
- Wetland Habitat (WET)

Asterisked Potential Beneficial Uses (P*)

- Municipal and Domestic Supply (MUN)

The probable future beneficial uses of the surface waters in the USCR are likely to remain consistent with past uses with the exception of agriculture supply (AGR). This beneficial use of water is likely to remain constant in areas of Reaches 4A and 4B where significant lands surrounding the river basin consist of irrigated agriculture. With the exception of commercial nurseries, the use of water for the irrigation of crops is likely to decline in Reach 5 where agricultural lands owned by Newhall Land and Farm adjacent to the river in the Los Angeles County portion of Reach 5 are expected to be developed into the residential areas of Landmark Village, Homestead Village, Mission Village and Potrero Village, which will comprise the Newhall Ranch land development. The first two phases of the Newhall Ranch development, Landmark Village and Mission Village, have been given final approval by the Los Angeles County Board of Supervisors.[32] [33]

3.2.2 Past, Present, and Probable Future Use of Irrigation in Agriculture around Reaches 4, 5, and 6

The 1975 Basin Plan designated the AGR beneficial use for all of the "Santa Clara River and its tributaries," as well as for the Upper Santa Clara River Subunit (for groundwater), where the present Reaches 4B, 5, and 6 are located. The 1975 Basin Plan did not specify the specific reaches of the river where the AGR beneficial use applied, the specific types of crops that were cultivated within these reaches, and whether surface water diversions were being utilized for irrigated agriculture in these reaches. In particular, there was no specific discussion about whether known salt-sensitive crops like avocados were present or were irrigated with surface water within Reaches 5 and 6. The 1975 Basin Plan mentioned the types of crop categories that were grown, based on water supply projections discussed in Chapter 13. Table 13-28 in the 1975 Basin Plan listed alfalfa, pasture, citrus and subtropical, truck crops, field crops, deciduous fruits and nuts, and small grains and provided water supply projections for these crop categories in the USCR subunit. While avocados and strawberries could have been included under the broad categories of "citrus and subtropical" and "field crops," respectively, there was no specific mention that these particular salt-sensitive crops were irrigated with either surface water or

[32] Los Angeles County, 2012. *Statement of Proceedings for the Regular Meeting of the Board of Supervisors of the County of Los Angeles Held in Room 381B of the Kenneth Hahn Hall of Administration.* May 15, 2012.

[33] Santa Clarita Valley Signal, 2012. "UPDATE: Supervisors OK second phase of Newhall Ranch." May 15, 2012.

groundwater in the Upper Santa Clara River watershed. Nursery crops were not mentioned in the 1975 Basin Plan.

3.2.2.1 Present Agricultural Irrigation in Reach 4

The overwhelming portion of agricultural operations in the vicinity of the SCR upstream of Fillmore are located in the Piru Valley around Reaches 4A and 4B of the SCR near the confluence with Piru Creek. Land use in this region is predominantly agricultural with extensive citrus and avocado, improved pasture, nursery crops, and row crops. Local growers in this area irrigate crops primarily with groundwater from local aquifers fed by releases from Lake Piru and the Santa Clara River, as well as surface diversions from the Santa Clara River. Agricultural supply water originating from Lake Piru are unaffected by chloride levels in the Santa Clara River because Lake Piru is fed with State Water Project water and local runoff. Camulos Ranch is the only known avocado grower that irrigates crops using water originating from Reach 4B surface waters.

The proposed water quality objectives in Reach 4B and the underlying groundwater are fully protective of agricultural uses in this area based on the result of the LRE for salt-sensitive crops (100 to 117 mg/L chloride threshold value). Further considerations of the use of surface water from the SCR and groundwater impacted by this water for agriculture are discussed in Section 3.2.4 Water Quality Conditions that Could Reasonably be achieved through the Coordinated Control of all Factors, Which Affect Water Quality in the Area.

3.2.2.2 Present Agricultural Irrigation in Reach 5

Newhall Land and Farm is the only landowner with existing agricultural operations that could potentially be impacted by groundwater-surface water interactions within Reach 5 of the Santa Clara River. All of Newhall Land and Farm's irrigated agricultural operations occur west of the intersection between Interstate-5 and the Santa Clara River, with the vast majority of its operations occurring west of Castaic Creek, where the current groundwater chloride objective is 150 mg/L.[34] This company has historically used only groundwater to grow salt-tolerant crops including walnuts, alfalfa, green mixed vegetables, onions, squash, parsley, cilantro, broccoli, artichokes, cauliflower and tomatoes within Reach 5.[35] Due to adverse climatic conditions, Newhall Land and Farm has not historically and does not plan in the future to cultivate salt-sensitive crops in Reaches 5 or 6. Therefore, the proposed SSOs for Reaches 5 and 6 are protective of the AGR beneficial use and are all less than or equal to the existing groundwater quality objective in the Castaic Valley underlying Reach 5.

Despite insufficient evidence in the LRE supporting a recommendation for a chloride threshold for nursery crops, the impact of the proposed water quality objectives on nursery crops in the area was considered. As described in White Paper 2A, a number of commercial and wholesale nurseries are located in the Santa Clarita Valley north of the SCR along Castaic Creek and south of the SCR between the Antelope Valley Freeway and Interstate 5. These nurseries are outside the vicinity of Reaches 5 and 6 and are not likely impacted by river surface water chloride

[34] Per phone conversation with Mark Subbotin, Vice President of Newhall Land and Farm (2007).

[35] *Ibid.*

concentrations. This is because the groundwater and surface water flow direction in the Castaic Creek Tributary region is from north to south and towards the main stem of the Santa Clara River, which has a lower elevation than the groundwater underlying tributary regions along Castaic Creek (See White Paper No. 2A). There is one commercial nursery that is located along the South Fork tributary in Placerita Canyon. However, the groundwater and surface water flow direction for the South Fork tributary is from south to north and towards the main stem of the Santa Clara River due to changes in water table elevations. Thus, it is very unlikely that surface flows from Reach 6 of the Santa Clara River would impact any groundwater that would affect this particular commercial nursery.

3.2.2.3 Present Agriculture Irrigation in Reach 6

Surface waters from Reach 6 or groundwater potentially impacted by these surface waters are not used as an irrigation supply (LACSD, 2007). Any possible past use of land around Reach 6 for non-nursery type agriculture has terminated due to the changing land use patterns of the region. Green Landscape Nursery is located near the Saugus WRP across Bouquet Canyon Road. This commercial nursery, however, is served exclusively with SWP water by the Santa Clarita Water Division of the Castaic Lake Water Agency (CLWA). Another commercial nursery is located along the South Fork tributary in Placerita Canyon. However, the groundwater and surface water flow direction for the South Fork tributary is from south to north and towards the main stem of the Santa Clara River. It, therefore, would likely be physically impossible for surface flows from Reach 6 of the Santa Clara River to impact any groundwater that would affect this commercial nursery. Finally, a number of other commercial nurseries are located several miles northeast and southeast of Reach 6 of the Santa Clara River. These, nurseries, however, would not be impacted by surface flows from the Santa Clara River.

3.2.2.4 Future Agriculture Irrigation in Reaches 4, 5, and 6

Irrigation levels in the area of Reach 4 of the SCR are not expected to change over the next few decades in the Piru Valley (the Piru and Eastern Fillmore Subbasins).[36] The predominantly agricultural community in the Piru Valley is generally opposed to urban sprawl and has an interest in protecting open space and agricultural lands.[37] Available land that could be cultivated to expand local agriculture is limited outside the 100-year flood zone of the SCR in the Piru Valley. Development of agricultural lands in Ventura County is limited by the Ventura County Save Open Spaces and Agricultural Resources (SOAR) measure. This measure requires voter approval of future changes to the open space, agricultural, and rural policies and land use designations in unincorporated areas, which are governed by Ventura County's General Plan. SOAR's provisions will remain in effect until CY 2021, unless repealed by the voters at a general election before CY 2021. Given these circumstances, significant changes in agricultural land uses in Reach 4 will not likely occur in the foreseeable future.

[36] See Task 2B – Numerical Model Development Approach for Projecting Water Demands and Supplies in the Piru Subbasin Upper Santa Clara River Chloride TMDL Collaborative Process (September 28, 2007) (Section 4.0), CH2M HILL–HGL

[37] *Ibid.*

The use of irrigation water for agriculture in Reach 5 is expected to decline due to ongoing changes in land use in the area. In particular, agricultural lands owned by Newhall Land and Farm adjacent to the SCR in Reach 5 on the Los Angeles County portion of Reach 5 are expected to be developed into the residential areas of Landmark Village, Homestead Village, Mission Village, and Potrero Village, which will comprise the Newhall Ranch land development. The first phase of the Newhall Ranch development, Landmark Village, has been given final approval by the Los Angeles County Board of Supervisors.

As delineated above, surface waters from Reach 6 or groundwater potentially impacted by these surface waters are not used as an irrigation supply for crops. Based on the changing land use patterns around Reach 6 towards residential and commercial development, this finding is not likely to change.

3.2.3 Environmental Characteristics of the Hydrographic Unit Under Consideration, Including the Quality of Water Available Hereto

The impact of the SSOs on the environmental characteristics of the waterbody, including in-stream and riparian species and habitat was considered. When implemented, Scenario 2 will result in reduced chloride discharges from the primary point sources in the USCR. The 100 mg/L 3-month rolling average surface WQOs in Reaches 4B and part of 5 and the 150 mg/L surface WQO in Reach 6 and part of 5 are more stringent than the effluent limitations that have applied to the Saugus and Valencia WRPs over a significant portion of their operating histories. Therefore, it is not expected that this rulemaking will result in any harm to in-stream or riparian species or habitat.

The discussion below describes the Santa Clara River Watershed based on previous characterizations of the watershed environment. Additionally, information on the sources and quality of the water supply is provided.

3.2.3.1 Setting and Physiography

The Santa Clara River is the largest river in Southern California. It originates in the northern slope of the San Gabriel Mountains in Los Angeles County, traverses Ventura County and flows into the Pacific Ocean between the Cities of San Buenaventura and Oxnard. The Santa Clara River watershed covers approximately 1,600 square miles over the river's 100 miles in length. The Basin Plan divides the watershed into 11 reaches, eight on the Santa Clara River and three comprised of major portions of significant tributaries including Santa Paula, Sespe, and Piru Creeks.

The Santa Clara River spans over two major regions designated as the Upper and Lower Santa Clara River. The portion of the river within Los Angeles County is generally described as the Upper Santa Clara River, and the portion within Ventura County is generally referred to as the Lower Santa Clara River. The Upper Santa Clara River watershed has approximately 680 square miles of mostly natural land with some mixed developed areas. Developed areas are concentrated in the Santa Clarita Valley, which has a population of over 250,000 located mostly within the City of Santa Clarita.[38] The major tributaries to the Upper Santa Clara River

[38] The City of Santa Clarita is comprised of the former unincorporated communities of Newhall, Valencia, Saugus, Canyon Country, and portions of Castaic.

watershed include Castaic Creek, San Francisquito Canyon, Bouquet Canyon, Sand Canyon, Mint Canyon, the Santa Clara River South Fork and Piru Creek (where Reaches 4A and 4B meet).

3.2.3.2 Historic and Current Flow

Surface flow levels correspond to seasonal precipitation within the region. Increased surface flows exist typically during winter and spring months followed by a relatively long summer and fall season of lower flows. Winter time flows during periods of significant precipitation have been measured as high as 1,880 cfs at the Blue Cut Gauging Station, which is located near the Los Angeles-Ventura County Line.[39] In contrast, in recent history, dry weather flows near Blue Cut Gauging Station have been recorded as low as 12.6 cfs.

Various reaches of the river have continuous flow only during significant storm events with portions having perennial flow and others intermittent. Natural flow in all the major streams and tributaries in the basin is intermittent and ephemeral, with most of the stream flow related to flood flows. In both wet and dry seasons, there is typically no flow upstream of the Saugus WRP (in Reach 7), and in some instances there is very little, if any, flow within the mid portion of Reach 6.[40] In Reach 4, there is typically no flow immediately downstream of Piru Creek in both wet and dry seasons (except during conservation releases from Lake Piru). This "dry gap" of varying length persists in the middle portion of Reach 4.

Baseflow in the USCR is comprised of surfacing groundwater, discharges from the Saugus and Valencia WRPs, conservation releases of imported and local waters from reservoirs, and runoff from applied water (agricultural runoff and urban runoff). During the dry months of the year, portions of the river completely subside for some period during the day (usually early morning). These conditions correspond to the Saugus WRP's low flow conditions. These observations indicate that the natural flow of water that would exist in Reach 6 without the Saugus WRP's discharge would be minimal and likely intermittent.

The base river flow between the Valencia WRP and Blue Cut gauging station (near the Los Angeles – Ventura County line), which comprises much of Reach 5, is composed of rising groundwater, treated wastewater discharges from the Valencia and Saugus WRPs, releases of water stored in Castaic Lake, bank seepage, and non-point sources, including uncontrolled runoff from agricultural and urban areas not related to storm flows. Based on flow measurements taken near the LA-VC line in Water Year 1999-2000, the total flow discharged from the District's WRPs comprised approximately 42% of the total flow measured.[41] Base flow caused by rising groundwater is due to geologic conditions that force groundwater into the streambed. This occurs throughout most of Reach 5 beginning at the Old Road Bridge just east of the Valencia

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[39] Source is US Geological Survey data available at http://waterdata.usgs.gov/nwis. This high flow occurred during a February 1998 storm. The figure is a calculated monthly mean flow at the Blue Cut Gauging Station (USGS 11109000 SANTA CLARA R NR PIRU CA).

[40] California Department of Water Resources, *Investigation of Water Quality and Beneficial Uses, Upper Santa Clara River Hydrologic Area*, 196 pp., June 1993.

[41] Based on Water year (WY) October 1999 – September 2000 flows measured daily at USGS gauging station 11109000 (Santa Clara River Nr Piru), located approximately 1.5 miles downstream of the LA-VC line.

WRP and the upper portion of Reach 4 east of the dry gap. [42] [43] This is part of the reason surface flow in this area is perennial.

Further downstream, in Reach 4 between the confluence at Piru Creek and Las Brisas, surface flow is typically present only during parts of the wet season, which varies by water year. This "dry gap" seasonally separates the upper Santa Clara River hydrologically from the lower river, which, during normal or below normal water years, impedes inter-reach migration and movement of aquatic life. The Freeman Diversion, downstream of Santa Paula, diverts some or all of Santa Clara River flows (depending on the flow conditions) to the El Rio and Saticoy spreading grounds, where the water recharges the underground aquifers. The United Water Conservation District has a diversion right of 375 cfs at any given time with a maximum of 144,000 acre-feet per year at the Freeman Diversion. During below average water years, this diversion can create dry river conditions downstream.

3.2.3.1 Groundwater/Surface Water Interactions

The Upper Santa Clara River system includes dynamic interactions between surface water and groundwater, with losing and gaining reaches present throughout the system. Results from the GSWIM and USGS studies provide insight into the groundwater/surface water interactions in the Upper Santa Clara River. Reach 6 is generally considered to be a losing reach that transitions to a gaining reach near the beginning of Reach 5. Surface water flows, including discharge from the Saugus WRP infiltrate into the upper aquifer. Direct recharge to the lower aquifer from the surface water does not occur, but the upper aquifer interacts with the lower aquifer so surface water can reach the lower aquifer over time. Reach 5 is predominantly gaining. Reach 4B also is considered a losing reach as surface flow moves into the subsurface of the river near Castaic Creek (dry gap) then reappears further west.

3.2.3.2 Watershed Habitats

The Santa Clara River has multiple biological resources. The river has at least six recognized natural communities including the Southern Coastal Salt Marsh, Subtidal Estuarine, Southern Riparian Scrub, Cottonwood-Willow Riparian Woodland, Alluvial Fan Sage Scrub, and Riverine. Downstream from the City of Santa Clarita are extensive riparian woodlands of willow and cottonwood primarily in Los Angeles County, which change to riparian scrub in Ventura County. The riparian forest is home to several bird species, including the endangered "Least" Bell's vireo. Overall, 14 resident bird species are listed as endangered or of special concern, and 6 plant species are endangered or candidates for listing. The unarmored threespine stickleback (UTS), a small scaleless, freshwater endangered fish, inhabits the river's upper reaches.

Extensive patches of high quality riparian habitat are present along the entire length of the Santa Clara River. These patches serve as "stepping stones" for migratory birds traveling between

[42] The California Department of Water Resources estimates that approximately 10,660 acre-feet per year of rising groundwater discharges to the surface water near the Los Angeles-Ventura County line.

[43] California Department of Water Resources, *Investigation of Water Quality and Beneficial Uses, Upper Santa Clara River Hydrologic Area*, 196 pp., June 1993.

riparian areas and wetlands on the south coast. The river is also home to many species in decline throughout the southern California region. The "Least" Bell's Vireo (*Vireo bellii pusillus*, a small bird) and the UTS (*Gasterosteus aculeatus wiliamsoni*) are both listed as endangered, as well as the steelhead trout, which occurs primarily in the lower SCR watershed.

The Santa Clara River serves also as an important wildlife corridor and habitat for several listed and indicator species including the Arroyo Toad, Slender Horned Spineflower, Southwest Willow Flycatcher, Red-Legged Frog, California Gnat Catcher, Plummers Mariposa Lily, Ocelated Humboldt Lily, Prostrand Navarretia, Forest Camp Sandwort, Summer Tanager, Riverside Fairy Shrimp, Nevins Barberry, and Loggerhead Shrike.

Larry Walker Associates previously reviewed literature on special status aquatic life species living in the Santa Clara River focusing on the Upper Santa Clara River. Nine special status aquatic species were selected for review based on their listing status by the US Fish and Wildlife Service (USFWS), as well as the species dependence on the aquatic habitat of the Santa Clara River. The literature review focused on the status of the UTS and Southern California Steelhead, and provides a general summary of ongoing and planned restoration projects affecting aquatic health in the Santa Clara River. The findings for the steelhead trout and UTS are summarized below.

The endangered steelhead is known to seasonally occupy the lower section of the Santa Clara River, from the estuary to the mouth of Piru Creek. The lower section of the Santa Clara River serves as a migration corridor for the steelhead to Santa Paula, Sespe, and Piru Creeks and is not typically used for spawning and rearing. Sespe Creek has historically been the greatest spawning grounds for steelhead in the Santa Clara River watershed. Therefore, recovery efforts are focused on maintaining access to Sespe Creek. While it is unknown if steelhead occupy the upper section of the river, there remains some potential for them to reach spawning habitat in headwater streams during above normal water years when the dry gap is inundated during the winter migration season (Capelli, pers. comm.). Access to headwater tributaries is impeded by (a) a 20' concrete sill at Saticoy, and (b) an accumulation of sandy substrate known as the 'dry gap' between Piru Creek and Las Brisas (Entrix, 1999; Capelli, 1997). While steelhead may have historically used headwater tributaries above the Piru Creek-Las Brisas dry gap to spawn, observations of steelhead in the Upper Santa Clara River have not been recorded in recent years (potentially due to a lack of monitoring); thus, the importance of these spawning grounds to overall species recovery is not fully determined.

The USFWS listed the UTS as federally endangered on October 13, 1970. It received full protection under the Endangered Species Act in 1973. Two sections of the Upper Santa Clara River and one section of San Francisquito Canyon were listed as critical habitat by the USFWS (USFWS, 1985), but were revoked by a 2002 USFWS rule (Vol. 67, No. 180).

Presently, the UTS is estimated to number in the thousands to ten thousands in the Upper Santa Clara River. Critical habitat for UTS in the Santa Clara River has been established by USFWS (1985) as two disjointed sections of the Upper Santa Clara River and San Francisquito Canyon. The two sections of the Upper Santa Clara River are described as (a) the section near Del Valle downstream of Interstate 5, and (b) the river section at the mouth of Soledad Canyon. These two sections are separated by a small, yet significant, ephemeral dry gap (Bouquet Canyon Road to Highway 14) in the riverbed. This gap separates fish in Soledad Canyon from the main-stem of the Santa Clara River, thereby reducing the threat of introgression of this sub-population in the

watershed. While these critical habitat areas represent significant habitat for the UTS population, they are not federally protected due to a 2002 USFWS rule to revoke the protective habitat designation.

The decline of the UTS is attributed to the effects of urbanization, mainly the channelizing of low-flow stream habitat so depended on by UTS (USGS, 2001). The introduced mosquitofish (*Gambusia affinis*) is suspected to compete with UTS for food (Baskin, 1974). Changes to river water quality, including changes in dissolved oxygen, nutrients, suspended sediment, and temperature, are also detrimental to UTS survival. Current threats to the UTS include hybridization with the armored and partially armored sticklebacks (described below) below the ephemeral dry gap, channeling of the river, and two non-native predators, the African clawed frog and the bullfrog.

A stickleback sub-species, the partially armored threespine stickleback (*Gasterosteus aculeatus microcephalus*), inhabits the lower Santa Clara River. This sub-species is seasonally isolated from the UTS by the dry gap between Piru and Las Brisas for most of the year (discussed earlier). *G. a. microcephalus* and UTS may co-mingle when river flows inundate the dry gap, which raises concerns of potential introgression between the sub-species. The partially armored threespine stickleback is not listed as threatened, endangered, or as a species of special concern. Partially armored threespine sticklebacks were the dominant observed species in Piru Creek during a 2003 survey conducted below Santa Felicia Dam with 90.6 percent of the fish species collected from the Creek being partially armored threespine sticklebacks.

The TES study, discussed above, determined that the USEPA aquatic life criteria for chloride are protective of the threatened and endangered species present in the USCR. In particular, the TES study noted that testing of surrogate T&E species confirmed the relatively low sensitivity of T&E fish and amphibians to chloride that was shown in the literature. Since the aquatic life criteria (230 mg/L measured as a 4-day average) are much higher than the proposed SSOs, threatened and endangered species will be protected by the proposed SSOs.

3.2.3.3 Impact of Quality of Water Supplied to the USCR

The largest source of chloride to the Upper Santa Clara River is the water supply. Up to 12.7 tons of chloride per day is imported into the watershed during dry years (CH2M Hill and HGL, 2006b). Dry and critically dry periods affecting the Sacramento and San Joaquin River Valleys reduce fresh-water flow into the Sacramento-San Joaquin Delta and result in higher than normal chloride concentrations in the SWP supply within the California aqueduct system. Imported SWP water supplies approximately 60% of local water demand in the Santa Clarita Valley. This water has a large influence on the final chloride concentration in the effluent of the Saugus and Valencia WRPs. Figure 25 illustrates the historic fluctuation of SWP water salinity showing the historic chloride concentrations at Check 41 (Tehachapi Pass). Check 41 is a SWP water quality monitoring station, located just upstream of where the California aqueduct splits into the west and east branches and is a good indicator of the water quality that enters the West Branch of the California Aqueduct, which ultimately is the water delivered to the Castaic Lake Reservoir and the Santa Clarita Valley. Approximately 8% of the Check Point 41 chloride data show concentrations exceeding 100 mg/L. The rising chloride concentrations depicted for water years 1998/99 - 2001/02 correspond to the Southern California critically dry years.

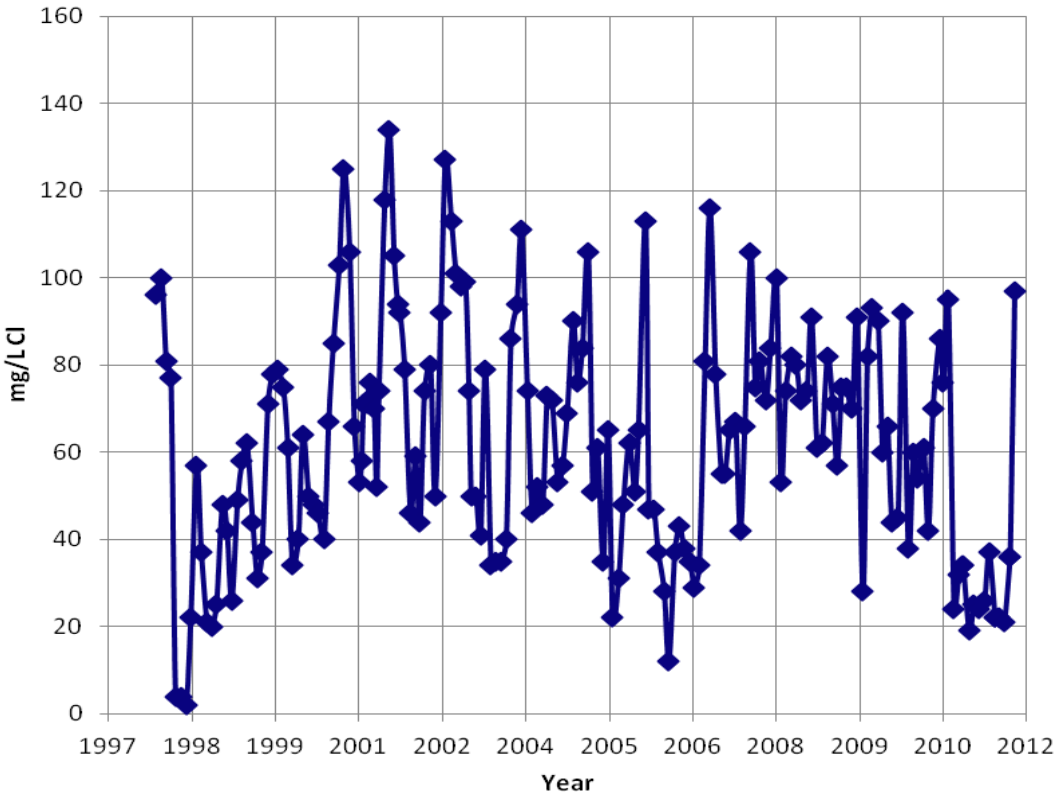

Figure 25. SWP Chloride Concentrations at Check 41 (California Aqueduct)

Figure 25 illustrates the impact that water supply chloride conditions have on WRP effluent quality. This figure shows how effluent quality generally tracks the imported water quality of SWP Water.

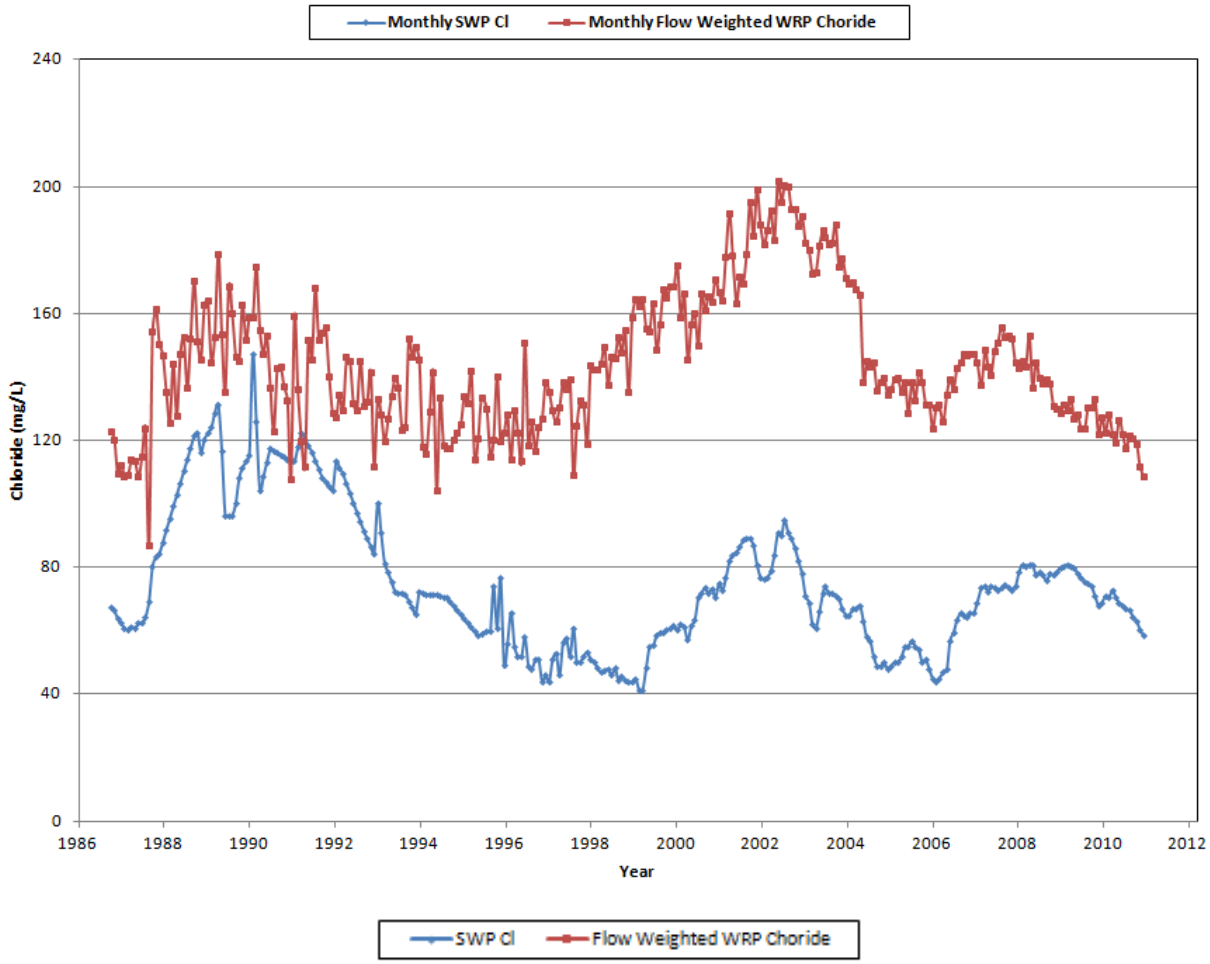

Figure 26. SCVSD WRP Effluent and SWP Chloride

Salinity fluctuations in the SWP water can also be observed in the imported water treated and delivered by the CLWA. The chloride concentrations levels observed in the untreated and treated SWP water sold by CLWA to local retail purveyors are somewhat attenuated from the Check Point 41 levels due to the large storage capacity of the Castaic Lake Reservoir and the influence from captured local stormwater. Nonetheless, during critically dry periods, chloride concentrations increase and have historically exceeded the 100 mg/L chloride objective. As shown in Figure 26, the chloride concentration in the CLWA deliveries to local Santa Clarita Valley retail water purveyors increased during the 1987-1991 critically dry period, and reached 147 mg/L in 1990. It is also important to note that more recent data for Castaic Lake indicate that the chloride concentrations in water delivered by the CLWA increased by more than 50 mg/L from 1999 to 2003 and then more than 35 mg/L from 2006 to 2008. The Castaic Lake chloride concentration observed in March 2003 was 95 mg/L, the highest chloride concentration observed since the last statewide critically dry period of 1987-1991.

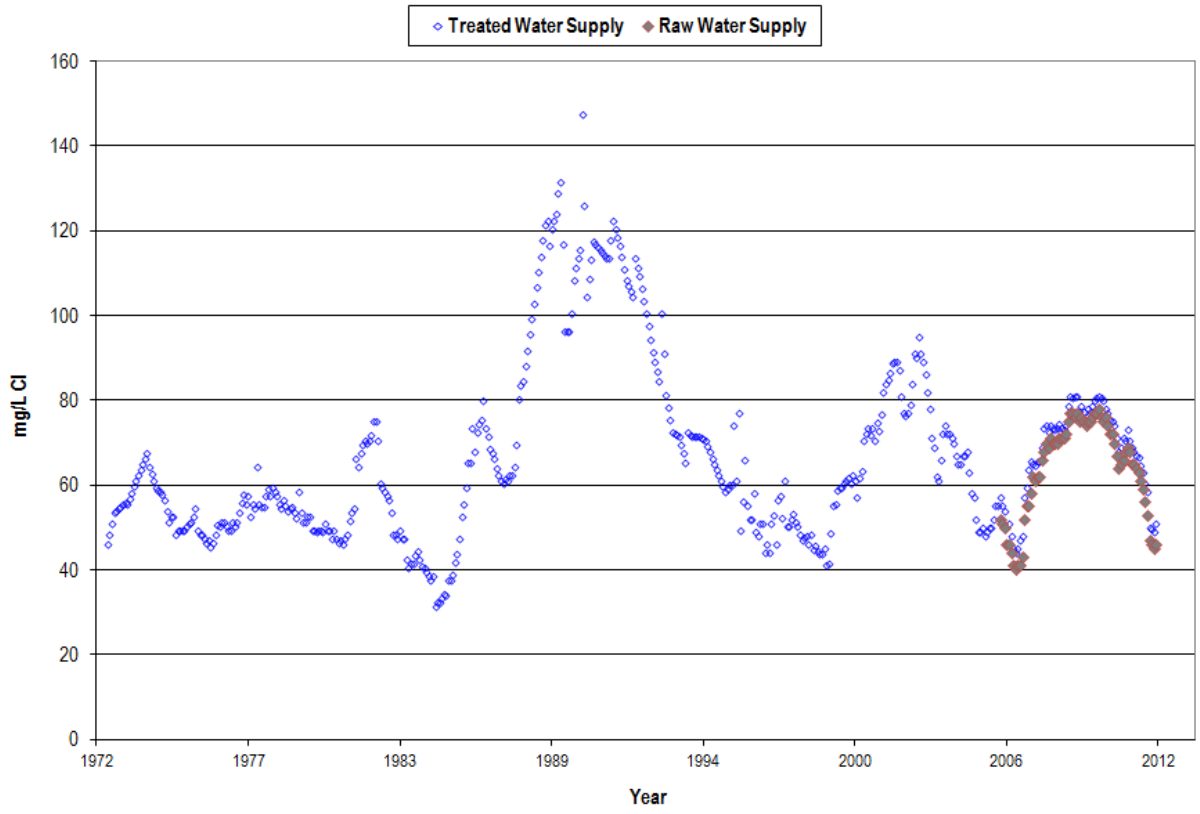

Figure 27. Castaic Lake Discharges – Raw and Treated SWP Water Chloride Concentrations

Consequently, the quality of the water available to the Santa Clarita Valley has a significant impact on the receiving water quality and can be high enough to cause or contribute to exceedances of the current water quality objective.

3.2.4 Water Quality Conditions that Could Reasonably be Achieved Through the Coordinated Control of all Factors, Which Affect Water Quality in the Area.

The Upper Santa Clara River Chloride TMDL identified the discharges from Saugus and Valencia WRPs as the primary sources of chloride to the Upper Santa Clara River. Chloride entering the treatment plants comes from two primary sources, the water supply and chloride added by residential, commercial and industrial users of the water. Brine from self-regenerating water softeners was identified as a specific source of chloride added by the residential, commercial and industrial users. In addition, infiltration and wastewater disinfection were identified as sources of chloride. The TMDL analysis showed that water supply accounted for 37 to 45% of the chloride loading from the WRPs during the years analyzed, residential SRWS accounted for 26 to 33% and wastewater disinfection accounted for 4 to 9% of the loading. All other sources accounted for the remaining 17 to 23% of the chloride loading.

Source control measures for the various sources were evaluated to determine the conditions that could be achieved through coordinated control of all factors. Control measures for residential SRWS and wastewater disinfection were identified, but source control measures for the water supply and other sources of chloride loading were not identified. As a result, end of pipe

treatment was also evaluated to reduce the amount of chloride discharged from the wastewater treatment plant.

Source control measures for SRWS have been developed and implemented in the watershed. These measures include development of a ban on existing and future SRWS and a buy-back program to encourage removal of existing SRWS. Additionally, stores in the watershed area were asked to voluntarily stop selling salt needed to recharge SRWS and most have responded to the request.

For wastewater disinfection, alternatives to chlorine disinfection processes were investigated and UV disinfection was identified as a method for reducing the amount of chloride added during disinfection. UV disinfection is being implemented at the Saugus and Valencia WRPs as part of Scenario 2.

The only end-of-pipe treatment available to remove salts is membrane treatment. Microfiltration/reverse osmosis (MF/RO) is planned for implementation at the Valencia WRP to remove the additional chloride necessary to meet water quality objectives. The amount of MF/RO installed would vary depending on the objectives to be met. As discussed above, the amount of MF/RO proposed under Scenario 1 would meet the current 100 mg/L instantaneous objectives and the amount proposed under Scenario 2 would be sufficient to meet the proposed SSOs. Given the negative impacts of the additional RO, pipe, and associated pumping that would result from implementation of Scenario 1, and the environmental and water resource benefits of Scenario 2, it is the preferred compliance measure.

As discussed throughout this report, the coordinated control of all factors in the manner described above will result in compliance with the proposed SSOs in this document. Section 2.4 in this report show the projected chloride concentrations at selected receiving water sites after implementation of Scenario 2 and the SRWS controls. These figures show the levels that are expected to be achieved after implementation of the program. Therefore, the conditions that can be achieved by Scenario 2 and the SRWS controls are those that can be reasonably achieved.

3.2.5 Baseline Economic Considerations

Baseline economic considerations are construed to mean the economic impacts that would result from compliance with the final effluent limit of 100 mg/L as a daily maximum under the Chloride TMDL. Baseline economic conditions are discussed above in Section 3.1.3.2.

3.2.6 The Need to Develop Housing

In adopting the site-specific objectives for chloride in the surface waters affected by this proposed action, the need for expanded housing in the region was considered. The proposed water quality objectives would not restrict the development of housing in the area of the reaches of the Santa Clara River affected by the proposed SSOs and averaging periods because they do not result in any increased economic costs related to housing development beyond the costs to comply with the current objectives. Much of the development needs for housing in the Upper Santa Clara River watershed will be accommodated by the planned Newhall development which has its own treatment facility with a planned discharge limit of 100 mg/L.

The proposed water quality objectives and implementation of Scenario 2 supports housing development as it enables further water recycling and provides a greater quantity of recycled water to support housing as compared to Scenario 1. Additionally, adopting the proposed SSOs would result in lower connection fees than under Scenario 1.

3.2.7 The Need to Develop and Use Recycled Water

Water Code section 13241 requires the Regional Water Board to consider the need to develop and use recycled water when establishing a water quality objective. The proposed water quality objectives will not have an impact on recycled water uses in the Santa Clarita Valley. However, use of recycled water may be hindered by the lower chloride objectives in groundwater underlying Reach 6 unless it is offset by other management measures, such as stormwater recharge projects. The impacts on recycled water will be addressed through development of the Salt and Nutrient Management Plan for the Upper Santa Clara River in accordance with the Recycled Water Policy. The CLWA's 2010 Urban Water Management Plan (UWMP) projects that water demand in the area will continue to increase, and that additional sources of water including recycled water will be necessary to meet projected demand.[44] Table 4-3 in CLWA's 2010 UWMP indicates that recycled water use in CLWA's service area is projected to increase from 325 AFY (actual use in 2010) to 9,600 AFY by 2030. This 2030 figure represents 24% of the imported water portion of the ultimate wastewater flow projected for the Santa Clarita Valley Joint Sewerage System of approximately 34 MGD.[45] The increased flow from the WRPs from current flows of 21 MGD to future flows of 34 MGD is expected to accommodate most of the increased recycled water demand in the watershed. The proposed SSOs and averaging periods will not cause any reduction in the amount of recycled water available for use in the Santa Clarita Valley and will support achieving the objectives of CLWA's UWMP. Additionally, the proposed SSOs are consistent with the secondary MCLs in Title 22 and will not result in water quality for chloride that exceeds these levels. However, without the proposed SSOs, additional advanced treatment would be required, leading to the loss of up to 0.13 MGD of available recycled water supplies to brine.

3.3 ANTIDEGREDATION ANALYSIS

The antidegradation analysis described in this section follows federal and State antidegradation policy and evaluates whether changes in water quality resulting from adoption of the proposed SSOs are consistent with maximum benefit to the people of the State and will not unreasonably affect existing or potential beneficial uses. The antidegradation analysis presented is comprised of two main components: (1) an analysis of the projected water quality impacts resulting from adoption of the SSOs and (2) a socio-economic impacts analysis to establish the balance between the proposed action and the public interest. To analyze projected water quality impacts, the following three-step process is undertaken.

- Determination of the baseline quality of the receiving water.
- Comparison of the baseline quality of the receiving water to the site specific objective, and an assessment of impacts to beneficial uses.

[44] See Chapter 4 of the 2010 Urban Water Management Plan (June 2011) prepared for Castaic Lake Water Agency (CLWA), CLWA Santa Clarita Water Division, Newhall County Water District, and Valencia Water Company.

[45] See Table 4-3, p. 4-10 in the 2010 UWMP.

- Balancing of the proposed site specific objectives with the public interest.

This section is structured to provide background on all of the requirements for assessment of compliance with the antidegradation policies and then describe the analysis conducted. The section is organized as follows:

- Summary of Federal and State Antidegradation Policies
- State and Federal Guidance on Antidegradation
- Summary of Alternatives Being Analyzed
- Evaluation of Water Quality Impacts
- Evaluation of Protection of Beneficial Uses
- Assessment of Socio-Economic Considerations
- Evaluation of Consistency with Antidegradation Policies

3.3.1 Federal and State Antidegradation Policies

Antidegradation policies have been adopted at both the federal and state level. These policies are intended to protect existing water quality and associated beneficial uses. The federal policy, originally adopted in 1975, is expressed as a regulation in 40 CFR 131.12. The federal policy requires that "water quality shall be maintained and protected." The text of the federal regulation is presented below:

(a) The State shall develop and adopt a statewide antidegradation policy and identify the methods for implementing such policy pursuant to this subpart. The antidegradation policy and implementation methods shall, at a minimum, be consistent with the following:

(1) *Existing instream water uses and the level of water quality necessary to protect the existing uses shall be maintained and protected.*

(2) Where the quality of waters exceed levels necessary to support propagation of fish, shellfish, and wildlife and recreation in and on the water, that quality shall be maintained and protected unless the State finds, after full satisfaction of the intergovernmental coordination and public participation provisions of the State's continuing planning process, that allowing lower water quality is necessary to accommodate important economic or social development in the area in which the waters are located. In allowing such degradation or lower water quality, the State shall assure water quality adequate to protect existing uses fully. Further, the State shall assure that there shall be achieved the highest statutory and regulatory requirements for all new and existing point sources and all cost-effective and reasonable best management practices for non-point source control.

(3) Where high quality waters constitute an outstanding National resource, such as waters of National and State parks and wildlife refuges and waters of exceptional recreational or ecological significance, that water quality shall be maintained and protected.

(4) In those cases where potential water quality impairment associated with a thermal discharge is involved, the antidegradation policy and implementing method shall be consistent with section 316 of the Act.

The State policy was adopted in 1968 as a resolution of the SRWCB (Resolution No. 68-16). The resolution is a statement of policy with respect to maintaining high quality waters in California. Resolution No. 68-16 requires that changes in water quality be consistent with the maximum benefit of the people of the State and not unreasonably affect beneficial uses. The full text of the state policy is provided below:

Whereas the California Legislature has declared that it is the policy of the State that the granting of permits and licenses for unappropriated water and the disposal of wastes into the waters of the State shall be so regulated as to achieve the highest water quality consistent with maximum benefit to the people of the State and shall be controlled so as to promote the peace, health, safety and welfare of the people of the State; and Whereas water quality control policies have been and are being adopted for waters of the State; and Whereas the quality of some waters of the State is higher than that established by the adopted policies and it is the intent and purpose of the board that such higher quality shall be maintained to the maximum extent possible consistent with the declaration of the Legislature;

NOW, THEREFORE, BE IT RESOLVED:

1. Whenever the existing quality of water is better than the quality established in policies as of the date on which such policies become effective, such existing high quality will be maintained until it has been demonstrated to the State that any change will be consistent with maximum benefit to the people of the State, will not unreasonably affect present and anticipated beneficial use of such water and will not result in water quality less than that prescribed in the policies.

2. Any activity which produces or may produce a waste or increased volume or concentration of waste and which discharges or proposes to discharge to existing high quality waters will be required to meet waste discharge requirements which will result in the best practicable treatment or control of the discharge necessary to assure that (a) a pollution or nuisance will not occur and (b) the highest water quality consistent with maximum benefit to the people of the State will be maintained.

The State Policy has been determined to be consistent with the requirements of the federal policy.

3.3.2 Federal and State Guidance on Antidegradation

In addition to the language contained in both the federal and state policies, a number of guidance documents have been issued at both the federal and state level. The guidance documents summarized in this section were reviewed and considered in development of the antidegradation analysis.

In 1987 the U.S. EPA, Region 9 issued guidance (*Guidance on Implementing the Antidegradation Provisions of 40 C.F.R. § 131.12* (U.S. EPA, 1987)) on the application of the Federal Antidegradation Policy. The State Water Resources Control Board (SWRCB) followed up with a policy memorandum to the Regional Water Quality Control Boards (Regional Water

Boards) to provide guidance on the application of the federal antidegradation policy for State and Regional Water Board actions, including establishing water quality objectives, issuing NPDES permits, and adopting waivers and exceptions to water quality objectives or control measures (Memorandum from William R. Attwater to Regional Board Executive Officers *Federal Antidegradation Policy* (Oct. 1987)) .

In August 2005, U.S. EPA issued a memorandum discussing antidegradation reviews and significance thresholds (Memorandum from Ephraim S. King, Director, Office of Science and Technology, U.S. EPA, Office of Water to Water Management Division Directors, Regions 1-10 (August 2005)). As discussed in the memorandum, an intent of the policy "is to maintain and protect high quality waters and not to allow for any degradation beyond a *de minimis* level without having made a demonstration, with opportunity for public input, that such lowering is necessary and important"

Finally, the SWRCB issued guidance to all Regional Boards regarding the implementation of antidegradation policies in NPDES permits (SWRCB Administrative Procedures Update (APU) No. 90-04). APU 90-04 provides the Regional Boards with guidance on the analysis that may be necessary to determine compliance with the antidegradation policies.

Consistent with APU 90-04, which incorporates the Attwater memo, the antidegradation analysis presented in this section evaluates whether changes in water quality resulting from the proposed SSOs and averaging periods are consistent with maximum benefit to the people of the State and will not unreasonably affect uses.

3.3.3 Application of the Antidegradation Policies to the Proposed SSOs

The Upper Santa Clara River is not designated an outstanding natural resource water; therefore, the receiving water is not subject to 40 CFR 131.12.a.3, but it is subject to other sections of the federal antidegradation policy, including 40 CFR 131.12.a.1 and 2. The application to other portions of the policy is determined on a constituent-by-constituent basis. For a water body where water quality is not better than needed to meet beneficial uses, either because it does not meet or it just meets applicable water quality objectives or criteria to protect beneficial uses, water quality necessary to support beneficial uses must be achieved and maintained. For waters with water quality that is better than necessary to support beneficial uses, a proposed change in water quality may not lower water quality unless such lowering is necessary to accommodate important economic or social development.

Application of the federal antidegradation policy is triggered by a lowering, or potential lowering, of surface water quality from the baseline quality of the receiving water. A discussion of baseline quality and a comparison of the proposed SSOs to the baseline are provided in subsequent sections.

3.3.4 Summary of Alternatives Being Analyzed

The guidance for implementation of the antidegradation policy described in APU 90-04 is primarily focused on analysis of new or modified discharges to a waterbody rather than on adjustment of water quality objectives. However, per the guidance, consistency with the

antidegradation policy should be considered during Basin Planning actions, including the adjustment of water quality standards.

The proposed action is a modification of the chloride water quality objectives in Reach 5 upstream of the Valencia WRP and Reach 6 from 100 mg/L as an instantaneous maximum to 150 mg/L with a 3-month averaging period and modification of the objectives in 100 mg/L Reaches 4B and 5 downstream of the Valencia WRP from 100mg/L as an instantaneous maximum to 100 mg/L with a 3-month averaging period. The alternative to the proposed SSOs is to maintain the chloride objective at 100 mg/L measured as an instantaneous maximum.

The SSO report provides the technical and scientific justification for the modification of the objectives and demonstrates that the proposed SSOs are protective of the existing and potential beneficial uses in the reaches to which they apply. However, per APU 90-04:

> "If the State and Regional Boards are aware that a change in water quality standards or implementation measures would permit specific projects, the applicability of the federal antidegradation policy to the changes in water quality caused by those projects should be considered."

Consistent with APU 90-04, the antidegradation analysis focuses on comparing the expected water quality after adoption of the proposed SSOs with baseline water quality, which as discussed in the next section, is equal to the 100 mg/L existing water quality objectives. Evaluating the differences between the two treatment scenarios necessary to comply with the existing water quality objectives and the proposed SSOs, which are Scenario 1 and Scenario 2, respectively, will allow determination of whether the proposed objective change is consistent with the state and federal antidegradation policies. Following are descriptions of the two scenarios evaluated.

3.3.4.1 Scenario 1

Scenario 1 is comprised of the project elements that would be constructed and operated by the SCVSD in order to comply with the water quality objective of 100 mg/L measured instantaneously. There are two ways to comply with the instantaneous 100 mg/L objective. One way would be to install upgrades to the wastewater treatment facilities at the Valencia WRP and Saugus WRP. This scenario includes installing sufficient advanced treatment made up of microfiltration and reverse osmosis (MF/RO) to ensure that the entire discharge volume which is a blend of advanced treated and tertiary treated effluent meets the 100 mg/L objective at all times. Since it is more cost effective to construct and operate a single advanced treatment facility, the other approach would require the construction of a pump station and pipeline from the Valencia WRP to the Saugus WRP to pump MF/RO output up to Saugus where it would be blended with tertiary treated water prior to discharge to meet the objective. Since the costs and impacts of installing MF/RO at both WRPs would be higher, the second approach is the preferred project for meeting the instantaneous 100 mg/L objective and is the one analyzed in this section. Additionally, to reduce the amount of chloride in the discharge at both the Saugus and Valencia WRPs, the treatment process would be upgraded to utilize UV disinfection instead of chlorination. Brine created by the operation of the MF/RO treatment would be conveyed via a pipeline to a series of deep wells for injection disposal.

The treatment infrastructure which would be constructed under Scenario 1 was evaluated as part of an environmental impact report (EIR) prepared in accordance with requirements of the California Environmental Quality Act (CEQA). A draft EIR was circulated for public comment in the spring and summer of 2013. Public comments were received and a Final EIR that included responses to those comments was certified on October 28, 2013. Detailed analysis of four different project alternatives to comply with a chloride objective of 100 mg/L measured as a 12 month average is found in Section 6 of the EIR. The infrastructure combination of Scenario 1 was selected as the preferred alternative in the EIR, however for these analyses the compliance objective has been changed to assess this infrastructure design with the current chloride objective of 100mg/L applied as an instantaneous maximum.

3.3.4.2 Scenario 2

Scenario 2 is comprised of the project elements that would be constructed and operated by the SCVSD in order to comply with the proposed site specific objectives. The proposed infrastructure consists of MF/RO treatment construction and operation at Valencia WRP, and the use of ultraviolet disinfection at both Valencia and Saugus WRPs. This scenario would not entail construction and use of a RO pipeline or pump station to convey RO water to Saugus for blending. Brine created by the operation of the MF/RO treatment would be conveyed via a pipeline to a series of deep wells for injection disposal. Under scenario 2, the application of the 3-month averaging period for Reaches 4B, 5, and 6 results in a reduction in the amount of MF/RO needed to comply with the objectives. The change from 100 mg/L to 150 mg/L in Reach 6 and Reach 5 upstream of Valencia, allows for a 100 mg/L flow weighted average effluent limitation for the two facilities and removes the need to build a pipeline between Saugus and Valencia to pump MF/RO water for blending at Saugus. However, it does not change the amount of MF/RO needed to be constructed or operated, as the flow-weighted average of the two facilities must also meet the 100 mg/L objective as a 3-month average. As Scenario 2 is derived from Scenario 1, it is considered the best alternative for meeting the proposed site-specific objectives. A comparison of the project elements for the two alternatives is provided in Table 12. A comparison of the objectives for the two alternatives can be found in Table 13.

Table 12. Comparison of Scenarios*

	Scenario 1		Scenario 2	
Treatment	Valencia WRP	Saugus WRP	Valencia WRP	Saugus WRP
UV	Y	Y	Y	Y
MF/RO	Y - 8.8 mgd	N	Y - 7.1 MGD	N
RO Blended	Y	Y	Y	N
RO Pump Station	WWRP → SWRP		N	N
RO Pipeline	WWRP → SWRP		N	N
Brine Line	WWRP → DWI		WWRP → DWI	

*Final combination of infrastructure associated with Scenario 1 may be altered based upon future engineering calculation results and regulatory input.

Table 13. Summary of Objectives to be Met by Projects Defined in Scenarios

	Scenario 1		Scenario 2	
Reach	**Water Quality Objective**	**averaging period**	**Conditional SSO**	**averaging period**
6	100 mg/L	instantaneous	150 mg/L	3-month
5 (upstream Valencia)	100 mg/L	instantaneous	150 mg/L	3-month
5 (downstream Valencia)	100 mg/L	instantaneous	100 mg/L	3-month
4B	100 mg/L	instantaneous	100 mg/L	3-month

3.3.5 Evaluation of Water Quality Impacts

The first step in the antidegradation analysis is a comparison of the anticipated water quality in the affected reaches of the Santa Clara River after adoption of the proposed site-specific objectives with baseline water quality. Baseline water quality is equal to the highest quality of the receiving water since adoption of the 1968 State Antidegradation Policy unless a lowering of water quality was permitted consistent with the state and federal antidegradation policies.

The highest water quality in the Santa Clara River occurred in the 1970s when the water quality objective of 100 mg/L was adopted. Since the 1970s, there have been temporary allowances of increased chloride levels in the receiving water to accommodate emergency drought conditions and to allow time to address increasing chloride levels. These higher levels are not an appropriate baseline for designating the condition of high quality waters because the allowances were intended to be temporary. The relaxation of effluent limitations for the Saugus and Valencia WRPs and other dischargers were justified under the antidegradation policy as only temporary solutions. Therefore, the appropriate baseline level for comparison under Resolution 68-16 and the federal antidegradation policy is 100 mg/L, which is the current water quality objective, while recognizing that higher levels of chloride were historically permitted during drought conditions. The changes in water quality resulting from the application of the proposed SSOs relative to the baseline were evaluated for both surface water and groundwater.

3.3.5.1 Surface Waters

The impacts on water quality are discussed extensively in the SSO report. The relevant analysis and findings are summarized and discussed in this section, but the graphs and data analysis are presented in the SSO report.

As discussed in the SSO report in Section 2.1.5.1, and Figure 1, a review of historic and current water quality demonstrates that chloride concentrations vary widely, and at some times are above and below both the current objectives and the proposed SSOs in Reaches 5 and 6. .

By comparing the frequency with which the chloride concentrations in Reaches 5 and 6 exceed 100 mg/L in the modeled historical data against the proposed SSOs, changes can be evaluated.

While these values are modeled values, they are reflective of actual historical water quality data collected from Reaches 5 and 6.

As compared to Scenario 1, Scenario 2 results in higher concentrations in the receiving water than baseline water quality, which would be achieved by Scenario 1. The maximum concentration predicted by the model after implementation of Scenario 2 was 150 mg/L in Reach 6, 136 mg/L in Reach 5 upstream of Valencia, and 107 mg/L in Reach 5 downstream of Valencia. These concentrations are 50 mg/L, 36 mg/L, and 7 mg/L higher than the predicted water quality under Scenario 1 during worst case conditions. Concentrations above the instantaneous 100 mg/L objective are predicted to occur 38% of the time in Reach 6, 22% of the time in Reach 5 above Valencia WRP, and 0.4% of the time in Reach 5 downstream of Valencia WRP discharge.

In addition to comparing the proposed SSOs to baseline concentrations of chloride, a comparison of the chloride loading for Scenario 1 and 2 was developed. Following is a summary of the monthly average chloride loading from each WRP via its outfall discharge to the USCR and the brine disposed under each scenario.

Scenario 1

VWRP : 330,556 lbs/month average

SWRP: 145,331 lbs/month average

Scenario 2

VWRP: 393,464 lbs/month average

SWRP: 143,856 lbs/month average

Under Scenario 1, RO permeate would be pumped up to Saugus WRP to be blended with treated water prior to discharge in order to comply with the current chloride objective. As this RO permeate contains some chloride, the mass of chloride discharged to Reach 6 from Saugus is actually higher under Scenario 1 than Scenario 2, by approximately 1,500 pounds/month, even though discharge concentrations would be lower. Conversely, as Scenario 1 is designed to comply with the current instantaneously measured chloride objective without an averaging period, it requires a larger RO treatment capacity, and thus more chloride is removed by the RO system. Therefore, approximately 61,000 pounds/month less chloride mass on average would be discharged to the Santa Clara River from the WRPs under Scenario 1 than would be discharged under Scenario 2.

Additionally, under Scenario 2 less of the treated wastewater flow at Valencia WRP is put through MF/RO system, so less chloride mass is removed from the discharge flow by the MF/RO system, and since less chloride is captured by the MF/RO system less brine is produced. Under Scenario 1 an estimated average of 88,000 pounds per month of chloride will be removed by the MF/RO filtration process and disposed of as brine, while under Scenario 2 65,000 pounds per month would be removed.

Scenario 2 will result in higher concentrations in the receiving water, particularly in Reach 6, as compared to Scenario 1. However, predicted concentrations above the 100 mg/L instantaneous objective are anticipated to be temporally limited to less than 38% of the time. Scenario 2 will also result in less chloride mass being removed from the watershed on average than Scenario 1. It is important to note that no exceedances of the proposed SSOs are predicted after implementation of Scenario 2.

3.3.5.2 Groundwaters

While site-specific objectives for groundwater are not proposed, the antidegradation analysis considers the impacts of the proposed surface water objective changes and the associated planned projects (Scenario 2) on groundwater quality.

Additional GSWIM modeling for Scenario 2 was performed to study the impacts on surface water and groundwater quality under severe drought conditions.[46] Scenario 2 model results were compared to an alternate operations scenario similar to Scenario 1, with the exception of a 3-month average 100 mg/L objective rather than an instantaneous 100 mg/L objective. In general, model results showed little to no difference in the surface and groundwater chloride concentrations simulated by Scenario 2 and the alternate operations scenario downgradient of the Valencia WRP. Scenario 2, in comparison to the alternate operations scenario, results in slightly higher chloride concentrations in groundwater and surface water in a small, localized area between the Saugus WRP and the Valencia WRP, representing 6% of the Alluvial Aquifer by area and < 1% of the Saugus Aquifer by area.

Over the 24-year simulation period, the single day maximum daily impact within the impacted Alluvial Aquifer (6% of area), compared to the alternate operations scenario is approximately 9 mg/L. The average daily impact within the impacted Alluvial Aquifer (6% of area), compared to the alternate operations scenario is approximately 1.3 mg/L. The single day maximum impact within the entire Alluvial Aquifer, compared to the alternate operations scenario is approximately 0.6 mg/L. It is expected that the impacts described above, when comparing Scenario 2 to baseline conditions, would be somewhat greater by an undetermined amount, as the modeling results above compared Scenario 2 to a 3-month average 100 mg/L objective.

While the projected values are modeled values, they are reflective of actual historical hydrology and water quality data collected from the groundwater basins and projected discharge quality. The model results show that the impacts from the proposed SSOs are limited temporally and spatially. While impacts to the shallow basins may occur during some time periods, impacts to the deeper Saugus aquifer may not occur or could take longer to occur.

Additional studies of groundwater impacts associated with Scenario 2 may be addressed through GSWIM modeling. Additionally, the Salt and Nutrient Management Plan (SNMP) for the Santa Clara River Valley East Subbasin will provide a comprehensive analysis of the groundwater basins and identify any potential mitigation measures that are needed to address sources of salts to the groundwater basins. The SNMP will include a basinwide monitoring program that will allow evaluation of changes in groundwater concentrations. Following project implementation,

[46]Development and Results of Additional GSWIM Simulations for the USCR Chloride TMDL Compliance Project, AMEC Environment & Infrastructure, Inc., July 2014

additional field studies or groundwater monitoring may be considered to evaluate project impacts.

3.3.6 Evaluation of Protection of Beneficial Uses

The 1975 Los Angeles Region Basin Plan designated nine beneficial uses to the Santa Clara River including agricultural supply (AGR), industrial process supply (PROC), industrial service supply (IND), groundwater recharge (GWR), freshwater replenishment (FRSH), cold freshwater habitat (COLD), wildlife habitat (WILD), water contact recreation (REC-1) and non-contact water recreation (REC-2). The 1994 Basin Plan designated additional beneficial uses including municipal and domestic supply (MUN[47]), migration of aquatic organisms (MIGR), warm freshwater habitat (WARM), and rare, threatened, and endangered species habitat (RARE).

Agricultural supply is the beneficial use that is the most sensitive to chloride. The evaluation of beneficial uses focuses on the protection of the agricultural beneficial use, but includes evaluation of other beneficial uses of the waterbody that could be impacted by chlorides.

3.3.6.1 Agricultural Supply Beneficial Use

As described in detail in Section 3.2 of the SSO report, the proposed SSOs and averaging periods are protective of the beneficial uses in the USCR for the following reasons:

- The proposed SSOs and averaging periods for surface water within Reaches 5 and 6 are protective of the AGR beneficial use because surface waters and groundwater potentially impacted by these surface waters are not currently and have not historically been used as an irrigation supply for salt-sensitive crops. This situation is unlikely to change due to climatic conditions that impact the ability to grow salt sensitive crops and because the use of irrigation water for crops is anticipated to decline in Reach 5 due to planned urban development.
- Reach 6 and Reach 5 above Valencia WRP are not immediately upstream of a reach where salt-sensitive crops exist and the flow weighting that will be permitted under Scenario 2 will ensure that discharges to Reach 6 and Reach 5 above Valencia WRP will not result in elevated chloride concentrations in the reaches where salt-sensitive agriculture occur.
- Water quality objectives for the other areas in the Los Angeles Region and in other regions for areas where similar non-salt sensitive crops are grown support the use of 150 mg/L as a chloride objective for Reach 6 and 5 above the Valencia WRP for protection of the agricultural beneficial uses present in these reaches.

[47] The MUN use for surface waters in Reaches 4B, 5, and 6 is designated as P*. The asterisked designation indicates that the waterbody has been designated as a potential municipal supply under SB 88-63 and RB 89-03, but may be considered for an exemption at a later date. In the interim, no new effluent limitations will be placed in Waste Discharge Requirements as a result of these designations.

- Reach 5 is immediately upstream of Reach 4B, a reach where salt sensitive agriculture does occur. As a result, discharges to Reach 5 below the Valencia WRP must ensure protection of downstream beneficial uses. To ensure this protection, the proposed SSOs for Reach 5 downstream of the Valencia WRP are set equal to the proposed SSOs for Reach 4B.
- The water quality analysis in Section 2.1 shows that the Scenario 2 will meet the site specific objectives in all reaches to ensure protection of beneficial uses.
- The project components of Scenario 2 will make possible the discharge of water meeting 100 mg/L as a 3-month average directly upstream of Reach 4B where salt sensitive agriculture occurs to ensure the waterbody is of sufficient quality to ensure the protection of salt sensitive agricultural beneficial uses.
- Beneficial uses downstream of Reach 4B are protected by maintaining the existing water quality objectives (100 mg/L as instantaneous maximum). Between Reach 4B and the downstream uses, two significant features are present that impact the quality of receiving water in the downstream reaches; the dry gap and Piru Creek. The dry gap means that water from Reach 4B does not reach 4A via surface flow. In Reach 4A, just downstream of Reach 4B, Piru Creek joins the SCR fed by releases from Lake Piru. These additional surface waters feed into the Piru Dry Gap and replenish groundwater in the Piru Subbasin, as well as downstream subbasins. Lake Piru's releases are nearly continuous, with daily mean releases of up to 650 cfs. Historically, (1975-2005) Lake Piru released water approximately 98 percent of the time. These features represent significant influences on the downstream receiving water quality between reaches 4B and downstream reaches.
- In the literature review and evaluation (LRE) averaging period study, exposure periods of weeks to months were necessary to see impacts on salt sensitive agriculture (Newfields, 2007). Thus the technical advisory group recommended a 3-month averaging period.
- The GWR beneficial use is utilized to ensure groundwater quality is protected for other purposes. In this case, the objectives are being developed to ensure recharge of groundwater does not impact the use of the groundwater basin for agricultural uses. As discussed above, the proposed SSOs are protective of the AGR beneficial use. As a result, the GWR beneficial use is also protected.

Based on this analysis, the proposed SSOs are protective of the AGR beneficial use.

3.3.6.2 Aquatic Life

The impact of the proposed SSOs on the environmental characteristics of the USCR, including in-stream and riparian species and habitat was considered in detail in Section 2.1.5.3 Evaluation of Protection of Aquatic Life Beneficial Use and Section 2.1.1 Threatened and Endangered Species Study (TES) and Section 3.2.3 Environmental Characteristics of the Hydrographic Unit Under Consideration. USEPA has recommended aquatic life criteria of 230 mg/L as a four-day average and 860 mg/L as a one-hour average. The TES study found that the existing USEPA

aquatic life chloride criteria are protective of threatened and endangered species in the Santa Clara River. These thresholds are significantly higher than the agricultural water supply protection thresholds and thus complying with those criteria will ensure the protection of aquatic life. An evaluation was conducted of historic and modeled future chloride concentrations from the GSWIM outputs to determine if the one-hour aquatic life criteria of 860 mg/L or the 4-day average chloride criteria of 230 mg/L were likely to be exceeded by the implementation of the SSOs and the infrastructure of Scenario 2. This evaluation showed that modeled historic chloride concentrations in Reaches 5 and 6 would not exceed the aquatic life chronic threshold with the exception of one four-day period when the 4-day averages on each day exceeded the threshold. This evaluation also showed that modeled future four-day average concentrations under Scenario 2 never exceed the aquatic life chronic threshold. In addition, as based on Figure 12 through Figure 14 and as discussed in Sections 2.4.3, the 860 mg/L one-hour acute threshold was never exceeded in the historic or projected modeling periods. When implemented, Scenario 1 and Scenario 2 will result in reduced chloride discharges from the primary point sources in the USCR and will not exceed 150 mg/L as a three-month average. Therefore, it is not expected that the proposed SSOs will result in actual harm to in-stream or riparian species or habitat.

3.3.6.3 Municipal Drinking Water Supply (MUN)

Groundwater underlying Reaches 5 and 6 of the Santa Clara River is designated as a potential drinking water supply. The secondary maximum contaminant level (MCL) for chloride is 250 mg/L. As discussed in Section 3.3.4, Scenario 2 will not result in groundwater chloride concentrations exceeding the secondary MCL. As a result, the projects will not result in impacts on the MUN beneficial use.

3.3.6.4 Other Beneficial Uses

While other beneficial uses are present in the Santa Clara River Watershed, chloride water quality objectives have not been established to protect any other beneficial uses. As a result, impacts to the beneficial uses are unlikely to occur.

3.3.6.5 Summary

In summary, changes in chloride discharge concentrations associated with the proposed SSOs will not adversely affect any of the existing or future anticipated beneficial uses of the USCR, or impair the integrity of the Santa Clara River as a whole. The proposed surface water chloride objectives in Reaches 5 and 6 are consistent with Resolution 68-16 because they are fully protective of current and foreseeable future uses of water for irrigation of crops in the area, as well as protective of the other beneficial uses of these waters. The proposed surface water SSO for Reaches 5 and 6 are substantially below the USEPA acute and chronic aquatic life criteria for chloride. Therefore, the objectives for Reaches 5 and 6 would be protective of the most chloride-sensitive aquatic organisms for which data are available as well as threatened and endangered species. Anticipated incremental increases in chloride concentrations resulting under Scenario 2 as compared to Scenario 1 would still meet water quality objectives necessary to protect all designated beneficial uses in the USCR and downstream.

3.3.7 Assessment of Socio-Economic Considerations

The public benefit derived from the proposed site-specific objectives and the associated treatment projects is an important consideration in the antidegradation analysis. In accordance with APU 90-004 guidance for a 'complete' antidegradation analysis, the following factors are considered in determining whether the proposed changes to the water quality objectives and the associated projects are necessary to accommodate economic or social development and is consistent with maximum public benefit:

- A consideration of alternative control measures that might reduce, eliminate, or compensate for the water quality impacts of the proposed projects;
- An evaluation of each alternative control measure for costs, impacts on water quality, and compliance with applicable laws, regulations, and policies;
- An assessment of the socio-economic impacts of each alternative; and
- A balancing of the proposed projects and the alternatives based on environmental and socio-economic considerations.

As discussed in Section 3.3.3, there are two alternative treatment scenarios being evaluated in this antidegradation analysis. Both scenarios are protective of beneficial uses, however Scenario 1 will attain existing water quality objectives, while Scenario 2 will attain proposed site specific objectives. This section provides an assessment of the (1) costs and socio-economic impacts and (2) environmental considerations for each scenario in order to determine if the proposed changes to the water quality objectives are consistent with maximum public benefit.

3.3.7.1 Economic Analysis

An economic analysis of the proposed SSOs was conducted utilizing the Interim Economic Guidance for Water Quality Standards (USEPA, 1995) and in accordance with APU 90-04. The Interim Economic Guidance for Water Quality Standards (Economic Guidance), provides a three step process for the evaluation:

1. Develop project costs and calculate the annualized cost of pollution control.
2. Determine if the requirements would interfere with development.
3. Determine if economic or social development would be important.

This section provides a discussion of each of these steps.

For step 1, the projected costs associated with the infrastructure construction and operation required to meet the water quality objectives of the two different scenarios were developed and are outlined below. In addition, as required in the Economic Guidance for public sector projects, the average annual cost per household was also defined.

Table 14. Estimated Costs of Scenario 1

Cost Element	Cost
Valencia UV Capital Cost	$20,000,000
Saugus UV Capital Cost	$10,000,000
Capital Cost (RO)	$53,600,000
Capital Cost (Valencia-Saugus Pipeline)	$12,800,000
Capital Cost (DWI)	$49,000,000
Capital Cost Total	$145,400,000
Valencia and Saugus UV Annual O&M	$100,000
RO Annual O&M Cost	$3,690,000
Valencia-Saugus Pipeline Annual O&M Cost	$140,000
DWI Annual O&M Cost	$1,100,000
O&M Annual Cost	$4,930,000
Equivalent Annual Cost (Capital and O&M)	$14,600,000

Table 15. Estimated Costs of Scenario 2

Cost Element	Cost
Valencia UV Capital Cost	$20,000,000
Saugus UV Capital Cost	$10,000,000
Capital Cost (RO)	$48,400,000
Capital Cost (Valencia-Saugus Pipeline)	$0
Capital Cost (DWI)	$42,000,000
Capital Cost Total	$120,400,000
Valencia and Saugus UV Annual O&M	$100,000
RO Annual O&M Cost	$3,170,000
Valencia-Saugus Pipeline Annual O&M Cost	$0
DWI Annual O&M Cost	$900,000
O&M Annual Cost	$4,070,000
Equivalent Annual Cost (Capital and O&M)	$12,100,000

As shown in Table 15, the costs of Scenario 2 are lower for both capital and O&M costs. A good comparison metric of the two projects is their equivalent annual cost (EAC). EAC is the annualized average of the sum of the amortized capital construction cost (including 2.8% interest rate for 20 years in this case) plus the annual operation and maintenance cost. The comparison of the EACs for the two scenarios shows that the Scenario 2 is 17% cheaper, a savings of $2.5 million annually. Over 20 years that is a savings of $50 million.

Table 16. Estimated Costs per Household and Connection Fees for Each Scenario

Rate/Connection Fee Increase	**Scenario 1 ($145M)**	**Scenario 2 ($120M)**
FY2019-20 Rates per Sewage Unit	$391	$361
FY2019-20 Increase in Connection Fee	Increase by $200 to $5,700	Increase by $200 to $5,700
Subsequent Annual Increases in Connection Fee over the 30-yr loan repayment, beginning in FY2020-21	Increase by $56 per year (for 30 years)	Increase by $45 per year (for 30 years)

While both scenarios will result in increased sewer rates, the cost savings under Scenario 2 will translate into lower monthly sewer rates as well as lower annual increases in sewer rates. The annual costs of each alternative, and their associated monthly sewer rate increases, can be translated into impacts to individual households due to the sewer rate increases and the impacts on the community for key economic indicators. At the individual household level, lower sewer rates will be translated into more available disposable personal income (DPI). More DPI translates into more dollars available to spend on essential goods and services such as food, lodging, and healthcare.

For Step 2, the Economic Guidance suggests the development of a number of indicators of community economic health to assess whether the costs would interfere with development. A screening metric is included which is the Average Total Pollution Control Cost per Household divided by the median income. According to the 2010 Census, the median income in Santa Clarita was $84,291. As a result, the difference in the cost per household for both Scenarios is less than 1% of the median annual income. This indicates that the cost of the project will likely not significantly interfere with development.

While the screening metric indicates that the direct economic impacts may not interfere with development, additional consideration of the economic situation of the community was conducted in accordance with APU 90-04. The Upper Santa Clara Watershed is currently covered by three TMDLs and a number of other constituents are considered to be impairing the waterbody. Based on initial watershed planning efforts, it is anticipated that implementation of additional water quality improvement projects to address these impairments will require significant investment of funds, particularly to address the Bacteria TMDL. As a result, the community will be faced with funding a number of water quality improvement projects over the coming years. By implementing Scenario 2, lower costs will be incurred to address chloride while still protecting beneficial uses.

The municipalities are halfway through the process of defining a multi-year watershed implementation plan to meet the existing TMDL requirements and address other water quality priorities. This watershed planning effort will result in a list of projects needed to improve water quality and meet water quality standards. It is anticipated that the plan will require significant investment of funds to improve water quality. As a result, the community will be faced with funding a number of water quality improvement projects over the coming years. The community will benefit from having implemented a more cost effective solution to addressing the chloride TMDL by having more money available to implement these future water quality improvement projects.

Additionally, the proposed SSOs will leave more money for the future to address other unforeseen water quality issues, including future TMDLs, future constituent of emerging concern requirements, and other stressors brought about by climate change.

3.3.7.2 Environmental Impacts

Aside from direct financial savings the environmental impacts associated with the two scenarios also differ. The construction and operation of the infrastructure associated with Scenario 1 will generate 1,288 more tons of greenhouse gas (carbon dioxide) every year, an increase of 28%. As California is moving forward under the California Global Warming Solutions Act (A.B. 32) that

seeks to reduce greenhouse gas emissions to 1990 levels by 2020, any reduction or minimization in new sources will help the state to achieve this goal. Furthermore, reducing the marginal increase in GHG associated with any new project may prove beneficial, as it is recognized that progress toward larger state and federal goals of GHG reduction will only be realized when the marginal reductions made possible by projects like this are accumulated at a landscape scale.

In addition to the lower air quality impacts associated Scenario 2, it will also have less impact on water resources. In order to produce sufficient lower concentration chloride water via the advanced treatment reverse osmosis system to release effluent meeting the water quality objective (100 mg/L as instantaneous maximum), Scenario 1 will require more water be put through the RO system, approximately 7.5% of which is lost to brine waste. When the RO system operates under Scenario 1, treating up to 8.8 million gallons daily (MGD), 7.5% of the water going through is lost to brine waste, up to 660,00 gallons daily. Scenario 2 RO processes up to 7.1 MGD and results in up to 530,000 gallons of brine waste. So Scenario 2 will save up to 130,000 gallons/daily of tertiary treated effluent that will be discharged to the USCR or made available for use as a local recycled water supply. In one year, Scenario 2 would result in saving up to 47,000,000 gallons of usable wastewater from being wasted as brine.

Furthermore, under Scenario 2 all the RO water produced will be discharged from the Valencia WRP, just upstream of the salt-sensitive agricultural beneficial use. In contrast, under Scenario 1, up to 4.26 MGD of RO water would be pumped up to the Saugus WRP for blending and discharge in Reach 6, where no salt-sensitive crops exist. The additional water could be available for downstream agricultural users.

The water could also be used as a recycled water source for additional local water supply. Under Scenario 2, due to a smaller RO facility and less disposal of brine, more high quality recycled water would be available from both the Valencia and Saugus WRPs that would be an environmental benefit to the community and provide long-term water sustainability for the Santa Clarita Valley. In July 2013, the SCVSD Board of Directors adopted a resolution to promote and optimize the use of recycled water in the Santa Clarita Valley, to reduce the total cost of water infrastructure, and to develop greater local water supply sustainability through integrated regional water planning and management including recycled water and storm water resources. SCVSD will assist the local water agencies in assessing recycled water reuse opportunities in the vicinity and develop recycled water project opportunities where determined to be cost-effective and feasible.

Finally, under Scenario 2, a number of potential environmental impacts will be mitigated or reduced. Under Scenario 2, less brine will be produced which translates into reduced impacts from the disposal of brine. The number of deep injection wells required for disposal of the produced brine waste is dependent upon the quantity of RO treatment and the duration of operation of the RO system. Thus as less RO would be required to comply with the proposed SSOs anticipated to be met by Scenario 2, one fewer deep well would be constructed under Scenario 2 which would result in a $7 million savings. As identified in Appendix 15-A of the EIR, the annual GHG emissions associated with the construction of infrastructure similar to that of both scenarios is estimated to be nearly 5,000 metric tons of CO2. Of this total nearly 3,400 of that is associated with construction of the deep wells. Therefore reducing the number of required wells, by reducing the volume of brine needing disposal will help to reduce the associated construction impacts associated with GHG production.

A detailed discussion of the potential construction impacts and other environmental impacts resulting from implementation of Scenario 1 are described in the EIR, a portion of which would be less or eliminated by implementing Scenario 2. In addition, removal of the permeate pipeline, as proposed in Scenario 2, would result in a reduction of 17% of NOx generated during construction, less significant traffic and noise impacts in construction, and an estimated reduction of 0.5 million kWh of energy usage during operation of the compliance project that provides an additional benefit of 4.4% reduction in annual GHG emissions.

In summary, Scenario 2 has a number of economic and environmental benefits as compared to Scenario 1. A comparison of the costs and environmental impacts of the two scenarios is shown in Table 17.

Table 17. Summary Table of Scenario Costs and Impacts

Element	Scenario 1	Scenario 2
Construction Cost	$145,000,000	$120,000,000
O&M Cost/Year	$5,000,000	$4,000,000
Equivalent Annual Cost (CIP+OM/ year over 20 years)	$14,600,000	$12,100,000
Design RO Required (Treatment Capacity) (MG/D)	8.8	7.1
Design RO - Brine Flow (MG/D)	0.7	0.5
Power Use (GWh/yr)	15.9	12
Greenhouse Gases (MT/yr CO2)	4,654	3,366

3.3.8 Evaluation of Consistency with Antidegradation Policies

Evaluation of consistency of the proposed SSOs with the antidegradation policy has been performed by comparing the impacts of projects necessary to meet a water quality objective of 100 mg/L measured instantaneously to projects necessary to meet the proposed SSOs. A summary of the comparison of the two scenarios is shown in Table 18.

Table 18. Summary of Water Quality, Socio-Economic and Environmental Impacts

Element	Scenario 1 (Baseline Water Quality)	Scenario 2 (Proposed SSOs)
Surface Water Quality Impacts (Section 3.3.5.1)	Baseline water quality attained	Increased chloride concentrations above baseline allowed. Approximately 61,000 lbs./mo Cl more discharged to USCR
Groundwater Quality Impacts (Section 3.3.5.2	Baseline water quality maintained	Temporally and spatially limited water quality impacts in shallow aquifer
Protection of Beneficial Uses (Section 3.2.1)	Protective of existing uses.	Protective of existing uses.
Costs (Section 3.3.7)	$145.4M	$120.4M
Design RO - Brine Flow (MG/D) (Section 3.3.7.2)	0.7	0.5
Power Use (GWh/yr) (Section 3.3.7.2)	15.9	12
Greenhouse Gases (MT/yr CO2) (Section 3.3.7.2)	4,654	3,366
Water Resources (Section 3.3.7.2)	More water lost to brine as a result of the objective. Would pump up to 4.26 MGD of RO up to Saugus to discharge into Reach 6, a losing reach.	Less water lost to brine because of the allowable averaging period. Could save up to 130,000 gallons/day over Scenario 1
Environmental Impacts (Section 3.3.7.2)	Construction impacts from larger MF/RO treatment facilities and pipeline construction.	Fewer construction impacts as compared to Scenario 1

The proposed SSOs and associated project (Scenario 2) is determined to comprise best practicable treatment or control and is consistent with federal and State antidegradation policies for the following reasons:

- While the proposed SSOs allow for an increase in chloride loading and higher instream concentrations above existing water quality objectives, the increased loading will not adversely affect existing or probable beneficial uses of the Santa Clara River.
- The additional chloride loading and higher allowable instream concentrations resulting from the proposed SSOs are offset by important economic and social development gained through the implementation of Scenario 2 projects as compared to Scenario 1 projects. These benefits include:

- Reduced costs and associated impacts from higher sewer rates.
- Providing additional water resources for recycled water and/or salt-sensitive agriculture and aquatic habitat through the reduction of brine waste and the discharge of high quality RO permeate in Reach 5, just upstream of salt-sensitive agriculture.
- Reduced energy use and greenhouse gas emissions, which will support reduction goals for greenhouse gases outlined in AB32.
- Reduced environmental impacts from the construction of additional RO capacity and the additional pump station and pipeline from the Valencia WRP to the Saugus WRP.

This analysis shows that the additional treatment associated with the SSOs will protect the USCR's beneficial uses at a lower cost than implementing what is required to meet the current objective. The savings will reduce the burden on local communities and allow for that cost savings to provide benefit in other parts of the local economy by reducing projected increases in service rates and new connection fees. The reduced costs will make more money available in the future to support implementation of other water quality improvement projects in the community. As described in this analysis, the proposed SSOs will support the continued need for cost-effective wastewater service and agricultural water supply in the communities of the USCR. The costs of complying with the current objective to achieve the incremental reduction in chloride concentrations that would result from the additional treatment elements is not commensurate to the benefits that would be achieved by adopting the proposed SSOs. As a result of the findings of this analysis, the proposed SSOs are consistent with the purpose and intent of the federal and state antidegradation policies.

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