SANTA CLARITA VALLEY SANITATION DISTRICT CHLORIDE COMPLIANCE FACILITIES PLAN AND ENVIRONMENTAL IMPACT REPORT

FINAL

SANITATION DISTRICTS OF LOS ANGELES COUNTY

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6.4.2.1 Residential Automatic Water Softeners (AWS) Removal

In this approach, the SCVSD has taken several steps to reduce the chloride contribution from residential AWS that discharge to the sewer system. In 2002, residential AWS were identified as the primary controllable source of chloride in the SCVSD service area. Based on this study, the SCVSD adopted an ordinance in 2003 prohibiting the installation of residential AWS. Chloride loading from AWS peaked in 2003/2004 at approximately 9,000 pounds per day, representing approximately 59 mg/L of chloride in the SCVSD effluent. The SCVSD implemented AWS Rebate Programs in 2005 (Phase I) and 2007 (Phase II) and initiated a 2008 voter approved ordinance that requires removal and disposal of all existing residential AWS in the SCVSD's service area. These efforts have resulted in removal of more than 7,900 AWS units. As of December 2011, the chloride contribution from residential AWS to the SCVSD's effluent had been reduced to approximately 6 mg/L. It is expected that the remaining discharging residential AWS units will be removed from operation through additional public outreach and enforcement of ordinances. Because removal of remaining residential AWS is already in progress, residential AWS removal is not included as part of the recommended project.

6.4.2.2 Chloride Control Measures for Industrial and Commercial Dischargers

The SCVSD has developed a strictly regulated system for industrial and commercial dischargers. Since 2002, the SCVSD has been systematically implementing more stringent requirements for industrial dischargers in the SCV. Industrial dischargers contribute 1 to 3 percent of the chloride load in the WRP's effluent. Nevertheless, the target chloride limit for every industrial discharger is 100 mg/L. Dischargers that cannot achieve 100 mg/L chloride limit due to technological or economic reasons are required to submit a Chloride Reduction Workplan detailing all technologically and economically feasible chloride reduction actions. In 2002, the SCVSD identified saline discharges at commercial businesses and developed mandatory best management practices (BMPs) for chloride reduction. The SCVSD conducts systematic inspections to ensure that residential AWS are not utilized and that BMPs are being implemented. Because chloride control measures for industrial and commercial dischargers are already in progress, these measures are not included as part of the recommended project.

6.4.2.3 Satellite Chloride Treatment Systems

In this approach, homeowners and businesses in the SCV would have individual water treatment systems to reduce chloride in drinking water prior to its use. Typical home water treatment systems use activated carbon, reverse osmosis (RO), or ion exchange technologies. Activated carbon does not remove chloride. RO is effective in removing chloride but produces a brine stream that requires proper disposal. Normally, home units discharge to the sewer but, in this case, sewering brine would defeat the purpose of a satellite treatment system because the chloride would still reach the WRPs and SCR. Using brine for irrigation at residences would be inappropriate because the salts would build up in the ground and eventually prevent vegetation growth and potentially percolate into groundwater. The RWQCB-LA would likely prohibit such a discharge. Consequently, brine would have to be stored and then periodically picked up and trucked to an offsite disposal location. To transport brine generated by the treatment units, between 300 and 500 trucks would be added to the city traffic every day. With approximately 15 percent of the water treated by RO becoming brine, this offsite trucking would be frequent and prohibitively expensive.

discharge to the SCR. This approach is deemed potentially feasible and carried into further analysis.

6.4.3.2 Supplemental Water

In this approach, tertiary-treated wastewater from each plant would be mixed with low chloride groundwater (supplemental water) to achieve a blend that meets the Chloride TMDL limit. To replace the groundwater used for blending and ensure no net loss of water supply to the SCV, additional water would be imported. This replacement water would be obtained via purchase and bank arrangements through CLWA. The amount of supplemental water needed would vary depending on the chloride levels reaching the WRPs and how supplemental water is combined with other approaches. Consequently, this approach is deemed potentially feasible and carried into further analysis.

6.4.4 No Project Alternative Approach

In this approach, the SCVSD would take no additional actions towards Chloride TMDL compliance which would result in exceeding the Chloride TMDL limit and violating discharge requirements set by RWQCB-LA pursuant to the federal Clean Water Act and the state's Porter Cologne Act. Violations would result in fines to the SCVSD, which would be passed on to the SCVSD's ratepayers. The penalties could include fines for every day that the SCVSD's WRPs violate the chloride limit and fines for every gallon of treated wastewater that is above the legal chloride limit. Additionally, third party lawsuits can be filed against the SCVSD with the potential of more expensive penalties totaling in the millions of dollars. The SCVSD's ratepayers would pay the cost of the fines, third party lawsuit fines, and eventually the cost of facilities for Chloride TMDL compliance. If the SCVSD refused or was unable to pay fines, a court would place the SCVSD into receivership wherein a third party would make decisions for the SCVSD rather than the SCVSD's Board of Directors. Such an outcome would result in loss of local control in decision-making on sanitation issues. In May 2011, the RWQCB-LA issued Notices of Violation for the VWRP and SWRP non-compliance with the Chloride TMDL (included in Appendix 6-B). In November 2012, the RWQCB-LA issued an administrative civil liability complaint to the SCVSD seeking a fine of $280,250 for failure to complete a Facilities Plan and EIR in 2011. In March of 2013, the SCVSD reached a settlement with the RWQCB-LA that reduced the fine to $225,000. Thus, this approach is not feasible but is analyzed in the EIR as required by California Environmental Quality Act (CEQA).

6.4.5 Evaluation of Conceptual Approaches

The conceptual approaches were evaluated as shown in Table 6-1. Conceptual approaches that met all criteria were deemed potentially feasible and carried into further analysis.

Natural Treatment Systems

NTS use natural processes for brine volume reduction. There are two common configurations of NTS: (1) halophytes (plants with unusually high tolerance to salinity), and (2) wetlands. Halophytes and wetlands could be planted and irrigated with brine relying on salt removal in the root zone and allowing evapotranspiration to reduce the volume of flow. NTS are an established technology for polishing and treatment of wastewater effluent, but have not been used widely as a method for brine minimization. These systems would require a large footprint. To prevent negative impacts to soil salinity and groundwater quality, such a system would likely need to be constructed on top of an impermeable liner. With a liner, salts would accumulate over time and necessitate a periodic replacement of soil and vegetation. Replaced soil and vegetation would likely be landfilled. Due to the limited space for such a system in the Santa Clarita Valley, this technology is not appropriate for this Facilities Plan.

Summary of Brine Minimization Approaches

Second-Pass RO, Softening followed by Second-Pass RO, and Mechanical and Thermal Evaporation are deemed feasible and are carried into further analysis. Other approaches are not further considered. To minimize costs, brine minimization facilities would be constructed adjacent to the MF/RO facilities.

6.5.4 Non-Chlorine Based Disinfection

In Section 6.4.2, modifying WRP operations to reduce chloride addition during wastewater treatment was identified as a feasible approach. As noted earlier, chlorine-based disinfection is the only remaining significant chloride contributor from wastewater treatment. Over time, chlorine doses for disinfection at the WRPs have been reduced to minimize chloride addition while still producing the needed level of disinfection. Switching to a non-chlorine based disinfection process is expected to reduce chloride loading at the WRPs by up to 7 mg/L and reduce the formation of undesirable disinfection byproducts that result from chlorination. This reduction would assist in complying with the Chloride TMDL but would not be enough to provide compliance without combining with one or more other approaches. This sub-section evaluates disinfection technologies that are not chlorine based as well as locations for the selected technology. Although chloride dioxide is chlorine based, this technology was included because it produces a low amount of chloride relative to conventional chlorine-based disinfection.

6.5.4.1 Non-Chlorine Based Disinfection Technologies

A number of processes can be used to disinfect wastewater. Chemical processes use compounds like chlorine, bromine, iodine, acids, alkalis, hydrogen peroxide, and ozone. Physical processes include irradiation by different sources such as UV. The most widely used disinfection process for wastewater is chlorination using chlorine gas or sodium hypochlorite (bleach). Chlorination is highly effective in the destruction of bacteria, viruses, and other disease-causing organisms. Disadvantages to chlorination are that it adds chloride to the water and can form undesirable chemical byproducts.

In reuse applications that include significant residence times within a distribution system, chlorine is typically added to create a disinfectant residual that will prevent microbial and biofilm growth within the piping network. In other cases, such as discharge to a water body, no chlorine residual should remain in the effluent so that aquatic species are protected. Unlike chlorination, UV and ozone do not leave a disinfectant residual in the treated effluent. If a residual is desired

Table 6-7. Brine Minimization Scenarios[a] for Brine Pipeline Alternative

	No Minimization	Second-Pass RO	Softening + Second-Pass RO
Brine Flow (max.)	1.3 mgd	0.6 mgd	0.3 mgd
Capital Costs			
Brine Minimization	-	$2 M	$14 M
Brine Pipeline	$109 M	$85 M	$72 M
Other Components	$63 M	$63 M	$60 M
Total Capital	$172 M	$150 M	$146 M
Annual O&M Cost (avg.)	$4.2 M/yr	$4.3 M/yr	$7.5 M/yr
Equivalent Annual Cost[b]	$15.5 M/yr	$14.2 M/yr	$17.1 M/yr
Total Annual Energy Consumption (avg.)	11.8 GWh/yr	11.1 GWh/yr	10.9 GWh/yr

[a] Brine minimization using an evaporator system was not evaluated because such a high-cost, low-brine system is not cost-effective with brine disposal via a pipeline.
[b] Equivalent Annual Cost is defined in Section 6.3.2 under the "Cost-Effective" criterion.

6.6.1.3 Use of UV Disinfection for the Brine Pipeline Alternative

As noted in Section 6.5.4, replacing the existing chlorine-based disinfection with UV disinfection would reduce chloride loading by about 7 mg/L as well as produce effluent with improved water quality. This sub-section evaluates the brine pipeline alternative under two scenarios: UV at Both WRPs, and No UV. Both scenarios assume MF/RO facilities at the VWRP, brine minimization via second-pass RO, a brine pipeline to the Los Angeles Basin and JWPCP, an RO product water conveyance system to the SWRP, and no use of supplemental water. The MF/RO facilities and brine pipeline have different sizes between scenarios due to the higher amount of chloride removal required for the No UV scenario.

Relevant data for the UV disinfection scenarios including costs and energy consumption are shown in Table 6-8.

Table 6-8. UV Disinfection Scenarios for Brine Pipeline Alternative

	UV at Both WRPs	No UV
MF/RO Product Water Flow (primary + secondary max.)	6.1 mgd	7.7 mgd
Brine Flow (max.)	0.5 mgd	0.6 mgd
Capital Costs		
UV Disinfection	$30 M	-
MF/RO+Second-Pass RO	$47 M	$52 M
Brine Pipeline	$84 M	$85 M
Other Components	$10 M	$13 M
Total Capital	$171 M	$150 M
Annual O&M Cost (avg.)	$3.7 M/yr	$4.3 M/yr
Equivalent Annual Cost[a]	$15.0 M/yr	$14.2 M/yr
Total Annual Energy Consumption (avg.)	8.7 GWh/yr	11.1 GWh/yr

[a] Equivalent Annual Cost is defined in Section 6.3.2 under the "Cost-Effective" criterion.

The No UV scenario would save $21 million in capital costs (12 percent) because building slightly larger MF/RO facilities and brine pipeline is less costly than building UV disinfection facilities. Despite its higher O&M costs, the No UV scenario would have an EAC about $0.8 million less per year, a 5 percent savings. The No UV scenario would avoid construction-related environmental impacts associated with construction of UV disinfection facilities and this scenario has two fewer facilities to design, construct and startup within the tight TMDL implementation

Use of the second-pass RO system would reduce brine flow by 50 percent, which would reduce the number of injection wells from 9 to 5 and only require development of Site A. These reductions would result in $33 million in capital cost savings (20 percent) and $0.5 million per year in O&M cost savings (11 percent). Use of second-pass RO would also reduce energy consumption by about 20 percent. Although addition of softening would reduce brine flow by another 50 percent, O&M costs would increase significantly, in large part due to the cost of softening chemicals and sludge disposal. Consequently, second-pass RO is the selected brine minimization scenario and is used in all subsequent discussions of the DWI alternative.

6.6.2.3 Use of UV Disinfection for DWI Alternative

As noted in Section 6.5.4, replacing the existing chlorine-based disinfection with UV disinfection would reduce chloride loading by about 7 mg/L as well as produce effluent with improved water quality. This sub-section evaluates the DWI alternative under two scenarios: UV at Both WRPs and No UV. Both scenarios assume MF/RO facilities at the VWRP, brine minimization via second-pass RO, a pump station and pipeline to convey brine from the VWRP to Site A, DWI wellhead facilities, an RO product water conveyance system to the SWRP, and no use of supplemental water. The MF/RO facilities have different sizes between scenarios due to the higher amount of chloride removal required and brine generated under the No UV scenario. Similarly, the No UV scenario would result in more brine generation and more injection wells. Relevant data for the UV disinfection scenarios including costs and energy consumption are shown in Table 6-11.

Table 6-11. UV Disinfection Scenarios for DWI Alternative

	UV at Both WRPs	No UV
MF/RO Product Water Flow (primary + secondary max.)	6.1 mgd	7.7 mgd
Brine Flow (max.)	0.5 mgd	0.6 mgd
Number of Injection Wells	5	6
Injection Sites	Site A	Site A
Capital Costs		
UV Disinfection	$30 M	-
MF/RO + Second-Pass RO	$47 M	$52 M
DWI	$42 M	$49 M
Other Components	$11 M	$13 M
Total Capital	$130 M	$114 M
Annual O&M Cost (avg.)	$4.1 M/yr	$4.9 M/yr
Equivalent Annual Cost[a]	$12.7 M/yr	$12.4 M/yr
Total Annual Energy Consumption (avg.)	11.3 GWh/yr	14.7 GWh/yr

[a] Equivalent Annual Cost is defined in Section 6.3.2 under the "Cost-Effective" criterion.

The UV at Both WRPs scenario has higher capital costs because it is more costly to build UV disinfection facilities than build slightly larger MF/RO facilities and an additional injection well. However, UV at Both WRPs would save $0.8 million per year in O&M costs (11 percent). As a result, EACs for both scenarios are essentially the same. UV at Both WRPs scenario would require 23 percent less energy and would provide the improved water quality gained by switching to UV disinfection. Overall, UV at Both WRPs is the selected UV scenario based on similar EAC, lower energy consumption, and improved effluent water quality.

Section 6.6.1.3 discusses the SCVSD's request to the RWQCB-LA that they modify discharge requirements in a way that would eliminate the need for the RO product water conveyance

- RO product water conveyance system to SWRP
- Brine disposal system via DWI

UV Disinfection Facilities

UV disinfection facilities would be the same as described in Section 7.2.1.1.

MF/RO Facilities

The MF/RO facilities would be the same as those described in Section 7.2.1.2 except that larger facilities would be needed to comply with a 100 mg/L chloride limit. Under worst-case conditions, approximately 7.1 mgd of VWRP tertiary-treated water would be diverted to the MF/RO facilities, which would produce 5.6 mgd of RO product water, 0.5 mgd of MF backwash, and 1.0 mgd of brine. Approximately 1.8 mgd of RO product water would be conveyed to the SWRP for blending with SWRP tertiary-treated water to comply with the Chloride TMDL. The rest of the RO product water would be blended with the remaining VWRP tertiary-treated water to comply with the Chloride TMDL. MF backwash would be returned to the VWRP for treatment. Brine would be minimized (concentrated) by use of second-pass RO facilities and then disposed via DWI as described below. Design criteria for the MF/RO facilities are shown in Table 7-5.

Table 7-5. Design Criteria for Alternative 2 MF/RO Facilities

Unit Process	Design Criteria	MF	RO
Facility Flows	Feed Water Source	Tertiary Effluent	MF
	Feed Water Recovery	92%	85%
	Feed Water Flow	7.1 mgd	6.6 mgd
	Product Water Flow	6.6 mgd	5.6 mgd
	Reject (Brine) Flow	0.5 mgd	1.0 mgd

Second-Pass RO Facilities

The second-pass RO facilities would be the same as described in Section 7.2.1.2 except that larger facilities would be needed to comply with a 100 mg/L chloride limit. The second-pass RO system would treat 1.0 mgd of brine from the primary MF/RO facilities and produce 0.5 mgd of RO product water and 0.5 mgd of brine. Design criteria for the second-pass RO facilities are shown in Table 7-6.

Table 7-6. Design Criteria for Alternative 2 Second-Pass RO Facilities

Unit Process	Design Criteria	Second-Pass RO
Facility Flows	Feed Water Source	Brine from Primary RO
	Feed Water Recovery	50%
	Feed Water Flow	1.0 mgd
	Product Water Flow	0.5 mgd
	Reject (Brine) Flow	0.5 mgd

RO Product Water Conveyance System to SWRP

As mentioned above in the discussion of MF/RO facilities, approximately 1.8 mgd of the RO product water would be conveyed to the SWRP for blending with SWRP tertiary-treated water to comply with the Chloride TMDL. Conveyance would be accomplished via construction of a pump station at the VWRP and a 14-inch diameter, 3.5-mile long pipeline. The RO product