BEAR VALLEY WATER DISTRICT

SALINITY EVALUATION
AND
MINIMIZATION PLAN

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Contents

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1.0 INTRODUCTION

On August 4, 2011 the California Regional Water Board, Central Valley Region (Regional Water Board) adopted Order No. R5-2011-0053 (NPDES Permit No. CA0085146) Waste Discharge Requirements for the Bear Valley Water District. Special Provision V1.C.3.b of the Order requires the District to "…prepare a salinity evaluation and minimization plan to address sources of salinity from the Facility." This report has been prepared to fulfill the requirements of this section of the Order.

The wastewater treatment plant (WWTP) receives wastewater from approximately 535 residential (133 year round residents) and 17 commercial connections within the Bear Valley Water District. WWTP influent is comprised primarily of domestic and commercial wastewater with no real industrial sources. The WWTP produces secondary disinfected effluent, with an existing design capacity of 0.5 million gallons per day (Mgal/day) and a permitted capacity of up to 0.1 Mgal/day, both on an average dry weather flow (ADWF) basis. The effluent can be discharged to Bloods Creek from January 1 through June 30 under conditions 1) storage reservoir (polishing pond) has less than 35 MG of unused effluent storage capacity and 2) providing a minimum of 20:1 dilution. Secondary effluent is applied to the District's Designated Land Disposal Area (DLDA) to the extent feasible, but primarily from May 1 through October 31 dependent upon snow melt and weather conditions. Effluent that in real-time cannot be discharged to Bloods Creek or the DLDA is stored until discharge is possible.

Recent monitoring of the potable water supply has yielded an average electrical conductivity (EC) of 78 µmhos/cm. The historical average wastewater effluent EC for the period of 1997 through 2010 is 126 µmhos/cm. The average wastewater effluent EC for 2011 is 60 µmhos/cm, below the historical average EC of 126 µmhos/cm.

1.1 Effluent Limitations and Applicable Water Quality Objectives

The Order does not contain a final effluent limitation for annual average electrical conductivity (EC) or total dissolved solids (TDS). The Water Quality Control Plan (Basin Plan) for the California Regional Water Quality Control Board Central Valley Region includes established and adopted numeric and narrative water quality objectives with respect to salinity. In addition, State Water Board Resolution 68-16, the "Anti-degradation Policy," requires 1) the quality of individual waters of the state be addressed in the permitting of waste discharges, and 2) high quality water should be preserved to the maximum benefit of the people of the state.

Numeric drinking water supply objectives on total dissolved solids (TDS) and EC have been adopted in the form of Secondary Maximum Contaminant Levels (SMCLs) based on duration of discharge to protect municipal and domestic water supply beneficial uses. These SMCLs consist of “Recommended,” “Upper,” and “Short-term” contaminant ranges. Narrative limitations for the protection of agricultural beneficial uses have also been established. These limitations should take the specific area, including climate and topography, and cropping patterns into account, and thus vary from area to area. Generally, numeric agricultural water quality objectives (WQOs) established by the Food and Agriculture Organization (FAO) that limit detrimental impacts to the most sensitive crops are applied as discharge limitations. A listing of these water quality objectives, effluent limitations, and the average concentration of the effluent is presented in Table 1.

Table 1

Comparison of Effluent Limitations, Applicable Water Quality Objectives, and Effluent Quality, Bear Valley Water District WWTP

Parameter	**Final Effluent Limitation**	**Secondary MCL [(a)]**	**Agriculture WQO**	**Effluent [(b)]**
Electrical Conductivity (µmhos/cm)	---	900-1600-2200	700	126
TDS (mg/L)	---	500-1000-1500	450	140

[(a)] Recommended –Upper-Short term.
[(b)] Average of polishing pond data 1997-2010.

The average WWTP effluent EC of 126 µmhos/cm (based on 1997 through 2010 monitoring) and 2011 testing result of 60 µmhos/cm are less than the agricultural water quality objective of 700 µmhos/cm, established in the Basin Plan. Based on the long-term effluent average, the District WWTP is currently capable of complying with all applicable salinity water quality objectives. However, increased water conservation in the community, including future State mandated reclamation and water conservation requirements, may inhibit compliance with the final effluent limitation in the future.

2.0 SALINITY SOURCES

The Bear Valley Water District WWTP influent wastewater is derived from residential and commercial uses of water. Thus, the salinity of the influent reflects the salinity of the potable water supply, additions from domestic and commercial uses of water, and any salinity contributed to (or diluted in) the collection system through infiltration and inflow. Additional inputs of salinity can occur during the wastewater treatment process, including increases in salinity concentration resulting from evaporation. Potential salinity sources associated with each of these components are discussed in this section.

2.1 Potable Water Supply

The potable water within the District's service area is provided by the Lake Alpine Water Company using low salinity surface water from springs and snow melt into Bear Lake. The treatment of this surface water includes microfiltration and disinfection which add salinity to the water. The average salinity of the treated potable water supply based on 2011 testing is 78 μmhos/cm, which is a low salinity water supply.

2.2 Residential Uses

The residential use of water contributes salinity to the wastewater within the District's service area primarily by the addition of soluble compounds to the water from excrement and cleaning products (e.g. detergents, soaps, cleansers, disinfectants, etc.). Generally, water softeners are large contributors of salinity to wastewater, but their use in the District's service area is unlikely based on the low hardness of the surface water supply (16 mg/L). Water quality data collected to date does not suggest significant numbers of water softeners in the community. The District may consider passing an ordinance banning the use of water softeners in new construction to prevent ill-informed homeowners from installing the devices when no material benefit will be realized. Swimming pools and hot tubs contribute salinity through maintenance activities and concentrate the salinity through evaporation. Other sources of salinity include the contribution of food particles through dishwashing and garbage disposals.

Although water conservation does not contribute salinity to the wastewater on a mass basis, it does increase the concentration of salts in the wastewater. As water conservation technology continues to be implemented within residential development and existing homes (e.g. there are already dual flush toilets on the market, a lower flush volume for liquid wastes and a higher flush volume for solid wastes), the wastewater salt concentration can be expected to continually increase (counter to the intent of the Order).

2.3 Commercial and Industrial Water Use

Commercial sources of salinity are somewhat similar to those from residential use of water. However, the salinity varies with type of business. Potential sources of salinity that are somewhat different than residential use include cooling water blow down, car washes, photo processing wastes, and healthcare facilities. There are no significant industrial wastewater discharges to the District's collection system.

2.4 Wastewater Collection and Treatment

Generally, salinity inputs from wastewater collection are attributed to infiltration and inflow (I&I). Infiltration of shallow groundwater, particularly in areas with substantial irrigated agriculture, can contribute salinity to the wastewater stream. Bear Valley is not surrounded by irrigated agricultural lands, and I/I does not appear to cause significant increases in wastewater salinity.

At the WWTP, salt containing chemicals, e.g., chlorine, are used to treat the wastewater. During treatment, incidental evaporation of water occurs, which increases the salt concentration of the effluent.

3.0 POTENTIAL METHODS TO REDUCE SALINITY AND ANTICIPATED LOAD REDUCTIONS

The use of water in the District's service area historically contributes a very low amount of salinity, approximately 48 μmhos/cm of EC, including contributions from the treatment process. Therefore, additional reductions in salinity are unlikely. Additional methods available to reduce the salinity of the District's effluent are limited. There is no source of lower salinity potable water. Public outreach and education efforts could be conducted to inform the citizens and businesses served by the District about salinity, and practices that could be employed to reduce effluent salinity. Including information with the utility bill would be a relatively simple and inexpensive method of education. The potential load reduction from these efforts will vary depending on public action, but is anticipated to be minimal.

Thus, any significant further reduction in effluent salinity will likely require modifications in treatment processes. The current chlorination/dechlorination system could be replaced with ultraviolet light disinfection, which could potentially reduce effluent salinity by approximately 50 mg/L. Reverse osmosis (RO) could remove salinity from the effluent, but at a very high cost. The brine stream created by RO would probably need to be shipped to the Bay Area for discharge to the ocean. Based on the cost of these potential treatment process modifications, District salinity reduction efforts will focus on source control rather than on advanced treatment processes.

4.0 MONITORING PLAN

The District currently monitors the WWTP effluent for EC twice a year (no discharge to Bloods Creek) and twice per week (during discharge to Bloods Creek) and for TDS monthly. The WWTP influent is monitored for EC monthly and the water supply is monitored by EC and TDS annually. Monitoring influent salinity using EC is problematic due to high levels of volatile (organic) dissolved solids, and monitoring the effluent is sufficient for determining salinity contributions. The continued implementation of this ongoing salinity monitoring program should provide adequate data to quantify the effectiveness of any District-implemented salinity minimization efforts.

5.0 SALINITY MINIMIZATION GOALS AND SCHEDULE

The District is currently in compliance with water quality objectives for salinity. The District will conduct its salinity minimization plan for the purpose of continuing to meet the objectives. The primary methods for further achieving salinity minimization include the consideration of implementing a public outreach program as well as continued monitoring. It should be noted that future water conservation programs will likely increase the salinity of the wastewater, and the District may not be capable of meeting these limitations if major accomplishments of “in home” water conservation are realized. If this occurs it is suggested that the order be reopened to recognize the salt concentration effect of water conservation.

6.0 CONCLUSION

The current increases in wastewater resource salinity from 1) use of potable water, and 2) the subsequent treatment of the wastewater produced in the Bear Valley Water District are below Regional Water Board objectives, which allow for an increase in effluent EC of 500 µmhos/cm over source water. The District has implemented a salinity monitoring program to track salinity trends and to determine if additional measures are necessary to further reduce effluent salinity. In addition, the necessity of a public education program will be explored, and implemented, if it is determined that the program could result in a measurable reduction in the salinity footprint of the community.