Analysis of an "Impairment" Determination Due to Chloride in the Santa Clara River

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Abstract

In 1998, three reaches of the Santa Clara River, located in Los Angeles and Ventura Counties, California, were identified as being impaired by chloride and consequently were listed on the Los Angeles Regional Water Quality Control Board=s (Regional Board) 303(d) List. The Regional Board had determined that agricultural uses were not being adequately protected. Because of concerns about the technical validity of the Regional Board's impairment determination, the Los Angeles County Sanitation Districts (Districts) conducted a study of the Santa Clara River Watershed to evaluate the basis of the chloride listing and the origin of the Basin Plan chloride objective. The study included a review of: 303(d) listing data, the original setting of the chloride objective for protection of agriculture, and trends of chloride concentrations in both surface water and groundwater within the watershed.

It is believed that the three reaches of the Santa Clara River were incorrectly identified by the Regional Board as being impaired by chloride. For example, all available data were not used in the impairment determination analysis. In one reach in Los Angeles County (Reach 7), only five data points were used for the impairment determination when nearly 420 historical data points were available. In addition, there was no attempt to account for spatial and temporal conditions when evaluating the water quality data for any of the reaches.

Concerns regarding the impacts of surface water on groundwater chloride levels lead to an evaluation by the Districts of historical groundwater data. A Mann-Kendall trend analysis was performed on the historical data. Analysis results revealed no basin-wide trends for increasing chloride, and no evidence of a threatened groundwater condition. Based on this information there was consensus among the stakeholders to revise the chloride objectives. Adoption of the proposed chloride objectives will result in the de-listing of the affected reaches and implementation of an assessment program to monitor future chloride trends in both surface water and groundwater.

1.0 Introduction

The Districts own and operate the Saugus and Valencia Water Reclamation Plants (WRPs), which are located in the Santa Clarita Valley in Los Angeles County. The Valencia and Saugus WRPs discharge tertiary treated wastewater to Reaches 7 and 8, respectively, of the Santa Clara River (see Figure 1). In 1998, Reaches 7 and 8 were included on the EPA approved 303(d) List as impaired due to chlorides. Over the past few years, the Districts have been conducting extensive surface water and groundwater quality evaluations to assess the impacts of WRP discharges on chloride levels. These evaluations also included investigating appropriate chloride objectives for the protection of downstream beneficial uses. The presence of chloride in the WRP effluents can be attributed to a combination of sources including the potable water supply, residential, industrial and commercial loadings (including water softeners), and to a smaller extent, WRP treatment processes (see Figure 2). Tertiary treatment does not remove salts from the wastewater, therefore salts pass through and are ultimately discharged at approximately the same concentration as they enter the treatment plant. This paper presents the results of the Districts= studies of historical water quality and chloride objective requirements for continued protection of beneficial uses. In addition, the Districts= experience with the chloride listing process is presented for consideration by regulators, operators of Publicly Owned Treatment Works (POTWs), and other watershed stakeholders dealing with similar issues.

2.0 Background

Since 1989, the Regional Board has recognized that during times of drought, chloride levels in Los Angeles County surface waters increase concomitantly with increases in chloride levels in imported potable water supplies. To accommodate these uncontrollable concentration changes, the Regional Board adopted a drought policy beginning in 1990 which provided relief to WRP dischargers. In 1997, the Regional Board upwardly revised water quality objectives for chloride for many surface waters in Region 4 (the Los Angeles Region). However, chloride objectives were not revised for the Santa Clara River because area farmers voiced concerns that increases in chlorides would have potentially detrimental impacts on avocado crops. In response to these concerns, the Regional Board adopted interim effluent chloride limits for POTWs discharging to the Santa Clara River and Calleguas Creek Watersheds. In addition, the Regional Board agreed to conduct a study to re-evaluate the surface water objectives needed to protect waters used for irrigation in the Santa Clara River and Calleguas Creek. This Regional Board study involved stakeholders from both Los Angeles and Ventura Counties.

Subsequent to undertaking a study of the surface water chloride objectives, the Regional Board completed its assessment of impaired water bodies for the 1998 303(d) List. As a result of this water quality assessment, the Regional Board identified Santa Clara River Reaches 7 and 8 in Los Angeles County, along with Reach 3 in Ventura County, as being impaired due to chloride. These reaches were added to the Regional Board=s 1998 303(d) List, but Reaches 7 and 8 were later removed by the State Water Resources Control Board (State Board) based on testimony from the Districts that raised concerns about the methodologies used in the assessment. The EPA overturned the State Board=s decision to de-list and added Reaches 7 and 8 back onto the 303(d) List. It should be noted that although Reaches 3, 7 and 8 were identified as impaired by chloride, there was no evidence of impairment of agricultural beneficial uses.

Surface water in the Santa Clara River is used in Ventura County for both agriculture and groundwater replenishment. One of the first concerns expressed by the Ventura County stakeholders was that discharges from the Saugus and Valencia WRPs were impacting chloride concentrations in the downstream portions of the Santa Clara River in Ventura County, specifically at Freeman Diversion, located at the downstream end of Reach 3. In response to those concerns, the Districts hired Kennedy-Jenks (KJ) Consultants to develop a surface water chloride model. The objective of the model was to determine the potential impact of discharges from the Saugus and Valencia WRPs on chloride concentrations in surface water at Freeman Diversion located over 30 miles downstream (see Figure 1). Surface water at the Freeman Diversion is diverted for direct agricultural use and groundwater recharge. It should be noted that although the historical average chloride concentration measured at the Freeman Diversion is less than the objective for Reach 3, more than 25% of the surface water data used by the Regional Board for their 1998 water quality assessment exceeded the objective (80 mg/L), resulting in the reach being identified as impaired for chloride on the 1998 303(d) List. KJ Consultants used available flow and chloride concentration data for the Saugus, Valencia and Santa Paula WRPs, major tributaries and the Freeman Diversion. KJ Consultants developed a stochastic model of flows and chloride concentrations in the Santa Clara River. A Monte Carlo simulation was used to incorporate the inherent uncertainty in the evaluation of

hydrologic data; the model is believed to be superior to deterministic models which ignore such variability.

The KJ Consultants= study (Kennedy-Jenks, 1998) concluded that the impact at Freeman Diversion from the discharge of reclaimed water from the Saugus and Valencia WRPs was insignificant during both drought and non-drought periods. In summary, during dry weather conditions, when chloride concentrations in the effluent dominated surface water flow are typically the greatest, the surface water flow disappears and the river becomes dry approximately three miles downstream of the Los Angeles/Ventura County Line (the downstream portion of Reach 7). The surface water infiltrates into the underlying groundwater in East Piru Basin. Conversely, during wet weather flows, though some of the WRP effluents may potentially make their way to Freeman Diversion, due to the dilution from high volume wet weather flows, the chloride concentrations are significantly lower. Volumetric flow rates and chloride concentrations recorded at Freeman Diversion appear to be primarily influenced by combinations of rising groundwater, the Santa Paula WRP, and flows from upstream tributaries such as Santa Paula Creek and Sespe Creek (reference Figure 1).

The results of the KJ Consultants= study were presented to stakeholders at a chloride workshop. The study conclusions prompted stakeholder discussions on the chloride objectives, historical water quality and evidence of beneficial use impairments. The focus of the watershed stakeholders was redirected from surface water quality to groundwater quality and gaining an understanding of the potential impacts, if any, that the Saugus and Valencia WRPs had on groundwater quality in Piru, Fillmore and Santa Paula Basins, with a specific emphasis on Piru Basin. As noted previously, flow in the Santa Clara River infiltrates into the Piru Basin in the eastern portion of Ventura County approximately 12 miles downstream of the Valencia WRP. Growers in the Santa Clara River Watershed predominantly use groundwater for irrigation and an initial evaluation by the Regional Board indicated a potential increasing chloride concentration trend in Piru Basin groundwater. Because of the indication of a potential threat to Piru Basin groundwater quality, the Regional Board prepared a draft TMDL to be protective of all surface waters and groundwaters in the Piru, Fillmore and Santa Paula Basins. The Regional Board suggested capping POTWs at current chloride mass loads and cutting agriculture=s chloride mass loads by 10% through the use of Best Management Practices (BMPs). BMPs were deemed necessary because irrigation and evapotranspiration lead to a concentrating of salts (including chloride) in return waters that runoff to the river and to a greater extent infiltrate into the groundwater basins. For comparison, Saugus, Valencia and Santa Paula WRPs contribute an estimated 20,000 lbs/day of chloride to surface water while agriculture contributes an estimated 30,000 lbs/day of chloride to groundwater.

3.0 Santa Clara River Watershed Chloride Study

Because of concerns that the Regional Board may not have correctly established the original 1975 chloride objectives for Reaches 7 and 8, and also because of concerns that the Regional Board=s initial trend analysis was not an accurate indicator of a basin-wide chloride problem for all groundwater basins, the Districts performed a rigorous evaluation of the current chloride objectives in relation to the protection of agricultural beneficial uses. The Districts also analyzed historical groundwater in Piru, Fillmore and Santa Paula groundwater basins and surface water data for Reaches 7 and 8 of the Santa Clara River. Descriptions of the evaluations, analyses and findings are presented in subsections 3.1 and 3.2.

3.1 Chloride Objectives

In 1975, the Regional Board established the chloride objectives for Reaches 7 and 8 at 100 mg/L as a flow-weighted annual average. The chloride objectives were originally set based on historical water quality and for protection of beneficial uses. The historical data used to justify this objective were obtained from receiving water stations located in the furthest downstream portions of the reaches. In these two reaches, water quality in downstream portions are not indicative of water quality throughout the reaches. Furthermore, the Regional Board listed a range of chloride objectives in the 1975 Basin Plan as between 100 and 355 mg/L for protection of the agriculture beneficial use, which was identified as the most restrictive beneficial use of the river with respect to chloride. For reference, the secondary drinking water standard for chloride is 250 mg/L. Based on the agricultural requirements and historical receiving water data at the LA/Ventura County

Line (at the downstream end of Reach 7), 100 mg/L was established as the objective in 1975 with a footnote specifying that a flow-weighted annual average be used. However, when the Regional Board updated the Basin Plan in 1994, either inadvertently or for the purpose of more streamlined compliance determinations, the footnote requiring flow-weighted averaging for determining compliance with the chloride objective was omitted. Subsequently, the Regional Board interpreted the objective as an instantaneous maximum for the receiving water. No justification for this change in the objective has been put forth by the Regional Board other than difficulties in acquiring accurate surface water flow data.

The Districts began collecting receiving water chloride samples in the upper portions of Reaches 7 and 8 in 1995. The Regional Board subsequently applied the 100 mg/L objective as an instantaneous maximum at these upstream points. It was upstream data, collected in June, August and September of 1996, that led to the 1998 impairment determination for Reach 7. Only 5 data points were used to determine impairment and all were taken in the summer and early fall. It appears that the Regional Board did not take into account seasonality in determining impairment. In addition, over 400 additional data points for the downstream end of Reach 7 were available prior to 1996 for use in determining impairment. However, these additional points were not considered in the determination. Figure 3 shows the additional 413 data points, taken for surface water at the Los Angeles/Ventura County Line (the downstream end of Reach 7), that could have also been considered by the Regional Board for their impairment determination. In view of Figure 3, it is apparent that chloride concentration has actually decreased dramatically since 1951. Furthermore, a review of data between 1970 and 1996 shows that if impairment criteria (i.e., 25% of the data exceeding the objective) were to have been applied to this larger data set, then no impairment would have been found by the Regional Board.

Upon investigation into the basis of the 100 mg/L chloride objective for protection of agriculture, it appears that the objective was incorrectly established. The Regional Board cited McKee and Wolf (1963) for a range of 100 to 150 mg/L chloride as being protective of agriculture. However, McKee and Wolf cited Zimmerman and Berg (1934) for this range. Through additional investigation, it was learned that Zimmerman and Berg used free residual chlorine and not chloride in their studies. Thus, with the lower limit of the Regional Board=s range for protection of agriculture in question, additional literature was reviewed for an appropriate chloride threshold. Avocados and strawberries were deemed as the most chloride sensitive crops grown in Ventura County. Though the Regional Board and local agricultural interests cited many articles as supporting a 100 mg/L threshold for avocados, thorough review of those articles revealed additional doubts as to the applicability of this value. For example, one article used empirically calculated theoretical chloride concentrations from measurements of TDS, another used high levels of nitrate in conjunction with chloride and another showed improper leaching practices where chloride built up high concentrations in the rootzone. It was determined that proper irrigation water management is required for the use of irrigation water with chlorides above 100 mg/L, and effects on sensitive crops would be expected with a chloride concentration in the vicinity of 177 mg/L. The UC Committee of Consultants published the AGuidelines for Interpretation of Water Quality for Agriculture@ in 1975. For surface irrigation of all crops, the Committee selected a chloride value of less than 142 mg/L as being protective, assuming a 15 to 20 percent leaching fraction in the applied water, and based on a long-term average. It should be mentioned that 106 mg/L is a threshold for plants that exhibit foliar sensitivity to chlorides (i.e. sensitivity to leaf uptake) whereas 142 mg/L is a threshold based on root sensitivity. Avocados and strawberries are sensitive to chlorides through root uptake only (Bernstein, 1964).

3.2 Chloride Trends

As was discussed in Section 2.0, the Regional Board presented elements of a draft TMDL that would have frozen POTW chloride mass loadings, capped chloride mass loadings from conservation releases, and decreased agricultural mass loadings by 10%. One of the major reasons for pursuing the TMDL was due to the perceived threat of degradation of Piru Basin groundwater. Early in the stakeholder process, the Regional Board presented chloride profiles of selected wells in the Piru Basin showing an increasing trend (see Figure 4). Their basis for an increasing chloride trend was derived from a figure taken from a 1989 California Department of Water Resources (DWR) hydrology report for the Santa Clara River Watershed. One major problem with their initial analysis was that between 1970 and 1989, there was only one additional data point used to justify these perceived trends (refer to Figure 4). To compound the issue, these single data points (for each chloride profile) were taken in the middle of the 1987-1991 drought, when groundwater elevations were near the lowest recorded levels ever and while reported pumpage was near the highest recorded levels ever (United Water Conservation Districts, 1998). Thirdly, there were no data being presented by the Regional Board tracking more current conditions, post-1989. The Districts were concerned that all available data were not being analyzed and that a skewed and inaccurate picture of trends was being presented. Because of those concerns, the Districts conducted a chloride study for

the Santa Clara River Watershed (Districts, 1999). A major objective of the Districts= chloride study was to survey available historical surface water and groundwater chloride data for the purpose of determining temporal trends in post-1970 water quality data for Piru, Fillmore and Santa Paula Watersheds.

It was determined that Mann-Kendall was an excellent statistical method to use because of the data limitations and the non-parametric nature of surface water and groundwater data sets. In particular**,** Mann-Kendall was advantageous over linear regression for this study because of its robustness in handling outliers, its flexibility with regards to distributional assumptions on the data sets and because the majority of the historical water quality records for surface water and groundwater in the Santa Clara River Watershed were irregularly sampled. Mann-Kendall has been used and cited in many other water quality monitoring applications (Hirsch et al., 1982, Gibbons, 1994, and Maidment, 1993). This method provided meaningful insight on where and what type of trends exist, as well as the strength and statistical significance of trends with respect to the data sets and time periods used for the analyses. Once trends were determined, more in-depth studies could be explored to help explain the causes and sources of trends at various locations, which may or may not be indicative of basin-wide problems, but rather of localized effects.

3.2.1 Reach 7 and Reach 8 Surface Water Trends

A Mann-Kendall trend analysis of the entire surface water chloride data set (420 data points collected from 1951 through 1998) for the downstream end of Reach 7 indicated a weak decreasing trend in chloride concentrations. This decreasing trend is believed to be associated with the cessation of brine discharges to the surface waters from oil drilling and production activities in the 1950's and 1960's. An evaluation of the data over the time period from 1970 to 1998 indicated a weak increasing trend in chloride concentration. This weak increasing trend was attributed to the impact of the 1987 through 1991 drought on surface and supply water qualities. Although the drought was over in 1991, it took several years before the water supply returned to its pre-drought chloride concentration levels. This lag time is likely caused by the rate of turnover of a local reservoir (approximately three years), which stores State Water Project (SWP) water and serves as a major source of drinking water for the Santa Clarita Valley.

The most recent drought in the Santa Clara River Watershed (1987-1991) had a significant effect on surface water chlorides in Reaches 7 and 8. Between 1970 and 1998, the maximum chloride concentration measured in Reach 7 was 125 mg/L; it was recorded in 1992 at the tail end of the drought. Similarly, the maximum chloride concentration in Reach 8 was measured in 1991 at 138 mg/L. Because data collection was infrequent during the drought period, it is believed that actual concentrations may have been even higher than those recorded.

These drought-related increases in surface water chloride concentrations are largely the result of changes in quality of the potable water supply in the region. The Santa Clarita Valley=s potable water supply is a blend of groundwater and SWP water. During drought periods, the SWP water typically experiences increases in salinity. Concentrations of chlorides in the potable water supplies (blended groundwater and SWP water) have been recorded as high as 115 mg/L during extended drought conditions. Chloride concentrations in the SWP water alone were recorded at a level as high as 117 mg/L during the last drought period in 1991. Increased chloride concentrations in the potable water directly results in increased concentrations in WRP effluents, which make up the majority of river flows during drought conditions.

The results of the trend analyses for Reaches 7 and 8 indicated that drought conditions have historically had the most significant effect on surface water chloride concentrations for these reaches post-1970. However, as evidenced by the trend analyses results for the 1951 through 1998 time period, there has been an actual decreasing trend with respect to chloride concentrations at the LA/Ventura County Line which is the furthest downstream point in Reach 7 before surface water from the Santa Clara River infiltrates in East Piru Basin.

3.2.2 Trends in Piru, Fillmore and Santa Paula Basin Groundwater

Mann-Kendall was also used to determine chloride trends in individual groundwater wells. Mann-Kendall is a particularly excellent method for trend detection in groundwater because it is a non-parametric method, and thus is not affected by outliers, nor is it based on establishing a linear relationship between concentration and time for processes that are often non-linear in nature. In contrast, linear regression, the most popular method for trend analyses, is a parametric

method that is highly affected by outliers and is based on establishing the degree that two variables are linearly related to each other. Often linear regression produces poorly correlated results for determining groundwater trends. This will be discussed in greater detail with regards to how the Regional Board=s methodology differed with the Districts trend analysis methodology. Ultimately, all trends, whether increasing, decreasing or showing no trends, were spatially represented in order to determine the relationship between spatial variations and chloride trends in groundwater. Figure 5 shows a map of trend analysis results for Piru, Fillmore and Santa Paula Basins.

Of the 156 wells evaluated (from the 1970-1998 data set), 16 (seven in Piru, four in Fillmore, and five in Santa Paula) were found to have increasing trends in chloride concentrations and 10 were found to have decreasing trends, while the remaining wells showed no trends. Some wells had insufficient data to statistically evaluate trends with any significance. The results indicate that there has not been widespread increases in chloride concentrations for all three basins, and for the most part the chloride concentrations have remained relatively constant in each basin. The wells showing increasing trends are believed to be affected by localized conditions of pumping, land-use and/or unique geological conditions. Additionally, a closer review of the wells showing increasing trends revealed that in most cases the magnitude of the increase was insignificant. The Districts believe that the results of these trend analyses confirmed that with respect to chloride, the agricultural uses have been historically protected in the Piru, Fillmore and Santa Paula Basins.

3.3 The Regional Board and Trends in Piru, Fillmore and Santa Paula Basins

In response to the Districts chloride study, the Regional Board performed another analysis of trends for groundwater chloride concentrations in Piru, Fillmore and Santa Paula Basins. The Regional Board=s analysis was a linear regression of the aggregation of all available data for all wells for all basins over time. In other words, they lumped together every historical data value for Piru, Fillmore and Santa Paula groundwater basins and performed a regression analysis through the data. The Districts felt that such a trend analysis was inadequate because it aggregates groundwater data from basins that have completely different water quality characteristics, potentially biasing the outcome of a trend. Subsequently, the Regional Board analyzed aggregate data in individual basins through regression analysis. In all cases their analyses showed very poor correlations (r-squared values less than 0.05), demonstrating the difficulties of using linear regression for detecting trends in groundwater processes that are non-linear in nature.

In their final analysis of Piru Basin, included in the Proposed Basin Plan Amendment (Regional Board, 2000) to be discussed in Section 4.0, the Regional Board used a linear regression of the annual average of all chloride values in a given year over time. In essence, the Regional Board took the average of all reported chlorides in Piru Basin for each year and performed a regression through that data set. This methodology produced a linear regression trend line with an r-squared value of 0.17, showing that even after transformation, the data sets were very poorly correlated.

The Districts had many concerns regarding the Regional Board=s analyses, including their final analysis. One major concern was the Regional Board=s methodology of aggregating all wells and all reported chloride values for use in a linear regression analysis. This practice of aggregation ignores the relationship that spatial and temporal variability have on trends. This is a particularly important issue with respect to Piru Basin, because of the fact that the groundwater has two different Basin Plan objectives for chloride for East and West Piru Basins. East Piru Basin has been identified by the DWR as an area containing exposed marine deposits, resulting in elevated concentrations of TDS, sulfates and chlorides; this conceivably was the reason why the Regional Board set the Basin Plan groundwater objective for chlorides in this region at 200 mg/L. In contrast, West Piru Basin, where the majority of agricultural activity exists in Piru, has a chloride groundwater objective of 100 mg/L. Using the Regional Board=s method of trend analysis, a groundwater sample from West Piru with 50 mg/L chloride sampled in 1960 plotted with a value of 150 mg/L for East Piru in 1990 would show an increasing trend. In reality, the well data in this example shows nothing about trends since the two subbasins have distinctly different water quality characteristics.

Another major concern regarding the Regional Board=s final analysis for the Piru Basin was the annual averaging technique used for determining Piru Basin trends. By taking annual averages of all Piru Basin groundwater data, the Regional Board was assuming that the available data set is robust enough that the average of available records in any given year will accurately reflect the average groundwater condition for the entire basin during that year. This assumption is very

suspect and most likely wrong, especially since there were many years in the available data set when only one record existed. A review of the available historical data showed that there were numerous times between 1930 and 1950 when only one record was available. Additionally, this methodology does not escape the difficulties associated with aggregating data as discussed previously.

4.0 Stakeholder Consensus and the Proposed Basin Plan Amendment

Growers who had originally defended the need for the 100 mg/L objective to protect avocado orchards later acknowledged that there was no current impairment of beneficial uses and that higher concentrations (>100 mg/L) in upstream reaches do not necessarily create impairment downstream. Ventura County growers and other Ventura County stakeholders were more worried about future development and associated future chloride loading. The growers were not interested in any program that would potentially limit irrigation practices such as a TMDL. Similarly, WRP operators were skeptical about the Regional Board=s proposal to cap the current chloride mass loading due to the lack of causal relationships that had been shown between effluent discharges and surface water and groundwater chloride concentrations. Capping WRPs at current chloride mass loads would have essentially put severe restrictions on future growth when the assimilative capacities of groundwaters and surface waters and, thus, the effects of future growth were undefined. The majority of stakeholders soon agreed that a change in the objectives and not a TMDL was warranted.

With stakeholder support, the Regional Board proposed a Basin Plan Amendment to change the current chloride objective in Reach 3 from 80 mg/L to 100 mg/L (based on a 12-month rolling average) with an instantaneous maximum limit of 180 mg/L. Similarly, in Reaches 7 and 8, the Regional Board proposed a change of the current chloride objective from 100 mg/L to 143 mg/L (based on a 12-month rolling average) with an instantaneous maximum limit of 180 mg/L. A surface water chloride concentration of 143 mg/L was agreed to be protective of beneficial uses (irrigation of avocado crops) as well as being more reflective of historical chloride conditions for these reaches. However, the Districts do not believe that 143 mg/L based on a 12-month rolling average is reflective of chloride concentrations during drought conditions. In order for the objective to be reflective of historical drought conditions, the proposed 143 mg/L objective should be based on a 36-month rolling average. The raising of the current objective will result in Reaches 7 and 8 being removed from the 1998 303(d) List. However, chloride concentrations in the upstream portions of these reaches have been historically higher, and it is currently unknown as to how the Regional Board will perform future impairment determinations at these locations, and when drought conditions persist in the watershed.

The Regional Board continues to believe that there is an increasing trend for chlorides in Piru Basin. Consequently, they are concurrently coordinating a watershed monitoring and assessment program with a few of the stakeholders (including the Districts and Santa Paula WRP). A major goal of this program is to collect additional receiving water data at key locations and develop a database of groundwater and surface water chloride concentrations. Additional and more representative data will be used to determine surface water-groundwater interactions and any impacts that surface water recharge from the Santa Clara River has on the underlying groundwater basins in Piru, Fillmore and Santa Paula.

5.0 Conclusions

The stakeholder process is an appropriate way to communicate concerns between the parties involved and, based on the Districts= experience, it does work to some degree. The situation for the Santa Clara River was unique in that initially adversarial stakeholders were able to find common ground in agreeing that a TMDL was not necessary. This common ground was based on the fact that the Regional Board=s TMDL would limit both agricultural operations as well as cap WRP chloride mass loadings without any concrete scientific evidence that such restrictions would benefit the agricultural beneficial uses, especially when there was no evidence that agriculture was ever impaired.

In the next twelve years, the Los Angeles Regional Board is mandated by the EPA to conduct and complete TMDLs for over 700 additional impairments identified on the 1998 303(d) List. This number is expected to increase significantly when the 2002 303(d) List is generated. The Districts finds these statistics alarming for any and all potential stakeholders involved in future TMDLs, in that the time is insufficient for the application of sound science to be applied to each individual TMDL. If a chloride TMDL had been required and implemented for the Santa Clara River, the

Districts believe that the Regional Board, by capping chloride mass loads from WRPs to current levels, would have indirectly required that advanced treatment be added to the existing treatment processes. Thus, millions of dollars for treatment would be required without any scientific basis that such a mass loading cap would benefit the agricultural beneficial uses.

The Districts recommend that any stakeholder involved in a TMDL process be an active participant that closely evaluates available data, evaluates methodologies and studies conclusions carefully. Most importantly, stakeholders should insist that sound science is driving decisions through all steps of the process.

Even though Reaches 7 and 8 will be removed from the 1998 303(d) List as a result of the revised objective, the Districts believe that these reaches may re-appear on a future 303(d) list as a result of a significant drought period. Finally, as evidenced by the chloride concentration profile for influent to the Saugus WRP (refer to Figure 6), it is inevitable that the proposed instantaneous maximum of 180 mg/L will be exceeded at receiving water stations immediately downstream of the WRP outfalls. These short-term peaks in influent chloride concentration routinely occur between 2:00 and 4:00 AM, are attributed to the use of residential self-regenerating water softeners in the Santa Clarita area, over which the Districts have no regulatory control.

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