Memorandum

DATE:	September 25, 2008
TO:	Robert Seyfried, SRCSD
SUBJECT:	Chloride Water Quality Objectives
cc:	Betsy Elzufon, LWA

Shikha Chetal

Larry Walker Associates
720 Wilshire Blvd, Suite 204
Santa Monica, CA 90401
Phone: 310-394-1036
Fax: 310-394-8959

INTRODUCTION

High levels of chloride in water can be harmful to humans, plants, agricultural crops, and aquatic life. Therefore, various thresholds of chloride have been set by the U.S. EPA and other agencies to prevent harm. A summary of these thresholds/objectives is presented in **Table 1**.

Table 1. Summary of chloride recommended objectives for different beneficial uses[1]

	Beneficial Use			
	MUN	**PROC**	**AGR**	**AQ LIFE**
Chloride	250 mg/L (U.S. EPA secondary MCL)	20-1000 mg/L	100-355 mg/L	230 mg/L (4-day avg. continuous conc.)

McKee & Wolfe (1963)

Table 2 lists water quality criteria for domestic supply as mentioned in the Water Quality Criteria Document (McKee & Wolfe, 1963)

Table 2. Range of promulgated standards for raw water sources of domestic supply

	Excellent source of water supply, requiring disinfection only, as treatment	Good source of water supply, requiring usual treatment such as filtration and disinfection	Poor source of water supply requiring special or auxiliary treatment and disinfection
Chloride, max., mg/L	50 or less	50-250	Above 250

[1] Adapted from the basin plan for the Los Angeles Region

CALIFORNIA

Regional Boards

In California, each Regional Board has adopted chloride water quality objectives for different water bodies based on recommended objectives, beneficial uses, and background levels. A summary of the chloride objectives for each region is provided in **Table 3**.

Table 3. Summary of chloride objective in the regional basin plans

Region	Summary
Region 1 – North Coast Region	Chloride objectives not included in Basin Plan
Region 2 – San Francisco Region	Recommended level for **municipal** supply – 250 mg/L Recommended level for **agricultural** supply – 355 mg/L Chloride WQO for Alameda Creek Watershed: 60 mg/l (90 day-arithmetic mean) 100 mg/l (90 day-90th percentile) 250 mg/l (daily maximum)
Region 3 – Central Coast Region	Chloride Surface WQOs range from *10*[2]-250 mg/L
Region 4 – Los Angeles Region	Chloride WQOs for Inland surface waters: Ventura River Watershed: 50-300 mg/L Santa Clara River Watershed: *45*-150 mg/L Calleguas Creek Watershed: 150 mg/L Malibu Creek Watershed: 500 mg/L Los Angeles River and San Gabriel River Watersheds: 10-150 mg/L San Antonio Creek: *6* mg/L
Region 5 – Central Valley Region	Chloride WQOs for **municipal** and **industrial** beneficial uses range from 150-250 mg/L
Region 6 – Lahontan Region	Chloride WQOs range from *0.01-25*mg/L
Region 7 – Colorado River Basin Region	Chloride objectives not included in Basin Plan
Region 8 – Santa Ana Region	Chloride WQOs for: Inland Surface streams range from 5-250mg/L Lakes and Reservoirs range from *10*-130mg/L Groundwater management zones range from *10-30*mg/L
Region 9 – San Diego Region	Chloride WQOs range from 50-400 mg/L

It should be noted that the ranges of chloride objectives presented in **Table 3** were derived from water body-specific chloride objectives. It is assumed that if a chloride objective is water body-specific, then it is most likely based on antidegradation criteria rather than chloride thresholds. This is the case in the Los Angeles Region. However, it is also possible that some of the chloride objectives presented in **Table 3** were established to protect a specific beneficial use.

[2] Italicized objectives are most likely based on anti-degradation objectives rather than chloride-effects objectives

This assumption may be checked by analyzing the original Basin Plans and their corresponding administrative documents.

Bay-Delta Salinity Plan

The Water Quality Control Plan for the San Francisco Bay/Sacramento-San Joaquin Delta Estuary (Bay-Delta Salinity Plan) also sets objectives for chloride to protect different beneficial uses. The chloride objectives for protecting municipal and industrial uses range from 150-250 mg/L. Chloride objectives for protecting agricultural and fish and wildlife beneficial uses have not been set in the Bay-Delta Salinity Plan.

Contra Costa Water District (CCWD)

The Contra Costa Water District Board adopted a different water quality goal for chloride in 1988[3]. The desired level of chloride in its water supply is 65 mg/L. Some important notes about the CCWD chloride goal are outlined below:

- The goal was adopted mainly to protect drinking water supply.
- According to CCWD documents, this value has been derived from the 1991 Water Quality Control Plan for Salinity in the San Francisco/Sacramento-San Joaquin Delta Estuary (Bay-Delta Salinity Plan).
- During the 1991 review of the Bay-Delta Salinity Plan, CCWD recommended retaining the 150 mg/L chloride objective in the plan. To support this argument, Fibreboard Louisiana-Pacific Corporation testified for CCWD. According to the testimony, the company required water with chloride levels less than 150 mg/L in order to run their operations. When chloride levels were higher, the company purchased water for dilution. This was the only testimony that supported the need for chloride levels to be less than 150 mg/L[4].
- During the 1991 review of the Bay-Delta Salinity Plan, CCWD argued for the inclusion of a 50 mg/L chloride objective to protect municipal and industrial use for portions of all years, except during prolonged droughts.
- In comments provided to the CALFED Bay-Delta Program on the August 1997 Draft Component Report, CCWD recommended that 250 mg/L chloride levels would represent a relaxation of existing water quality objectives; hence, a lower value (150 mg/L or lower) be adopted[5].

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[3] Contra Costa Water District (1988). "Resolution No. 88-45"

[4] Bay-Delta Section, Division of Water Rights, Water Resources Control Board. "Water quality control plan for salinity : San Francisco Bay/Sacramento-San Joaquin Delta Estuary, 1991: Technical Report"

[5] Contra Costa Water District: Water Resources. "Comments on the August 1997 Draft Component Report" August 15, 1997.