



# Memorandum

DATE: June 17, 2015

TO: Bob Seyfried, SRCSD

COPY TO: Betsy Elzufon, LWA

**Airy Krich-Brinton**

707 4th Street, Suite 200

Davis, CA 95616

530.753.6400 x226

530.753.7030 fax

airyk@LWA.com

SUBJECT: **Copper Effluent Limits for the Sacramento Regional Wastewater Treatment Plant**

---

## INTRODUCTION

The Central Valley Regional Water Quality Control Board (Regional Board) has issued a Tentative Order to the Sacramento Regional County Sanitation District (Regional San) to amend Sacramento Regional Wastewater Treatment Plant's (SRWTP) NPDES permit (No. CA0077682) Order No. R5-2010-0114-03. The proposed amendment would include effluent limits for copper with which consistent compliance is uncertain. The existing permit includes a discussion of mixing zones associated with acute and chronic aquatic life water quality criteria (beginning p. F-44) based on the mixing zone analysis conducted for the issuance of the permit in 2010. As described in Section IV.C.2.e.ii. (p. F-47-50), Flow Science developed and field tested a dynamic model that was used to conduct the mixing zone study. The dynamic model was reviewed by TetraTech, a USEPA contractor, who concluded that "the model study was conducted in a sound and scientifically defensible manner. The modeling experts determined that the linked dynamic modeling system is capable of providing an accurate probabilistic representation of receiving water quality conditions." The dynamic model was accepted by use by the Regional Board and "judged to be suitable for use in the ...derivation of water quality-based effluent limits (WQBELs)."<sup>1</sup>

Regional San is requesting that effluent limits for copper be calculated for an acute mixing zone of 60 feet and chronic mixing zone of 350 feet downstream of the diffuser, as supported by the mixing zone analysis conducted for the 2010 permit renewal. The dynamic model, updated to the most recent dataset and in conjunction with the mixing zones, is an appropriate method to calculate

---

<sup>1</sup> K. Landau, Assistant Executive Officer, CVRWQCB. Letter to Mary K. Snyder. Acceptance of Sacramento Regional County Sanitation District's Dynamic Mathematical Model for use in NPDES Permit Renewal for the Sacramento Regional Wastewater Treatment Plant. April 2, 2009.

WQBELs for copper. The calculation of effluent limits using the dynamic model for these mixing zones is presented below.

**DYNAMIC MODEL RESULTS**

The dynamic model approved by the Regional Board is used to determine the long-term averages (LTAs) used in the effluent limit determination. Flow Science conducted dynamic modeling of downstream copper concentrations in the river at an effluent discharge rate of 181 MGD. Mixed effluent and river hardness and the appropriate compliance rate of no more than one exceedance in three years were used to select the LTAs for acute and chronic CTR criteria. The model recalculates the downstream river hardness, applicable criteria and copper concentration at each time step. Hourly values for a 70-year simulation period result in over 600,000 data points that are representative of the statistical concentration distribution of a constituent downstream of the diffuser. Therefore, the model results are more representative of the ambient condition than the steady state approach presented in the SIP.<sup>2</sup> Copper effluent data from 2012-2014 corresponding to the dataset submitted with Regional San’s 2015 *Report of Waste Discharge* and upstream receiving water data for Sacramento River at Freeport from 2005-2014 were used to update the model. The model results are shown in Tables 1 and 2.

**Table 1. Acute Mixing Zone Dynamic Model Results (60 feet downstream of diffuser)**

Copper concentration (ug/L)					Percent of time in compliance w/the 1-hour acute CTR criterion
Mean Effluent	Std. Dev. Effluent	Mean River*	Std. Dev. River*	Acute CTR Criterion**	60 feet
4.62*	1.06*	1.52	0.71	9.8	99.996
12.6	2.9	1.52	0.71	9.8	99.98
15.3	3.5	1.52	0.71	9.8	99.91
18.9	4.3	1.52	0.71	9.8	99.56
23.4	5.4	1.52	0.71	9.8	98.19
31.8	7.3	1.52	0.71	9.8	91.35
36.2	8.3	1.52	0.71	9.8	85.51

\*Existing Condition

\*\*CTR criterion is hardness dependent and varies from hour-to-hour. Tabulated value is the mean for the simulation

<sup>2</sup> State Water Resources Control Board (SWRCB 2000), *Policy for Implementation of Toxics Standards for Inland Surface Waters, Enclosed Bays, and Estuaries of California (SIP)*, May 2000.

**Table 2. Chronic 4-day Mixing Zone Dynamic Model Results (350 feet downstream of diffuser)**

Copper concentration (ug/L)					Percent of time in compliance w/the 4-day chronic CTR criterion
Mean Effluent	Std. Dev. Effluent	Mean River*	Std. Dev. River*	Chronic CTR Criterion**	350 feet
4.62*	1.06*	1.52	0.71	6.7	100.00
16.5	3.8	1.52	0.71	6.7	100.00
22.1	5.1	1.52	0.71	6.7	100.00
30.2	6.9	1.52	0.71	6.7	100.00
41.2	9.5	1.52	0.71	6.7	100.00
62.8	14.4	1.52	0.71	6.7	99.64
73.5	16.9	1.52	0.71	6.7	96.51

\*Existing Condition

\*\*CTR criterion is hardness dependent and varies from hour-to-hour. Tabulated value is the mean for the simulation.

The applicable LTAs were 15.3 µg/L at 60 feet for the acute mixing zone and 62.8 µg/L at 350 feet for the chronic mixing zone.

### EFFLUENT LIMITS CALCULATION

The acute and chronic LTAs determined as described above were used in the SIP effluent limits calculation (Step 1.4.B) to determine the effluent limits, as shown in Table 5.

**Table 5. Copper Effluent Limits Calculation using Dynamic Model LTAs**

	Acute (60ft)	Chronic (350ft)
Dynamic Model LTA	15.3	62.8
Coefficient of variation <sup>[a]</sup>	0.23	0.23
Permitted monitoring frequency/month	4	4
AMEL Multiplier (95 <sup>th</sup> %)	1.20	1.20
AMEL (µg/L)	<b>18</b>	75
MDEL Multiplier (99 <sup>th</sup> %)	1.65	1.65
MDEL (µg/L)	<b>25</b>	104

[a] Calculated from total copper effluent data collected between 2012-2014 (standard deviation 1.06/ average 4.62).

The acute pathway results in the most stringent limits of 18 µg/L (AMEL) and 25 µg/L (MDEL).