

DILUTION ALTERNATIVE NO. 3

SACRAMENTO COUNTY SANITATION DISTRICT SACRAMENTO REGIONAL WASTEWATER TREATMENT PLANT SACRAMENTO COUNTY

Proposed Waste Discharge Requirements Renewal and Time Schedule Order (NPDES No. CA0077682)

Regional Water Quality Control Board, Central Valley Region Board Meeting – 9 December 2010 ITEM # 6

State and Federal regulations allow consideration of dilution in establishing effluent limits. If dilution is allowed, the discharge does not have to meet water quality standards at the point of discharge, but water quality standards must be met in the river after some mixing of effluent and river water has occurred. The part of the river where mixing occurs and water quality objectives are not met is termed the "mixing zone". Within the mixing zone water quality standards are not met, so there could be an impact to organisms if the organisms stayed in the mixing zone long enough. Effluent limitations and the size and shape of the mixing zone are set to prevent impacts on aquatic life and other beneficial uses. There are several criteria that must be met before a mixing zone can be granted, as described in the Fact Sheet. SRCSD has conducted extensive studies of dilution available in the Sacramento River and the size and shape of the possible mixing zones. The alternative mixing zones being considered in this permit renewal meet the required technical criteria, however, granting of mixing zones is discretionary and need not be granted even if all technical criteria are met.

DILUTION ALTERNATIVE No. 3

DILUTION GRANTED FOR HUMAN CARCINOGEN CRITERIA, CHRONIC AQUATIC LIFE CRITERIA, AND ACUTE AQUATIC LIFE CRITERIA

This alternative adds the allowance of a mixing zone for acute aquatic life criteria to the option presented in the tentative NPDES permit. An acute toxicity impact is the death of the organism. Although an acute mixing zone may be allowed, the SIP requires that the mixing zone be appropriately sized to prevent lethality to organisms passing through the mixing zone. USEPA recommends that float times through a mixing zone less than 15 minutes ensures that there will not be lethality to passing organisms. The acute mixing zone proposed in this alternative extends 60 feet downstream from the outfall. Based on a minimum river velocity of 0.35 feet/sec, the minimum float time is 2.8 minutes.¹ Furthermore, the proposed permit includes an acute toxicity effluent limitation that requires compliance to be determined based on acute bioassays using 100% effluent.

This permit alternative results in the following changes to the NPDES Permit:

¹ Memorandum from Larry Walker Associates to SRCSD, Mixing Zones and Prevention of Acutely Toxic Conditions, dated 13 July 2009.

1. NPDES Permit. Modify section IV.C.2.d.iii of the Fact Sheet (Attachment F) as shown in underline/strikeout format below:

iii. Evaluation of Available Dilution for Acute Aquatic Life Criteria. USEPA Region VIII, in its "EPA Region VIII Mixing Zones and Dilution Policy", recommends no dilution for acute aquatic life criteria, stating the following, "*In incomplete mix situations, discharge limitations to implement acute chemical-specific aquatic life criteria and narrative (no acute toxicity) criteria shall be based on achieving such acute criteria at the end-of-pipe (i.e., without an allowance for dilution). This approach is intended to implement the narrative requirement prohibiting acutely toxic conditions in the mixing zone.*"² The SRCSD has requested an acute mixing zone for compliance with acute water quality criteria for ammonia, copper, cyanide, and chlorpyrifos.

The requested acute aquatic life mixing zone is 400 feet wide and extends 60 feet downstream of the diffuser. The proposed acute mixing zone meets the requirements of the SIP as follows:

(1) *Shall not compromise the integrity of the entire waterbody* - The TSD states that, "*If the total area affected by elevated concentrations within all mixing zones combined is small compared to the total area of a waterbody (such as a river segment), then mixing zones are likely to have little effect on the integrity of the waterbody as a whole, provided that the mixing zone does not impinge on unique or critical habitats.*"³ The Sacramento River is approximately 600 feet wide at the surface. The acute mixing zone is approximately 60 ft x 350 ft. The Sacramento River is a very large waterbody. Except as noted for ammonia in subsection vi., below, the acute mixing zone would not compromise the integrity of the entire waterbody.

(2) *Shall not cause acutely toxic conditions to aquatic life passing through the mixing zone* – The SIP requires that the acute mixing zone be appropriately sized to prevent lethality to organisms passing through the mixing zone. USEPA recommends that float times through a mixing zone less than 15 minutes ensures that there will not be lethality to passing organisms. The acute mixing zone proposed by the Discharger extends 60 feet downstream from the outfall. Based on a minimum river velocity of 0.35 feet/sec, the minimum float time is 2.8 minutes⁴. Furthermore, this Order includes an acute toxicity effluent limitation that requires compliance to be determined based on acute bioassays using 100% effluent. Compliance with these requirements ensures that acutely toxic conditions to aquatic life passing through the chronic mixing zone do not occur.

(3) *Shall not restrict the passage of aquatic life* – The SRCSD developed a dynamic model to evaluate the near-field effects of the discharge. The

² USEPA Region VIII Mixing Zones and Dilution Policy, December 1994 (Updated September 1995), (page 18)

³ TSD, pg. 33

⁴ Memorandum from Larry Walker Associates to SRCSD, Mixing Zones and Prevention of Acutely Toxic Conditions, dated 13 July 2009.

dynamic model was used to evaluate the zone of passage around the mixing zone where water quality objectives are met. The dynamic model indicates there is a zone of passage for aquatic life, which was verified through dye testing. The size of the zone of passage varies on either side of the river depending on the river geometry⁵. The surface of the river is approximately 600 feet across and the bottom of the river is approximately 400 feet across. Based on the model the zone of passage at the surface of the river is generally at least 100 feet on both sides of the river, while the zone of passage at the bottom of the river is greater than 40 feet from both sides of the river.

(4) *Shall not adversely impact biologically sensitive or critical habitats, including, but not limited to, habitat of species listed under federal or State endangered species laws* – The acute mixing zone will not cause acutely toxic conditions, allows adequate zones of passage, and, except as noted for ammonia in subsection vi., below, is sized appropriately to ensure that there will be no adverse impacts to biologically sensitive or critical habitats.

(5) *Shall not produce undesirable or nuisance aquatic life; result in floating debris, oil, or scum; produce objectionable color, odor, taste, or turbidity; cause objectionable bottom deposits; cause nuisance* – The current discharge has not been shown to result in floating debris, oil, or scum; produce objectionable color, odor, taste, or turbidity; cause objectionable bottom deposits; or cause nuisance. This Order requires the discharge meets Title 22 (or equivalent) tertiary filtration, which will ensure continued compliance with these mixing zone requirements. There is concern that the high ammonia concentrations in the discharge create undesirable or nuisance aquatic life (see subsection vi. for ammonia, below), therefore, an acute mixing zone for ammonia is not allowed. With these requirements the acute mixing zone will not produce undesirable or nuisance aquatic life, result in floating debris, oil, or scum; produce objectionable color, odor, taste, or turbidity; cause objectionable bottom deposits; or cause nuisance.

(6) *Shall not dominate the receiving water body or overlap a mixing zone from different outfalls* – The acute mixing zone is small relative to the water body, so it will not dominate the water body. Furthermore, the mixing zone does not overlap mixing zones from other outfalls. There are no outfalls or mixing zones in the vicinity of the discharge.

(7) *Shall not be allowed at or near any drinking water intake* – The acute mixing zone is not near a drinking water intake. The nearest downstream drinking water intake is the Barker Slough Pumping Plant, which is approximately 40 miles downstream of the discharge.

⁵ Model Verification Results for FLOWMOD Simulations of SRCSD Effluent Discharge to the Sacramento River at Freepoint, November 2007 Field Study, Flow Science

The acute aquatic life mixing zone complies with the SIP and the Basin Plan, ~~due to concerns with aquatic toxicity in the Delta, the Central Valley Water Board has denied the allowance of an acute aquatic life mixing zone in this Order. Section 1.4.2 of the SIP states, in part, "...The allowance of mixing zones is discretionary and shall be determined on a discharge-by-discharge basis." In this case, the Delta is impaired for unknown toxicity and has experienced a significant pelagic organism decline. Therefore, the Central Valley Water Board finds that the allowance of an acute aquatic life mixing zone is not acceptable for this discharge. Furthermore,~~ However, as discussed in subsection vi, below, based on Facility performance, an acute mixing zone is either not needed for the constituents requested by the Discharger or not allowed by the Basin Plan. See subsection vi, below, for a pollutant-by-pollutant evaluation for these constituents.

2. NPDES Permit. Modify section IV.C.3.d.ii.(c) of the Fact Sheet (Attachment F) as shown in underline/strikeout format below:

(c) Dilution Considerations. As discussed in Section IV.C.2.d of the Fact Sheet, an allowance for acute and chronic aquatic life dilution may be granted. However, based on the considerations below and discussed in more detail in Attachment J, no dilution has been allowed for ammonia. The Central Valley Water Board determines that the Discharger must fully nitrify and denitrify its wastewater to reduce ammonia and nitrogen for the following reasons: