13263.6(a), and an interim effluent mass limitation for mercury (total) has been established in this Order to maintain the Discharger's current mercury loading to the San Joaquin River.

7. **Stormwater Requirements.** USEPA promulgated federal regulations for storm water on 16 November 1990 in 40 CFR Parts 122, 123, and 124. The NPDES Industrial Storm Water Program regulates storm water discharges from wastewater treatment facilities. Wastewater treatment plants are applicable industries under the stormwater program and are obligated to comply with the federal regulations. No storm water is directly discharged from the Facility, and therefore, coverage of stormwater discharges from the Facility is not necessary.

8. **Endangered Species Act.** See Limitations and Discharge Requirements – Findings, Section II.P.

D. Impaired Water Bodies on CWA 303(d) List

1. Under Section 303(d) of the 1972 Clean Water Act, states, territories and authorized tribes are required to develop lists of water quality limited segments. The waters on these lists do not meet water quality standards, even after point sources of pollution have installed the minimum required levels of pollution control technology. On 30 November 2006 USEPA gave final approval to California's 2006 Section 303(d) List of Water Quality Limited Segments. The Basin Plan references this list of Water Quality Limited Segments (WQLSs), which are defined as "*...those sections of lakes, streams, rivers or other fresh water bodies where water quality does not meet (or is not expected to meet) water quality standards even after the application of appropriate limitations for point sources (40 CFR 130, et seq.).*" The Basin Plan also states, "*Additional treatment beyond minimum federal standards will be imposed on dischargers to [WQLSs]. Dischargers will be assigned or allocated a maximum allowable load of critical pollutants so that water quality objectives can be met in the segment.*" The Delta is divided into multiple WQLSs. The Facility discharges directly into the southern portion and just upstream of the Stockton Deep Water Ship Channel (DWSC). The listing for both WQLSs are applicable to the discharge. The WQLSs are 303(d) listed for: chloropyrifos; DDT; diazinon; dioxin; electrical conductivity (EC); exotic species; furan compounds; group A pesticides; mercury; pathogens; PCBs; and unknown toxicity.

2. **Total Maximum Daily Loads.** The USEPA requires the Regional Water Board to develop total maximum daily loads (TMDLs) for each 303(d) listed pollutant and water body combination. The DWSC is located directly downstream of the discharge location and is 303(d) listed for dissolved oxygen (DO).

   A TMDL for oxygen demanding substances in the DWSC was adopted by the Regional Water Board on 27 January 2005 (Resolution No. R5-2005-0005). The TMDL was approved by the State Water Board on 16 November 2005 and approved by the USEPA on 27 February 2007. The wasteload allocations contained in the TMDL for the Stockton Regional Wastewater Facility are equal to the effluent limitations that were in effect when the TMDL was adopted for oxygen demanding

substances, specifically ammonia, $CBOD_5$, and DO. Until wasteload allocations are adopted by Regional Water Board, this Order contains effluent limitations requiring a tertiary-level treatment, or equivalent, which is necessary to protect the beneficial uses of the receiving water. For DO and ammonia, this Order retains the effluent limits from previous Order No. R5-2002-0083 (see section IV.C).

E. Other Plans, Policies and Regulations

1. The discharge authorized herein and the treatment and storage facilities associated with the discharge of treated municipal wastewater, except for discharges of residual sludge and solid waste, are exempt from the requirements of Title 27, California Code of Regulations (CCR), section 20005 *et seq.* (hereafter Title 27). The exemption, pursuant to Title 27 CCR section 20090(a), is based on the following:

   a. The waste consists primarily of domestic sewage and treated effluent;

   b. The waste discharge requirements are consistent with water quality objectives; and

   c. The treatment and storage facilities described herein are associated with a municipal wastewater treatment plant.

2. The State Water Board adopted the *Water Quality Control Policy for the Enclosed Bays and Estuaries of California* (see Limitations and Discharge Requirements – Findings, Section II.J). The requirements within this Order are consistent with its policy.

IV. RATIONALE FOR EFFLUENT LIMITATIONS AND DISCHARGE SPECIFICATIONS

Effluent limitations and toxic and pretreatment effluent standards established pursuant to Sections 301 (Effluent Limitations), 302 (Water Quality Related Effluent Limitations), 304 (Information and Guidelines), and 307 (Toxic and Pretreatment Effluent Standards) of the Clean Water Act (CWA) and amendments thereto are applicable to the discharge.

The Federal CWA mandates the implementation of effluent limitations that are as stringent as necessary to meet water quality standards established pursuant to state or federal law [33 U.S.C., §1311(b)(1)(C); 40 CFR, §122.44(d)(1)]. NPDES permits must incorporate discharge limits necessary to ensure that water quality standards are met. This requirement applies to narrative criteria as well as to criteria specifying maximum amounts of particular pollutants. Pursuant to Federal regulations, 40 CFR §122.44(d)(1)(i), NPDES permits must contain limits that control all pollutants that "*are or may be discharged at a level which will cause, have the reasonable potential to cause, or contribute to an excursion above any state water quality standard, including state narrative criteria for water quality.*" Federal regulations, 40 CFR, §122.44(d)(1)(vi), further provide that "[w]*here a state has not established a water quality criterion for a specific chemical pollutant that is present in an effluent at a concentration that causes, has the reasonable potential to cause, or contributes to an excursion above a narrative criterion within an applicable State water quality standard, the permitting authority must*

establish effluent limits."

The CWA requires point source discharges to control the amount of conventional, non-conventional, and toxic pollutants that are discharged into the waters of the United States. The control of pollutants discharged is established through effluent limitations and other requirements in NPDES permits. There are two principal bases for effluent limitations: 40 CFR §122.44(a) requires that permits include applicable technology-based limitations and standards, and 40 CFR §122.44(d) requires that permits include water quality-based effluent limitations to attain and maintain applicable numeric and narrative water quality criteria to protect the beneficial uses of the receiving water where numeric water quality objectives have not been established. The Regional Water Board's Basin Plan, page IV-17.00, contains an implementation policy ("Policy for Application of Water Quality Objectives") that specifies that the Regional Water Board "*will, on a case-by-case basis, adopt numerical limitations in orders which will implement the narrative objectives.*" This policy complies with 40 CFR §122.44(d)(1). With respect to narrative objectives, the Regional Water Board must establish effluent limitations using one or more of three specified sources, including (1) USEPA's published water quality criteria, (2) a proposed state criterion (*i.e.*, water quality objective) or an explicit state policy interpreting its narrative water quality criteria (*i.e.*, the Regional Water Board's "Policy for Application of Water Quality Objectives")(40 CFR §§122.44(d)(1) (vi) (A), (B) or (C)), or (3) an indicator parameter. The Basin Plan contains a narrative objective requiring that: "*All waters shall be maintained free of toxic substances in concentrations that produce detrimental physiological responses in human, plant, animal, or aquatic life*" (narrative toxicity objective). The Basin Plan requires the application of the most stringent objective necessary to ensure that surface water and groundwater do not contain chemical constituents, discoloration, toxic substances, radionuclides, or taste and odor producing substances that adversely affect beneficial uses. The Basin Plan states that material and relevant information, including numeric criteria, and recommendations from other agencies and scientific literature will be utilized in evaluating compliance with the narrative toxicity objective. The Basin Plan also limits chemical constituents in concentrations that adversely affect surface water beneficial uses. For waters designated as municipal, the Basin Plan specifies that, at a minimum, waters shall not contain concentrations of constituents that exceed Maximum Contaminant Levels (MCL) of CCR Title 22. The Basin Plan further states that, to protect all beneficial uses, the Regional Water Board may apply limits more stringent than MCLs.

A. Discharge Prohibitions

1. **Prohibition III.A (No discharge or application of waste other than that described in this Order).** This prohibition is based on CWC Section 13260 that requires filing of a report of waste discharge (ROWD) before discharges can occur. The Discharger submitted a ROWD for the discharges described in this Order; therefore, discharges not described in this Order are prohibited.

2. **Prohibition III.B (No bypasses or overflow of untreated wastewater, except under the conditions allowed by Federal Standard Provisions I.G. and I.H. in Attachment D of this permit).** As stated in Section I.G of Attachment D, Standard

Provisions, this Order prohibits bypass from any portion of the treatment facility. Federal regulations, 40 CFR 122.41 (m), define "bypass" as the intentional diversion of waste streams from any portion of a treatment facility. This section of the federal regulations, 40 CFR 122.41 (m)(4), prohibits bypass unless it is unavoidable to prevent loss of life, personal injury, or severe property damage. In considering the Regional Water Board's prohibition of bypasses, the State Water Board adopted a precedential decision, Order No. WQO 2002-0015, which cites the federal regulations, 40 CFR 122.41(m), as allowing bypass only for essential maintenance to assure efficient operation.

3. **Prohibition III.C (No controllable condition shall create a nuisance).** This prohibition is based on CWC Section 13050 that requires water quality objectives established for the prevention of nuisance within a specific area. The Basin Plan prohibits conditions that create a nuisance.

4. **Prohibition III.D (No inclusion of pollutant free wastewater shall cause improper operation of the Facility's systems).** This prohibition is based on CFR Part 122.41 et seq. that requires the proper design and operation of treatment facilities.

B. Technology-Based Effluent Limitations

1. Scope and Authority

Regulations promulgated in section 125.3(a)(1) require technology-based effluent limitations for municipal dischargers to be placed in NPDES permits based on Secondary Treatment Standards or Equivalent to Secondary Treatment Standards.

The Federal Water Pollution Control Act Amendments of 1972 (PL 92-500) established the minimum performance requirements for POTWs [defined in section 304(d)(1)]. Section 301(b)(1)(B) of that Act requires that such treatment works must, as a minimum, meet effluent limitations based on secondary treatment as defined by the USEPA Administrator.

Based on this statutory requirement, USEPA developed secondary treatment regulations, which are specified in Part 133. These technology-based regulations apply to all municipal wastewater treatment plants and identify the minimum level of effluent quality attainable by secondary treatment in terms of biochemical oxygen demand (BOD_5), total suspended solids (TSS), and pH.

2. Applicable Technology-Based Effluent Limitations

a. **Carbonaceous Biochemical Oxygen Demand (5-Day @ 20°C) ($CBOD_5$) and Total Suspended Solids (TSS).** Federal regulations, 40 CFR, Part 133, establish the minimum weekly and monthly average level of effluent quality attainable by secondary treatment for $CBOD_5$ and TSS. Tertiary treatment is necessary to protect the beneficial uses of the receiving stream and the final effluent limitations for $CBOD_5$ and TSS are based on the technical capability of

the tertiary process. BOD_5 is a measure of the amount of oxygen used in the biochemical oxidation of organic matter; the CBOD test is used as a substitute for BOD. The secondary and tertiary treatment standards for $CBOD_5$ and TSS are indicators of the effectiveness of the treatment processes. The principal design parameter for wastewater treatment plants is the daily $CBOD_5$ and TSS loading rates and the corresponding removal rate of the system. In applying CFR 40 Part 133 for weekly and monthly average $CBOD_5$ and TSS limitations, the application of tertiary treatment processes results in the ability to achieve lower levels for $CBOD_5$ and TSS than the secondary standards currently prescribed; therefore these limitations have been revised to 15 mg/L (weekly average) and 10 mg/L (monthly average), which is technically based on the capability of a tertiary system. In addition to these limits, a daily maximum effluent limitation of 20 mg/L for $CBOD_5$ and for TSS is included in this Order to ensure that the treatment works are not organically overloaded and operate in accordance with design capabilities.

Also, 40 CFR 133.102, in describing the minimum level of effluent quality attainable by secondary treatment, states that the 30-day average percent removal shall not be less than 85 percent. This Order contains a limitation requiring an average of 85 percent removal of $CBOD_5$ and TSS over each calendar month.

b. **Flow.** The Facility is designed to provide a tertiary level of treatment for up to a design flow of 55 mgd. Therefore, this Order contains an Average Dry Weather Flow effluent limit of 55 mgd.

c. The final technology-based effluent limitations required by this Order are summarized below in Table F-3

Table F-3. Summary of Technology-based Effluent Limitations

Parameter	Units	Effluent Limitations				
		Average Monthly	Average Weekly	Maximum Daily	Instantaneous Minimum	Instantaneous Maximum
CBOD 5-day @ 20°C	mg/L	10	15	20		
Total Suspended Solids	mg/L	10	15	20		
Flow	mgd			55[1]		
85% Removal of CBOD 5-day @ 20°C and Total Suspended Solids						

[1] Average dry weather flow

C. Water Quality-Based Effluent Limitations (WQBELs)

1. Scope and Authority

As specified in section 122.44(d)(1)(i), permits are required to include WQBELs for pollutants (including toxicity) that are or may be discharged at levels that cause, have reasonable potential to cause, or contribute to an in-stream excursion above any state water quality standard. The process for determining reasonable potential

and calculating WQBELs when necessary is intended to protect the designated uses of the receiving water as specified in the Basin Plan, and achieve applicable water quality objectives and criteria that are contained in other state plans and policies, or any applicable water quality criteria contained in the California Toxics Rule (CTR) and National Toxics Rule (NTR) (see Limitations and Discharge Requirements – Findings, Section II.I).

2. **Applicable Beneficial Uses and Water Quality Criteria and Objectives**

a. **Receiving Water.** The receiving stream is the San Joaquin River, just upstream of the Stockton Deep Water Ship Channel (DWSC), and a portion of the Delta Waterways. The beneficial uses of the receiving water are described above in Section III.C.1 of this Fact Sheet.

b. **Hardness.** While no effluent limitation for hardness is necessary in this Order, hardness is critical to the assessment of the need for, and the development of, effluent limitations for certain metals. The *California Toxics Rule* and the *National Toxics Rule* contain water quality criteria for seven metals that vary as a function of hardness, the lower the hardness the lower the water quality criteria. The hardness-dependent metal criteria include cadmium, copper, chromium III, lead, nickel, silver, and zinc.

Effluent limitations for the discharge must be set to protect the beneficial uses of the receiving water for all discharge conditions. In the absence of the option of including condition-dependent, "floating" effluent limitations that are reflective of actual hardness conditions at the time of discharge, effluent limitations must be set using a reasonable worst-case condition in order to protect beneficial uses for all discharge conditions. The SIP does not address how to determine hardness for application to the equations for the protection of aquatic life when using hardness-dependent metals criteria. It simply states, in Section 1.2, that the criteria shall be properly adjusted for hardness using the hardness of the receiving water. The CTR requires that, for waters with a hardness of 400 mg/L (as $CaCO_3$), or less, the actual ambient hardness of the surface water must be used. It further requires that the hardness values used must be consistent with the design discharge conditions for design flows and mixing zones.[1] The CTR does not define whether the term "ambient," as applied in the regulations, necessarily requires the consideration of upstream as opposed to downstream hardness conditions.

The point in the receiving water affected by the discharge is downstream of the discharge. As the effluent mixes with the receiving water, the hardness of the receiving water can change. Therefore, it is appropriate to use the ambient hardness downstream of the discharge that is a mixture of the effluent and receiving water for the determination of the CTR hardness-dependent metals criteria. Recent studies indicate that using the lowest recorded receiving water hardness for establishing water quality criteria is not always protective of the

[1] See 40 CFR 131.38(c)(4)(i)

receiving water under various mixing conditions (e.g. when the effluent hardness is less than the receiving water hardness). The studies evaluated the relationships between hardness and the CTR metals criterion that is calculated using the CTR metals equation. The equation describing the total recoverable regulatory criterion, as established in the CTR, is as follows:

$$\text{CTR Criterion} = e^{m[\ln(H)]+b} \qquad \text{(Equation 1)}$$

Where:

H = Design Hardness
b = metal- and criterion-specific constant
m = metal- and criterion-specific constant

The constants "m" and "b" are specific to both the metal under consideration, and the type of total recoverable criterion (i.e. acute or chronic). The metal-specific values for these constants are provided in the CTR at paragraph (b)(2), Table 1.

The relationship between the Design Hardness and the resulting criterion in Equation 1 can exhibit either a downward-facing (i.e., concave downward) or an upward-facing (i.e., concave upward) curve depending on the values of the criterion-specific constants. The curve shapes for acute and chronic criteria for the metals are as follows:

Concave Downward: cadmium (chronic), chromium (III), copper, nickel, and zinc

Concave Upward: cadmium (acute), lead, and silver (acute)

For those contaminants where the regulatory criteria exhibit a concave downward relationship as a function of hardness, use of the lowest recorded effluent hardness for establishment of water quality objectives is fully protective of all beneficial uses regardless of whether the effluent or receiving water hardness is higher. Use of the lowest recorded effluent hardness is also protective under all possible mixing conditions between the effluent and the receiving water (i.e., from high dilution to no dilution). Therefore, for cadmium (chronic), chromium (III), copper, nickel, and zinc, the reasonable worst-case ambient hardness can be estimated by using the lowest effluent hardness. The water quality criteria for these metals were calculated for this Order using Equation 1 and a reported minimum effluent hardness of 98 mg/L as $CaCO_3$, based on 247 samples obtained by the Discharger between 1 May 2002 and 31 January 2007.

For those metals where the regulatory criteria exhibit a concave upward relationship as a function of hardness, water quality objective based on either the effluent hardness or the receiving water hardness alone, would not be protective under all mixing scenarios. Instead, both the hardness of the receiving water and the effluent is required to determine the reasonable worst-case ambient hardness. In this case, using the lowest upstream receiving water hardness in Equation 2, below, is protective if the effluent hardness is ALWAYS higher than

the receiving water hardness. Under circumstances where the effluent hardness is not ALWAYS higher than the receiving water hardness, it may be appropriate to use the highest reported upstream receiving water hardness in Equation 2. The following equation provides fully protective water quality criteria for those metals that exhibit a concave upward relationship.

$$\text{CTR Criterion} = \left[\frac{m}{H_{rw}} \cdot \left(H_{eff} - H_{rw}\right) + 1\right] \cdot e^{m \cdot \ln(H_{rw}) + b} \qquad \text{(Equation 2)}$$

Where:

H_{eff} = lowest recorded effluent hardness
H_{rw} = lowest recorded receiving water hardness
b = metal- and criterion-specific constant
m = metal- and criterion-specific constant

Therefore, for cadmium (acute), lead, and silver (acute) water quality criteria were calculated using Equation 2 with a lowest reported effluent hardness of 98 mg/L as $CaCO_3$ and a highest and lowest reported receiving water hardness of 240 and 90 mg/L as $CaCO_3$, respectively, based on twelve samples taken between January 2002 and December 2002.

c. **Assimilative Capacity/Mixing Zone.** Section 1.4.2 of the SIP specifies the requirements for establishing mixing zones and dilution credits. The allowance of mixing zones and dilution credits is discretionary and is determined on a discharge-by-discharge basis.

A dilution credit is a numerical value associated with the mixing zone that accounts for the receiving water entrained into the discharge. The dilution credit is a value used in the calculation of effluent limitations. Dilution credits may be limited or denied on a pollutant-by-pollutant basis.

Before establishing a mixing zone and dilution credit for a discharge, it must first be determined if, and how much receiving water is available to dilute the discharge. For determining year round mixing zones, the mixing zone and dilution credits must be determined using the parameters specified in Table 3 of Section 1.4.2.1 of the SIP.

The dilution method provided in the SIP assumes a constant diluting flow in the river, which is normal for most discharges. However, because the San Joaquin River is tidal, the flow of dilution water varies with the tidal cycle, resulting in river flow stagnation and very little dilution of effluent. Data provided by USGS Site No. 11304810 provides tidally filtered mean daily discharge data for the San Joaquin River just upstream of the discharge location. Receiving water flow data from 20 August 1995 through 20 September 2007 indicate a minimum tidally filtered daily discharge flow rate of -264 cubic feet per second (cfs) that occurred

on 22 August 2007. Further, a minimum 7-day average tidally filtered daily discharge flow rate of -58.43 cfs was recorded on the date ending 24 August 2007. These negative flow rates indicate low flow conditions in the receiving water and substantial tidal influence, which could result in multiple periods of flow stagnation and little to no dilution. Additionally, tidal action impacts receiving water with multiple doses of the effluent as the river flows downstream past the discharge, reverses moving upstream past the discharge a second time, then again reverses direction and passes the discharge point a third time as it moves down the river.

Evaluation of Available Dilution for Acute and Chronic Aquatic Life Criteria. During the previous permit renewal for Order No. R5-2002-0083, a "Box Model" by Jones & Stokes was created to attempt to quantify the effect of the multiple doses of effluent to the receiving water. However, due to the impaired condition of the San Joaquin River, the presence of endangered species, and the uncertainty regarding the reliability and accuracy of this "Box Model" study of the discharge and receiving water, the Regional Water Board did not grant dilution credits and mixing zones for the acute and chronic aquatic life criteria. The Discharger has not provided additional information to adequately demonstrate that dilution credits for the acute and chronic aquatic life criteria are appropriate. Therefore, this Order does not allow any dilution credits in the calculations of water quality-based effluent limitations based on acute and chronic aquatic life criteria.

Evaluation of Available Dilution for Priority Pollutant Human Health Criteria. For human health criteria, critical environmental impacts are expected to occur far downstream from the source such that complete mixing is a valid assumption. With regard to completely mixed discharges the SIP states, "*For completely-mixed discharges…the amount of receiving water available to dilute the effluent shall be determined by calculating the dilution ratio (i.e. the critical receiving water flow divided by the effluent flow)…*" The SIP recommends using the harmonic mean receiving water flow and the long-term arithmetic mean to calculate a dilution credit for human health criteria constituents. The previous permit, Order No. R5-2002-0083, granted a 10:1 dilution credit based on the San Joaquin River flows measured slightly upstream of the discharge during the period from November 1995 through June 2000 (848 cfs), which was the only data at that time, and the permitted design flow of 55 mgd (or 85 cfs). Order No. R5-2002-0083 also provisionally required the Discharger to conduct a human carcinogenic impact study that included at a minimum: 1) a human carcinogenic mixing zone evaluation and 2) an additive human carcinogenicity analysis to evaluate the relative carcinogenic risk of the combined discharge of multiple human carcinogens into the San Joaquin River. Order No. R5-2002-0083 required the human carcinogenic mixing zone evaluation to include, at minimum, a hydraulic analysis of the effluent discharged into the receiving water over a variety of flow conditions to delineate the extent of the corresponding human carcinogen criteria mixing zone.

In compliance, the Discharger submitted the "Evaluation of San Joaquin River Tidal Flow Dilution at the Stockton Regional Wastewater Control Facility" (Jones and Stokes, May 2005), and the human carcinogenic impact study final report, *Stockton Regional Wastewater Control Facility Human Carcinogen Impact Study Phase 2A: Basin Plan Calculation of Additive Toxicity Ratio* (EOA,Inc., 17 May 2006). In these studies, the Discharger tracked tidal movement during various tidal stages, estimated the cumulative tidal flow volume that moved past the discharge, analyzed the long-term average dilution flow, and evaluated the upstream flow at Vernalis combined with the diversions in the Old River to estimate the net flows within the vicinity of the discharges. Based on the findings of this study, there is available dilution for human health criteria.

The San Joaquin River flow data obtained slightly upstream of the discharge during the period from 20 August 1995 through 25 March 2008 was used to calculate the harmonic mean receiving water flow, as recommended in the SIP. The harmonic mean calculation is one over the average of the reciprocals of the running average flow rates; however, the strong tidal influence exerted on the San Joaquin River flows within the area of the discharge complicates this calculation. The calculation is relatively straightforward during the positive San Joaquin River flows, which occurs during the ebb-tide flows; however, the calculation is complex during the negative San Joaquin River flows, which may occur during flood-tide flows or drought years. When negative flow rate values occur, the "running average flow rate" can be positive or negative, and the average of the reciprocals of the running average flow rates can be close to zero. Thus, the harmonic mean calculated value may be artificially high or low (i.e. the harmonic mean of 1.01 and -1.00 is –202, or using the absolute value, the harmonic mean is 1.005). Each tidal period (either ebb-tide or flood-tide) is 6.2 hours, the daily tidal cycle is 24.8 hours, and the full lunar cycle is 28 days; therefore, using a 28-day running average flow rate in the harmonic mean calculation is appropriate to account for negative flows, which equates to an harmonic mean of 647 cfs. Based on the harmonic flow of 647 cfs (November 1995 to 25 March 2008) and a long-term arithmetic mean of 48.6 cfs (1 May 2002 to 31 January 2007), a dilution credit of up to 13.3:1 may be allowed. Based on the findings of the human carcinogenic mixing zone evaluation study and the human carcinogenic impact study, a dilution credit of 13:1 is protective of the MUN beneficial use. Therefore, the proposed Order grants a 13:1 dilution credit applicable to the human health criteria, with a mixing zone that extends approximately 3.5 miles upstream and 1 mile downstream of the discharge (within this section of the San Joaquin River, the downstream is wider than the upstream section). The estimated size of the mixing zone is based on the May 2005 study that estimated the tidal movement up and downstream from the discharge. The 13:1 dilution likely occurs much closer to the point of discharge. There are no known drinking water intakes in the vicinity of the discharge.

Evaluation of Available Dilution for Agricultural Water Quality Objectives. For constituents where water quality criteria are based on agricultural water quality objectives, critical environmental impacts are expected to occur far downstream from the source such that complete mixing is a valid assumption.

Regarding the application of a mixing zone, the TSD states that," *...the presence of mixing zones should not result in significant health risks, when evaluated using reasonable assumptions about exposure pathways. ...*". As previously stated, there are no known drinking water intakes in the vicinity of the discharge, but there is one agricultural water intake located near the discharge, which is used for flood irrigation in the spring time (depending on crop rotations). However, because protection of agricultural beneficial uses is based upon the long-term effects, for purposes of establishing WQBELs in this Order, dilution credits may be granted based on the San Joaquin River harmonic flow and a long-term arithmetic mean discharge (See Evaluation of Available Dilution for Priority Pollutant Human Health Criteria). Therefore, this Order grants a 13:1 dilution credit applicable to those constituents where water quality criteria are based on agricultural water quality objectives.

In granting a mixing zone, the SIP states that a mixing zone shall be as small as practicable, and meet the conditions provided in Section 1.4.2.2 as follows:

"A: A mixing zone shall not:

(1) compromise the integrity of the entire water body;
(2) cause acutely toxic conditions to aquatic life passing through the mixing zone;
(3) restrict the passage of aquatic life;
(4) adversely impact biologically sensitive or critical habitats, including, but not limited to, habitat of species listed under federal or State endangered species laws;
(5) produce undesirable or nuisance aquatic life;
(6) result in floating debris, oil, or scum;
(7) produce objectionable color, odor, taste, or turbidity;
(8) cause objectionable bottom deposits;
(9) cause nuisance;
(10) dominate the receiving water body or overlap a mixing zone from different outfalls; or
(11) be allowed at or near any drinking water intake. A mixing zone is not a source of drinking water. To the extent of any conflict between this determination and the Sources of Drinking Water Policy (Resolution No. 88-63), this SIP supersedes the provisions of that policy."

This Order only allows a mixing zone for human health and agricultural criteria (i.e. long-term criteria). This Order does not allow mixing zones for compliance with aquatic toxicity criteria. The mixing zone is as small as practicable, will not compromise the integrity of the entire water body, restrict the passage of aquatic life, dominate the waterbody or overlap existing mixing zones from different outfalls. No drinking water intakes are located within the mixing zone and the mixing zone does not overlap a mixing zone from a different outfall.

The discharge will not cause acutely toxic conditions to aquatic life passing through the mixing zone, because this Order does not allow an acute mixing zone and requires compliance with an acute toxicity effluent limitation and

requires acute bioassays using 100% effluent. Compliance with the acute toxicity effluent limitation assures the effluent is not acutely toxic.

The discharge will not adversely impact biologically sensitive or critical habitats, including, but not limited to, habitat of species listed under federal or State endangered species laws, because this Order does not allow mixing zones for compliance with aquatic toxicity criteria. The Discharger must meet stringent end-of-pipe effluent limitations for constituents that demonstrated reasonable potential to exceed aquatic toxicity criteria (i.e. ammonia, aluminum, cyanide, total residual chlorine).

The discharge 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, because this Order requires end-of-pipe effluent limitations (e.g. for biochemical oxygen demand and total suspended solids) and discharge prohibitions to prevent these conditions from occurring.

As suggested by the SIP, in determining the extent of or whether to allow a mixing zone and dilution credit, the Regional Water Board has considered the presence of pollutants in the discharge that are carcinogenic, mutagenic, teratogenic, persistent, bioaccumulative, or attractive to aquatic organisms, and concluded that the allowance of the mixing zone and dilution credit is adequately protective of the beneficial uses of the receiving water.

The mixing zone therefore complies with the SIP. The mixing zone also complies with the Basin Plan, which requires that the mixing zone not adversely impact beneficial uses. Beneficial uses will not be adversely affected for the same reasons discussed above. In determining the size of the mixing zone, the Regional Water Board has considered the procedures and guidelines in the EPA's Water Quality Standards Handbook, 2d Edition (updated July 2007), Section 5.1, and Section 2.2.2 of the Technical Support Document for Water Quality-based Toxics Control (TSD). The SIP incorporates the same guidelines.

3. Determining the Need for WQBELs

a. CWA section 301 (b)(1) requires NPDES permits to include effluent limitations that achieve technology-based standards and any more stringent limitations necessary to meet water quality standards. Water quality standards include Regional Water Board Basin Plan beneficial uses and narrative and numeric water quality objectives, State Water Board-adopted standards, and federal standards, including the CTR and NTR. The Basin Plan includes numeric site-specific water quality objectives and narrative objectives for toxicity, chemical constituents, and tastes and odors. The narrative toxicity objective states: "*All waters shall be maintained free of toxic substances in concentrations that produce detrimental physiological responses in human, plant, animal, or aquatic life.*" (Basin Plan at III-8.00.) With regards to the narrative chemical constituents objective, the Basin Plan states that waters shall not contain chemical

constituents in concentrations that adversely affect beneficial uses. At minimum, "*...water designated for use as domestic or municipal supply (MUN) shall not contain concentrations of chemical constituents in excess of the maximum contaminant levels (MCLs)*" in Title 22 of CCR. The narrative tastes and odors objective states: "*Water shall not contain taste- or odor-producing substances in concentrations that impart undesirable tastes or odors to domestic or municipal water supplies or to fish flesh or other edible products of aquatic origin, or that cause nuisance, or otherwise adversely affect beneficial uses.*"

b. Federal regulations require effluent limitations for all pollutants that are or may be discharged at a level that will cause or have the reasonable potential to cause, or contribute to an in-stream excursion above a narrative or numerical water quality standard. Based on information submitted as part of the application, in studies, and as directed by monitoring and reporting programs, the Regional Water Board finds that the discharge has a reasonable potential to cause or contribute to an in-stream excursion above a water quality standard for aluminum, ammonia, bis (2-ethylhexyl) phthalate, chlorine (total residual), chlorodibromomethane, cyanide, dichlorobromomethane, electrical conductivity, manganese, molybdenum, and nitrate plus nitrite. Water quality-based effluent limitations (WQBELs) for these constituents are included in this Order. A summary of the reasonable potential analysis (RPA) is provided in Attachment G, and a detailed discussion of the RPA for each constituent is provided below.

c. The Regional Water Board conducted the RPA in accordance with Section 1.3 of the SIP. Although the SIP applies directly to the control of CTR priority pollutants, the State Water Board has held that the Regional Water Board may use the SIP as guidance for water quality-based toxics control.[2] The SIP states in the introduction "*The goal of this Policy is to establish a standardized approach for permitting discharges of toxic pollutants to non-ocean surface waters in a manner that promotes statewide consistency.*" Therefore, in this Order the RPA procedures from the SIP were used to evaluate reasonable potential for both CTR and non-CTR constituents.

d. WQBELs were calculated in accordance with section 1.4 of the SIP, as described in Section IV.C.4 of this Fact Sheet.

e. **Aluminum.** The Secondary MCL for aluminum for the protection of the MUN beneficial use is 200 µg/L. In addition, USEPA developed National Recommended Ambient Water Quality Criteria (NAWQC) for protection of freshwater aquatic life for aluminum, and the recommended four-day average (chronic) and one-hour average (acute) criteria are 87 µg/L and 750 µg/L, respectively. However, information contained in the footnotes to the NAWQC indicate that the development of the chronic criterion was based on specific receiving water conditions where there is low pH (below 6.5) and low hardness levels (below 50 mg/L as CaCO3). The San Joaquin River (SJR) has been measured to have hardness values—typically between 57 and 152 mg/L as

[2] See, Order WQO 2001-16 (Napa) and Order WQO 2004-0013 (Yuba City).

$CaCO_3$. Because the hardness values in the SJR are higher (which decreases the toxic effects to aquatic life) than the water hardness values in which the criterion was developed, USEPA advises that a water effects ratio (WER) might be appropriate to better reflect the actual toxicity of aluminum to aquatic organisms.

In May 2006, the Arid West Water Quality Research Project produced a research report, *Evaluation of the EPA Recalculation Procedure in the Arid West Technical Report*, to update NAWQC based on more recent data, and to recalculate these NAWQC to reflect the resident species observed in arid West receiving waters. This research report states that "*speciation and/or complexation of aluminum is highly dependent on ambient water quality characteristics and ultimately determines the mechanism of toxicity. [Increased] Concentrations of calcium in the water was shown to decrease toxic effects to fish.*" Based on the Arid West Technical Report, the Chronic Aluminum (total) Criterion Value is calculated as 1954 µg/L for a mean hardness value of 272 mg/L as $CaCO_3$, which is similar to the WER value calculated in Manteca's Phase II WER Study.

The City of Manteca completed an aluminum WER study (12 April 2007) for the San Joaquin River near its discharge point, which is located upstream of the Discharger's outfall. The Manteca WER study, which may be used to calculate a WER for the City of Manteca's discharge, indicated that a WER of 22.7 can be applied to the chronic criterion for aluminum. Since the characteristics of the river (e.g. hardness and pH) near Manteca are similar to those near the City of Stockton, the results of the Manteca WER study put into question the applicability of the stringent CCC recommended by the NAWQC for aluminum. Using the WER adjustment in accordance with the SIP, the applicable water quality criteria for aluminum for chronic exposure becomes 22.7 x 87 µg/L or 1975 µg/L.

Although the Arid West Technical Report has not been approved by USEPA nor has it received independent scientific peer review, based on its findings and the Manteca WER study, the Regional Water Board finds that there is uncertainty of the appropriateness of using the chronic criterion recommended in the NAWQC (87 µg/L). Therefore, for this RPA for aluminum, an acute and chronic criterion of 750 µg/L was used for protection of aquatic life and the secondary MCL of 200 µg/L was used for protection of MUN.

Based on 21 samples collected between 29 January 2002 and 2 August 2006, the MEC for aluminum was 2,900 µg/L. The maximum observed upstream receiving water aluminum concentration was 1,800 µg/L, based on 19 samples collected between 20 March 2002 and 2 August 2006. Therefore, aluminum in the discharge has a reasonable potential to cause or contribute to an in-stream excursion above a level necessary to protect aquatic life and the MUN beneficial use.

Based on the above information, using the chronic criterion recommended in the NAWQC (87 µg/L) is not appropriate for the receiving water. Therefore, this Order contains a final Average Monthly Effluent Limitation (AMEL) and Maximum

Daily Effluent Limitation (MDEL) for aluminum of 311 µg/L and 750 µg/L, respectively, based on USEPA's NAWQC of 750 ug/L for the protection of freshwater aquatic life (See Table F-7 of this Fact Sheet for WQBEL calculations). This Order also contains an annual average effluent limitation of 200 µg/L for aluminum, based on the Secondary MCL, for protection of the MUN beneficial use. In addition, this Order includes a reopener to consider a revision of the final effluent limitations for aluminum if additional information is provided by the Discharger, such as submission of a defensible water effects ratio study or defensible findings from an independent scientific peer review of the Arid West Technical Report, particularly the updated national ambient water quality criteria contained in Chapter 3 of that report.

Based on the sample results in the effluent, it appears that the Discharger may be in immediate non-compliance upon issuance of the permit. New or modified control measures may be necessary in order to comply with the effluent limitations, and the new or modified control measures cannot be designed, installed and put into operation within 30 calendar days. Furthermore, the effluent limitations for aluminum are a new regulatory requirement within this permit, which becomes applicable to the waste discharge with the adoption of this Order, which was adopted after 1 July 2000. Therefore, a compliance time schedule for compliance with the aluminum effluent limitations is established in TSO No. R5-2008-0155 in accordance with CWC section 13300, that requires preparation and implementation of a pollution prevention plan in compliance with CWC section 13263.3.

f. **Ammonia Nitrogen, Total (as N).** Untreated municipal wastewater contains ammonia. Nitrification is a biological process that converts ammonia to nitrite and nitrite to nitrate. Denitrification is a process that converts nitrate to nitrite or nitric oxide and then to nitrous oxide or nitrogen gas, which is then released to the atmosphere. The previous permit, Order No. R5-2002-0083, contained final effluent limitations for ammonia (as N), an AMEL of 2 mg/L (917 lbs/day) and an MDEL of 5 mg/L (2,294 lbs/day), and contained a provisional requirement to evaluate the effects that a nitrification facility would have and what additional treatment may be necessary. Because the Discharger could not immediately comply with the final effluent limitations, the Regional Water Board also issued Cease and Desist Order (CDO) No. R5-2002-0084 to provide a compliance schedule for construction and operation of the nitrification facilities. The CDO required full compliance with the ammonia limitations by 1 April 2007. The Discharger petitioned the State Water Board requesting review of these Orders. In response to the Discharger's petition, the State Water Board granted a stay for portions of the existing permit and the CDO (See previous section I.B of this Fact Sheet), and as a result, extended the compliance date with these ammonia effluent limitations to 10 August 2008. The Discharger has since added nitrification facilities, which include nitrifying biotowers and engineered wetlands; thus, the Discharger now nitrifies to remove ammonia from the waste stream to meet the ammonia limits in Order No. R5-2002-0083.

Inadequate or incomplete nitrification may result in the discharge of ammonia to the receiving stream. Ammonia is known to cause toxicity to aquatic organisms in surface waters. Discharges of ammonia would violate the Basin Plan narrative toxicity objective. Therefore, the discharge has the reasonable potential to cause or contribute to an exceedance of the Basin Plan's narrative toxicity objective. Applying CFR Part 122.44(d)(1)(vi)(B), it is appropriate to use USEPA's Ambient National Water Quality Criteria for the Protection of Freshwater Aquatic Life for ammonia, which was developed to be protective of aquatic organisms.

USEPA's *Ambient Water Quality Criteria for the Protection of Freshwater Aquatic Life*, for total ammonia, recommends acute standards (1-hour average; criteria maximum concentration) based on pH, and chronic standards (30-day average, criteria continuous concentration) based on pH and temperature. It also recommends a maximum four-day average concentration of 2.5 times the criteria continuous concentration. USEPA found that as pH increased, both the acute and chronic toxicity of ammonia increased. Salmonids were more sensitive to acute toxicity effects than other species. However, while the acute toxicity of ammonia was not influenced by temperature, it was found that invertebrates and young fish experienced increasing chronic toxicity effects with increasing temperature. The beneficial uses of the San Joaquin River downstream of the discharge include migration of aquatic organisms, and spawning, reproduction, and/or early development. Thus, because the presence of salmonids and early fish life stages in San Joaquin River within the vicinity of the discharge is well-documented, the recommended criteria for waters where salmonids and early life stages are present were used. USEPA's recommended criteria are shown below:

$$CCC_{30-day} = \left(\frac{0.0577}{1+10^{7.688-pH}} + \frac{2.487}{1+10^{pH-7.688}}\right) \times MIN\left(2.85, 1.45 \cdot 10^{0.028(25-T)}\right), \text{ and}$$

$$CMC = \left(\frac{0.275}{1+10^{7.204-pH}} + \frac{39.0}{1+10^{pH-7.204}}\right),$$

where T is in degrees Celsius

Previous Order No. R5-2002-0083 demonstrated that the effluent discharge has reasonable potential to exceed ammonia water quality criteria in the receiving water through four separate methods: (1) identifying toxicity in the RWCF effluent using "real-time" data (ammonia, pH, and temperature occurring simultaneously), (2) identifying toxicity in the receiving water using "real-time" data, (3) showing reasonable potential based on critical conditions that are a combination of worst-case observations, and (4) evaluation based on the expected receiving water pH and temperature occurring under drought flow conditions. The complex derivation of the final ammonia effluent limitations were based on these four methods and the Discharger's cost-effective analysis of upgrading the Facility. As a result, previous Order No. R5-2002-0083 required the same ammonia-N effluent limits as the 1994 permit, MDEL of 5 mg/L and an AMEL of 2 mg/L, which became effective August 2008. By letter dated 22 March 2002, EPA

Region IX concurred with the methodology for calculating the WQBELs for ammonia.

Since issuance of the previous Order No. R5-2002-0083, additional "real time" data for both the effluent and receiving water was obtained, and therefore, the effluent and receiving water monitoring data from September 1992 through December 2007 were evaluated to determine the accuracy of the evaluation of the acute and chronic ammonia criteria. An acute ammonia toxicity criterion was calculated for each receiving water pH value using the CMC equation based on salmonids present. A chronic toxicity criterion was calculated for each paired receiving water 30-day average temperature and pH using the CCC equation based on early life stages present. A total of 619 receiving water ammonia concentration samples (either R2 or R2a, whichever was greater) were compared to its paired acute and 30-day average chronic criteria for ammonia. Table F-4 below lists the occurrences where the receiving water ammonia concentration exceeded the ammonia criteria.

Table F-4. Summary of Ammonia Effluent Limit Derivations

Date	Year Hydrological Type	Ammonia Concentrations (mg/L as N)			Ammonia Criteria (mg/L as N)	
		Effluent Daily	Receiving Water Daily	Receiving Water Monthly Average	Acute	30-day Average Chronic
Jan-00	Above Normal	24.7	5.9	5.9	17.5	5.1
Jan-04	Dry	24.4	6.5	4.4	13	4.2
Feb-04	Dry	26	7.2	4.9	13.5	4.1
Feb-04	Dry	26	4.3	5.2	12	3.4
Feb-04	Dry	25.2	5.5	5.5	12.8	3.4

As indicated in Table F-4 above, at times the chronic criterion was exceeded in the receiving water. However, these exceedances occurred during periods of high effluent concentrations of ammonia, as much as five times the MDEL allowed in the previous Order. As previously discussed in this Fact Sheet, the Discharger upgraded the Facility in September 2006 to meet the final ammonia effluent limits. Further evaluation of 72 paired effluent and receiving water samples obtained after the Facility's upgrade (18 September 2006) yields a maximum daily effluent concentration value of 12.5 mg/L and an average value of 3.37 mg/L, and a receiving water maximum concentration of 0.9 mg/L and an average value of 0.35 mg/L. Based on this evaluation, the ammonia effluent limitations at a MDEL of 5 mg/L and an AMEL of 2 mg/L are fully protective of the beneficial uses, and therefore, this Order carries forward these limitations from the previous Order.

Research has demonstrated that ammonia can inhibit growth of marine diatoms at ammonia concentrations in the receiving water much lower than ammonia concentrations that impact fish species. Studies are in progress examining possible impacts of ammonia on growth of fresh water diatoms that exist in the

Delta in the vicinity of this discharge. The Delta has a relative low primary productivity for an estuarine environment. If ammonia inhibition of fresh water diatoms does occur, it is possible that lowered primary productivity from diatom inhibition could be a contributing factor to Delta pelagic organism decline. Studies are ongoing to evaluate the effect of ammonia on the inhibition of growth of freshwater diatoms in the Delta, as well as, studies to evaluate the sensitivity of delta smelt to ammonia toxicity. Based on the result of these or other studies, this Order may be reopened to reconsider the ammonia effluent limitations.

g. **Bis (2-ethylhexyl) phthalate.** Bis (2-ethylhexyl) phthalate is used primarily as one of several plasticizers in polyvinyl chloride (PVC) resins for fabricating flexible vinyl products. According to the Consumer Product Safety Commission, USEPA, and the Food and Drug Administration, these PVC resins are used to manufacture many products, including soft squeeze toys, balls, raincoats, adhesives, polymeric coatings, components of paper and paperboard, defoaming agents, animal glue, surface lubricants, and other products that must stay flexible and noninjurious for the lifetime of their use. The State MCL for bis (2-ethylhexyl) phthalate is 4 µg/L and the USEPA MCL is 6 µg/L. The NTR criterion for human health protection for consumption of water and aquatic organisms is 1.8 µg/L and for consumption of aquatic organisms only is 5.9 µg/L. The previous Order contained a daily maximum effluent limitation of 48 µg/L.

The MEC for bis (2-ethylhexyl) phthalate was 5.5 µg/L, based on 61 samples collected between 1 May 2001 and 14 June 2006, while the maximum observed upstream receiving water bis (2-ethylhexyl) phthalate concentration was 3.2 µg/L, based on 21 samples collected between 22 May 2002 and 15 November 2006. Therefore, the discharge has a reasonable potential to cause or contribute to an in-stream excursion above the NTR criterion for bis (2-ethylhexyl) phthalate.

Section 1.4.3.2 of the SIP states that the ambient background concentration shall be set equal to the arithmetic mean of the individual reported measure or estimated concentration. All ambient background samples were reported below the reported detection limits (non-detects) except for the sample obtained on 10 November 2004, and therefore, the arithmetic mean concentration is set at that concentration value of 3.2 µg/L. Per the SIP, no dilution is allowed since the arithmetic mean exceeds the bis (2-ethylhexyl) phthalate criterion. This Order includes an AMEL and MDEL for bis (2-ethylhexyl) phthalate of 1.8 µg/L and 3.6 µg/L, respectively, based on the NTR criterion for the protection of human health (see Table F-8 for WQBEL calculations).

Based on the sample results in the effluent, it appears that the Discharger may be in immediate non-compliance upon issuance of the permit. New or modified control measures may be necessary in order to comply with the effluent limitations, and the new or modified control measures cannot be designed, installed and put into operation within 30 calendar days. Furthermore, the effluent limitations for bis (2-ethylhexyl) phthalate are a new regulatory requirement within this permit, which becomes applicable to the waste discharge with the adoption of this Order, which was adopted after 1 July 2000. Therefore,

a compliance time schedule for compliance with the bis (2-ethylhexyl) phthalate effluent limitations is established in TSO No. R5-2008-0155 in accordance with CWC section 13300, that requires preparation and implementation of a pollution prevention plan in compliance with CWC section 13263.3.

h. **Chlorodibromomethane (Dibromochloromethane).** A performance-based MDEL of 23 µg/L was applied in the previous Order and monitoring requirements were established to evaluate the reasonable potential of chlorodibromomethane to exceed water quality criteria. The CTR includes a chlorodibromomethane criterion of 0.41 µg/L for the protection of human health and is based on a one-in-a-million cancer risk for waters from which both water and organisms are consumed. The MEC for chlorodibromomethane was 29 µg/L, based on 60 samples collected between 20 March 2002 and 15 November 2006 while concentrations were not detected in 26 receiving water samples (non-detects) collected during this same period. The reported detection levels ranged from 0.5 µg/L to 0.03 µg/L; accordingly, the ambient background concentration was set at 0.03 µg/L (per SIP section 1.4.3.2). Therefore, the discharge has a reasonable potential to cause or contribute to an in-stream excursion above the CTR criterion for chlorodibromomethane.

A dilution credit for chlorodibromomethane of up to 13:1 can be granted, based on the available human health dilution (see Section IV.C.2.c). An AMEL and MDEL for chlorodibromomethane of 5.0 µg/L and 16 µg/L, respectively, are included in this Order based on the CTR criterion for the protection of human health (see Table F-9 for WQBEL calculations). These more stringent effluent limitations are necessary to be consistent with the SIP and the antidegradation requirements. The CTR criterion for fish consumption only is 34 µg/L, therefore, these effluent limits are protective of human health for the consumption of fish caught within the human health mixing zone.

Based on the sample results in the effluent, it appears that the Discharger may be in immediate non-compliance upon issuance of the permit. New or modified control measures may be necessary in order to comply with the effluent limitations, and the new or modified control measures cannot be designed, installed and put into operation within 30 calendar days. Furthermore, the effluent limitations for chlorodibromomethane are a new regulatory requirement within this permit, which becomes applicable to the waste discharge with the adoption of this Order, which was adopted after 1 July 2000. Therefore, a compliance time schedule for compliance with the chlorodibromomethane effluent limitations is established in TSO No. R5-2008-0155 in accordance with CWC section 13300, that requires preparation and implementation of a pollution prevention plan in compliance with CWC section 13263.3.

i. **Chlorine Residual.** The Discharger uses chlorine for disinfection, which is extremely toxic to aquatic organisms. The Discharger uses a sulfur dioxide process to dechlorinate the effluent prior to discharge to the San Joaquin River. Due to the existing chlorine use and the potential for chlorine to be discharged, the discharge has a reasonable potential to cause or contribute to an in-stream

excursion above the Basin Plan's narrative toxicity objective.

The USEPA *Technical Support Document for Water Quality-Based Toxics Control* [EPA/505/2-90-001] contains statistical methods for converting chronic (4-day) and acute (1-hour) aquatic life criteria to average monthly and maximum daily effluent limitations based on the variability of the existing data and the expected frequency of monitoring. However, because chlorine is an acutely toxic constituent that can and will be monitored continuously, an average 1-hour limitation is considered more appropriate than a maximum daily limitation; and a 4-day limitation is considered more appropriate than an average monthly effluent limitation. Therefore, an average 1-hour effluent limitation of 0.02 mg/L and an average 4-day effluent limitation of 0.01 mg/L for chlorine are included in this Order based on the criteria. Based on data reported during the previous permit term, it appears as if the Discharger can immediately comply with these new effluent limitations for chlorine residual.

The chlorine residual limitations required in this Order are protective of aquatic organisms in the undiluted discharge. If compliance is maintained, the Regional Water Board does not anticipate residual chlorine impacts to benthic organisms.

j. **Chloride. (see Subsection aa, below, for Salinity)**

k. **Chloroform. (see Subsection gg, below, for Total Trihalomethanes)**

l. **Copper, Total Recoverable.** The CTR includes hardness-dependent criteria for the protection of freshwater aquatic life for copper. The criteria for copper are presented in dissolved concentrations. USEPA recommends conversion factors to translate dissolved concentrations to total concentrations. The USEPA default conversion factors for copper in freshwater are 0.96 for both the acute and the chronic criteria. Using the reasonable worst-case ambient hardness, estimated here as the lowest effluent hardness (98 mg/L as $CaCO_3$), and the USEPA recommended dissolved-to-total translator, the applicable chronic criterion (maximum 4-day average concentration) is 9.17 µg/L and the applicable acute criterion (maximum 1-hour average concentration) is 13.74 µg/L, as total recoverable.

The MEC for total copper was 6.3 µg/L, based on 67 samples collected between 20 March 2002 and 10 January 2007, while the maximum observed upstream receiving water total copper concentration was 5 µg/L, based on 10 samples collected between 20 March 2002 and 4 December 2002. Therefore, the discharge does not demonstrate reasonable potential to cause or contribute to an in-stream excursion above the CTR criteria for copper.

Therefore, based on new information and the procedures established in Section 1.3 of the SIP for determining reasonable potential, the discharge no longer demonstrates reasonable potential to exceed water quality criteria for copper. The removal of the effluent limitations for copper is in compliance with 40 CFR 122.44(l)(2)(i)(B)(1).

m. **Cyanide, Total Recoverable.** The CTR includes maximum 1-hour average and 4-day average cyanide concentrations of 22 µg/L and 5.2 µg/L, respectively, for the protection of freshwater aquatic life. The MEC for cyanide was 13 µg/L, based on 120 samples collected between 20 January 2002 and 30 June 2008, while the maximum observed upstream receiving water cyanide concentration was 300 µg/L, based on 10 samples collected between 20 March 2002 and 4 December 2002. Therefore, the discharge has a reasonable potential to cause or contribute to an in-stream excursion above the CTR criteria for cyanide. Previous Order No. R5-2002-0083 contains final limits for cyanide that became effective 1 May 2006, an AMEL of 4.0 µg/L and a MDEL of 9.2 µg/L. However, based on the procedures in the SIP, and on recent effluent data, this Order contains cyanide effluent limitations recalculated as an MDEL at 9.0 µg/L and an AMEL at 4.1 µg/L (see Table F-11 for WQBEL calculations).

To comply with the requirements of the previous Order No. R5-2002-0083, the Discharger developed a pollution prevention plan for cyanide, which included a source identification study and mass balance of influent loadings. Based on the findings of this study, the Discharger concluded that 71% of the cyanide influent load is from residential sources, 12% is from commercial sources, and 7% is from the industrial dischargers. As such, implementation of local limits or other industrial source control may not have a significant impact in overall cyanide reduction.

To determine if the cyanide exceedences are actually a function of sample preservation techniques ("Cyanide Formation and Fate in Complex Effluents and its Relation to Water Quality," Water and Environmental Research Foundation, 2003), the Discharger is currently investigating the feasibility of modifying its analytical procedures. In addition to modifying analytical procedures, which in the City's case would require construction of new laboratory facilities, the City will also evaluate operational modifications that can be made to their filtration and disinfection facilities to reduce cyanide formation. The City will also evaluate the benefits and feasibility of switching its current chlorine-based disinfection system to alternative disinfection, and if necessary, construct alternative disinfection facilities. The previous Order No. R5-2002-0083 cyanide effluent limitation has been modified in this Order, and based on the sample results in the effluent, it appears that the Discharger may be in immediate non-compliance upon issuance of the permit. Because new or modified control measures may be necessary as proposed in order to comply with the effluent limitations, and the new or modified control measures cannot be designed, installed and put into operation within 30 calendar days, a compliance time schedule for compliance with the cyanide effluent limitations is established in TSO No. R5-2008-0155 in accordance with CWC section 13300, that requires preparation and implementation of a pollution prevention plan in compliance with CWC section 13263.3.

n. **Diazinon.** The Basin Plan requires the Regional Water Board to consider relevant numerical criteria and guidelines developed by other agencies in determining compliance with the narrative toxicity objective (Basin Plan, IV-17.00). In March 2000, the California Department of Fish and Game (DFG)

established acute and chronic criteria for diazinon to protect fresh water aquatic life. The acute (1-hour average) and chronic (4-day average) criteria are 0.08 µg/L and 0.05 µg/L, respectively. Order No. R5-2002-0083 established a MDEL of 0.1 µg/L.

The MEC for diazinon was <0.25 µg/L, based on 57 samples collected between 22 May 2002 and 10 January 2007, and no diazinon concentrations was detected in the upstream receiving water monitoring results, <0.25 µg/L, based on three samples collected between 22 May 2002 and 13 November 2002. Based on new information and the procedures established in Section 1.3 of the SIP for determining reasonable potential, the discharge no longer demonstrates reasonable potential to exceed water quality criteria for diazinon. The removal of the effluent limitations for diazinon is in compliance with 40 CFR 122.44(l)(2)(i)(B)(1).

o. **Dichlorobromomethane (Bromodichloromethane).** A performance-based MDEL of 82 µg/L was applied in the previous Order and monitoring requirements were established to evaluate the reasonable potential of dichlorobromomethane to exceed water quality criteria. The CTR includes a dichlorobromomethane criterion of 0.56 µg/L for the protection of human health and is based on a one-in-a-million cancer risk for waters from which both water and organisms are consumed. The MEC for dichlorobromomethane was 36 µg/L, based on 82 samples collected between 20 March 2002 and 13 May 2008; while dichlorobromomethane concentrations were not detected in the upstream receiving water monitoring samples. Therefore, the discharge demonstrates a reasonable potential to cause or contribute to an in-stream excursion above the CTR criterion for dichlorobromomethane.

A dilution credit for dichlorobromomethane of up to 13:1 can be granted, based on the available human health dilution (see Section IV.C.2.c). An AMEL and MDEL for dichlorobromomethane of 6.8 µg/L and 20 µg/L, respectively, are included in this Order based on the CTR criterion for the protection of human health (See Table F-10 for WQBEL calculations). These more stringent effluent limitations are necessary to be consistent with the SIP and antidegradation requirements. The CTR criterion for fish consumption only is 46 µg/L, therefore, these effluent limits are protective of human health for the consumption of fish caught within the human health mixing zone.

Based on the sample results in the effluent, it appears that the Discharger may be in immediate non-compliance upon issuance of the permit. New or modified control measures may be necessary in order to comply with the effluent limitations, and the new or modified control measures cannot be designed, installed and put into operation within 30 calendar days. Furthermore, the effluent limitations for dichlorobromomethane are a new regulatory requirement within this permit, which becomes applicable to the waste discharge with the adoption of this Order, which was adopted after 1 July 2000. Therefore, a compliance time schedule for compliance with the dichlorobromomethane effluent limitations is established in TSO No. R5-2008-0155 in accordance with

CWC section 13300, that requires preparation and implementation of a pollution prevention plan in compliance with CWC section 13263.3.

p. **1,1-Dichloroethylene (1,1-DCE).** The CTR includes a 1,1-dichloroethylene criterion of 0.057 µg/L for the protection of human health and is based on a one-in-a-million cancer risk for waters from which both water and organisms are consumed. Based on performance data collected between April 1994 and April 2000, the previous order established an interim MDEL of 14.5 µg/L.

1,1-dichloroethylene was not detected in the effluent and the maximum detection level was <0.06 µg/L, based on 68 samples collected between 20 March 2002 and 10 January 2007. Also, 1,1-dichloroethylene was not observed in the upstream receiving water concentration and the maximum detection level was <0.06 µg/L, based on 26 samples collected between 20 March 2002 and 15 November 2006. Based on new information and the procedures established in Section 1.3 of the SIP for determining reasonable potential, the discharge no longer demonstrates reasonable potential to exceed water quality criteria for 1,1-dichloroethylene. The removal of the effluent limitations for 1,1-dichloroethylene is in compliance with 40 CFR 122.44(l)(2)(i)(B)(1).

q. **Dichloromethane (Methylene Chloride).** The CTR includes a criterion of 4.7 µg/L for dichloromethane for the protection of human health and is based on a one-in-a-million cancer risk for waters from which both water and organisms are consumed. Previous Order No. R5-2002-0083 established an MDEL of 25 µg/L, and an AMEL of 14.5 µg/L.

Dichloromethane was not detected in the effluent and the maximum detection level was <0.5 µg/L, based on 68 samples collected between 20 March 2002 and 10 January 2007. The maximum observed upstream receiving water dichloromethane concentration was 0.12 µg/L, based on 10 samples collected between 20 March 2002 and 4 December 2002. Based on new information and the procedures established in Section 1.3 of the SIP for determining reasonable potential, the discharge no longer demonstrates reasonable potential to exceed the CTR criterion for dichloromethane. Therefore, effluent limitations are not necessary. The removal of the effluent limitations for dichloromethane is in compliance with 40 CFR 122.44(l)(2)(i)(B)(1).

r. **Dissolved Oxygen.** Board Resolution No. R5-2005-0005 was adopted on 27 January 2005 by the Regional Water Board, and approved by the USEPA on 7 February 2007. Board Resolution No. R5-2005-0005 establishes a TMDL for factors contributing to the dissolved oxygen impairment in the Stockton Deep Water Ship Channel portion of the San Joaquin River. The TMDL is applicable to the Facility's discharge, but does not apply direct minimum limitations on DO concentrations in the effluent. However, the Basin Plan identifies objectives for dissolved oxygen in the SJR, between Turner Cut and Stockton. The previous permit, Order No. R5-2002-0083, contained effluent limitations for dissolved oxygen of 6.0 mg/L from 1 September through 30 November and 5.0 mg/L throughout the remainder of the year.

The minimum DO concentration observed was 1.8 mg/L based on 1,498 samples collected between 1 May 2002 through 31 January 2007. The discharge demonstrates reasonable potential to exceed water quality objectives contained in the Basin Plan. Therefore, the daily minimum effluent limitations for dissolved oxygen contained in the previous permit, Order No. R5-2002-0083, are retained in this Order, and are based on the Basin Plan water quality objectives for dissolved oxygen concentrations in the San Joaquin River.

s. **Electrical Conductivity. (see Subsection bb., below, for Salinity)**

t. **Manganese, Total Recoverable.** The applicable water quality objective for manganese contained in Table III-1 of the Basin Plan is 50 µg/L (as dissolved). In the absence of a specific translator for manganese, a translator of 1 is assumed (i.e., the applicable objective for manganese in the total form is equal to 50 µg/L). The MEC for manganese was 180 µg/L (reported as total), based on 23 samples collected between 29 January 2002 and 14 November 2006. The maximum observed upstream receiving water manganese concentration was 240 µg/L (as total), based on 10 samples collected between 20 March 2002 and 4 December 2002.

To determine the assimilative capacity of the San Joaquin River for manganese, the Discharger conducted additional upstream receiving water monitoring during the period 7 December 2005 through 2 August 2006, and measured manganese as total and dissolved. The results of this study were provided as part of their report of waste discharge, and the arithmetic mean of the observed upstream receiving water concentration for dissolved manganese was reported as 7 µg/L. The dissolved data for the receiving water indicates assimilative capacity exists in the receiving water for manganese. Therefore, a dilution credit for manganese of up to 13:1 can be granted, based on the available human health dilution (as discussed in Section IV.C.2.c above). In accordance with 40 CFR 122.45(c), the WQBEL in dissolved form was converted to the total form using the assumed translator of one. Based on the allowable dilution credit, an MDEL of 1308 µg/L is calculated. However, the Regional Water Board finds that granting of this dilution credit could allocate an unnecessarily large portion of the receiving water's assimilative capacity for manganese and could violate the Antidegradation Policy. For this reason, a performance-based effluent limitation (mean plus 3.3 standard deviations) is included in this Order., An MDEL for total manganese of 286 µg/L is included in this Order based on Basin Plan objectives for the protection of human health. Based on the sample results for the effluent, it appears the Discharger can meet this new limitation.

u. **Mercury, Total.** The current USEPA Ambient Water Quality Criteria for Protection of Freshwater Aquatic Life, continuous concentration, for mercury is 0.77 µg/L (30-day average, chronic criteria). The CTR contains a human health criterion (based on a one-in-a-million cancer risk) of 0.050 µg/L for waters from which both water and aquatic organisms are consumed. Both values are controversial and subject to change. In 40 CFR Part 131, USEPA acknowledges that the human health criteria may not be protective of some aquatic or

endangered species and that "*...more stringent mercury limits may be determined and implemented through use of the State's narrative criterion.*" In the CTR, USEPA reserved the mercury criteria for freshwater and aquatic life and may adopt new criteria at a later date.

From 20 March 2002 through 10 January 2007, the Discharger collected 67 effluent samples for total mercury. The maximum observed effluent mercury concentration was 0.013 µg/L (March 2002). The Stockton Deep Water Ship Channel portion of the Delta Waterways, which is about 1.5 miles downstream of the discharge, has been listed as an impaired water body pursuant to Section 303(d) of the Clean Water Act because of mercury. Mercury bioaccumulates in fish tissue, and therefore, the discharge of mercury to the receiving water is likely to contribute to exceedances of the narrative toxicity objective and impacts on beneficial uses. Because the Stockton Deep Water Ship Channel has been listed as an impaired water body for mercury, the discharge must not cause or contribute to increased mercury levels.

The SIP, Section 1.3, requires the establishment of an effluent limitation for a constituent when the receiving stream background water quality exceeds an applicable criterion or objective. Order No. R5-2002-0083 established a mass-based effluent limitation of 0.92 lbs/year for mercury based on the average flow rate for the period (33.2 mgd) and average discharge concentration for the period (0.0094 µg/L). In addition, the Discharger was required to perform an offset program feasibility and development study with the intention of mitigating the mass loading of mercury in effluent above the interim mass limitation. The Facility submitted the study in September 2006. The study identifies potentially feasible and unlikely feasible offset projects. The feasibility is primarily associated with legal liability concerns, regulatory constraints, applicable policies, and unwilling landowners. The report concludes that due to the uncertainty as to the viability of any offset projects, any future TMDL requirements, and future offset policies, it would be premature to propose permit conditions based on the current report. Therefore, the interim mass-based effluent limitation of 0.92 lbs/year is retained in this Order. This limitation is based on maintaining the mercury loading at the current level until a TMDL can be established and USEPA develops mercury standards that are protective of human health. Compliance time schedules have not been included since the discharge currently meets the water quality criteria and the mass limitation. If USEPA develops new water quality standards for mercury, the Regional Water Board adopts a Delta methylmercury TMDL or if the Regional Water Board determines that a mercury offset program is feasible for dischargers subject to a NPDES permit, this Order may be reopened to reevaluate the interim mercury mass loading limitation(s) and the need for a mercury offset program. The previous Order No. R5-2002-0083 established a mercury banking program to allow the Discharger to comply with the terms of that Order, to allow for growth, and to do so in a way that effectively removes the mercury from the watershed. The mercury banking program accumulated the difference between the interim mass limit (0.92 lbs/year) and the mercury mass discharges below that limit, and allowed the accumulative total (banked mercury loadings) to be used to offset mercury loads