CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
CENTRAL VALLEY REGION

ORDER R5-2015-0097

AMENDING WASTE DISCHARGE REQUIREMENTS
ORDER R5-2010-0114-03 (NPDES PERMIT NO. CA0077682)

SACRAMENTO REGIONAL COUNTY SANITATION DISTRICT
SACRAMENTO REGIONAL WASTEWATER TREATMENT PLANT
SACRAMENTO COUNTY

The California Regional Water Quality Control Board, Central Valley Region, (hereafter Central Valley Water Board) finds that:

1. On 9 December 2010, the Central Valley Water Board adopted Waste Discharge Requirements Order R5-2010-0114, prescribing waste discharge requirements for the Sacramento Regional Wastewater Treatment Plant. For the purposes of this Order, the Sacramento Regional County Sanitation District is hereafter referred to as “Discharger” and the Sacramento Regional Wastewater Treatment Plant is hereafter referred to as “Facility.”

2. Waste Discharge Requirements Order R5-2010-0114 (NPDES Permit No. CA0077682) authorizes the discharge of up to 181 million gallons per day of disinfected secondary treated wastewater to the Sacramento River, a water of the United States and within the legal boundary of the Sacramento-San Joaquin Delta.

3. The Facility’s treatment system consists of mechanical bar screens, aerated grit removal, primary sedimentation, pure oxygen activated sludge, secondary clarification, chlorine disinfection with dechlorination and a diffuser for river discharge. Solids handling consists of dissolved air flotation thickeners, gravity belt thickeners, anaerobic digesters and sludge stabilization basins with disposal on-site through land application or biosolids recycling facility. Wastewater is discharged to the Sacramento River at Freeport, a water of the United States.

4. Order R5-2010-0114 has been amended by the Central Valley Water Board on several occasions and is currently identified as Order R5-2010-0114-03. On 1 December 2011, Order R5-2011-0083 was adopted making changes to the Monitoring and Reporting Program, recycled water use, manganese effluent limitations, and interim effluent limitations for chlorpyrifos and diazinon. On 4 October 2013, Order R5-2013-0124 was adopted conforming the ammonia and nitrate effluent limitations to State Water Resources Control Board (State Water Board) Order WQ 2012-0013; incorporating the effect of the stays of certain time deadlines and schedules issued by the Sacramento County Superior Court; modifying final effluent limitations for chlorodibromomethane and dichlorobromomethane; and removing effluent limitations and revising monitoring requirements for N-nitrosodimethylamine (NDMA). On 8 August 2014, Orders R5-2014-0102 and R5-2014-0103 were adopted modifying the interim ammonia effluent limitation and revising total coliform requirements to seasonal total coliform requirements, respectively. Finally, on 9 October 2014, Order R5-2014-0122 was adopted adding Delta Regional Monitoring Program provisions.

5. This Order amends Order R5-2010-0114-03 to address a Sacramento Superior Court order. On 29 October 2014, the Superior Court for Sacramento County entered a judgment and peremptory writ of mandate in the matter of *California Sportfishing Protection Alliance* v. *California Regional Water Quality Control Board, Central Valley Region (Case No. 34-2013-80001358-CU-QM-GDS)* (Regional San Decision)*,* ruling that the Central Valley Water Board abused its discretion by 1) failing to use the equation set forth in the California Toxics Rule (CTR) and by using the hardness value of the effluent in the equations; 2) failing to establish a weekly effluent limitation for aluminum; and 3) continuing the Thermal Plan exceptions in effect without first concluding the permitted discharge, considered cumulatively with all other significant impacts on affected species, would "assure the protection and propagation of a balanced indigenous community of shellfish, fish and wildlife in and on" the Sacramento River. The Court ordered the Central Valley Water Board to modify Order R5-2010-0114-03 (NPDES Permit No. CA0077682) to: 1) vacate the Thermal Plan exceptions in the Permit and to reconsider the issue of whether Thermal Plan exceptions may be granted in this case under the standards set forth in Code of Federal Regulations (CFR) at 40 CFR § 125.73(a); 2) vacate the portions of the Permit establishing effluent limitations for hardness-dependent metals, and to recalculate such effluent limitations using the equations set forth in 40 CFR § 131.38(b)(2), and without using the hardness value of the effluent in those equations; and 3) establish in the Permit a weekly effluent limitation for aluminum as required by 40 CFR § 122.45(d)(2). Order R5-2010-0114-03 is amended in accordance with the Regional San Decision.

6. The Discharger has also requested a modification of Order R5-2010-0114-03 to allow use disinfected secondary treated effluent for sewer line flushing. Currently potable water is used for this activity. Allowing the use of treated effluent for sewer flushing in lieu of potable water will comply with the Governor's mandate to conserve water during the significant drought conditions the State is experiencing.

7. Order R5-2010-0114-03 may be reopened and modified in accordance with 40 CFR § 122.62(a)(2).

8. Issuance of this Order is exempt from the provisions of the California Environmental Quality Act (Pub. Resources Code, § 21000 et seq.) ("CEQA") pursuant to Water Code section 13389, since the adoption or modification of a NPDES permit for an existing source is statutorily exempt and this Order only serves to modify a NPDES permit (*Pacific Water Conditioning Ass'n, Inc. v. City Council of City of Riverside* (1977) 73 Cal.App.3d 546, 555-556.).

9. The Central Valley Water Board has notified the Discharger and interested agencies and persons of its intent to amend Waste Discharge Requirements for this discharge and has provided them with an opportunity to submit their written views and recommendations.

IT IS HEREBY ORDERED THAT:

1. Effective immediately, consistent with the Regional San Decision, the Central Valley Water Board vacates the portions of Waste Discharge Requirements Order R5-2010-0114-03 (NPDES No. CA0077682) that established effluent limitations for CTR hardness-dependent metals, and recalculates the effluent limitations using the equations set forth in 40 CFR §131.38 (b)(2) without using the hardness value of the effluent in those equations. Additionally, the Central Valley Water Board vacates the Thermal Plan exceptions in Order R5-2010-0114-03, adopts Thermal Plan exceptions in the amended Permit consistent with the standards set forth in 40 CFR §125.73 (a), and establishes a weekly effluent limitation for aluminum as required by 40 CFR § 122.45 (d)(2).

2. Effective immediately, Waste Discharge Requirements Order R5-2010-0114-03 (NPDES No. CA0077682) is amended as shown in underline/strikeout format in Attachment 1 to address the Regional San Decision, described in Finding 5, and allow use of treated effluent for sewer line flushing, described in Finding 6.

Any person aggrieved by this action of the Central Valley Water Board may petition the State Water Resource Control Board (State Water Board) to review the action in accordance with Water Code section 13320 and California Code of Regulations, title 23, sections 2050 and following. The State Water Board must receive the petition by 5:00 p.m., 30 days after the date of this Order, except that if the thirtieth day following the date of this Order falls on a Saturday, Sunday, or state holiday (including mandatory furlough days), the petition must be received by the State Water Board by 5:00 p.m. on the next business day. Copies of the law and regulations applicable to filing petitions may be found on the Internet at: http://www.waterboards.ca.gov/public_notices/petitions/water_quality or will be provided upon request.

I, PAMELA C. CREEDON, Executive Officer, do hereby certify the foregoing is a full, true, and correct copy of an Order adopted by the California Regional Water Quality Control Board, Central Valley Region, on 31 July 2015.

Original Signed By
PAMELA C. CREEDON, Executive Officer

Attachment 1

CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
CENTRAL VALLEY REGION

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ORDER NO. R5-2010-0114-~~03~~04
NPDES NO. CA0077682
(as amended by Order R5-2011-0083, Order R5-2013-0124, Order R5-2014-0102, Order R5-2014-0103, Order R5-2014-0122, Order R5-2015-0097, and WQ 2012-0013)

WASTE DISCHARGE REQUIREMENTS FOR THE
SACRAMENTO REGIONAL COUNTY SANITATION DISTRICT
SACRAMENTO REGIONAL WASTEWATER TREATMENT PLANT
SACRAMENTO COUNTY

The following Discharger is subject to waste discharge requirements as set forth in this Order:

Table 1. Discharger Information

Discharger	Sacramento Regional County Sanitation District
Name of Facility	Sacramento Regional Wastewater Treatment Plant
Facility Address	8521 Laguna Station Road
	Elk Grove, CA 95758
	Sacramento County
The U.S. Environmental Protection Agency (USEPA) and the Regional Water Quality Control Board have classified this discharge as a major discharge.	

The discharge by the **Sacramento Regional County Sanitation District** from the discharge points identified below is subject to waste discharge requirements as set forth in this Order:

Table 2. Discharge Location

Discharge Point	Effluent Description	Discharge Point Latitude	Discharge Point Longitude	Receiving Water
001	Disinfected Secondary Treated Wastewater	38º 27' 15" N	121º 30' 00" W	Sacramento River

Table 3. Administrative Information

This Order was adopted by the Regional Water Quality Control Board on:	**9 December 2010**
This Order shall become effective on:	**50 days after the Adoption Date of this Order**
This Order shall expire on:	**1 December 2015**
The Discharger shall file a Report of Waste Discharge in accordance with title 23, California Code of Regulations, as application for issuance of new waste discharge requirements no later than:	**180 days prior to the Order expiration date**

I, Pamela C. Creedon, Executive Officer, do hereby certify that this Order with all attachments is a full, true, and correct copy of an Order adopted by the California Regional Water Quality Control Board, Central Valley Region, on 9 December 2010, as amended by Order R5-2011-0083 on 1 December 2011, Order R5-2013-0124 on 4 October 2013, Orders R5-2014-0102 and R5-2014-0103 on 8 August 2014, ~~and~~ Order R5-2014-0122 on 9 October 2014, and Order R5-2015-0097 on 31 July 2015. This Order was also amended by State Water Resources Control Board WQ 2012-0013 on 4 December 2012.

Original Signed By
PAMELA C. CREEDON, Executive Officer

Table of Contents

I. Facility Information 4
II. Findings 4
III. Discharge Prohibitions 15
IV. Effluent Limitations and Discharge Specifications 16
A. Effluent Limitations – Discharge Point No. 001 16
1. Final Effluent Limitations – Discharge Point No. 001 16
2. Interim Effluent Limitations – Discharge Point No. 001 19
B. Land Discharge Specifications – Not Applicable 20
C. Reclamation Specifications – Not Applicable 20
V. Receiving Water Limitations 20
A. Surface Water Limitations 20
B. Groundwater Limitations. 22
VI. Provisions 23
A. Standard Provisions 23
B. Monitoring and Reporting Program Requirements 27
C. Special Provisions 27
1. Reopener Provisions 27
2. Special Studies, Technical Reports and Additional Monitoring Requirements 30
3. Best Management Practices and Pollution Prevention 33
4. Construction, Operation and Maintenance Specifications 34
5. Special Provisions for Municipal Facilities (POTWs Only) 35
7. Compliance Schedules 38
VII. Compliance Determination 39

List of Tables

Table 1. Discharger Information 1
Table 2. Discharge Location 1
Table 3. Administrative Information 1
Table 4. Facility Information 4
Table 5. Basin Plan Beneficial Uses 7
Table 6. Effluent Limitations 16
Table 7. Interim Effluent Limitations 19

List of Attachments

Attachment A – Definitions A-1
Attachment C – Flow Schematic C-1
Attachment D – Standard Provisions D-1
Attachment E – Monitoring and Reporting Program E-1
Attachment F – Fact Sheet F-1
Attachment G – Summary of Reasonable Potential Analysis G-1
Attachment H – Calculation of WQBELs H-1
Attachment I – Dioxin and Furan Sampling H-1
Attachment J – Ammonia Issues J-1

I. FACILITY INFORMATION

The following Discharger is subject to waste discharge requirements as set forth in this Order:

Table 4. Facility Information

Discharger	Sacramento Regional County Sanitation District
Name of Facility	Sacramento Regional Wastewater Treatment Plant, Elk Grove
Facility Address	8521 Laguna Station Road
	Elk Grove, CA 95758
	Sacramento
Facility Contact, Title, and Phone	Prabhakar Somavarapu, District Engineer, (916) 875-9000
Mailing Address	10060 Goethe Road, Sacramento, CA 95827
Type of Facility	Publicly Owned Treatment Works
Facility Design Flow	181 Million Gallons per Day (MGD) (Permitted Average Dry Weather Flow)

II. FINDINGS

The California Regional Water Quality Control Board, Central Valley Region (hereinafter Central Valley Water Board), finds:

A. Background. Sacramento Regional County Sanitation District (hereinafter Discharger) is currently discharging pursuant to Order No. 5-00-188 and National Pollutant Discharge Elimination System (NPDES) Permit No. CA0077682. The Discharger submitted a Report of Waste Discharge, dated 1 February 2005, and applied for a NPDES permit renewal to discharge up to 218 mgd of treated wastewater from Sacramento Regional Wastewater Treatment Plant, hereinafter Facility. In June 2010, the Discharger withdrew its request to increase the treatment plant capacity from 181 mgd to 218 mgd.

For the purposes of this Order, references to the “discharger” or “permittee” in applicable federal and state laws, regulations, plans, or policy are held to be equivalent to references to the Discharger herein.

Order R5-2010-0114 was adopted by the Central Valley Water Board on 9 December 2010, and was subsequently amended. The Central Valley Water Board adopted amending Order R5-2011-0083 on 1 December 2011, amending Order R5-2013-0124 on 4 October 2013, and amending Orders R5-2014-0102 and R5-2014-0103 on 8 August 2014. The State Water Resources Control Board also revised Order R5-2010-0114 through adoption of WQ 2012-0013 on 4 December 2012.

The Discharger provides sewerage service to the Cities of Sacramento, Folsom, West Sacramento, and the Sacramento Area Sewer District service area. The Sacramento Area Sewer District service area includes the Cities of Elk Grove, Rancho Cordova, Citrus Heights, Courtland, and Walnut Grove, as well as, portions

of the unincorporated areas of Sacramento County. The population served is approximately 1.3 million people. The Discharger owns and operates the main trunk lines/interceptors feeding the Facility. The smaller diameter collection systems are owned and operated by the various contributing agencies and not by the Discharger. This Order regulates the Facility only. The collection systems that feed the Facility are regulated under the State Water Resources Control Board's Water Quality Order No. 2006-0003.

The Facility is contracted to accept 60 mgd of wastewater and storm runoff from the downtown Sacramento combined collection system. Combined collection flows are managed by the Combined Wastewater Collection and Treatment System (CWCTS) operated by the City of Sacramento. The CWCTS is governed by Waste Discharge Requirements Order No.R5-2010-0004 (NPDES No. CA0079111). Depending on treatment and conveyance capacity, flow in excess of 60 mgd may be received at the Facility.

B. Facility Description. The Discharger owns and operates the Facility, a Publicly Owned Treatment Works (POTW). The current treatment system consists of mechanical bar screens, aerated grit removal, primary sedimentation, pure oxygen activated sludge aeration, secondary clarification, chlorine disinfection with dechlorination and a diffuser for river discharge. Solids handling consists of dissolved air flotation thickeners, gravity belt thickeners, anaerobic digesters and sludge stabilization basins with disposal on-site through land application or biosolids recycling facility. Wastewater is discharged from Discharge Point No. 001 (see Table 2 on cover page) to the Sacramento River at Freeport, a water of the United States, and within the legal boundaries of the Sacramento – San Joaquin Delta. Attachment B provides a map of the area around the Facility. Attachment C provides a flow schematic of the current Facility. Attachment F, section II.A, provides a more complete description of the current and future Facility, including the future Facility operations for both May-October and November-April.

The Discharger currently provides 5.0 MGD of treated wastewater to the Water Reclamation Facility (WRF) for unrestricted use, with a provision for WRF expansion to 10 MGD. The WRF is regulated under the Master Reclamation Permit No. 97-146 and provides recycled water for landscape irrigation and wastewater treatment plant process water.

As part of Waste Discharge Requirements (WDR) Order No. R5-2003-0076, a corrective action program (CAP) was initiated by the Discharger. The CAP is to address elevated constituent concentrations that were observed in samples from groundwater monitoring wells down gradient of the Dedicated Land Disposals areas (DLDs) and the Class III landfill when compared to upgradient groundwater monitoring wells. Extraction wells are used for hydraulic control of the site. Characterization of the groundwater aquifer is documented in the reports submitted twice annually pursuant to WDR Order No. R5-2003-0076. The Discharger conveys the extracted groundwater from the CAP extraction wells, estimated at approximately 1.0 MGD, to the Facility effluent channel downstream of the secondary clarifiers and upstream of the plant chlorination station or onsite

constructed wetlands. Discharging water from the CAP system downstream of the secondary clarifiers is acceptable and does not decrease the amount of treatment as the treatment processes upstream of this discharge point are not designed for removal of the CAP discharge constituents of concern. Furthermore, based on the extracted groundwater sampling, estimates of CAP discharge constituent concentrations are either below current Facility effluent concentrations or do not have a reasonable potential to violate water quality objectives in the receiving water. Based on these considerations, the Board finds disposal of CAP discharge as described above to be acceptable.

C. Legal Authorities. This Order is issued pursuant to section 402 of the Clean Water Act (CWA) and implementing regulations adopted by USEPA and chapter 5.5, division 7 of the California Water Code (CWC; commencing with section 13370). It shall serve as a NPDES permit for point source discharges from this facility to surface waters. This Order also serves as Waste Discharge Requirements (WDRs) pursuant to Article 4, Chapter 4, Division 7 of the CWC (commencing with section 13260).

D. Background and Rationale for Requirements. The Central Valley Water Board developed the requirements in this Order based on information submitted as part of the application, through monitoring and reporting programs, and other available information. The Fact Sheet (Attachment F), which contains background information and rationale for Order requirements, is hereby incorporated into this Order and constitutes part of the Findings for this Order. Attachments A through J are also incorporated into this Order.

E. California Environmental Quality Act (CEQA). Under CWC section 13389, this action to adopt an NPDES permit is exempt from the provisions of CEQA, Public Resources Code sections 21100-21177.

F. Technology-based Effluent Limitations. Section 301(b) of the CWA and implementing USEPA permit regulations at section 122.44, title 40 of the Code of Federal Regulations (40 CFR 122.44), require that permits include conditions meeting applicable technology-based requirements at a minimum, and any more stringent effluent limitations necessary to meet applicable water quality standards. The discharge authorized by this Order must meet minimum federal technology-based requirements based on Secondary Treatment Standards at 40 CFR Part 133. A detailed discussion of the technology-based effluent limitations development is included in the Fact Sheet.

G. Water Quality-Based Effluent Limitations (WQBELs). Section 301(b) of the CWA and 40 CFR 122.44(d) require that permits include limitations more stringent than applicable federal technology-based requirements where necessary to achieve applicable water quality standards. This Order contains requirements, expressed as water quality-based requirements that are necessary to achieve water quality standards. The Central Valley Water Board considered the factors listed in CWC section 13241 in establishing these requirements. The rationale for these requirements, which consist of tertiary treatment or equivalent requirements, is

discussed in the Fact Sheet.

40 CFR 122.44(d)(1)(i) mandates that permits include effluent limitations for all pollutants that are or may be discharged at levels that have the reasonable potential to cause or contribute to an exceedance of a water quality standard, including numeric and narrative objectives within a standard. Where reasonable potential has been established for a pollutant, but there is no numeric criterion or objective for the pollutant, WQBELs must be established using: (1) USEPA criteria guidance under CWA section 304(a), supplemented where necessary by other relevant information; (2) an indicator parameter for the pollutant of concern; or (3) a calculated numeric water quality criterion, such as a proposed state criterion or policy interpreting the state's narrative criterion, supplemented with other relevant information, as provided in 40 CFR 122.44(d)(1)(vi).

H. Water Quality Control Plans.

1. The Central Valley Water Board adopted a *Water Quality Control Plan*, *Fourth Edition (Revised September 2009),* for the Sacramento and San Joaquin River Basins (hereinafter Basin Plan) on 9 December 1994 that designates beneficial uses, establishes water quality objectives, and contains implementation programs and policies to achieve those objectives for all waters addressed through the plan. In addition, the Basin Plan implements State Water Resources Control Board (State Water Board) Resolution No. 88-63, which established state policy that all waters, with certain exceptions, should be considered suitable or potentially suitable for municipal or domestic supply. Discharge to 001 is within the legal boundaries of the Sacramento-San Joaquin Delta. Beneficial uses applicable to the Sacramento –San Joaquin Delta are as follows:

Table 5. Basin Plan Beneficial Uses

Discharge Point	Receiving Water Name	Beneficial Use(s)
001	**Sacramento – San Joaquin Delta**	Existing: Municipal and domestic supply (MUN); Agricultural supply, including irrigation and stock watering (AGR); Industrial process supply (PROC); Industrial service supply (IND); Water contact recreation, including canoeing and rafting (REC-1); Non-contact water recreation (REC-2); Warm freshwater habitat (WARM); Cold freshwater habitat (COLD); Migration of aquatic organisms, warm and cold (MIGR); Spawning, reproduction, and/or early development, warm (SPWN); Wildlife habitat (WILD); and Navigation (NAV).
NA	**Groundwater**	Municipal and domestic water supply (MUN); Agricultural supply (AGR); Industrial service supply (IND); and Industrial process supply (PRO).

The Basin Plan includes a 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 listed as a WQLS for Chlorpyrifos, DDT, Diazinon, Exotic Species, Group A Pesticides, Mercury, Polychlorinated byphenyls (PCBs) and unknown toxicity in the 303(d) list of impaired water bodies.

2. **Thermal Plan.** The State Water Board adopted the Water Quality Control Plan for Control of Temperature in the Coastal and Interstate Water and Enclosed Bays and Estuaries of California (Thermal Plan) on 18 May 1972, and amended this plan on 18 September 1975. This plan contains temperature objectives for surface waters. Requirements of this Order implement the Thermal Plan.

   The Thermal Plan allows regional boards to provide exceptions to specific water quality objectives in the Thermal Plan so long as the exceptions comply with CWA section 316(a) and federal regulations. The applicable exception is promulgated in 40 CFR Section 125.73(a), which provides that, "*Thermal discharge effluent limitations or standards established in permits may be less stringent than those required by applicable standards and limitations if the discharger demonstrates to the satisfaction of the director that such effluent limitations are more stringent than necessary to assure the protection and propagation of a balanced, indigenous community of shellfish, fish and wildlife in and on the body of water into which the discharge is made. This demonstration must show that the alternative effluent limitation desired by the discharger, considering the cumulative impact of its thermal discharge together with all other significant impacts on the species affected, will assure the protection and propagation of a balanced indigenous community of shellfish, fish and wildlife in and on the body of water into which the discharge is to be made.*"

   The Central Valley Water Board, after consideration of the Discharger's temperature studies and consultation with the National Marine Fisheries Services (NMFS), the United States Fish and Wildlife Service (USFWS), and the California Department of Fish and Wildlife (CDFW) (fishery agencies), finds the Discharger's studies adequately demonstrate the following:

   - The thermal plume from the discharge will show no direct acute or chronic thermal effects on fishes (including larval and juvenile life stages), benthic macroinvertebrates, or plankton. The thermal exposures, either in the near-field plume area or far-field downstream areas would not exceed lethal or sub-lethal effect thresholds for aquatic life.

   - There is a sufficient zone of passage such that the thermal plume from the discharge will not result in blockage or significant delay of upstream

migration of adult fishes or downstream migration of larval and juvenile fishes. The discharge upon its full mixing with river flow would not block or delay upstream adult migration of fish species.

- Predatory fishes were not holding in the warmer water plume near the diffuser, where they could prey upon ESA-listed fishes as they migrate past the diffuser.

- Fishes were not holding within the plume area due to the elevated water temperature for sufficient periods of time to experience toxicity, based on plume water quality.

The Discharger has demonstrated that Effluent and Receiving Water Limitations based on the Thermal Plan are more stringent than necessary to assure the protection and propagation of a balanced, indigenous community of shellfish, fish, and wildlife in and on the body of water into which the discharge is made. This demonstration has shown the Effluent and Receiving Water Limitations for temperature in this Order are sufficient, considering the cumulative impact of the thermal discharge together with all other significant impacts on the species affected, to assure the protection and propagation of a balanced, indigenous community of shellfish, fish and wildlife in and on the body of water into which the discharge is made.

Therefore, in accordance with 40 CFR Section 125.73(a) this Order continues the exceptions to Thermal Plan objectives 5A(1)(a) and 5A(1)(b) from Order 5-00-188, as follows:

- **Thermal Plan Objective 5A(1)(a) Exception:**

  The maximum temperature of the discharge shall not exceed the natural receiving water temperature by more than:

  25º F from 1 October through 30 April;

  -and-

  20º F from 1 May through 30 September

- **Thermal Plan Objective 5A(1)(b) Exception:**

  If the natural receiving water temperature is less than 65ºF, the discharge shall not create a zone, defined by water temperature of more than 2ºF above natural temperature, which exceeds 25 percent of the cross sectional area of the River at any point outside the zone of initial dilution.

  If the natural receiving water temperature is 65ºF or greater, the discharge shall not create a zone, defined by a water temperature of 1ºF or more above natural receiving water temperature which exceeds 25 percent of

the cross sectional area of the River at any point outside the zone of initial dilution for more than one hour per day as an average in any month.

3. **Bay-Delta Plan.** The Water Quality Control Plan for the San Francisco Bay/Sacramento-San Joaquin Delta Estuary (Bay-Delta Plan) was adopted on 13 December 2006 by the State Water Board superseding the May 1995 and the 1991 Bay-Delta Plan. The Bay-Delta Plan identifies the beneficial uses of the estuary and includes objectives for flow, salinity, and endangered species protection.

   The Bay-Delta Plan attempts to create a management plan that is acceptable to the stakeholders while at the same time is protective of beneficial uses of the Sacramento – San Joaquin Delta. The State Water Board adopted Decision 1641 (D-1641) on 29 December 1999. D-1641 implements flow objectives for the Bay-Delta Estuary, approves a petition to change points of diversion of the Central Valley Project and the State Water Project in the Southern Delta, and approves a petition to change places of use and purposes of use of the Central Valley Project. The water quality objectives of the Bay-Delta Plan are implemented as part of this Order.

   The Sacramento River at Freeport is within the designated critical habitat for five federally-listed fish species including winter- and spring-run Chinook salmon (*Oncorhynchus tshawytscha*), Steelhead (*O. mykiss*), Delta smelt (*Hypomesus transpacificus*) and Green sturgeon (*Acipenser medirostris*). Other listed wildlife species that feed on Central Valley fishes include the California Least Tern (*Stenula antillarum brownie*) and the Giant Garter snake (*Thamnopsis gigas*). In addition to the federally-listed species the California State Species of Special Concern include the Sacramento Splittail (*Pogonichthys macrolepidotus*) and the Central Valley Fall/Late-Fall Salmon (*Oncorhynchus tshawytscha*).

   Requirements of this Order specifically implement the applicable Water Quality Control Plans.

   The Central Valley Water Board adopted Resolution No. R5-2007-0161, Water Board's Actions to Protect Beneficial Uses of the San Francisco Bay/Sacramento- San Joaquin Delta Estuary on 6 December 2007. The purpose of the resolution is to identify and implement actions needed to protect the San Francisco/San Joaquin Delta beneficial uses. Some actions include exercising the State Water Board's water rights authority over water right decisions and exercising the San Francisco Bay Regional Water Quality Control Board's and Central Valley Water Board's authority over controlling water quality in the Delta.

~~H.~~I. **National Toxics Rule (NTR) and California Toxics Rule (CTR)**. USEPA adopted the NTR on 22 December 1992, and later amended it on 4 May 1995 and 9 November 1999. About 40 criteria in the NTR applied in California. On

18 May 2000, USEPA adopted the CTR. The CTR promulgated new toxics criteria for California and, in addition, incorporated the previously adopted NTR criteria that were applicable in the state. The CTR was amended on 13 February 2001. These rules contain water quality criteria for priority pollutants.

~~I.~~J. **State Implementation Policy.** On 2 March 2000, the State Water Board adopted the *Policy for Implementation of Toxics Standards for Inland Surface Waters, Enclosed Bays, and Estuaries of California* (State Implementation Policy or SIP). The SIP became effective on 28 April 2000 with respect to the priority pollutant criteria promulgated for California by USEPA through the NTR and to the priority pollutant objectives established by the Central Valley Water Board in the Basin Plan. The SIP became effective on 18 May 2000 with respect to the priority pollutant criteria promulgated by USEPA through the CTR. The State Water Board adopted amendments to the SIP on 24 February 2005 that became effective on 13 July 2005. The SIP establishes implementation provisions for priority pollutant criteria and objectives and provisions for chronic toxicity control. Requirements of this Order implement the SIP.

~~J.~~K. **Compliance Schedules and Interim Requirements.** In general, an NPDES permit must include final effluent limitations that are consistent with CWA section 301 and with 40 CFR 122.44(d). There are exceptions to this general rule. The State Water Board has concluded that where the Central Valley Water Board's Basin Plan allows for schedules of compliance and the Regional Water Board is newly interpreting a narrative standard, it may include schedules of compliance in the permit to meet effluent limits that implement a narrative standard. See In the Matter of Waste Discharge Requirements for Avon Refinery (State Water Board Order WQ 2001-06 at pp. 53-55). See also Communities for a Better Environment (CBE) et al. v. State Water Resources Control Board, 34 Cal.Rptr.3d 396, 410 (2005). The Basin Plan for the Sacramento and San Joaquin Rivers includes a provision that authorizes the use of compliance schedules in NPDES permits for water quality objectives that are adopted after the date of adoption of the Basin Plan, which was 25 September 1995 (see Basin Plan at page IV-16). Consistent with the State Water Board's Order in the CBE matter, the Central Valley Water Board has the discretion to include compliance schedules in NPDES permits when it is including an effluent limitation that is a "new interpretation" of a narrative water quality objective. This conclusion is also consistent with USEPA policies and administrative decisions. See, e.g., Whole Effluent Toxicity (WET) Control Policy. The State Water Board's *Policy for Compliance Schedules in National Pollutant Discharge Elimination System Permits* (Compliance Schedule Policy) allows compliance schedules for new, revised, or newly interpreted water quality objectives or criteria, or in accordance with a TMDL. All compliance schedules must be as short as possible, and may not exceed 10 years from the effective date of the adoption, revision, or new interpretation of the applicable water quality objective or criterion, unless a TMDL allows a longer schedule. The Central Valley Water Board, however, is not required to include a compliance schedule, but may issue a Time Schedule Order pursuant to CWC section 13300 or a Cease and Desist Order pursuant to CWC section 13301 where it finds that the discharger is violating or threatening to violate the permit. The

Central Valley Water Board will consider the merits of each case in determining whether it is appropriate to include a compliance schedule in a permit, and, consistent with the Basin Plan Compliance Schedule Policy, should consider feasibility of achieving compliance, and must impose a schedule that is as short as practicable possible to achieve compliance with the objectives, criteria, or effluent limitation based on the objective or criteria.

Section 2.1 of the SIP provides that, based on a Discharger's request and demonstration that it is infeasible for an existing Discharger to achieve immediate compliance with an effluent limitation derived from a CTR criterion, compliance schedules may be allowed in an NPDES permit. Unless an exception has been granted under section 5.3 of the SIP, a compliance schedule may not exceed 5 years from the date that the permit is issued or reissued, nor may it extend beyond 10 years from the effective date of the SIP (or 18 May 2010) to establish and comply with CTR criterion-based effluent limitations. The Compliance Schedule Policy and the SIP do not allow compliance schedules for priority pollutants beyond 18 May 2010, except for new or more stringent priority pollutant criteria adopted by USEPA after 17 December 2008.

Where a compliance schedule for a final effluent limitation exceeds 1 year, the Order must include interim numeric limitations for that constituent or parameter, interim milestones and compliance reporting within 14 days after each interim milestone. The permit may also include interim requirements to control the pollutant, such as pollutant minimization and source control measures. Where allowed by the Basin Plan, compliance schedules and interim effluent limitations or discharge specifications may also be granted to allow time to implement a new or revised water quality objective. This Order does include compliance schedules and interim effluent limitations. A detailed discussion of the basis for the compliance schedules and interim effluent limitations is included in the Fact Sheet (Attachment F).

~~K.~~L. Alaska Rule. On 30 March 2000, USEPA revised its regulation that specifies when new and revised state and tribal water quality standards become effective for CWA purposes. (40 CFR 131.21 and 65 FR 24641 (27 April 2000).) Under the revised regulation (also known as the Alaska rule), new and revised standards submitted to USEPA after 30 May 2000, must be approved by USEPA before being used for CWA purposes. The final rule also provides that standards already in effect and submitted to USEPA by 30 May 2000 may be used for CWA purposes, whether or not approved by USEPA.

~~L.~~M. Stringency of Requirements for Individual Pollutants. This Order contains both technology-based effluent limitations and WQBELs for individual pollutants. The technology-based effluent limitations consist of restrictions on flow and percent removal requirements for 5-day biochemical oxygen demand (BOD_5) and total suspended solids (TSS) and pH. The WQBELs consist of restrictions on ammonia, copper, cyanide, carbon tetrachloride, chlorodibromomethane, dichlorobromomethane, methylene chloride, tetrachloroethylene, pentachlorophenol, bis(2-ethylhexyl) phthalate, dibenzo(ah)anthracene, aluminum, nitrate, manganese,

methyl tertiary butyl ether, mercury, chlorine residual, diazinon, and chlorpyrifos. This Order's technology-based pollutant restrictions implement the minimum, applicable federal technology-based requirements. In addition, this Order includes water quality based effluent limitations for BOD_5, total coliform organisms, and TSS to meet numeric objectives or protect beneficial uses.

WQBELs have been scientifically derived to implement water quality objectives that protect beneficial uses. Both the beneficial uses and the water quality objectives have been approved pursuant to federal law and are the applicable federal water quality standards. To the extent that toxic pollutant WQBELs were derived from the CTR, the CTR is the applicable standard pursuant to 40 CFR 131.38. The scientific procedures for calculating the individual WQBELs for priority pollutants are based on the CTR-SIP, which was approved by USEPA on 18 May 2000. All beneficial uses and water quality objectives contained in the Basin Plan were approved under state law and submitted to and approved by USEPA prior to 30 May 2000. Any water quality objectives and beneficial uses submitted to USEPA prior to 30 May 2000, but not approved by USEPA before that date, are nonetheless "*applicable water quality standards for purposes of the [Clean Water] Act*" pursuant to 40 CFR 131.21(c)(1). Collectively, this Order's restrictions on individual pollutants are no more stringent than required to implement the technology-based requirements of the CWA and the applicable water quality standards for purposes of the CWA.

~~M.~~N. **Antidegradation Policy**. 40 CFR 131.12 requires that the state water quality standards include an antidegradation policy consistent with the federal policy. The State Water Board established California's antidegradation policy in State Water Board Resolution No. 68-16. Resolution No. 68-16 incorporates the federal antidegradation policy where the federal policy applies under federal law. Resolution No. 68-16 requires that existing quality of waters be maintained unless degradation is justified based on specific findings. The Central Valley Water Board's Basin Plan implements, and incorporates by reference, both the state and federal antidegradation policies. As discussed in detail in the Fact Sheet, the permitted discharge is consistent with the antidegradation provision of 40 CFR 131.12 and Resolution No. 68-16.

~~N.~~O. **Anti-Backsliding Requirements.** Sections 303(d)(4) and 402(o)(2) of the CWA and federal regulations at 40 CFR 122.44(l) prohibit backsliding in NPDES permits. These anti-backsliding provisions require effluent limitations in a reissued permit to be as stringent as those in the previous permit, with some exceptions. Some effluent limitations in this Order are less stringent that those in Order No. 5-00-188 and Order 2010-0114-03. As discussed in detail in the Fact Sheet, this relaxation of effluent limitations is consistent with the anti-backsliding requirements of the CWA and federal regulations.

~~O.~~P. **Endangered Species Act.** This Order does not authorize any act that results in the taking of a threatened or endangered species or any act that is now prohibited, or becomes prohibited in the future, under either the California Endangered Species Act (Fish and Game Code sections 2050 to 2097) or the Federal Endangered Species Act (16 U.S.C.A. sections 1531 to 1544). This Order requires compliance

with effluent limits, receiving water limits, and other requirements to protect the beneficial uses of waters of the state. The discharger is responsible for meeting all requirements of the applicable Endangered Species Act.

~~P.~~Q. **Monitoring and Reporting.** 40 CFR 122.48 requires that all NPDES permits specify requirements for recording and reporting monitoring results. CWC sections 13267 and 13383 authorize the Central Valley Water Board to require technical and monitoring reports. The Monitoring and Reporting Program establishes monitoring and reporting requirements to implement federal and State requirements. The Monitoring and Reporting Program is provided in Attachment E.

~~Q.~~R. **Standard and Special Provisions.** Standard Provisions, which apply to all NPDES permits in accordance with 40 CFR 122.41, and additional conditions applicable to specified categories of permits in accordance with 40 CFR 122.42, are provided in Attachment D. The discharger must comply with all standard provisions and with those additional conditions that are applicable under 40 CFR 122.42. The Central Valley Water Board has also included in this Order special provisions applicable to the Discharger. A rationale for the special provisions contained in this Order is provided in the Fact Sheet.

~~R.~~S. **Provisions and Requirements Implementing State Law.** The provisions/requirements in sections V.B and VI.C.4.c of this Order are included to implement state law only. These provisions/requirements are not required or authorized under the federal CWA; consequently, violations of these provisions/requirements are not subject to the enforcement remedies that are available for NPDES violations.

~~S.~~T. **Notification of Interested Parties.** The Central Valley Water Board has notified the Discharger and interested agencies and persons of its intent to prescribe WDRs for the discharge and has provided them with an opportunity to submit their written comments and recommendations. Details of notification are provided in the Fact Sheet of this Order.

~~T.~~U. **Consideration of Public Comment.** The Central Valley Water Board, in a public meeting, heard and considered all comments pertaining to the discharge. Details of the Public Hearing are provided in the Fact Sheet.

THEREFORE, IT IS HEREBY ORDERED, that Order No. 5-00-188 is rescinded upon the effective date of this Order except for enforcement purposes, and, in order to meet the provisions contained in division 7 of the CWC (commencing with section 13000) and regulations adopted thereunder, and the provisions of the federal CWA and regulations and guidelines adopted thereunder, the Discharger shall comply with the requirements in this Order.

III. Discharge Prohibitions

A. Discharge of wastewater at a location or in a manner different from that described in the Findings (Sections II.A and II.B of the Fact Sheet) is prohibited, with the exception of the disinfected secondary effluent that may be reclaimed for dust control and compaction on construction projects, landscape irrigation, wash down water, vehicle washing and grounds maintenance within the Facility boundaries, and for flushing of pipelines within the sewer collection system. It may also be used for in-plant process water and fire protection and used in the tertiary treatment plant and distribution system. Any use of reclaimed disinfected secondary effluent must meet the requirements of Title 22, California Code of Regulations, Section 60301, et seq. and the associated Department of Public Health guidelines as applicable. Runoff of disinfected secondary effluent is prohibited except as regulated by Master Reclamation Requirements, Order 97-146.

B. The by-pass or overflow of wastes to surface waters is prohibited, except as allowed by Federal Standard Provisions I.G. and I.H. (Attachment D), and as described in Finding II.B, for the groundwater Corrective Action Program (CAP).

C. Neither the discharge nor its treatment shall create a nuisance as defined in section 13050 of the CWC.

D. The Discharger shall not allow pollutant-free wastewater to be discharged into the collection, treatment, and disposal system in amounts that significantly diminish the system's capability to comply with this Order. Pollutant-free wastewater means rainfall, groundwater, cooling waters, and condensates that are essentially free of pollutants.

E. Discharge to the Sacramento River is prohibited when the Sacramento River instantaneous flow is less than 1300 cubic feet per second (cfs) at RSWU-001.

F. Discharge to the Sacramento River is prohibited when there is less than a 14:1 (river:effluent) flow ratio over a rolling one-hour period available in the Sacramento River at RSWU-001.

G. The discharge or storage of waste classified as 'hazardous' or 'designated', as defined in California Code of Regulations, title 23, section 2521, subdivision (a) and Water Code section 13173, is prohibited.

IV. EFFLUENT LIMITATIONS AND DISCHARGE SPECIFICATIONS

A. Effluent Limitations – Discharge Point No. 001

Effective immediately unless otherwise specified, the Discharger shall maintain compliance with the following final effluent limitations at Discharge Point No. 001, with compliance measured at Monitoring Location EFF-001 as described in the Monitoring and Reporting Program.

1. Final Effluent Limitations – Discharge Point No. 001

a. The Discharger shall maintain compliance with the following effluent limitations specified in Table 6:

Table 6. Effluent Limitations

Parameter	Units	Effluent Limitations				
		Average Monthly	Average Weekly	Maximum Daily	Instantaneous Minimum	Instantaneous Maximum
Conventional Pollutants						
Biochemical Oxygen Demand, 5-day @ 20°C[2]	mg/L	10	15	20	--	--
	lbs/day[1]	15,100	22,700	30,200	--	--
Total Suspended Solids[2]	mg/L	10	15	20	--	--
	lbs/day[1]	15,100	22,700	30,200	--	--
pH	standard units	--	--	--	6.0	8.0
Priority Pollutants						
Bis(2-ethylhexyl)phthalate	µg/L	--	--	13	--	--
Carbon Tetrachloride	µg/L	--	--	5.3	--	--
Chlorodibromomethane[3] (prior to nitrification facilities operating)	µg/L	--	--	2.2	--	--
Chlorodibromomethane[3] (after nitrification facilities begin operating)	µg/L	--	--	12	--	--
Copper, Total Recoverable	µg/L	~~7.3~~7.4	--	~~9.3~~10	--	--
Cyanide	µg/L	--	--	11	--	--
Dibenzo(ah)anthracene	µg/L	0.2	--	0.4	--	--
Dichlorobromomethane[3] (prior to nitrification facilities operating)	µg/L	--	--	3.4	--	--
Dichlorobromomethane[3] (after nitrification facilities begin operating)	µg/L	--	--	35	--	--
Methylene Chloride	µg/L	4.7	--	11	--	--
Pentachlorophenol	µg/L	--	--	18	--	--

Parameter	Units	Effluent Limitations				
		Average Monthly	Average Weekly	Maximum Daily	Instantaneous Minimum	Instantaneous Maximum
Tetrachloroethylene	µg/L	--	--	4.4	--	--
Non-Conventional Pollutants						
Settleable Solids	ml/L	0.1	--	0.2	--	--
Aluminum, Total Recoverable	µg/L	~~503~~470	~~--~~683	~~750~~ --	--	--
Ammonia Nitrogen, Total (as N)[2] (Apr-Oct)	mg/L	1.5	--	2.0	--	--
	lbs/day[1]	2264	--	3019	--	--
Ammonia Nitrogen, Total (as N)[2] (Nov-Mar)	mg/L	2.4	--	3.3	--	--
	lbs/day[1]	3622	--	4981	--	--
Nitrate, Total (as N)[4]	mg/L	10	--	--	--	--
Manganese, Total Recoverable	µg/L	--	--	270	--	--
Methyl Tertiary Butyl Ether	µg/L	--	--	18	--	--

1 Based on a design average dry weather flow of 181 MGD.

2 This Order includes interim effluent limitations for BOD_5, TSS, and Total Ammonia Nitrogen (section IV.A.2.). Effective immediately, the interim effluent limitations shall apply in lieu of final effluent limitations for these constituents. The final effluent limitations for BOD_5 and TSS become effective 9 May 2023, and final effluent limitations for Total Ammonia Nitrogen become effective11 May 2021.

3 See task vi of the compliance schedule for ammonia (Section VI.C.7.b).

4 In its Order WQO 2012-0013, the State Water Board approved nitrate as an interim limitation.

b. Percent Removal. The average monthly percent removal of 5-day biochemical oxygen demand (BOD_5) and total suspended solids (TSS) shall not be less than 85 percent.

c. Chronic Whole Effluent Toxicity. There shall be no chronic whole effluent toxicity in the effluent discharge.

d. Acute Whole Effluent Toxicity. Survival of aquatic organisms in 96-hour bioassays of undiluted waste shall be no less than:

i. 70%, minimum for any one bioassay; and

ii. 90%, median for any three consecutive bioassays.

e. Temperature. The maximum temperature of the discharge shall not exceed the natural receiving water temperature at RSWU-001 by more than 20°F from 1 May through 30 September and more than 25°F from 1 October through 30 April.

f. Total Residual Chlorine[1]. Effluent total residual chlorine shall not exceed:

i. 0.011 mg/L, as a 4-day average; and
ii. 0.019 mg/L, as a 1-hour average.

g. Total Coliform Organisms[1]. Effluent total coliform organisms shall not exceed:

i. May-October
(a) 2.2 most probable number (MPN) per 100 mL, as a 7-day median;
(b) 23 MPN/100 mL, more than once in any 30-day period; and
(c) 240 MPN/100 mL, at any time.

ii. November-April
(a) 2.2 MPN/100 mL, as a monthly median;
(b) 23 MPN/100 mL, as a weekly median; and
(c) 240 MPN/100 mL, at any time.

h. Average Dry Weather Flow. The average dry weather discharge flow shall not exceed 181 mgd.

i. Aluminum, Total Recoverable. Effluent total recoverable aluminum concentrations shall not exceed 200 µg/L as a calendar annual average.

j. Electrical Conductivity. Effluent electrical conductivity shall not exceed 900 µmhos/cm as a calendar annual average.

k. Mercury. For a calendar year, the performance-based interim annual mass load of total mercury shall not exceed 2.3 lbs/year.

l. Chlorpyrifos and Diazinon. Effluent chlorpyrifos and diazinon concentrations shall not exceed the sum of one as defined below:

i. Average Monthly Effluent Limit

$$S_{AMEL} = \frac{C_{D\text{-}avg}}{0.08} + \frac{C_{C\text{-}avg}}{0.012} \leq 1.0$$

$C_{D\text{-}avg}$ = average monthly diazinon effluent concentration in µg/L
$C_{C\text{-}avg}$ = average monthly chlorpyrifos effluent concentration in µg/L

[1] This Order includes interim effluent limitations for total residual chlorine and total coliform organisms (section IV.A.2.). Effective immediately, the interim effluent limitations for these constituents shall apply in lieu of final effluent limitations. The final effluent limitations for total residual chlorine are effective 1 December 2020. Effluent limitations for total coliform organisms become effective when the Discharger complies with Special Provisions section VI.C.7 or 9 May 2023, whichever is sooner.

ii. Maximum Daily Effluent Limit

$$S_{MDEL} = \frac{C_{D\text{-}max}}{0.16} + \frac{C_{C\text{-}max}}{0.025} \leq 1.0$$

$C_{D\text{-}max}$ = maximum daily diazinon effluent concentration in µg/L
$C_{C\text{-}max}$ = maximum daily chlorpyrifos effluent concentration in µg/L

2. Interim Effluent Limitations – Discharge Point No. 001

The Discharger shall maintain compliance with the following interim effluent limitations at Discharge Point No. 001, with compliance measured at Monitoring Location EFF-001 as described in the Monitoring and Reporting Program.

a. Effective immediately and ending on 10 May 2021 for ammonia and 8 May 2023 for BOD_5 and TSS, the Discharger shall maintain compliance with the interim effluent limitations specified in Table 7. These interim effluent limitations shall apply in lieu of the corresponding final effluent limitations specified for the same parameters during the time period indicated in this provision:

Table 7. Interim Effluent Limitations

Parameter	Units	Effluent Limitations				
		Average Monthly	Average Weekly	Maximum Daily	Instantaneous Minimum	Instantaneous Maximum
Conventional Pollutants						
Biochemical Oxygen Demand, 5-day @ 20°C	mg/L	30	45	60	--	--
	lbs/day[1]	45,286	67,929	90,572	--	--
Total Suspended Solids	mg/L	30	45	60	--	--
	lbs/day[1]	45,286	67,929	90,572	--	--
Non-Conventional Pollutant						
Ammonia Nitrogen, Total (as N)	mg/L	39	43	47	--	--
	lbs/day[1]	49,400	52,920	67,929	--	--

1. Based on a design flow of 181 MGD.

b. Total Residual Chlorine[1]. Effective immediately and ending on 30 November 2020, the effluent total residual chlorine shall not exceed:

i. 0.011 mg/L, as a monthly average; and
ii. 0.018 mg/L, as a daily average.

[1] The final effluent limitations for total residual chlorine become effective1 December 2020.

c. **Total Coliform Organisms[1]. Effective immediately and ending on 8 May 2023,** the total coliform organisms shall not exceed:

i. 23 most probable number (MPN) per 100 mL, as a weekly median; and
ii. 500 MPN/100 mL, in any two consecutive days as a daily maximum.

B. Land Discharge Specifications – Not Applicable

C. Reclamation Specifications – Not Applicable

V. RECEIVING WATER LIMITATIONS

A. Surface Water Limitations

Receiving water limitations are based on water quality objectives contained in the Basin Plan and are a required part of this Order. The discharge shall not cause the following in the Sacramento River and Sacramento-San Joaquin Delta:

1. **Bacteria.** The fecal coliform concentration, based on a minimum of not less than five samples for any 30-day period, to exceed a geometric mean of 200 MPN/100 mL, nor more than 10 percent of the total number of fecal coliform samples taken during any 30-day period to exceed 400 MPN/100 mL.

2. **Biostimulatory Substances.** Water to contain biostimulatory substances which promote aquatic growths in concentrations that cause nuisance or adversely affect beneficial uses.

3. **Chemical Constituents.** Chemical constituents to be present in concentrations that adversely affect beneficial uses**.**

4. **Color.** Discoloration that causes nuisance or adversely affects beneficial uses.

5. **Dissolved Oxygen**: The dissolved oxygen concentration to be reduced below 7.0 mg/L at any time.

6. **Floating Material.** Floating material to be present in amounts that cause nuisance or adversely affect beneficial uses.

7. **Oil and Grease.** Oils, greases, waxes, or other materials to be present in concentrations that cause nuisance, result in a visible film or coating on the surface of the water or on objects in the water, or otherwise adversely affect beneficial uses.

[1] The final effluent limitations for total coliform organisms become effective when the Discharger complies with Special Provisions section VI.C.7. or 9 May 2023, whichever is sooner.

8. **pH.** The pH to be depressed below 6.5 nor raised above 8.5.

9. **Pesticides**:

   a. Pesticides to be present, individually or in combination, in concentrations that adversely affect beneficial uses;

   b. Pesticides to be present in bottom sediments or aquatic life in concentrations that adversely affect beneficial uses;

   c. Total identifiable persistent chlorinated hydrocarbon pesticides to be present in the water column at concentrations detectable within the accuracy of analytical methods approved by USEPA or the Executive Officer

   d. Pesticide concentrations to exceed those allowable by applicable antidegradation policies (see State Water Board Resolution No. 68-16 and 40 CFR 131.12,

   e. Pesticide concentrations to exceed the lowest levels technically and economically achievable;

   f. Pesticides to be present in concentration in excess of the maximum contaminant levels set forth in CCR, Title 22, division 4, chapter 15; nor

   g. Thiobencarb to be present in excess of 1.0 µg/L.

10. **Radioactivity**:

   a. Radionuclides to be present in concentrations that are harmful to human, plant, animal, or aquatic life nor that result in the accumulation of radionuclides in the food web to an extent that presents a hazard to human, plant, animal, or aquatic life.

   b. Radionuclides to be present in excess of the maximum contaminant levels specified in Table 4 (MCL Radioactivity) of section 64443 of Title 22 of the California Code of Regulations.

11. **Suspended Sediments.** The suspended sediment load and suspended sediment discharge rate of surface waters to be altered in such a manner as to cause nuisance or adversely affect beneficial uses.

12. **Settleable Substances.** Substances to be present in concentrations that result in the deposition of material that causes nuisance or adversely affects beneficial uses.

13. **Suspended Material.** Suspended material to be present in concentrations that cause nuisance or adversely affect beneficial uses.

14. **Taste and Odors.** Taste- or odor-producing substances to be present in concentrations that impart undesirable tastes or odors to fish flesh or other edible products of aquatic origin, or that cause nuisance, or otherwise adversely affect beneficial uses.

15. **Temperature.**

    a. If the natural receiving water temperature is less than 65°F, the discharge shall not create a zone, defined by water temperature of more than 2°F above natural temperature, which exceeds 25 percent of the cross sectional area of the River at any point outside the zone of initial dilution.

    b. If the natural receiving water temperature is 65ºF or greater, the discharge shall not create a zone, defined by a water temperature of 1ºF or more above natural receiving water temperature which exceeds 25 percent of the cross sectional area of the River at any point outside the zone of initial dilution for more than one hour per day as an average in any month.

    c. The discharge shall not cause the receiving water surface temperature to increase more than 4ºF above the ambient temperature of the receiving water at any time or place.

16. **Toxicity.** Toxic substances to be present, individually or in combination, in concentrations that produce detrimental physiological responses in human, plant, animal, or aquatic life.

17. **Turbidity**.

    a. Shall not exceed 2 Nephelometric Turbidity Units (NTU) where natural turbidity is less than 1 NTU;

    b. Shall not increase more than 1 NTU where natural turbidity is between 1 and 5 NTUs;

    c. Shall not increase more than 20 percent where natural turbidity is between 5 and 50 NTUs;

    d. Shall not increase more than 10 NTU where natural turbidity is between 50 and 100 NTUs; no

    e. Shall not increase more than 10 percent where natural turbidity is greater than 100 NTUs.

B. Groundwater Limitations.

The release of waste constituents from any transport, storage, treatment, or disposal component associated with the Facility shall not cause the underlying groundwater to be degraded.

VI. PROVISIONS

A. Standard Provisions

1. The Discharger shall comply with all (federal NPDES standard conditions from 40 CFR Part 122) Standard Provisions included in Attachment D of this Order.

2. The Discharger shall comply with the following provisions:

a. If the Discharger's wastewater treatment plant is publicly owned or subject to regulation by California Public Utilities Commission, it shall be supervised and operated by persons possessing certificates of appropriate grade according to Title 23, CCR, division 3, chapter 26.

b. After notice and opportunity for a hearing, this Order may be terminated or modified for cause, including, but not limited to:

i. Violation of any term or condition contained in this Order;

ii. Obtaining this Order by misrepresentation or by failing to disclose fully all relevant facts;

iii. A change in any condition that requires either a temporary or permanent reduction or elimination of the authorized discharge; and

iv. A material change in the character, location, or volume of discharge.

The causes for modification include:

- *New regulations.* New regulations have been promulgated under section 405(d) of the CWA, or the standards or regulations on which the permit was based have been changed by promulgation of amended standards or regulations or by judicial decision after the permit was issued.

- *Land application plans.* When required by a permit condition to incorporate a land application plan for beneficial reuse of sewage sludge, to revise an existing land application plan, or to add a land application plan.

- *Change in sludge use or disposal practice.* Under 40 CFR 122.62(a)(1), a change in the Discharger's sludge use or disposal practice is a cause for modification of the permit. It is cause for revocation and reissuance if the Discharger requests or agrees.

The Central Valley Water Board may review and revise this Order at any time upon application of any affected person or the Central Valley Water Board's own motion.

c. If a toxic effluent standard or prohibition (including any scheduled compliance specified in such effluent standard or prohibition) is established under section 307(a) of the CWA, or amendments thereto, for a toxic pollutant that is present in the discharge authorized herein, and such standard or prohibition is more stringent than any limitation upon such pollutant in this Order, the Central Valley Water Board will revise or modify this Order in accordance with such toxic effluent standard or prohibition.

The Discharger shall comply with effluent standards and prohibitions within the time provided in the regulations that establish those standards or prohibitions, even if this Order has not yet been modified.

d. This Order shall be modified, or alternately revoked and reissued, to comply with any applicable effluent standard or limitation issued or approved under sections 301(b)(2)(C) and (D), 304(b)(2), and 307(a)(2) of the CWA, if the effluent standard or limitation so issued or approved:

i. contains different conditions or is otherwise more stringent than any effluent limitation in the Order; or

ii. controls any pollutant limited in the Order.

The Order, as modified or reissued under this paragraph, shall also contain any other requirements of the CWA then applicable.

e. The provisions of this Order are severable. If any provision of this Order is found invalid, the remainder of this Order shall not be affected.

f. The Discharger shall take all reasonable steps to minimize any adverse effects to waters of the State or users of those waters resulting from any discharge or sludge use or disposal in violation of this Order. Reasonable steps shall include such accelerated or additional monitoring as necessary to determine the nature and impact of the non-complying discharge or sludge use or disposal, and adequate public notification to downstream water agencies or others who might contact the non-complying discharge.

g. The Discharger shall ensure compliance with any existing or future pretreatment standard promulgated by USEPA under section 307 of the CWA, or amendment thereto, for any discharge to the municipal system.

h. The discharge of any radiological, chemical or biological warfare agent or high-level, radiological waste is prohibited.

i. A copy of this Order shall be maintained at the discharge facility and be available at all times to operating personnel. Key operating personnel shall be familiar with its content.

j. Safeguard to electric power failure:

i. The Discharger shall provide safeguards to assure that, should there be reduction, loss, or failure of electric power, the discharge shall comply with the terms and conditions of this Order.

ii. Upon written request by the Central Valley Water Board the Discharger shall submit a written description of safeguards. Such safeguards may include alternate power sources, standby generators, retention capacity, operating procedures, or other means. A description of the safeguards provided shall include an analysis of the frequency, duration, and impact of power failures experienced over the past 5 years on effluent quality and on the capability of the Discharger to comply with the terms and conditions of the Order. The adequacy of the safeguards is subject to the approval of the Central Valley Water Board.

iii. Should the treatment works not include safeguards against reduction, loss, or failure of electric power, or should the Central Valley Water Board not approve the existing safeguards, the Discharger shall, within 90 days of having been advised in writing by the Central Valley Water Board that the existing safeguards are inadequate, provide to the Central Valley Water Board and USEPA a schedule of compliance for providing safeguards such that in the event of reduction, loss, or failure of electric power, the Discharger shall comply with the terms and conditions of this Order. The schedule of compliance shall, upon approval of the Central Valley Water Board, become a condition of this Order.

k. The Discharger, upon written request of the Central Valley Water Board, shall file with the Board a technical report on its preventive (failsafe) and contingency (cleanup) plans for controlling accidental discharges, and for minimizing the effect of such events. This report may be combined with that required under Central Valley Water Board Standard Provision contained in section VI.A.2.j. of this Order.

The technical report shall:

i. Identify the possible sources of spills, leaks, untreated waste by-pass, and contaminated drainage. Loading and storage areas, power outage, waste treatment unit outage, and failure of process equipment, tanks and pipes should be considered.

ii. Evaluate the effectiveness of present facilities and procedures and state when they became operational.

iii. Predict the effectiveness of the proposed facilities and procedures and provide an implementation schedule containing interim and final dates when they will be constructed, implemented, or operational.

The Central Valley Water Board, after review of the technical report, may establish conditions which it deems necessary to control accidental discharges and to minimize the effects of such events. Such conditions shall be incorporated as part of this Order, upon notice to the Discharger.

l. A publicly owned treatment works whose waste flow has been increasing, or is projected to increase, shall estimate when flows will reach hydraulic and treatment capacities of its treatment and disposal facilities. The projections shall be made in January, based on the last 3 years' average dry weather flows, peak wet weather flows and total annual flows, as appropriate. When any projection shows that capacity of any part of the facilities may be exceeded in 4 years, the Discharger shall notify the Central Valley Water Board by 31 January. A copy of the notification shall be sent to appropriate local elected officials, local permitting agencies and the press. Within 120 days of the notification, the Discharger shall submit a technical report showing how it will prevent flow volumes from exceeding capacity or how it will increase capacity to handle the larger flows. The Central Valley Water Board may extend the time for submitting the report.

m. The Discharger shall submit technical reports as directed by the Executive Officer. All technical reports required herein that involve planning, investigation, evaluation, or design, or other work requiring interpretation and proper application of engineering or geologic sciences, shall be prepared by or under the direction of persons registered to practice in California pursuant to California Business and Professions Code, sections 6735, 7835, and 7835.1. To demonstrate compliance with Title 16, CCR, sections 415 and 3065, all technical reports must contain a statement of the qualifications of the responsible registered professional(s). As required by these laws, completed technical reports must bear the signature(s) and seal(s) of the registered professional(s) in a manner such that all work can be clearly attributed to the professional responsible for the work.

n. The Central Valley Water Board is authorized to enforce the terms of this permit under several provisions of the CWC, including, but not limited to, sections 13385, 13386, and 13387.

o. For publicly owned treatment works, prior to making any change in the point of discharge, place of use, or purpose of use of treated wastewater that results in a decrease of flow in any portion of a watercourse, the Discharger must file a petition with the State Water Board, Division of Water Rights, and receive approval for such a change. (CWC section 1211).

p. In the event the Discharger does not comply or will be unable to comply for any reason, with any prohibition, maximum daily effluent limitation, 1-hour

average effluent limitation, or receiving water limitation contained in this Order, the Discharger shall notify the Central Valley Water Board by telephone (916) 464-3291 within 24 hours of having knowledge of such noncompliance, and shall confirm this notification in writing within 5 days, unless the Central Valley Water Board waives confirmation. The written notification shall include the information required by the Standard Provision contained in Attachment D section 5.E.1. [40 CFR 122.41(l)(6)(i)].

q. Failure to comply with provisions or requirements of this Order, or violation of other applicable laws or regulations governing discharges from this facility, may subject the Discharger to administrative or civil liabilities, criminal penalties, and/or other enforcement remedies to ensure compliance. Additionally, certain violations may subject the Discharger to civil or criminal enforcement from appropriate local, state, or federal law enforcement entities.

r. In the event of any change in control or ownership of land or waste discharge facilities presently owned or controlled by the Discharger, the Discharger shall notify the succeeding owner or operator of the existence of this Order by letter, a copy of which shall be immediately forwarded to the Central Valley Water Board.

To assume operation under this Order, the succeeding owner or operator must apply in writing to the Executive Officer requesting transfer of the Order. The request must contain the requesting entity's full legal name, the state of incorporation if a corporation, address and telephone number of the persons responsible for contact with the Central Valley Water Board and a statement. The statement shall comply with the signatory and certification requirements in the federal Standard Provisions (Attachment D, section 5.B) and state that the new owner or operator assumes full responsibility for compliance with this Order. Failure to submit the request shall be considered a discharge without requirements, a violation of the CWC. Transfer shall be approved or disapproved in writing by the Executive Officer.

B. Monitoring and Reporting Program Requirements

The Discharger shall comply with the Monitoring and Reporting Program, and future revisions thereto, in Attachment E of this Order.

C. Special Provisions

1. Reopener Provisions

a. Conditions that necessitate a major modification of a permit are described in 40 CFR 122.62, including:

i. If new or amended applicable water quality standards are promulgated or approved pursuant to section 303 of the CWA, or amendments thereto,

this permit may be reopened and modified in accordance with the new or amended standards.

ii. When new information, that was not available at the time of permit issuance, would have justified different permit conditions at the time of issuance.

b. This Order may be reopened for modification, or revocation and reissuance, as a result of the detection of a reportable priority pollutant generated by special conditions included in this Order. These special conditions may be, but are not limited to, fish tissue sampling, whole effluent toxicity, monitoring requirements on internal waste streams, and monitoring for surrogate parameters. Additional requirements may be included in this Order as a result of the special condition monitoring data.

c. **Pollution Prevention.** This Order requires the Discharger prepare pollution prevention plans following CWC section 13263.3(d)(3) for ammonia and mercury. Based on a review of the pollution prevention plans, this Order may be reopened for addition and/or modification of effluent limitations and requirements for these constituents.

d. **Whole Effluent Toxicity.** As a result of a Toxicity Reduction Evaluation (TRE), this Order may be reopened to include a numeric chronic toxicity limitation, a new acute toxicity limitation, and/or a limitation for a specific toxicant identified in the TRE. Additionally, if the State Water Board revises the SIP's toxicity control provisions that would require the establishment of numeric chronic toxicity effluent limitations, this Order may be reopened to include a numeric chronic toxicity effluent limitation based on the new provisions.

e. **Water Effects Ratios (WER) and Metal Translators.** A default WER of 1.0 has been used in this Order for calculating CTR criteria for applicable priority pollutant inorganic constituents. In addition, default dissolved-to-total metal translators have been used to convert water quality objectives from dissolved to total recoverable when developing effluent limitations for copper. If the Discharger performs studies to determine site-specific WERs and/or site-specific dissolved-to-total metal translators, this Order may be reopened to modify the effluent limitations for the applicable inorganic constituents.

f. **Perchlorate and 1,2-diphenyl hydrazine Studies.** If after review of the study results it is determined that the discharge has reasonable potential to cause or contribute to an exceedance of a water quality objective this Order may be reopened and effluent limitations added for the subject constituents.

g. **Central Valley Drinking Water Policy**. If water quality objectives are adopted for organic carbon, nutrients, salinity, bromide, or pathogens to protect drinking water supplies in the Central Valley Region, this Order may

be reopened for addition and/or modification of effluent limitations and requirements, as appropriate, to require compliance with the applicable water quality objectives.

h. Ammonia Studies. The ammonia effluent limitations in this Order are based on USEPA's recommended National Ambient Water Quality Criteria for protection of aquatic life. However, studies are ongoing to evaluate the effect of ammonia on the inhibition of growth of diatoms in the Bay-Delta, studies to evaluate the sensitivity of delta smelt to ammonia toxicity, and studies of the technological feasibility of ammonia removal processes. Based on the result of these studies, this Order may be reopened to modify the ammonia effluent limitations, as appropriate.

i. Temperature ~~Studies~~Requirements. The temperature effluent limitations and receiving water ~~prohibitions~~ limitations in this Order are based on allowance of ~~the existing~~ Thermal Plan ~~exemption~~ exceptions that have been continued from Order 5-00-188~~conditions~~. NMFS, USFWS, and CDFW are the consulting agencies for consideration of Thermal Plan exceptions. These fishery agencies recommended the existing Thermal Plan Exceptions be continued from Order 5-00-188, and ~~United States Fish and Wildlife Service (USFWS)~~ requested studies to characterize fish behavior in the affected river reach to determine how fish behave in response to the discharge field, and whether predator concentrations are elevated in the thermal discharge field. The Discharger submitted the study in March 2013. ~~Based on the result of these studies, t~~This Order may be reopened to modify the temperature effluent limitations and receiving water ~~prohibitions~~limitations, as appropriate.

j. The Bay-Delta Plan. The South Delta salinity standards are currently under review by the State Water Board in accordance with implementation provisions contained in the Bay-Delta Water Quality Control Plan. If applicable water quality objectives of the Bay-Delta Plan are adopted, this Order may be reopened for addition and/or modification of effluent limitations and requirements, as appropriate.

k. Constituents of Emerging Concern (CECs). The State Water Resources Control Board is conducting studies on CECs discharged from wastewater treatment plants. Upon completion of the studies and formulation of recommendations for CEC monitoring, this Order may be reopened for addition of monitoring or special studies of CECs in the treatment plant discharge.

l. Interim Ammonia Effluent Limitations. The Discharger is required in the Pollution Prevention Program to evaluate means of reducing effluent ammonia concentrations in the interim until compliance with final Ammonia effluent limitations can be attained. If the Discharger identifies and implements strategies that reduce effluent Ammonia concentrations, this Order may be reopened for modification of the interim Ammonia Effluent Limitations.

m. Nitrogen Studies. The nitrate effluent limitations in this Order are based on USEPA's primary maximum contaminant level for drinking water. However, studies are on-going to evaluate the effect of nitrogen in the Bay-Delta system and to users of Bay-Delta waters. Based on the result of these or other studies, this Order may be reopened to modify the nitrate effluent limitations, as appropriate.

2. Special Studies, Technical Reports and Additional Monitoring Requirements

a. Chronic Whole Effluent Toxicity. For compliance with the Basin Plan's narrative toxicity objective, this Order requires the Discharger to conduct chronic whole effluent toxicity (WET) testing, as specified in the Monitoring and Reporting Program (Attachment E, section V). Furthermore, this Provision requires the Discharger to investigate the causes of, and identify corrective actions to reduce or eliminate effluent toxicity. If the discharge exhibits toxicity exceeding the numeric toxicity monitoring trigger during accelerated monitoring established in this Provision, the Discharger is required to initiate a TRE in accordance with an approved TRE Workplan, and take actions to mitigate the impact of the discharge and prevent recurrence of toxicity. A TRE is a site-specific study conducted in a stepwise process to identify the source(s) of toxicity and the effective control measures for effluent toxicity. TREs are designed to identify the causative agents and sources of effluent toxicity, evaluate the effectiveness of the toxicity control options, and confirm the reduction in effluent toxicity. This Provision includes requirements for the Discharger to develop and submit a TRE Workplan and includes procedures for accelerated chronic toxicity monitoring and TRE initiation.

i. Toxicity Reduction Evaluation (TRE) Workplan. Within 90 days of the effective date of this Order, the Discharger shall submit to the Central Valley Water Board a TRE Workplan for approval by the Executive Officer. The TRE Workplan shall outline the procedures for identifying the source(s) of, and reducing or eliminating effluent toxicity. The TRE Workplan must be developed in accordance with USEPA guidance[1] and be of adequate detail to allow the Discharger to immediately initiate a TRE as required in this Provision.

ii. Accelerated Monitoring and TRE Initiation. When the numeric toxicity monitoring trigger is exceeded during regular chronic toxicity monitoring, and the testing meets all test acceptability criteria, the Discharger shall initiate accelerated monitoring as required in the Accelerated Monitoring Specifications. The Discharger shall initiate a TRE to address effluent toxicity if any WET testing results exceed the numeric toxicity monitoring trigger during accelerated monitoring.

[1] See the Fact Sheet (Attachment F, section VII.B.2.a. for a list of USEPA guidance documents that must be considered in the development of the TRE Workplan.)

iii. **Numeric Toxicity Monitoring Trigger.** The numeric toxicity monitoring trigger to initiate a TRE is **8 TU_C** (where TU_C = 100/NOEC). The monitoring trigger is not an effluent limitation; it is the toxicity threshold at which the Discharger is required to begin accelerated monitoring and initiate a TRE when the effluent exhibits toxicity.

iv. **Accelerated Monitoring Specifications.** If the numeric toxicity monitoring trigger is exceeded during regular chronic toxicity testing, the Discharger shall initiate accelerated monitoring within 14 days of notification by the laboratory of the exceedance. Accelerated monitoring shall consist of four (4) chronic toxicity tests conducted once every 2 weeks using the species that exhibited toxicity. The following protocol shall be used for accelerated monitoring and TRE initiation:

(a) If the results of four (4) consecutive accelerated monitoring tests do not exceed the monitoring trigger, the Discharger may cease accelerated monitoring and resume regular chronic toxicity monitoring. However, notwithstanding the accelerated monitoring results, if there is adequate evidence of effluent toxicity, the Executive Officer may require that the Discharger initiate a TRE.

(b) If the source(s) of the toxicity is easily identified (e.g., temporary plant upset), the Discharger shall make necessary corrections to the facility and shall continue accelerated monitoring until four (4) consecutive accelerated tests do not exceed the monitoring trigger. Upon confirmation that the effluent toxicity has been removed, the Discharger may cease accelerated monitoring and resume regular chronic toxicity monitoring.

(c) If the result of any accelerated toxicity test exceeds the monitoring trigger, the Discharger shall cease accelerated monitoring and begin a TRE to investigate the cause(s) of, and identify corrective actions to reduce or eliminate effluent toxicity. Within thirty (30) days of notification by the laboratory of any test result exceeding the monitoring trigger during accelerated monitoring, the Discharger shall submit a TRE Action Plan to the Central Valley Water Board including, at minimum:

(1) Specific actions the Discharger will take to investigate and identify the cause(s) of toxicity, including a TRE WET monitoring schedule;

(2) Specific actions the Discharger will take to mitigate the impact of the discharge and prevent the recurrence of toxicity; and

(3) A schedule for these actions.

b. Perchlorate and 1,2-Diphenyl-hydrazine Study. There are indications that the discharge may contain perchlorate and 1,2-Diphenyl-hydrazine at levels

that may have a reasonable potential to cause or contribute to an exceedance of water quality objectives. The Discharger shall comply with the following time schedule to conduct a study to determine if the effluent has the reasonable potential to cause or contribute to an instream exceedance of the applicable water quality objective for perchlorate and 1,2-Diphenyl-hydrazine:

Task	Compliance Date
i. Submit Workplan and Time Schedule	90 days from Adoption Date of this Order
ii. Begin Study	To be determined in Task i.
iii. Complete Study	To be determined in Task i.
iv. Submit Study Report	To be determined in Task i, or by three years from the Adoption Date of this Order, whichever is sooner.

c. *Hyalella azteca* Study. The Discharger shall submit a workplan and time schedule for Executive Officer approval to conduct a study to determine if it is feasible to use existing laboratory procedures to evaluate both acute and chronic toxicity of the discharge. The study should build upon existing research of whole effluent toxicity (WET) testing using *Hyalella azteca* and shall recommend monitoring frequencies that result in an effective evaluation of the discharge (e.g., monitoring conducted when pyrethroid pesticides may be prevalent in the discharge). The permit may be reopened to incorporate the testing if determined feasible.

Task	Compliance Date
i. Submit Workplan and Time Schedule	90 days from Adoption Date of this Order
ii. Begin Study	To be determined in Task i.
iii. Complete Study	To be determined in Task i.
iv. Submit Study Report	To be determined in Task i.

d. Temperature Study. Order R5-2010-0114 required ~~The~~ the Discharger ~~shall submit a workplan and time schedule for Executive Officer approval for development of~~ to develop a temperature study to evaluate the thermal effects of the discharge and that study has been completed. ~~determining whether permitted conditions are protective of the aquatic life beneficial uses of the Sacramento River~~. ~~The workplan shall be implemented upon approval by the Executive Officer.~~ The study ~~will~~ included an evaluation of: (1) the existing Thermal Plan Exception and its effects on aquatic life, and (2) any proposed request for new Thermal Plan Exception(s). The Discharger ~~must~~ was also required to consult with the ~~U.S. Fish and Wildlife Service, the National Marine Fisheries Service, and the California Department of Fish and Game~~USFWS,NMFS and CDFW~~,~~ to

consider additional issues (such as fish attraction to mixing zone areas) in development of the workplan for the Study.

Task	Compliance Date
i. Submit Workplan and Time Schedule	180 days from the Adoption Date of this Order
ii. Begin Study	To be determined in Task i.
iii. Complete Study	To be determined in Task i.
iv. Submit Study Report	To be determined in Task i or by four years from the Adoption Date of this Order, whichever is sooner.

e. Municipal Water Supply Characterization Study. The Discharger shall collect and submit annual municipal water supply quality and quantity data from water purveyors within the Discharger's service area. Total dissolved solids and electrical conductivity or specific conductance shall be reported as a weighted average of groundwater and surface water quality using the most recent published information from the water purveyors and other databases available to the public. In addition to characterizing the water supply in the service area, the Discharger shall report the influent and effluent total dissolved solids and electrical conductivity of the discharge in the annual report. The Discharger shall compile the information and provide updates on 1 February, annually.

f. Filtration Operations Study. After a sufficient degree of operational experience following commencement of operation of filtration facilities as designed, built and operated, including at least three years of circumstances described in the Future Facility description in Section II.A.2 of the Fact Sheet where some BNR effluent does not receive filtration, a study of November-April performance of the filtration and disinfection system will be required of the Discharger. The study, to be conducted at a time determined by the Central Valley Water Board, will summarize data including the amount (on a daily basis and annual basis) of effluent that did not receive filtration, influent and effluent flows, filter effluent turbidity, filter loading rates, effluent giardia and cryptosporidium data, and effluent E. coli and total coliform data.

3. Best Management Practices and Pollution Prevention

a. Pollution Prevention Plan for mercury. Mercury concentrations in the SRWTP effluent have been reduced by implementation of the Discharger's 2001 Pollution Prevention Plan. The Discharger shall update and continue to implement its Pollution Prevention Plan for mercury, in accordance with CWC section 13263.3. The minimum requirements for the Pollution Prevention Plan are outlined in the Fact Sheet (Attachment F section VII.B.7.b). The Pollution Prevention Plan for mercury shall be updated and submitted to the

Central Valley Water Board **within nine months of the adoption date of this Order** for the approval by the Executive Officer. The Discharger shall submit annual reports evaluating the effectiveness of the plan in accordance with the Monitoring and Reporting Program (Attachment E section X.D.1.)

b. Salinity Evaluation and Minimization Plan. The Discharger shall prepare a salinity evaluation and minimization plan to address sources of salinity from the Facility. The plan shall be completed and submitted to the Central Valley Water Board **within nine months of the adoption date of this Order** for the approval by the Executive Officer. The plan shall be implemented upon approval by the Executive Officer. The Discharger shall submit an annual report evaluating the effectiveness of the plan in accordance with the Monitoring and Reporting Program (Attachment E section X.D.1.).

c. 2,3,7,8-TCDD and Other Dioxin and Furan Congeners Source Evaluation and Minimization Plan. The Discharger shall prepare a 2,3,7,8-TCDD and other dioxin and furan congeners evaluation and minimization plan to address sources of detectable dioxins OCDD and 1,2,3,4,6,7,8-HpCDD from the Facility. The plan shall be completed and submitted to the Central Valley Water Board **within nine months of the adoption date of this Order** for review and approval by the Executive Officer.

4. Construction, Operation and Maintenance Specifications

a. Turbidity. Effective **9 May 2023** or upon compliance with Special Provisions VI.C.6.a, whichever is sooner, filter effluent turbidity (as monitored at location FIL-001 described in Attachment E, Table E-1) shall not exceed:

i. 2 NTU, as a daily average;

ii. 5 NTU, more than 5% of the time within a 24-hour period; and

iii. 10 NTU, at any time.

b. The treatment facilities shall be designed, constructed, operated, and maintained to prevent inundation or washout due to floods with a 100-year return frequency.

c. Emergency Storage Basin Operating Requirements.

i. The treatment facilities shall be designed, constructed, operated, and maintained to prevent inundation or washout due to floods with a 100-year return frequency.

ii. Public contact with wastewater shall be precluded through such means as fences, signs, and other acceptable alternatives.

iii. Ponds shall be managed to prevent breeding of mosquitoes. In particular,

a. An erosion control program should assure that small coves and irregularities are not created around the perimeter of the water surface.

b. Weeds shall be minimized.

c. Dead algae, vegetation, and debris shall not accumulate on the water surface.

iv. Freeboard for the total ESB system shall never be less than 2 feet (measured vertically to the lowest point of overflow).

v. The discharge of waste classified as "hazardous" as defined in section 2521(a) of Title 23, California Code of Regulations (CCR), or "designated", as defined in section 13173 of the CWC, to the treatment ponds is prohibited.

vi. Objectionable odors originating at this Facility shall not be perceivable beyond the limits of the wastewater treatment and disposal areas (or property owned by the Discharger).

5. Special Provisions for Municipal Facilities (POTWs Only)

a. Collection System. On 2 May 2006, the State Water Board adopted State Water Board Order No. 2006-0003, a Statewide General WDR for Sanitary Sewer Systems. The Discharger shall be subject to the requirements of Order No. 2006-0003 and any future revisions thereto. Order No. 2006-0003 requires that all public agencies that currently own or operate sanitary sewer systems apply for coverage under the General WDR. The Discharger has applied for and has been approved for coverage under State Water Board Order 2006-0003 for operation of its wastewater collection system.

b. Pretreatment Requirements.

i. The Discharger shall be responsible and liable for the performance of all Control Authority pretreatment requirements contained in 40 CFR Part 403, including any subsequent regulatory revisions to 40 CFR Part 403. Where 40 CFR Part 403 or subsequent revision places mandatory actions upon the Discharger as Control Authority but does not specify a timetable for completion of the actions, the Discharger shall complete the required actions within 6 months from the issuance date of this permit or the effective date of the 40 CFR Part 403 revisions, whichever comes later. For violations of pretreatment requirements, the Discharger shall be

subject to enforcement actions, penalties, fines, and other remedies by USEPA or other appropriate parties, as provided in the CWA.

ii. The Discharger shall enforce the requirements promulgated under sections 307(b), 307(c), and 307(d), and 402(b) of the CWA with timely, appropriate and effective enforcement actions. The Discharger shall cause all nondomestic users subject to federal categorical standards to achieve compliance no later than the date specified in those requirements or, in the case of a new nondomestic user, upon commencement of the discharge.

iii. The Discharger shall perform the pretreatment functions as required by in 40 CFR Part 403 including, but not limited to:

(a) Implement the necessary legal authorities required as provided in 40 CFR 403.8(f)(1);

(b) Enforce the pretreatment requirements under 40 CFR 403.5 and 403.6;

(c) Implement the programmatic functions as provided in 40 CFR 403.8(f)(2); and

(d) Provide the requisite funding and personnel to implement the pretreatment program as provided in 40 CFR 403.8(f)(3).

iv. The Discharger shall implement, as more completely set forth in 40 CFR 403.5, the necessary legal authorities, programs, and controls to ensure that the following incompatible wastes are not introduced to the treatment system, where incompatible wastes are:

(a) Wastes which create a fire or explosion hazard in the treatment works;

(b) Wastes which will cause corrosive structural damage to treatment works, but in no case wastes with a pH lower than 5.0, unless the works is specially designed to accommodate such wastes;

(c) Solid or viscous wastes in amounts which cause obstruction to flow in sewers, or which cause other interference with proper operation or treatment works;

(d) Any waste, including oxygen demanding pollutants (BOD, etc.), released in such volume or strength as to cause inhibition or disruption in the treatment works, and subsequent treatment process upset and loss of treatment efficiency;

(e) Heat in amounts that inhibit or disrupt biological activity in the treatment works, or that raise influent temperatures above 40°C

(104°F), unless the Regional Water Board approves alternate temperature limits;

(f) Petroleum oil, non-biodegradable cutting oil, or products of mineral oil origin in amounts that will cause interference or pass through;

(g) Pollutants which result in the presence of toxic gases, vapors, or fumes within the treatment works in a quantity that may cause acute worker health and safety problems; and:

(h) Any trucked or hauled pollutants, except at points predesignated by the Discharger.

v. The Discharger shall implement, as more completely set forth in 40 CFR 403.5, the legal authorities, programs, and controls necessary to ensure that indirect discharges do not introduce pollutants into the sewerage system that, either alone or in conjunction with a discharge or discharges from other sources:

(a) Flow through the system to the receiving water in quantities or concentrations that cause a violation of this Order, or:

(b) Inhibit or disrupt treatment processes, treatment system operations, or sludge processes, use, or disposal and either cause a violation of this Order or prevent sludge use or disposal in accordance with this Order.

6. Other Special Provisions

a. Seasonal Title 22, or Equivalent, Disinfection Requirements. Effective 9 May 2023, from May-October wastewater shall be oxidized, coagulated, filtered, and adequately disinfected pursuant to the Department of Public Health (DPH) reclamation criteria, CCR, Title 22, division 4, chapter 3, (Title 22), or equivalent, in accordance with the compliance schedule in Section VI.C.7.a, below.

7. Compliance Schedules

a. Compliance Schedule for Seasonal Title 22, or Equivalent, Disinfection Requirements. By **9 May 2023**, the Discharger shall comply with the seasonal disinfection requirements (Section VI.C.6.a), final seasonal effluent limits for total coliform organisms (Section IV.A.1.g), final effluent limits for BOD_5 and TSS (Section IV.A.1.a), and the filter turbidity operational specifications (Section VI.C.4.a). Until final compliance, the Discharger shall submit progress reports in accordance with the Monitoring and Reporting Program (Attachment E, section X.D.1).

Task		Date Due
i.	Submit Method of Compliance Workplan/Schedule	Within 6 months after adoption of this Order
ii.	Progress Reports[1]	**9 July 2014**, annually thereafter, after approval of work plan until final compliance
iii.	Begin CEQA process for Compliance Project	**16 May 2017**
iv.	Begin construction of Compliance Project	**16 May 2020**
v.	Submit Seasonal Operations Plan[2]	**No later than 30 days prior to full compliance**
vi.	Full Compliance	**9 May 2023**

[1] The progress reports shall detail what steps have been implemented towards achieving compliance with waste discharge requirements, including studies, construction progress, evaluation of measures implemented, and recommendations for additional measures as necessary to achieve full compliance by the final compliance date.

[2] The plan shall incorporate as a goal to reasonably limit the amount of unfiltered discharge and describe anticipated operations of the Facility when flows in excess of filter design capacity occur considering influent flows to the entire Facility, available storage, river flows, impending meteorological conditions, and any other relevant operational considerations. This plan will be periodically updated, as necessary, based on accumulated operating data and experience.

b. Compliance Schedule for Final Effluent Limitations for ammonia. This Order requires compliance with the final effluent limitations for ammonia by **11 May 2021**. The Discharger shall comply with the following time schedule to ensure compliance with the final effluent limitations:

Task	Date Due
i. Submit Method of Compliance Workplan/Schedule	Within 6 months after adoption of this Order
ii. Submit and Implement Pollution Prevention Plan (PPP)[1] for ammonia	Within 1 year after adoption of this Order
iii. Progress Reports[2]	13 July 2014, annually thereafter, after approval of work plan until final compliance
iv. Begin CEQA process for Compliance Project	**19 May 2015**
v. Begin construction of Compliance Project	**19 May 2018**
vi. Submit Operations Plan: The plan shall include the date for initiation of operation of the nitrification facilities, which will establish the date when the effluent limits for dichlorobromomethane and chlorodibromomethane increase.[3]	No later than 30 days prior to the first day of discharge that includes effluent from the ammonia and nitrate removal wastewater treatment system.
vii. Full Compliance	**11 May 2021**

[1] The PPP shall be prepared and implemented in accordance with CWC section 13263.3(d)(3) as outlined in the Fact Sheet (Attachment F section VII.B.7.b). The PPP shall include an evaluation of methods for reducing effluent ammonia concentrations through treatment process optimization, eliminating high ammonia side streams, etc.

[2] The progress reports shall detail what steps have been implemented towards achieving compliance with waste discharge requirements, including studies, construction progress, evaluation of measures implemented, and recommendations for additional measures as necessary to achieve full compliance by the final compliance date.

[3] The Operation Plan shall be prepared and implemented in accordance with CWC section 13385 (j)(1)(D)(i)(I). The Operations Plan must describe the actions the discharger will take during the period of adjusting and testing, including steps to prevent violations and identifies the shortest reasonable time required for the period of adjusting and testing, not to exceed 90 days for a wastewater treatment unit that relies on a biological treatment process.

VII. COMPLIANCE DETERMINATION

A. BOD_5 and TSS Effluent Limitations (Section IV.A.1.a. and 2.a.). Compliance with the final and interim effluent limitations for BOD_5 and TSS required in Limitations and Discharge Requirements section IV.A.1.a. and 2.a. shall be ascertained by 24-hour composite samples. Compliance with effluent limitations required in Limitations and Discharge Requirements section IV.A.1.b for percent removal shall be calculated using the arithmetic mean of BOD_5 and TSS in effluent samples collected over a monthly period as a percentage of the arithmetic mean of

the values for influent samples collected at approximately the same times during the same period.

B. Aluminum Effluent Limitations (Section IV.A.1.i). Compliance with the final effluent limitations for aluminum can be demonstrated using either total or acid-soluble (inductively coupled plasma/atomic emission spectrometry or inductively coupled plasma/mass spectrometry) analysis methods, as supported by USEPA's Ambient Water Quality Criteria for Aluminum document (EPA 440/5-86-008), or other standard methods that exclude aluminum silicate particles as approved by the Executive Officer.

C. Total Mercury Mass Loading Effluent Limitations (Section IV.A.1.k). The procedures for calculating mass loadings are as follows:

1. The total pollutant mass load for each individual calendar month shall be determined using an average of all concentration data collected that month and the corresponding total monthly flow. All effluent monitoring data collected under the monitoring and reporting program, pretreatment program and any special studies shall be used for these calculations. The total calendar annual mass loading shall be the sum of the individual calendar months from January through December.

2. In calculating compliance, the Discharger shall count all non-detect measures at one-half of the detection level. If compliance with the effluent limitation is not attained due to the non-detect contribution, the Discharger shall improve and implement available analytical capabilities and compliance shall be evaluated with consideration of the detection limits.

D. Average Dry Weather Flow Effluent Limitations (Section IV.A.1.h). Compliance with the average dry weather flow effluent limitations will be determined annually based on the average daily flow over the three lowest consecutive dry weather months (e.g., July, August, and September).

E. Total Coliform Organisms Final and Interim Effluent Limitations (Section IV.A.1.g. and 2.c.).

i **7-Day Median**. For each day that an effluent sample is collected and analyzed for total coliform organisms, compliance with the 7-day median final effluent limitation (Section IV.A.1.g.i.(a)) shall be determined by calculating the median concentration of total coliform bacteria in the effluent utilizing the bacteriological results of the last 7 days. For example, if a sample is collected on a Wednesday, the result from that sampling event and all results from the previous 6 days (i.e., Tuesday, Monday, Sunday, Saturday, Friday, and Thursday) are used to calculate the 7-day median. The first compliance determination is made on 7 May of a year and the last compliance determination is made on 31 October of a year.

ii **Monthly Median**. Compliance with the total coliform monthly median final effluent limitation (Section IV.A.1.g.ii.(a)) shall be determined by calculating the median value of total coliform bacteria in the effluent utilizing all total coliform results during each calendar month in which the monthly median limitation applies (i.e., November – April).

iii. **Weekly Median**. Compliance with the interim weekly median effluent limitation (Section IV.A.2.c.i) and final weekly median effluent limitation (Section IV.A.1.g.ii.(b)) shall be determined by calculating the median value of total coliform bacteria in the effluent utilizing all total coliform results from Sunday through Saturday of each calendar week.

F. Total Residual Chlorine Effluent Limitations (Section IV.A.1.f. and 2.b.). Continuous monitoring analyzers for chlorine residual or for dechlorination agent residual in the effluent are appropriate methods for compliance determination. A positive residual dechlorination agent in the effluent indicates that chlorine is not present in the discharge, which demonstrates compliance with the effluent limitations. This type of monitoring can also be used to prove that some chlorine residual exceedances are false positives. Continuous monitoring data showing either a positive dechlorination agent residual or a chlorine residual at or below the prescribed limit are sufficient to show compliance with the total residual chlorine effluent limitations, as long as the instruments are maintained and calibrated in accordance with the manufacturer's recommendations.

Any excursion above the 1-hour average or 4-day average total residual chlorine effluent limitations is a violation. If the Discharger conducts continuous monitoring and the Discharger can demonstrate, through data collected from a back-up monitoring system, that a chlorine spike recorded by the continuous monitor was not actually due to chlorine, then any excursion resulting from the recorded spike will not be considered an exceedance, but rather reported as a false positive. Records supporting validation of false positives shall be maintained in accordance with Section 4 Standard Provisions (Attachment D).

G. Chronic Whole Effluent Toxicity Effluent Limitation (Section IV.A.1.c). Compliance with the accelerated monitoring and TRE/TIE provisions of Provision VI.C.2.a shall constitute compliance with the effluent limitation.

H. Acute Whole Effluent Toxicity Effluent Limitation (Section IV.A.1.d). For each 96-hour acute bioassay test result, compliance with the acute WET 90% median survival effluent limitation shall be determined based on the median of that test result and the previous two test results.

I. Turbidity Receiving Water Limitation (Section V.A.17.). Compliance shall be determined using data samples from receiving water monitoring station location RSWD-003 and analyzed with data samples for natural turbidity at receiving water monitoring station location RSWU-001.

J. Dissolved Oxygen Receiving Water Limitation (Section V.A.5.). Compliance shall be determined using data samples from receiving water monitoring station location RSWD-003.

K. pH Receiving Water Limitation (Section V.A.8.). Compliance shall be determined using data samples from receiving water monitoring station location RSWD-003.

L. Temperature Receiving Water Limitation (Section V.A.15.). Compliance shall be determined using data samples from receiving water monitoring station location RSWD-003 and analyzed with data samples for natural temperature at receiving water monitoring station location RSWU-001.

M. Chlorpyrifos and Diazinon Effluent Limitations (Section IV.A.1.l.). Compliance shall be determined by calculating the sum (S), as provided in this Order, with analytical results that are reported as "non-detectable" concentrations to be considered to be zero.

N. Mass Effluent Limitations (Section IV.A.1.a). The mass effluent limitations contained in Final Effluent Limitations IV.A.1.a and Interim Effluent Limitations IV.A.2.a and d are based on the permitted average dry weather flow and calculated as follows:

Mass (lbs/day) = Flow (MGD) x Concentration (mg/L) x 8.34 (conversion factor)

If the effluent flow exceeds the permitted average dry weather flow during wet-weather seasons, the effluent mass limitations contained in Final Effluent Limitations IV.A.1.a and Interim Effluent Limitations IV.A.2.a and d shall not apply. If the effluent flow is below the permitted average dry weather flow during wet-weather seasons, the effluent mass limitations do apply.

O. Use of Delta Regional Monitoring Program and other Receiving Water Data to Determine Compliance with Receiving Water Limitations. Delta Regional Monitoring Program data and other receiving water monitoring data that is not specifically required to be conducted by the Discharger under this permit, will not be used directly to determine that the discharge is in violation of this Permit. The Discharger may, however, conduct any site-specific receiving water monitoring deemed appropriate by the Discharger that is not conducted by the Delta RMP and submit that monitoring data. As described in Section VIII of Attachment E, such data may be used, if scientifically defensible, in conjunction with other receiving water data, effluent data, receiving water flow data, and other pertinent information to determine whether or not a discharge is in compliance with this Permit.

ATTACHMENT A – DEFINITIONS

Arithmetic Mean (μ)
Also called the average, is the sum of measured values divided by the number of samples. For ambient water concentrations, the arithmetic mean is calculated as follows:

Arithmetic mean = $\mu = \Sigma x / n$ where: Σx is the sum of the measured ambient water concentrations, and n is the number of samples.

Average Monthly Effluent Limitation (AMEL)
The highest allowable average of daily discharges over a calendar month, calculated as the sum of all daily discharges measured during a calendar month divided by the number of daily discharges measured during that month.

Average Weekly Effluent Limitation (AWEL)
The highest allowable average of daily discharges over a calendar week (Sunday through Saturday), calculated as the sum of all daily discharges measured during a calendar week divided by the number of daily discharges measured during that week.

Bioaccumulative
Those substances taken up by an organism from its surrounding medium through gill membranes, epithelial tissue, or from food and subsequently concentrated and retained in the body of the organism.

Carcinogenic
Pollutants are substances that are known to cause cancer in living organisms.

Coefficient of Variation (CV)
CV is a measure of the data variability and is calculated as the estimated standard deviation divided by the arithmetic mean of the observed values.

Daily Discharge
Daily Discharge is defined as either: (1) the total mass of the constituent discharged over the calendar day (12:00 am through 11:59 pm) or any 24-hour period that reasonably represents a calendar day for purposes of sampling (as specified in the permit), for a constituent with limitations expressed in units of mass or; (2) the unweighted arithmetic mean measurement of the constituent over the day for a constituent with limitations expressed in other units of measurement (e.g., concentration).

The daily discharge may be determined by the analytical results of a composite sample taken over the course of 1 day (a calendar day or other 24-hour period defined as a day) or by the arithmetic mean of analytical results from one or more grab samples taken over the course of the day.

For composite sampling, if 1 day is defined as a 24-hour period other than a calendar day, the analytical result for the 24-hour period will be considered as the result for the calendar day in which the 24-hour period ends.

Diatoms
Diatoms are planktonic micro algae.

Detected, but Not Quantified (DNQ)
DNQ are those sample results less than the RL, but greater than or equal to the laboratory's MDL.

Dilution Credit
Dilution Credit is the amount of dilution granted to a discharge in the calculation of a water quality-based effluent limitation, based on the allowance of a specified mixing zone. It is calculated from the dilution ratio or determined through conducting a mixing zone study or modeling of the discharge and receiving water.

Effluent Concentration Allowance (ECA)
ECA is a value derived from the water quality criterion/objective, dilution credit, and ambient background concentration that is used, in conjunction with the coefficient of variation for the effluent monitoring data, to calculate a long-term average (LTA) discharge concentration. The ECA has the same meaning as waste load allocation (WLA) as used in USEPA guidance (Technical Support Document For Water Quality-based Toxics Control, March 1991, second printing, EPA/505/2-90-001).

Enclosed Bays
Enclosed Bays means indentations along the coast that enclose an area of oceanic water within distinct headlands or harbor works. Enclosed bays include all bays where the narrowest distance between the headlands or outermost harbor works is less than 75 percent of the greatest dimension of the enclosed portion of the bay. Enclosed bays include, but are not limited to, Humboldt Bay, Bodega Harbor, Tomales Bay, Drake's Estero, San Francisco Bay, Morro Bay, Los Angeles-Long Beach Harbor, Upper and Lower Newport Bay, Mission Bay, and San Diego Bay. Enclosed bays do not include inland surface waters or ocean waters.

Estimated Chemical Concentration
The estimated chemical concentration that results from the confirmed detection of the substance by the analytical method below the ML value.

Estuaries
Estuaries means waters, including coastal lagoons, located at the mouths of streams that serve as areas of mixing for fresh and ocean waters. Coastal lagoons and mouths of streams that are temporarily separated from the ocean by sandbars shall be considered estuaries. Estuarine waters shall be considered to extend from a bay or the open ocean to a point upstream where there is no significant mixing of fresh water and seawater. Estuarine waters included, but are not limited to, the Sacramento-San Joaquin Delta, as defined in CWC section 12220, Suisun Bay, Carquinez Strait downstream to the Carquinez

Bridge, and appropriate areas of the Smith, Mad, Eel, Noyo, Russian, Klamath, San Diego, and Otay rivers. Estuaries do not include inland surface waters or ocean waters.

Inland Surface Waters
All surface waters of the State that do not include the ocean, enclosed bays, or estuaries.

Instantaneous Maximum Effluent Limitation
The highest allowable value for any single grab sample or aliquot (i.e., each grab sample or aliquot is independently compared to the instantaneous maximum limitation).

Instantaneous Minimum Effluent Limitation
The lowest allowable value for any single grab sample or aliquot (i.e., each grab sample or aliquot is independently compared to the instantaneous minimum limitation).

Larval Fish
Larval Fish are early life stage in the life of fish.

LC_{50}
LC_{50} is the concentration of effluent that is lethal to 50% of the exposed test organisms (measured in a dilution series ranging from 100% effluent to 0% effluent).

LOEC
LOEC is the Lowest Observed Effect Concentration (the Lowest concentration of an effluent at which adverse effects are observed on the aquatic test organism).

Maximum Daily Effluent Limitation (MDEL)
The highest allowable daily discharge of a pollutant, over a calendar day (or 24-hour period). For pollutants with limitations expressed in units of mass, the daily discharge is calculated as the total mass of the pollutant discharged over the day. For pollutants with limitations expressed in other units of measurement, the daily discharge is calculated as the arithmetic mean measurement of the pollutant over the day.

Median
The middle measurement in a set of data. The median of a set of data is found by first arranging the measurements in order of magnitude (either increasing or decreasing order). If the number of measurements (n) is odd, then the median = $X_{(n+1)/2}$. If n is even, then the median = $(X_{n/2} + X_{(n/2)+1})/2$ (i.e., the midpoint between the $n/2$ and $n/2+1$).

Method Detection Limit (MDL)
MDL is the minimum concentration of a substance that can be measured and reported with 99 percent confidence that the analyte concentration is greater than zero, as defined in 40 CFR Part 136, Attachment B, revised as of 3 July 1999.

Minimum Level (ML)
ML is the concentration at which the entire analytical system must give a recognizable signal and acceptable calibration point. The ML is the concentration in a sample that is equivalent to the concentration of the lowest calibration standard analyzed by a specific analytical procedure, assuming that all the method specified sample weights, volumes, and

processing steps have been followed. For the constituents identified in Appendix 4 of the SIP, MLs are those as specified. The MLs specified in Appendix 4 shall be used until such time that new values are adopted by the State Water Resources Control Board, and become effective.

Mixing Zone
Mixing Zone is a limited volume of receiving water that is allocated for mixing with a wastewater discharge where water quality criteria can be exceeded without causing adverse effects to the overall water body.

NOEC
NOEC is the No Observed Effect Concentration (the highest concentration of an effluent at which no adverse effects are observed on the aquatic test organism).

Not Detected (ND)
Sample results which are less than the laboratory's MDL.

Ocean Waters
The territorial marine waters of the State as defined by California law to the extent these waters are outside of enclosed bays, estuaries, and coastal lagoons. Discharges to ocean waters are regulated in accordance with the State Water Board's California Ocean Plan.

Pelagic Zone
Pelagic Zone is a zone of the ocean with plants or animals living or growing at or near the surface of the ocean. Pelagic organisms may be found in the brackish water (water that is a combination of salt and fresh water) of deltas and estuaries.

Persistent Pollutants
Persistent pollutants are substances for which degradation or decomposition in the environment is nonexistent or very slow.

Primary Production
Primary production is the production of organic compounds from atmospheric or aquatic carbon dioxide, principally through the process of photosynthesis. The organisms responsible for primary production are known as primary producers and form the base of the food chain. In aquatic systems, algae are primary producers.

Pollutant Minimization Program (PMP)
PMP means waste minimization and pollution prevention actions that include, but are not limited to, product substitution, waste stream recycling, alternative waste management methods, and education of the public and businesses. The goal of the PMP shall be to reduce all potential sources of a priority pollutant(s) through pollutant minimization (control) strategies, including pollution prevention measures as appropriate, to maintain the effluent concentration at or below the water quality-based effluent limitation. Pollution prevention measures may be particularly appropriate for persistent bioaccumulative priority pollutants where there is evidence that beneficial uses are being impacted. The Central Valley Water

Board may consider cost effectiveness when establishing the requirements of a PMP. The completion and implementation of a Pollution Prevention Plan, if required pursuant to CWC section 13263.3(d), shall be considered to fulfill the PMP requirements.

Pollution Prevention
Pollution Prevention means any action that causes a net reduction in the use or generation of a hazardous substance or other pollutant that is discharged into water and includes, but is not limited to, input change, operational improvement, production process change, and product reformulation (as defined in Water Code section 13263.3). Pollution prevention does not include actions that merely shift a pollutant in wastewater from one environmental medium to another environmental medium, unless clear environmental benefits of such an approach are identified to the satisfaction of the State or Central Valley Water Board.

Satellite Collection System
The portion, if any, of a sanitary sewer system owned or operated by a different public agency than the agency that owns and operates the wastewater treatment facility that a sanitary sewer system is tributary to.

Source of Drinking Water
Any water designated as municipal or domestic supply (MUN) in a Central Valley Water Board Basin Plan.

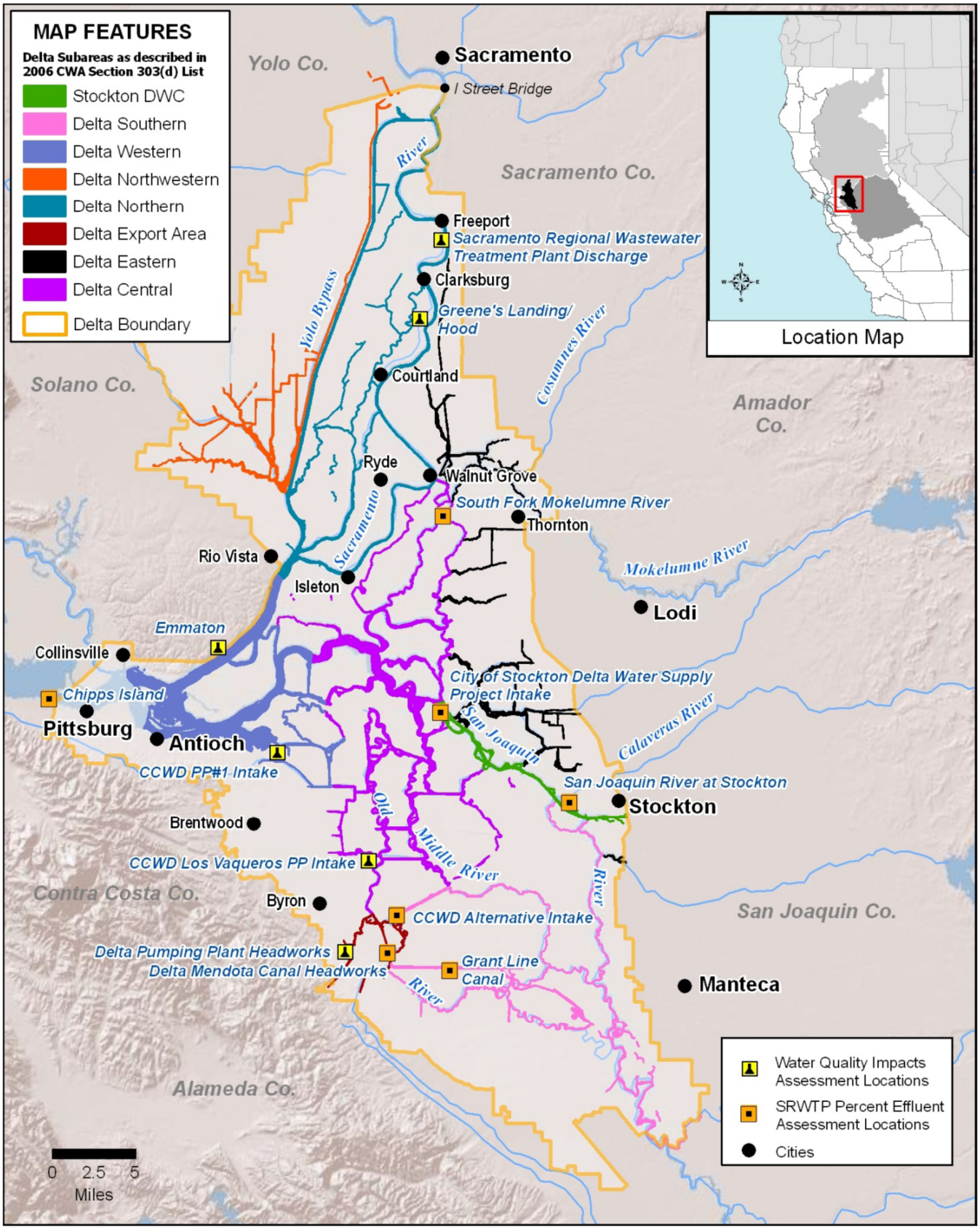
Standard Deviation (σ)
Standard Deviation is a measure of variability that is calculated as follows:

$$\sigma = (\sum[(x - \mu)^2]/(n - 1))^{0.5}$$

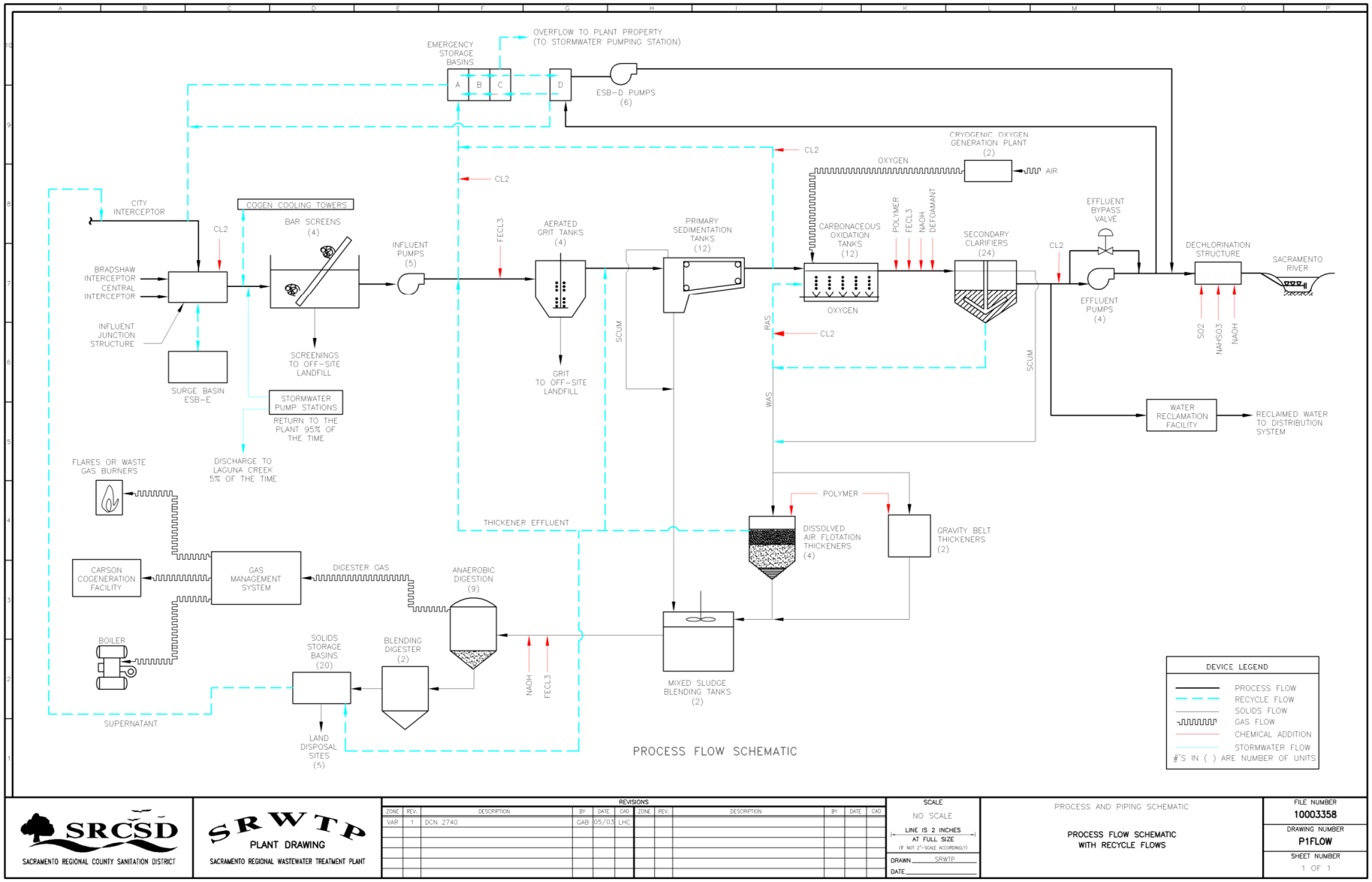
where:
x is the observed value;
μ is the arithmetic mean of the observed values; and
n is the number of samples.

Toxicity Reduction Evaluation (TRE)
TRE is a study conducted in a step-wise process designed to identify the causative agents of effluent or ambient toxicity, isolate the sources of toxicity, evaluate the effectiveness of toxicity control options, and then confirm the reduction in toxicity. The first steps of the TRE consist of the collection of data relevant to the toxicity, including additional toxicity testing, and an evaluation of facility operations and maintenance practices, and best management practices. A Toxicity Identification Evaluation (TIE) may be required as part of the TRE, if appropriate. (A TIE is a set of procedures to identify the specific chemical(s) responsible for toxicity. These procedures are performed in three phases (characterization, identification, and confirmation) using aquatic organism toxicity tests.)

ATTACHMENT B – MAP



ATTACHMENT C – FLOW SCHEMATIC



ATTACHMENT D – STANDARD PROVISIONS

1. STANDARD PROVISIONS – PERMIT COMPLIANCE

A. Duty to Comply

1. The Discharger must comply with all of the conditions of this Order. Any noncompliance constitutes a violation of the Clean Water Act (CWA) and the California Water Code (CWC) and is grounds for enforcement action, for permit termination, revocation and reissuance, or modification; or denial of a permit renewal application. (40 CFR 122.41(a).)

2. The Discharger shall comply with effluent standards or prohibitions established under section 307(a) of the CWA for toxic pollutants and with standards for sewage sludge use or disposal established under section 405(d) of the CWA within the time provided in the regulations that establish these standards or prohibitions, even if this Order has not yet been modified to incorporate the requirement. (40 CFR 122.41(a)(1).)

B. Need to Halt or Reduce Activity Not a Defense

It shall not be a defense for a Discharger in an enforcement action that it would have been necessary to halt or reduce the permitted activity in order to maintain compliance with the conditions of this Order. (40 CFR 122.41(c).)

C. Duty to Mitigate

The Discharger shall take all reasonable steps to minimize or prevent any discharge or sludge use or disposal in violation of this Order that has a reasonable likelihood of adversely affecting human health or the environment. (40 CFR 122.41(d).)

D. Proper Operation and Maintenance

The Discharger shall at all times properly operate and maintain all facilities and systems of treatment and control (and related appurtenances) which are installed or used by the Discharger to achieve compliance with the conditions of this Order. Proper operation and maintenance also includes adequate laboratory controls and appropriate quality assurance procedures. This provision requires the operation of backup or auxiliary facilities or similar systems that are installed by a Discharger only when necessary to achieve compliance with the conditions of this Order. (40 CFR 122.41(e).)

E. Property Rights

1. This Order does not convey any property rights of any sort or any exclusive privileges. (40 CFR 122.41(g).)

2. The issuance of this Order does not authorize any injury to persons or property or invasion of other private rights, or any infringement of state or local law or regulations. (40 CFR 122.5(c).)

F. Inspection and Entry

The Discharger shall allow the Central Valley Water Board, State Water Board, United States Environmental Protection Agency (USEPA), and/or their authorized representatives (including an authorized contractor acting as their representative), upon the presentation of credentials and other documents, as may be required by law, to (40 CFR 122.41(i); CWC section 13383):

1. Enter upon the Discharger's premises where a regulated facility or activity is located or conducted, or where records are kept under the conditions of this Order (40 CFR 122.41(i)(1));

2. Have access to and copy, at reasonable times, any records that must be kept under the conditions of this Order (40 CFR 122.41(i)(2));

3. Inspect and photograph, at reasonable times, any facilities, equipment (including monitoring and control equipment), practices, or operations regulated or required under this Order (40 CFR 122.41(i)(3)); and

4. Sample or monitor, at reasonable times, for the purposes of assuring Order compliance or as otherwise authorized by the CWA or the CWC, any substances or parameters at any location. (40 CFR 122.41(i)(4).)

G. Bypass

1. Definitions

a. “Bypass” means the intentional diversion of waste streams from any portion of a treatment facility. (40 CFR 122.41(m)(1)(i).)

b. “Severe property damage” means substantial physical damage to property, damage to the treatment facilities, which causes them to become inoperable, or substantial and permanent loss of natural resources that can reasonably be expected to occur in the absence of a bypass. Severe property damage does not mean economic loss caused by delays in production. (40 CFR 122.41(m)(1)(ii).)

2. Bypass not exceeding limitations. The Discharger may allow any bypass to occur which does not cause exceedances of effluent limitations, but only if it is for essential maintenance to assure efficient operation. These bypasses are not subject to the provisions listed in Standard Provisions – Permit Compliance 1.G.3, 1.G.4, and 1.G.5 below. (40 CFR 122.41(m)(2).)

3. Prohibition of bypass. Bypass is prohibited, and the Central Valley Water Board may take enforcement action against a Discharger for bypass, unless (40 CFR 122.41(m)(4)(i)):

a. Bypass was unavoidable to prevent loss of life, personal injury, or severe property damage (40 CFR 122.41(m)(4)(i)(A));

b. There were no feasible alternatives to the bypass, such as the use of auxiliary treatment facilities, retention of untreated wastes, or maintenance during normal periods of equipment downtime. This condition is not satisfied if adequate back-up equipment should have been installed in the exercise of reasonable engineering judgment to prevent a bypass that occurred during normal periods of equipment downtime or preventive maintenance (40 CFR 122.41(m)(4)(i)(B)); and

c. The Discharger submitted notice to the Central Valley Water Board as required under Standard Provisions – Permit Compliance1.G.5 below. (40 CFR 122.41(m)(4)(i)(C).)

4. The Central Valley Water Board may approve an anticipated bypass, after considering its adverse effects, if the Central Valley Water Board determines that it will meet the three conditions listed in Standard Provisions – Permit Compliance 1.G.3 above. (40 CFR 122.41(m)(4)(ii).)

5. Notice

a. Anticipated bypass. If the Discharger knows in advance of the need for a bypass, it shall submit a notice, if possible at least 10 days before the date of the bypass. (40 CFR 122.41(m)(3)(i).)

b. Unanticipated bypass. The Discharger shall submit notice of an unanticipated bypass as required in Standard Provisions - Reporting 5.E below (24-hour notice). (40 CFR 122.41(m)(3)(ii).)

H. Upset

Upset means an exceptional incident in which there is unintentional and temporary noncompliance with technology based permit effluent limitations because of factors beyond the reasonable control of the Discharger. An upset does not include noncompliance to the extent caused by operational error, improperly designed treatment facilities, inadequate treatment facilities, lack of preventive maintenance, or careless or improper operation.
(40 CFR 122.41(n)(1).)

1. Effect of an upset. An upset constitutes an affirmative defense to an action brought for noncompliance with such technology based permit effluent limitations if the requirements of Standard Provisions – Permit Compliance 1.H.2 below are met. No determination made during administrative review of

claims that noncompliance was caused by upset, and before an action for noncompliance, is final administrative action subject to judicial review. (40 CFR 122.41(n)(2).)

2. Conditions necessary for a demonstration of upset. A Discharger who wishes to establish the affirmative defense of upset shall demonstrate, through properly signed, contemporaneous operating logs or other relevant evidence that (40 CFR 122.41(n)(3)):

a. An upset occurred and that the Discharger can identify the cause(s) of the upset (40 CFR 122.41(n)(3)(i));

b. The permitted facility was, at the time, being properly operated (40 CFR 122.41(n)(3)(ii));

c. The Discharger submitted notice of the upset as required in Standard Provisions – Reporting 5.E.2.b below (24-hour notice) (40 CFR 122.41(n)(3)(iii)); and

d. The Discharger complied with any remedial measures required under Standard Provisions – Permit Compliance 1.C above. (40 CFR 122.41(n)(3)(iv).)

3. Burden of proof. In any enforcement proceeding, the Discharger seeking to establish the occurrence of an upset has the burden of proof. (40 CFR 122.41(n)(4).)

2. STANDARD PROVISIONS – PERMIT ACTION

A. General

This Order may be modified, revoked and reissued, or terminated for cause. The filing of a request by the Discharger for modification, revocation and reissuance, or termination, or a notification of planned changes or anticipated noncompliance does not stay any Order condition. (40 CFR 122.41(f).)

B. Duty to Reapply

If the Discharger wishes to continue an activity regulated by this Order after the expiration date of this Order, the Discharger must apply for and obtain a new permit. (40 CFR 122.41(b).)

C. Transfers

This Order is not transferable to any person except after notice to the Central Valley Water Board. The Central Valley Water Board may require modification or revocation and reissuance of the Order to change the name of the Discharger and incorporate such other requirements as may be necessary under the CWA and the CWC. (40 CFR 122.41(l)(3) and 122.61.)

3. STANDARD PROVISIONS – MONITORING

A. Samples and measurements taken for the purpose of monitoring shall be representative of the monitored activity. (40 CFR 122.41(j)(1).)

B. Monitoring results must be conducted according to test procedures under 40 CFR Part 136 or, in the case of sludge use or disposal, approved under 40 CFR Part 136 unless otherwise specified in 40 CFR Part 503 unless other test procedures have been specified in this Order. (40 CFR 122.41(j)(4) and 122.44(i)(1)(iv).)

4. STANDARD PROVISIONS – RECORDS

A. Except for records of monitoring information required by this Order related to the Discharger's sewage sludge use and disposal activities, which shall be retained for a period of at least 5 years (or longer as required by 40 CFR Part 503), the Discharger shall retain records of all monitoring information, including all calibration and maintenance records and all original strip chart recordings for continuous monitoring instrumentation, copies of all reports required by this Order, and records of all data used to complete the application for this Order, for a period of at least three (3) years from the date of the sample, measurement, report or application. This period may be extended by request of the Central Valley Water Board Executive Officer at any time. (40 CFR 122.41(j)(2).**)**

B. Records of monitoring information shall include:

1. The date, exact place, and time of sampling or measurements (40 CFR 122.41(j)(3)(i));

2. The individual(s) who performed the sampling or measurements (40 CFR 122.41(j)(3)(ii));

3. The date(s) analyses were performed (40 CFR 122.41(j)(3)(iii));

4. The individual(s) who performed the analyses (40 CFR 122.41(j)(3)(iv));

5. The analytical techniques or methods used (40 CFR 122.41(j)(3)(v)); and

6. The results of such analyses. (40 CFR 122.41(j)(3)(vi).)

C. Claims of confidentiality for the following information will be denied (40 CFR 122.7(b)):

1. The name and address of any permit applicant or Discharger (40 CFR 122.7(b)(1)); and

2. Permit applications and attachments, permits and effluent data. (40 CFR 122.7(b)(2).)

5. STANDARD PROVISIONS – REPORTING

A. Duty to Provide Information

The Discharger shall furnish to the Central Valley Water Board, State Water Board, or USEPA within a reasonable time, any information which the Central Valley Water Board, State Water Board, or USEPA may request to determine whether cause exists for modifying, revoking and reissuing, or terminating this Order or to determine compliance with this Order. Upon request, the Discharger shall also furnish to the Central Valley Water Board, State Water Board, or USEPA copies of records required to be kept by this Order. (40 CFR 122.41(h); Wat. Code, § 13267.)

B. Signatory and Certification Requirements

1. All applications, reports, or information submitted to the Central Valley Water Board, State Water Board, and/or USEPA shall be signed and certified in accordance with Standard Provisions – Reporting 5.B.2, 5.B.3, 5.B.4, and 5.B.5 below. (40 CFR 122.41(k).)

2. All permit applications shall be signed by either a principal executive officer or ranking elected official. For purposes of this provision, a principal executive officer of a federal agency includes: (i) the chief executive officer of the agency, or (ii) a senior executive officer having responsibility for the overall operations of a principal geographic unit of the agency (e.g., Regional Administrators of USEPA). (40 CFR 122.22(a)(3).).

3. All reports required by this Order and other information requested by the Central Valley Water Board, State Water Board, or USEPA shall be signed by a person described in Standard Provisions – Reporting 5.B.2 above, or by a duly authorized representative of that person. A person is a duly authorized representative only if:

a. The authorization is made in writing by a person described in Standard Provisions – Reporting 5.B.2 above (40 CFR 122.22(b)(1));

b. The authorization specifies either an individual or a position having responsibility for the overall operation of the regulated facility or activity such as the position of plant manager, operator of a well or a well field, superintendent, position of equivalent responsibility, or an individual or position having overall responsibility for environmental matters for the company. (A duly authorized representative may thus be either a named individual or any individual occupying a named position.) (40 CFR 122.22(b)(2)); and

c. The written authorization is submitted to the Central Valley Water Board and State Water Board. (40 CFR 122.22(b)(3).)

4. If an authorization under Standard Provisions – Reporting 5.B.3 above is no longer accurate because a different individual or position has responsibility for the overall operation of the facility, a new authorization satisfying the requirements of Standard Provisions – Reporting 5.B.3 above must be submitted to the Central Valley Water Board and State Water Board prior to or together with any reports, information, or applications, to be signed by an authorized representative. (40 CFR 122.22(c).)

5. Any person signing a document under Standard Provisions – Reporting 5.B.2 or 5.B.3 above shall make the following certification:

"*I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.*" (40 CFR 122.22(d).)

C. Monitoring Reports

1. Monitoring results shall be reported at the intervals specified in the Monitoring and Reporting Program (Attachment E) in this Order. (40 CFR 122.22(l)(4).)

2. Monitoring results must be reported on a Discharge Monitoring Report (DMR) form or forms provided or specified by the Central Valley Water Board or State Water Board for reporting results of monitoring of sludge use or disposal practices. (40 CFR 122.41(l)(4)(i).)

3. If the Discharger monitors any pollutant more frequently than required by this Order using test procedures approved under 40 CFR Part 136 or, in the case of sludge use or disposal, approved under 40 CFR Part 136 unless otherwise specified in 40 CFR Part 503, or as specified in this Order, the results of this monitoring shall be included in the calculation and reporting of the data submitted in the DMR or sludge reporting form specified by the Central Valley Water Board. (40 CFR 122.41(l)(4)(ii).)

4. Calculations for all limitations, which require averaging of measurements, shall utilize an arithmetic mean unless otherwise specified in this Order. (40 CFR 122.41(l)(4)(iii).)

D. Compliance Schedules

Reports of compliance or noncompliance with, or any progress reports on, interim and final requirements contained in any compliance schedule of this

Order, shall be submitted no later than 14 days following each schedule date. (40 CFR 122.41(l)(5).)

E. Twenty-Four Hour Reporting

1. The Discharger shall report any noncompliance that may endanger health or the environment. Any information shall be provided orally within 24 hours from the time the Discharger becomes aware of the circumstances. A written submission shall also be provided within five (5) days of the time the Discharger becomes aware of the circumstances. The written submission shall contain a description of the noncompliance and its cause; the period of noncompliance, including exact dates and times, and if the noncompliance has not been corrected, the anticipated time it is expected to continue; and steps taken or planned to reduce, eliminate, and prevent reoccurrence of the noncompliance. (40 CFR 122.41(l)(6)(i).)

2. The following shall be included as information that must be reported within 24 hours under this paragraph (40 CFR 122.41(l)(6)(ii)):

a. Any unanticipated bypass that exceeds any effluent limitation in this Order. (40 CFR 122.41(l)(6)(ii)(A).)

b. Any upset that exceeds any effluent limitation in this Order. (40 CFR 122.41(l)(6)(ii)(B).)

3. The Central Valley Water Board may waive the above-required written report under this provision on a case-by-case basis if an oral report has been received within 24 hours. (40 CFR 122.41(l)(6)(iii).)

F. Planned Changes

The Discharger shall give notice to the Central Valley Water Board as soon as possible of any planned physical alterations or additions to the permitted facility. Notice is required under this provision only when (40 CFR 122.41(l)(1)):

1. The alteration or addition to a permitted facility may meet one of the criteria for determining whether a facility is a new source in 40 CFR 122.29(b) (40 CFR 122.41(l)(1)(i)); or

2. The alteration or addition could significantly change the nature or increase the quantity of pollutants discharged. This notification applies to pollutants that are not subject to effluent limitations in this Order. (40 CFR 122.41(l)(1)(ii).)

3. The alteration or addition results in a significant change in the Discharger's sludge use or disposal practices, and such alteration, addition, or change may justify the application of permit conditions that are different from or absent in the existing permit, including notification of additional use or disposal sites not

reported during the permit application process or not reported pursuant to an approved land application plan. (40 CFR 122.41(l)(1)(iii).)

G. Anticipated Noncompliance

The Discharger shall give advance notice to the Central Valley Water Board or State Water Board of any planned changes in the permitted facility or activity that may result in noncompliance with General Order requirements. (40 CFR 122.41(l)(2).)

H. Other Noncompliance

The Discharger shall report all instances of noncompliance not reported under Standard Provisions – Reporting 5.C, 5.D, and 5.E above at the time monitoring reports are submitted. The reports shall contain the information listed in Standard Provision – Reporting 5.E above. (40 CFR 122.41(l)(7).)

I. Other Information

When the Discharger becomes aware that it failed to submit any relevant facts in a permit application, or submitted incorrect information in a permit application or in any report to the Central Valley Water Board, State Water Board, or USEPA, the Discharger shall promptly submit such facts or information. (40 CFR 122.41(l)(8).)

VI. STANDARD PROVISIONS – ENFORCEMENT

A. The Central Valley Water Board is authorized to enforce the terms of this permit under several provisions of the CWC, including, but not limited to, sections 13385, 13386, and 13387

VII. ADDITIONAL PROVISIONS – NOTIFICATION LEVELS

A. Publicly-Owned Treatment Works (POTWs)

All POTWs shall provide adequate notice to the Central Valley Water Board of the following (40 CFR 122.42(b)):

1. Any new introduction of pollutants into the POTW from an indirect discharger that would be subject to sections 301 or 306 of the CWA if it were directly discharging those pollutants (40 CFR 122.42(b)(1)); and

2. Any substantial change in the volume or character of pollutants being introduced into that POTW by a source introducing pollutants into the POTW at the time of adoption of the Order. (40 CFR 122.42(b)(2).)

3. Adequate notice shall include information on the quality and quantity of effluent introduced into the POTW as well as any anticipated impact of the

change on the quantity or quality of effluent to be discharged from the POTW. (40 CFR 122.42(b)(3).)

ATTACHMENT E – MONITORING AND REPORTING PROGRAM

Table of Contents

I. General Monitoring Provisions E-2
II. Monitoring Locations E-4
III. Influent Monitoring Requirements E-4
A. Monitoring Location INF-001 ..... E-4
B. Monitoring Location CAP-001 ..... E-5
IV. Effluent Monitoring Requirements E-5
A. Monitoring Location EFF-001 ..... E-5
B. Effluent Characterization Monitoring Location EFF-001 ..... E-8
V. Whole Effluent Toxicity Testing Requirements E-9
VI. Land Discharge Monitoring Requirements E-12
A. Monitoring Locations ESB (A through E) E-12
VII. Reclamation Monitoring Requirements E-12
VIII. Receiving Water Monitoring Requirements – Surface Water and Groundwater E-13
IX. Other Monitoring Requirements E-17
C. Filter Effluent – Monitoring Location FIL-001 ..... E-17
X. Reporting Requirements E-17
A. General Monitoring and Reporting Requirements E-17
B. Self Monitoring Reports (SMRs) E-18
C. Discharge Monitoring Reports (DMRs) E-23
D. Other Reports E-23

List of Tables

Table E-1. Monitoring Station Locations E-4
Table E-2a. Influent Monitoring E-4
Table E-2b. Groundwater Corrective Action Program (CAP) Monitoring E-5
Table E-3a. Effluent Monitoring E-5
Table E-3b. Effluent Characterization Monitoring E-8
Table E-4. Chronic Toxicity Testing Dilution Series E-10
Table E-5. Land Discharge Monitoring Requirements E-12
Table E-6a. Receiving Water Monitoring Requirements- Monitoring Locations RSWU-001 through RSWD-005 ..... E-14
Table E-6b. Receiving Water Monitoring Requirements – Monitoring Location RSWU-001 ..... E-15
Table E-7 Filter Effluent Monitoring E-17
Table E-8. Monitoring Periods and Reporting Schedule E-19
Table E-9. Reporting Requirements for Special Provisions Progress Reports E-23

ATTACHMENT E – MONITORING AND REPORTING PROGRAM

Title 40 of the Code of Federal Regulations (CFR), section 122.48 (40 CFR 122.48) requires that all NPDES permits specify monitoring and reporting requirements. California Water Code (CWC) sections 13267 and 13383 also authorize the Central Valley Regional Water Quality Control Board (Central Valley Water Board) to require technical and monitoring reports. This Monitoring and Reporting Program establishes monitoring and reporting requirements, which implement the federal and California regulations.

I. GENERAL MONITORING PROVISIONS

A. Samples and measurements taken as required herein shall be representative of the volume and nature of the monitored discharge. All samples shall be taken at the monitoring locations specified below and, unless otherwise specified, before the monitored flow joins or is diluted by any other waste stream, body of water, or substance. Monitoring locations shall not be changed without notification to and the approval of this Central Valley Water Board.

B. Effluent samples shall be taken downstream of the last addition of wastes to the treatment or discharge works where a representative sample may be obtained prior to mixing with the receiving waters. Samples shall be collected at such a point and in such a manner to ensure a representative sample of the discharge.

C. Chemical, bacteriological, and bioassay analyses of any material required by this Order shall be conducted by a laboratory certified for such analyses by the Department of Public Health (DPH; formerly the Department of Health Services). Laboratories that perform sample analyses must be identified in all monitoring reports submitted to the Central Valley Water Board. In the event a certified laboratory is not available to the Discharger for any onsite field measurements such as pH, turbidity, temperature and residual chlorine, such analyses performed by a noncertified laboratory will be accepted provided a Quality Assurance-Quality Control Program is instituted by the laboratory. A manual containing the steps followed in this program for any onsite field measurements such as pH, turbidity, temperature and residual chlorine must be kept onsite in the treatment facility laboratory and shall be available for inspection by Central Valley Water Board staff. The Quality Assurance-Quality Control Program must conform to USEPA guidelines or to procedures approved by the Central Valley Water Board.

D. Appropriate flow measurement devices and methods consistent with accepted scientific practices shall be selected and used to ensure the accuracy and reliability of measurements of the volume of monitored discharges. All monitoring instruments and devices used by the Discharger to fulfill the prescribed monitoring program shall be properly maintained and calibrated as necessary, at least yearly, to ensure their continued accuracy. All flow measurement devices shall be calibrated at least once per year to ensure continued accuracy of the devices.

E. Monitoring results, including noncompliance, shall be reported at intervals and in a manner specified in this Monitoring and Reporting Program.

F. Laboratories analyzing monitoring samples shall be certified by DPH, in accordance with the provision of CWC section 13176, and must include quality assurance/quality control data with their reports.

G. The Discharger shall conduct analysis on any sample provided by USEPA as part of the Discharge Monitoring Quality Assurance (DMQA) program. The results of any such analysis shall be submitted to USEPA's DMQA manager.

H. The Discharger shall file with the Central Valley Water Board technical reports on self-monitoring performed according to the detailed specifications contained in this Monitoring and Reporting Program.

I. The results of all monitoring required by this Order shall be reported to the Central Valley Water Board, and shall be submitted in such a format as to allow direct comparison with the limitations and requirements of this Order. Unless otherwise specified, discharge flows shall be reported in terms of the monthly average and the daily maximum discharge flows.

II. MONITORING LOCATIONS

The Discharger shall establish the following monitoring locations to demonstrate compliance with the effluent limitations, discharge specifications, and other requirements in this Order:

Table E-1. Monitoring Station Locations

Discharge Point Name	Monitoring Location Name	Monitoring Location Description
--	INF-001	Location where a representative sample of the facility's influent can be obtained.
--	CAP-001	Groundwater Corrective Action Program (CAP) Discharge Monitoring
001	EFF-001	Location where a representative sample of the facility's effluent can be obtained. [Latitude 38° 27' 15"N and Longitude 121° 30' 00"W]
--	FIL-001	Location where a representative sample of the facility's filtration system effluent can be obtained without influence from downstream unit processes or flows.
--	ESB (A-E)	Emergency Storage Basins A through E
--	RSWU-001	Sacramento River at Freeport Bridge
--	RSWD-003	Sacramento River 4200 feet downstream of Discharge Point No. 001 at Cliff's Marina
--	RSWD-004	Sacramento River at River Mile 44
--	RSWD-005	Sacramento River at River Mile 43

III. INFLUENT MONITORING REQUIREMENTS

A. Monitoring Location INF-001

1. The Discharger shall monitor influent to the facility at INF-001 as follows:

Table E-2a. Influent Monitoring

Parameter	Units	Sample Type	Minimum Sampling Frequency	Required Analytical Test Method
Flow	mgd	Meter	Continuous	--
Biochemical Oxygen Demand (BOD) (5-day @ 20 Deg. C)	mg/L	24-hr Composite[1]	1/day	--
Total Suspended Solids (TSS)	mg/L	24-hr Composite[1]	1/day	--
pH[2]	Standard Units	Meter	Continuous	--
Electrical Conductivity	µmhos/cm @ 25°C	24-hr Composite[1]	1/week	--
Total Dissolved Solids	mg/L	24-hour Composite[1]	1/month	--

Parameter	Units	Sample Type	Minimum Sampling Frequency	Required Analytical Test Method

[1] 24-hour flow proportional composite. In the event of composite sample malfunction, a grab sample must be substituted.
[2] Grab samples to be collected whenever the continuous pH meter is offline for 30 minutes or longer.

B. Monitoring Location CAP-001

1. The Discharger shall monitor the Groundwater Corrective Action Program (CAP) discharge to the facility at CAP-001 as follows in Table E-2b. The monitoring results may be submitted separate from the Self-Monitoring Reports. The monitoring results collected between 1 January and 30 June shall be submitted by 1August each year, and results collected between 1 July and 31 December shall be submitted on 1 February each year.

Table E-2b. Groundwater Corrective Action Program (CAP) Monitoring

Parameter	Units	Sample Type	Minimum Sampling Frequency	Required Analytical Test Method
Flow	mgd	Meter/Totalizer	1/month	--
Title 22 Metals[1]	µg/L	Grab	2/year	--
Nitrate Nitrogen, Total (as N)	mg/L	Grab	2/year	--
Electrical Conductivity	µmhos/cm @ 25°C	Grab	2/year	--
Total Dissolved Solids	mg/L	Grab	2/year	--

[1] Title 22 metals shall include the analyses of arsenic, cadmium, chromium, copper, lead, mercury, nickel, and zinc.

IV. EFFLUENT MONITORING REQUIREMENTS

A. Monitoring Location EFF-001

1. The Discharger shall monitor final dechlorinated effluent at EFF-001 as follows. If more than one analytical test method is listed for a given parameter, the Discharger must select from the listed methods and corresponding Minimum Level:

Table E-3a. Effluent Monitoring

Parameter	Units	Sample Type	Minimum Sampling Frequency	Required Analytical Test Method
Flow	mgd	Meter	Continuous	--
Chlorine, Total Residual[1]	mg/L	Meter	Continuous	--
Sulphur Dioxide or Sodium Bisulfite	mg/L	Meter	Continuous	--

Parameter	Units	Sample Type	Minimum Sampling Frequency	Required Analytical Test Method
Temperature	°F	Meter	Continuous	--
pH[3]	standard units	Meter	Continuous	--
Biochemical Oxygen Demand (5-day @ 20 ºC) (BOD_5)	mg/L	24-hr Composite[6]	1/day	--
Total Suspended Solids (TSS)	mg/L	24-hr Composite[6]	1/day	--
Total Coliform Organisms[14]	MPN/100 mL	Grab	1/day	--
Ammonia Nitrogen, Total (as N) [2]	mg/L	Grab[13]	1/day	--
Settleable Solids	mL/L	24-hr Composite[6]	1/day	--
Dissolved Oxygen	mg/L	Meter	Continuous	--
Cryptosporidium	Oocysts /100 mL	Grab	1/month	EPA method 1622/23
Giardia	Cysts/ 100 mL	Grab	1/month	EPA method 1623
Nitrate Nitrogen, Total (as N)	mg/L	Grab[13]	1/week	--
Nitrite Nitrogen, Total (as N)	mg/L	Grab[13]	1/week	--
Total Kjeldahl Nitrogen	mg/L	Grab[13]	1/week	--
Oil and Grease	mg/L	Grab	1/month	--
Electrical Conductivity @ 25 Deg. C	µmhos/cm	24-hr Composite[6]	1/week	--
Total Dissolved Solids (TDS)	mg/L	24-hr Composite[6]	1/week	--
Total Organic Carbon	mg/L	24-hr Composite[6]	1/month	--
Aluminum, Total Recoverable[11]	µg/L	24-hr Composite[6,7]	1/month	--
Cyanide, Total Recoverable[4]	µg/L	Grab	1/month	[8]
Mercury, Total[5]	ng/L	24-hr Composite[6]	1/month	EPA Method 1631[5]
Mercury, Methyl[5]	ng/L	24-hr. Composite	1/month	EPA Method 1630[5]
Manganese, Dissolved and Total Recoverable	µg/L	24-hr Composite[6]	1/month	--
Copper, Dissolved and Total Recoverable	µg/L	24-hr Composite[6,7]	1/month	--
Methylene Chloride[4]	µg/L	Grab	1/month	--
Tetrachloroethylene[4]	µg/L	Grab	1/month	--
Pentachlorophenol[4]	µg/L	Grab	1/month	
Dibenzo(a,h)anthracene[4]	µg/L	Grab	1/month	
Bis-2 (ethylhexyl) phthalate[4,10]	µg/L	Grab	1/month	--
Chlorodibromomethane[4]	µg/L	Grab	1/month	--

Parameter	Units	Sample Type	Minimum Sampling Frequency	Required Analytical Test Method
Dichlorobromomethane[4]	µg/L	Grab	1/month	--
Carbon Tetrachloride[4]	µg/L	Grab	1/month	--
Methyl-tert-butyl ether (MTBE) [4]	µg/L	Grab	1/month	--
Chlorpyrifos	µg/L	24-hr Composite[6]	1/month	EPA Method 625M; Method 8141 or equivalent
Diazinon	µg/L	24-hr Composite[6]	1/month	EPA Method 625M; Method 8141 or equivalent
Hardness (as $CaCO_3$)	mg/L	24-hr Composite[6]	1/month	--
Alkalinity	mg/L	24-hr Composite[6]	1/month	--
Effluent/River Dilution Ratio[12]	--	Calculation	Continuous	--
Effluent Diversions[9]	Hr:Min	Narrative description for reason of diversion--	1/month	--

1 Beginning 1 December 2011, total chlorine residual must be monitored with a method sensitive to and accurate at the permitted level of 0.01 mg/L. Report the magnitude and duration of all non-zero chlorine residual events within the reporting period.

2 Concurrent with whole effluent toxicity monitoring.

3 pH of effluent shall be measured continuously at one second intervals and tracked as a 20-minute running average. The highest and lowest 20-minute averages each day will be reported.

4 For priority pollutant constituents the reporting levels shall be consistent with Sections 2.4.2 and 2.4.3 of the Policy for Implementation of Toxics Standards for Inland Surface Waters, Enclosed Bays, and Estuaries of California. Sampling and analysis of Bis (2-ethylhexyl) phthalate shall be conducted using ultra-clean techniques that eliminate the possibility of sample contamination.

5 Unfiltered methylmercury and total mercury samples shall be taken using clean hands/dirty hands procedures, as described in U.S. EPA method 1669: Sampling Ambient Water for Trace Metals at EPA Water Quality Criteria Levels, for collection of equipment blanks (section 9.4.4.2), and shall be analyzed by U.S. EPA method 1630/1631 (Revision E) with a method detection limit of 0.02 ng/l for methylmercury and 0.2 ng/l for total mercury.

6 24-hour flow proportioned composite. In the event of composite sample malfunction, a grab sample must be substituted.

7 Concurrent with hardness monitoring.

8 Samples taken at the effluent without preservatives, may be analyzed for cyanide within 15 minutes from collection and must be performed by a laboratory certified for such analyses by the State Department of Public Health.

9 An annual summary of effluent diversions to include date, time, duration and reason for the diversion.

10 In order to verify if bis (2-ethylhexyl) phthalate is truly present in the effluent discharge, the Discharger shall take steps to assure that sample containers, sampling apparatus, and analytical equipment are not sources of the detected contaminant.

11 Compliance with the final effluent limitations for aluminum can be demonstrated using either total or acid-soluble (inductively coupled plasma/atomic emission spectrometry or inductively coupled plasma/mass spectrometry) analysis methods, as supported by USEPA's Ambient Water Quality Criteria for Aluminum document (EPA 440/5-86-008), or other standard methods that exclude aluminum silicate particles as approved by the Executive Officer.

12 Running Hourly Average/Running Hourly Average. Report lowest, highest, and average ratio calculated for each day.

13 A concurrent temperature sample should be taken.

14 Total coliform sample to be collected after chlorination and prior to dechlorination. The sample must be dechlorinated immediately after sample collection.

B. Effluent Characterization Monitoring Location EFF-001

1. The Discharger shall monitor final dechlorinated effluent at EFF-001 as follows in Table E-3b. Beginning 1 January 2013, the Discharger shall monitor monthly for one calendar year (concurrent with receiving water characterization monitoring) and repeat the monitoring every other calendar year, beginning 1 January of that year. The effluent characterization monitoring results shall be submitted with the receiving water characterization monitoring results required in Table E-6b and may be submitted separate from the Self-Monitoring Reports, but no later than 1 April of the year following the calendar year of sampling.

Table E-3b. Effluent Characterization Monitoring

Parameter	Units	Sample Type	Minimum Sampling Frequency	Required Analytical Test Method
Electrical Conductivity @ 25 Deg. C	µmhos/cm	Grab	1/month-every other year[1]	--
Total Dissolved Solids (TDS)	mg/L	Grab	1/month-every other year[1]	--
Dioxin[9]	µg/L	--	--	--
Pyrethroids[5]	ng/L	24-hr Composite[4]	1/month-every other year[1]	--
Priority Pollutants[2]	µg/L	[7]	1/month-every other year[1]	--
Standard Minerals[3]	mg/L	24-hr Composite[4]	1/month-every other year[1]	--
Other Constituents of Concern[6]	µg/L	[7]	1/month-every other year[1]	--
Hardness (as $CaCO_3$)[8]	mg/L	24-hr Composite[4]	1/month-every other year[1]	--
Alkalinity	mg/L	24-hr Composite[4]	1/month-every other year[1]	--
Dissolved Organic Carbon	mg/L	24-hr Composite[4]	1/month-every other year[1]	
Total Phosphorus	mg/L	24-hr Composite[4]	1/month-every other year[1]	

[1] Monthly sampling for the 2013 calendar year and every other calendar year thereafter. These samples should be taken during the same time that monthly receiving water samples are taken for the Coordinated Monitoring Program (CMP)

[2] Priority pollutants include all 126 priority pollutants listed in the California Toxics Rule (CTR, 40 CFR 131.38), except dioxin. For priority pollutant constituents the reporting levels shall be consistent with Sections 2.4.2 and 2.4.3 of the Policy for Implementation of Toxics Standards for Inland Surface Waters, Enclosed Bays, and Estuaries of California.

[3] Standard minerals shall include the following: boron, calcium, iron, magnesium, potassium, sodium, chloride, manganese, phosphorus, total alkalinity (including alkalinity series), and hardness, and include verification that the analysis is complete (i.e., cation/anion balance).

[4] 24-hour flow proportioned composite.

[5] Pyrethroids to include bifenthrin, cyfluthrin, cypermethrin, esfenvalerate, lambda-cyhalothrin and permethrin.

[6] Other Constituents of Concern include:

Aluminum	Di(2-ethylhexyl)adipate	Radionuclides
Atrazine	Ethylene dibromide	Simazine

Barium	Fluoride	Styrene
Carbofuran	Glyphosate	Sulfate
NEMA and NDEA	MBAS	Sulfide
Chromium, Total	Sulfite	Trichlorofluoromethane
Diquat	Thiobencarb	1,1,2-trichloro-1,2,2-trifluoroethane
1,2-dibromo-3-chloropropane (DBCP)	Tributyltin	Xylenes
		Disulfoton

[7] Sample types for volatile organic compounds and semi-volatile organic compounds, sulfite, sulfide and cyanide shall be collected as grab samples. All other constituents shall be 24-hour flow proportioned composite samples.

[8] Hardness must be sampled concurrently with Priority Pollutant sampling.

[9] Dioxin sampling shall be in accordance with Attachment I.

V. WHOLE EFFLUENT TOXICITY TESTING REQUIREMENTS

A. Acute Toxicity Testing. The Discharger shall conduct acute toxicity testing to determine whether the effluent is contributing acute toxicity to the receiving water. The Discharger shall meet the following acute toxicity testing requirements:

1. *Monitoring Frequency* – The Discharger shall perform a weekly 96-hour continuous flow-through acute toxicity testing, concurrent with effluent ammonia sampling.

2. *Sample Types* –The effluent shall be taken at the effluent monitoring location EFF-001. If the flow-through bioassay is not available for use, static renewal testing may be used. For static renewal testing, the samples shall be flow proportional 24-hour composites samples and shall be representative of the volume and quality of the discharge.

3. *Test Species* – **Effective immediately**, the test species shall be fathead minnows (*Pimephales promelas*). **Effective 1 July 2011** the test species shall be rainbow trout (*Oncorhynchus mykiss*).

4. *Methods* – The acute toxicity testing samples shall be analyzed using EPA-821-R-02-012, Fifth Edition and its subsequent amendments or revisions. Temperature, total residual chlorine, and pH shall be recorded at the time of sample collection. No pH adjustment may be made unless approved by the Executive Officer.

5. *Test Failure* – If an acute toxicity test does not meet all test acceptability criteria, as specified in the test method, the Discharger must take all reasonable steps to determine reason for test failure.

B. Chronic Toxicity Testing. The Discharger shall conduct three species chronic toxicity testing on RSWU-001 and RSWD-003 and the effluent at EFF-001 to determine whether the effluent is contributing chronic toxicity to the receiving water. The Discharger shall meet the following chronic toxicity testing requirements:

1. *Monitoring Frequency –* The Discharger shall perform monthly three species chronic toxicity testing.

2. *Sample Types* – Effluent samples shall be flow proportional 24-hour composites and shall be representative of the volume and quality of the discharge. The effluent samples shall be taken at the effluent monitoring location EFF-001. The receiving water shall be a grab sample obtained from the RSWU-001 sampling location and RSWD-003 as identified in this Monitoring and Reporting Program.

3. *Sample Volumes* – Adequate sample volumes shall be collected to provide renewal water to complete the test in the event that the discharge is intermittent.

4. *Test Species* – Chronic toxicity testing measures sublethal (e.g., reduced growth, reproduction) and/or lethal effects to test organisms exposed to an effluent compared to that of the control organisms. The Discharger shall conduct chronic toxicity tests with:

   a. The cladoceran, water flea, *Ceriodaphnia dubia* (survival and reproduction test);

   b. The fathead minnow, *Pimephales promelas* (larval survival and growth test); and

   c. The green alga, *Selenastrum capricornutum* (growth test).

5. *Methods* – The presence of chronic toxicity shall be estimated as specified in Short-term Methods for Estimating the Chronic Toxicity of Effluents and Receiving Waters to Freshwater Organisms, Fourth Edition, EPA/821-R-02-013, October 2002 and its subsequent amendments or revisions.

6. *Reference Toxicant* – As required by the SIP, all chronic toxicity tests shall be conducted with concurrent testing with a reference toxicant and shall be reported with the chronic toxicity test results.

7. *Dilutions* – The chronic toxicity testing shall be performed using the dilution series identified in the table, below. The receiving water control (RSWU-001) shall be used as the diluent (unless the receiving water is toxic). If the receiving water is toxic, lab control water may be substituted as the diluent.

Table E-4. Chronic Toxicity Testing Dilution Series

Sample	Dilutions (%)					Controls	
% EFF-001	100	50	25	12.5	6.25	--	--
% RSWU-001	0	50	75	87.5	93.75		100
% RSWD-003	0	0	0	0	0		100
% Laboratory Water	0	0	0	0	0		100

8. *Test Failure* – The Discharger must re-sample and re-test as soon as possible, but no later than fourteen (14) days after receiving notification of a test failure. A test failure is defined as follows:

   a. The reference toxicant test or the effluent test does not meet all test acceptability criteria as specified in the Short-term Methods for Estimating the Chronic Toxicity of Effluents and Receiving Waters to Freshwater Organisms, Fourth Edition, EPA/821-R-02-013, October 2002 (Method Manual), and its subsequent amendments or revisions; or

   b. The percent minimum significant difference (PMSD) measured for the test exceeds the upper PMSD bound variability criterion in Table 6 on page 52 of the Method Manual. (A retest is only required in this case if the test results do not exceed the monitoring trigger specified in the Special Provision at section VI. 2.a.iii. of the Order.)

C. **WET Testing Notification Requirements.** The Discharger shall notify the Central Valley Water Board within 24-hours after the receipt of test results exceeding the monitoring trigger during regular or accelerated monitoring, or an exceedance of the acute toxicity effluent limitation.

D. **WET Testing Reporting Requirements.** All toxicity test reports shall include the contracting laboratory's complete report provided to the Discharger and shall be in accordance with the appropriate "Report Preparation and Test Review" sections of the method manuals. At a minimum, whole effluent toxicity monitoring shall be reported as follows:

   1. **Chronic WET Reporting.** Regular chronic toxicity monitoring results shall be reported to the Central Valley Water Board within 45 days following completion of the test, and shall contain, at minimum:

      a. The results expressed in TUc, measured as 100/NOEC, and also measured as 100/LC50, 100/EC25, 100/IC25, and 100/IC50, as appropriate.

      b. The statistical methods used to calculate endpoints;

      c. The statistical output page, which includes the calculation of the percent minimum significant difference (PMSD);

      d. The dates of sample collection and initiation of each toxicity test; and

      e. The results compared to the numeric toxicity monitoring trigger.

      Additionally, an annual report shall be submitted 1 February of each year that contains chronic toxicity test results for the previous calendar year expressed in TUc, and organized by test species, type of test (survival, growth or

reproduction), and monitoring frequency, i.e., either quarterly, monthly, accelerated, or Toxicity Reduction Evaluation (TRE).

2. **Acute WET Reporting.** Acute toxicity test results shall be submitted with the monthly discharger self-monitoring reports and reported as percent survival. If more than one tank is used in the testing, percent survival for all tanks shall be reported. Additionally, the monthly discharge self-monitoring reports shall contain an updated chronology of the last 12 months of acute toxicity test results.

3. **TRE Reporting.** Reports for TREs shall be submitted in accordance with the schedule contained in the Discharger's approved TRE Workplan.

4. **Quality Assurance (QA).** The Discharger must provide the following information for QA purposes :

   a. Results of the applicable reference toxicant data with the statistical output page giving the species, NOEC, LOEC, type of toxicant, dilution water used, concentrations used, PMSD, and dates tested.

   b. The reference toxicant control charts for each endpoint, which include summaries of reference toxicant tests performed by the contracting laboratory.

   c. Any information on deviations or problems encountered and how they were dealt with.

VI. LAND DISCHARGE MONITORING REQUIREMENTS

A. Monitoring Locations ESB (A through E)

1. The Discharger shall monitor **diverted influent or treated effluent** at the Emergency Storage Basins, when wastewater is present, as follows:

Table E-5. Land Discharge Monitoring Requirements

Parameter	Units	Sample Type	Minimum Sampling Frequency	Required Analytical Test Method
Reason for Diversion	--	Narrative	--	--
Duration of Diversion	hours	Narrative	Per each intermittent diversion event	--
Description (Influent or Effluent)	--	Narrative	Per each intermittent diversion event	--
Freeboard	0.1 feet	Measured	Weekly	--

VII. RECLAMATION MONITORING REQUIREMENTS

A. Reclamation sampling shall be done in accordance with Waste Discharge Requirements Order No. 97-146 or subsequent Orders that regulate the reclamation of treated wastewater.

VIII. RECEIVING WATER MONITORING REQUIREMENTS – SURFACE WATER AND GROUNDWATER

The Discharger shall implement the Receiving Water Monitoring Requirements in Attachment E, Sections VIII.A.1, VIII.A.2 and VIII.A.3 of this Order. However, in lieu of conducting the individual monitoring specified in Attachment E, Sections VIII.A.1, VIII.A.2 and VIII.A.3 of this Order (including visual observations), the Discharger may elect to participate in the Delta Regional Monitoring Program. [1] The Discharger may choose to conduct all or part of the receiving water monitoring through the Delta Regional Monitoring Program. If the Discharger elects to cease all or part of the individual receiving water monitoring and instead participates in the Delta Regional Monitoring Program, the Discharger shall submit a letter signed by an authorized representative informing the Board that the Discharger will participate in the Delta Regional Monitoring Program, and the date on which individual receiving water monitoring required under Attachment E, Sections VIII.A.1, VIII.A.2 and VIII.A.3 will cease, or be modified, and specific monitoring locations and constituent combinations that will no longer be conducted individually. Written approval of the Discharger's request, by the Executive Officer, is required prior to discontinuing part or all of individual receiving water monitoring. Approval by the Executive Officer is not required prior to participating in the Delta Regional Monitoring Program.

If the Discharger participates in the Delta Regional Monitoring Program in lieu of conducting individual receiving water monitoring, the Discharger shall continue to participate in the Delta Regional Monitoring Program until such time as the Discharger informs the Board that participation in the Delta RMP will cease and individual monitoring is reinstituted. Receiving water monitoring under Attachment E, Sections VIII.A.1, VIII.A.2 and VIII.A.3, is not required under this Order so long as the Discharger adequately supports the Delta Regional Monitoring Program. However, the Report of Waste Discharge for the next permit renewal shall include, at minimum, one representative ambient background characterization monitoring event for priority pollutant constituents during the term of the permit. Data from the Delta Regional Monitoring Program may be utilized to characterize the receiving water in the permit renewal. Alternatively, the Discharger may conduct any site-specific receiving water monitoring deemed appropriate by the Discharger and submit that monitoring data with this Characterization Monitoring. If the Discharger fails to adequately support the Delta Regional Monitoring Program, as defined by the Delta RMP Steering Committee, the Discharger shall reinstitute individual receiving water monitoring under Attachment E, Sections VIII.A.1, VIII.A.2 and VIII.A.3, upon written notice from the Executive Officer. During participation in the Delta RMP, the

[1] If the Discharger elects to participate in the Delta RMP, it shall continue to submit receiving water data for temperature. At minimum, one representative upstream receiving water temperature sample shall be submitted annually for the month of January. The temperature data shall be submitted in the January self-monitoring report and will be used to determine compliance with the temperature effluent limitation. Temperature data may be collected by the Discharger for this purpose or the Discharger may submit representative temperature data from the Delta RMP or other appropriate monitoring programs (e.g., Department of Water Resources, United States Geological Survey, etc.).

Discharger may- conduct and submit any or part of the receiving water monitoring included in this Monitoring and Reporting Program that is deemed appropriate by the Discharger.

Delta RMP data is not intended to be used directly to represent either upstream or downstream water quality for purposes of determining compliance with this Permit. Delta RMP monitoring stations are established generally as “integrator sites” to evaluate the combined impacts on water quality of multiple discharges into the Delta; Delta RMP monitoring stations would not normally be able to identify the source of any specific constituent, but would be used to identify water quality issues needing further evaluation. Delta RMP monitoring data , along with individual Discharger data, may be used to help establish background receiving water quality for Reasonable Potential analyses in an NPDES Permit after evaluation of the applicability of the data for that purpose. Delta RMP data, as with all environmental monitoring data, can provide an assessment of water quality at a specific place and time that can be used in conjunction with other information, such as other receiving water monitoring data, spatial and temporal distribution and trends of receiving water data, effluent data from the Discharger’s discharge and other point and non-point source discharges, receiving water flow volume, speed and direction, and other information to determine the likely source or sources of a constituent that resulted in exceedance of a receiving water quality objective.

During the period of participation in the Delta Regional Monitoring Program, the Discharger shall continue to report any individually conducted receiving water monitoring data in the Electronic Self-Monitoring Reports (eSMR) according to the Monitoring and Reporting Program. In addition, 1) with each submitted eSMR, the Discharger’s eSMR cover letter shall state that the Discharger is participating in the Delta Regional Monitoring Program in lieu of conducting the individual receiving water monitoring program required by the permit, and 2) with each annual report, the Discharger shall attach a copy of the letter originally submitted to the Central Valley Water Board describing the monitoring location(s) and constituent combinations that will no longer be conducted individually.

A. Monitoring Locations RSWU-001, RSWD-003, RSWD-004 and RSWD-005

1. The Discharger shall monitor Sacramento River at RSWU-001, RSWD-003, RSWD-004 and RSWD-005 as follows:

Table E-6a. Receiving Water Monitoring Requirements- Monitoring Locations RSWU-001 through RSWD-005

Parameter	Units	Sample Type	Minimum Sampling Frequency	Required Analytical Test Method
Flow (at RSWU-001 only)	cfs	--	Continuous	--
Fecal Coliform Organisms	MPN/100 mL	Grab	1/Quarter	--
pH[1]	standard units	Grab	1/Week	--
Ammonia Nitrogen, Total (as N)	mg/L	Grab	1/Week	--

Parameter	Units	Sample Type	Minimum Sampling Frequency	Required Analytical Test Method
Nitrogen, Total	mg/L	Grab	1/Week	--
Dissolved Oxygen	mg/L	Grab	1/Week	--
Electrical Conductivity@ 25°C	µmhos/cm	Grab	1/Week	--
Hardness (as $CaCO_3$)	mg/L	Grab	1/Month	--
Alkalinity (as $CaCO_3$)	mg/L	Grab	1/Month	--
Temperature[1]	°F	Grab	1/Week	--
Turbidity	NTU	Grab	1/Week	--

[1] Temperature and pH shall be collected at the same time as the ammonia sample.

2. The Discharger shall monitor Sacramento River at RSWU-001 as follows in Table E-6b. Beginning 1 January 2013, the Discharger shall monitor monthly for one calendar year (concurrent with effluent characterization monitoring) and repeat the monitoring every other calendar year. The monitoring results shall be submitted with the effluent characterization monitoring results as required in Table E-3b and may be submitted separate from the Self-Monitoring Reports, but no later than 1 April of the year following the calendar year of sampling.

Table E-6b. Receiving Water Monitoring Requirements – Monitoring Location RSWU-001

Parameter	Units	Sample Type	Minimum Sampling Frequency	Required Analytical Test Method
Electrical Conductivity @ 25 Deg. C	µmhos/cm	Grab	1/month-every other year[1]	--
Total Dissolved Solids (TDS)	mg/L	Grab	1/month-every other year[1]	--
Chlorpyrifos	µg/L	Grab	1/month-every other year[1]	EPA Method 625M; Method 8141, or equivalent GC/MS
Diazinon	µg/L	Grab	1/month-every other year[1]	EPA Method 625M Method 8141, or equivalent GC/MS
Dioxin[7]	µg/L	--	--	--
Pyrethroids[4]	ng/L	Grab	1/month-every other year[1]	--
Priority Pollutants[2]	µg/L	Grab	1/month-every other year[1]	--
Standard Minerals[3]	mg/L	Grab	1/month-every other year[1]	--
Other Constituents of Concern[5]	µg/L	Grab	1/month-every other year[1]	--
Hardness (as $CaCO_3$)[6]	mg/L	Grab	1/month-every other year[1]	--
Alkalinity (as $CaCO_3$)	mg/L	Grab	1/month-every other year[1]	--

[1] Monthly sampling for the 2013 calendar year and every other calendar year thereafter. These samples should be taken during the same time that monthly receiving water samples are taken for the Coordinated Monitoring Program (CMP).

[2] Priority pollutants include all 126 priority pollutants listed in the California Toxics Rule (CTR, 40 CFR 131.38), except dioxin. For priority pollutant constituents the reporting levels shall be consistent with Sections 2.4.2 and 2.4.3 of the Policy for Implementation of Toxics Standards for Inland Surface Waters, Enclosed Bays, and Estuaries of California.

[3] Standard minerals shall include the following: boron, calcium, iron, magnesium, potassium, sodium, chloride, manganese, phosphorus, total alkalinity (including alkalinity series), and hardness, and include verification that the analysis is complete (i.e., cation/anion balance).

[4] Pyrethroids to include bifenthrin, cyfluthrin, cypermethrin, esfenvalerate, lambda-cyhalothrin and permethrin.

[5] Other Constituents of Concern include:

Aluminum	Di(2-ethylhexyl)adipate	Radionuclides
Atrazine	Ethylene dibromide	Simazine
Barium	Fluoride	Styrene
Carbofuran	Glyphosate	Sulfate
NEMA and NDEA	MBAS	Sulfide
Chromium, Total	Sulfite	Trichlorofluoroethane
Diquat	Thiobencarb	1,1,2-trichloro-1,2,2-trifluoromethane
1,2-dibromo-3-chloropropane (DBCP)	Tributyltin	Xylenes
		Disulfoton

[6] Hardness must be sampled concurrently with Priority Pollutant sampling.

[7] Dioxin sampling shall be in accordance with Attachment I.

3. In conducting the receiving water sampling when discharging to Sacramento River at Discharge Point No. 001, a log shall be kept of the receiving water conditions throughout the reach bounded by Monitoring Locations RSW-001 and RSW-003 and the reach bounded by Monitoring Locations RSW-004 and RSW-005. Attention shall be given to the presence or absence of:

a. Floating or suspended matter;
b. Discoloration;
c. Bottom deposits;
d. Aquatic life;
e. Visible films, sheens, or coatings;
f. Fungi, slimes, or objectionable growths; and
g. Potential nuisance conditions.

Notes on receiving water conditions shall be summarized in the monitoring report.

B. Groundwater Monitoring Locations (Not Applicable)

Groundwater monitoring at the facility shall be conducted in accordance with Waste Discharge Requirements R5-2003-0076 or subsequent Orders that regulate the disposal of biosolids and protection of groundwater in the vicinity of the biosolids disposal.

IX. OTHER MONITORING REQUIREMENTS

A. Biosolids (Not Applicable)

Biosolids sampling and disposal shall be conducted in accordance with Waste Discharge Requirements Order No. R5-2003-0076 or subsequent Orders that regulate the disposal of biosolids.

B. Municipal Water Supply

1. See Section VI.C.2.e for monitoring and reporting requirements

C. Filter Effluent – Monitoring Location FIL-001

The Discharger shall monitor filter effluent at FIL-001 as follows:

Table E-7 Filter Effluent Monitoring

Parameter	Units	Sample Type	Sampling Frequency
Turbidity[1]	NTU	Meter	Continuous

[1] Continuous filter effluent turbidity monitoring is required on the date special Provision VI.C.6.a becomes effective.

X. REPORTING REQUIREMENTS

A. General Monitoring and Reporting Requirements

1. The Discharger shall comply with all Standard Provisions (Attachment D) related to monitoring, reporting, and recordkeeping.

2. Upon written request of the Regional Water Board, the Discharger shall submit a summary monitoring report. The report shall contain both tabular and graphical summaries of the monitoring data obtained during the previous year(s).

3. **Compliance Time Schedules.** For compliance time schedules included in the Order, the Discharger shall submit to the Regional Water Board, on or before each compliance due date, the specified document or a written report detailing compliance or noncompliance with the specific date and task. If noncompliance is reported, the Discharger shall state the reasons for noncompliance and include an estimate of the date when the Discharger will be in compliance. The Discharger shall notify the Regional Water Board by letter when it returns to compliance with the compliance time schedule.

4. The Discharger shall report to the Regional Water Board any toxic chemical release data it reports to the State Emergency Response Commission within 15 days of reporting the data to the Commission pursuant to section 313 of the "*Emergency Planning and Community Right to Know Act*" of 1986.

B. Self Monitoring Reports (SMRs)

1. At any time during the term of this permit, the State Water Board or the Central Valley Water Board may notify the Discharger to electronically submit Self-Monitoring Reports (SMRs) using the State Water Board's California Integrated Water Quality System (CIWQS) Program Web site (http://www.waterboards.ca.gov/ciwqs/index.html). Until such notification is given, the Discharger shall submit hard copy SMRs. The CIWQS Web site will provide additional directions for SMR submittal in the event there will be service interruption for electronic submittal.

2. The Discharger shall report in the SMR the results for all monitoring specified in this Monitoring and Reporting Program under sections III through IX, except that the monitoring required in Table E-3b and E-6b, and Groundwater Corrective Action Program (CAP) Monitoring required in Table E-2b, may be submitted as a separate reports as specified in this Monitoring and Reporting Program. The Discharger shall submit monthly SMRs including the results of all required monitoring using USEPA-approved test methods or other test methods specified in this Order. If the Discharger monitors any pollutant more frequently than required by this Order, the results of this monitoring shall be included in the calculations and reporting of the data submitted in the SMR. Sampling to meet one requirement may be used to satisfy another monitoring requirement (e.g., during the calendar year effluent characterization monitoring of priority pollutants is required per Table E-3b, the monitoring may satisfy the monthly effluent monitoring for the priority pollutants required in Table E-3a).

3. Monitoring periods and reporting for all required monitoring shall be completed according to the following schedule:

Table E-8. Monitoring Periods and Reporting Schedule

Sampling Frequency	Monitoring Period Begins On…	Monitoring Period	SMR Due Date
Continuous	Permit effective date	All	First day of second calendar month following month of sampling
1/Day	Permit effective date	(Midnight through 11:59 PM) or any 24-hour period that reasonably represents a calendar day for purposes of sampling.	First day of second calendar month following month of sampling
1/Week	Permit effective date	Sunday through Saturday	First day of second calendar month following month of sampling
2/Week	Permit effective date	Sunday through Saturday	First day of second calendar month following month of sampling
3/Week	Permit effective date	Sunday through Saturday	First day of second calendar month following month of sampling
1/Month	Permit effective date	1st day of calendar month through last day of calendar month	First day of second calendar month following month of sampling
2/Month	Permit effective date	1st day of calendar month through last day of calendar month	First day of second calendar month following month of sampling
1/Quarter	Permit effective date	1 January through 31 March 1 April through 30 June 1 July through 30 September 1 October through 31 December	1 May 1 August 1 November 1 February
1/Year	Permit effective date	January 1 through December 31	1 February
2/Year	Permit effective date	1 January through 30 June 1 July through 31 December	1 August 1 February

4. **Reporting Protocols.** The Discharger shall report with each sample result the applicable reported Minimum Level (ML) and the current Method Detection Limit (MDL), as determined by the procedure in 40 CFR Part 136.

   The Discharger shall report the results of analytical determinations for the presence of chemical constituents in a sample using the following reporting protocols:

   a. Sample results greater than or equal to the reported ML shall be reported as measured by the laboratory (i.e., the measured chemical concentration in the sample).

   b. Sample results less than the RL, but greater than or equal to the laboratory's MDL, shall be reported as "Detected, but Not Quantified," or DNQ. The

estimated chemical concentration of the sample shall also be reported.

For the purposes of data collection, the laboratory shall write the estimated chemical concentration next to DNQ as well as the words "Estimated Concentration" (may be shortened to "Est. Conc."). The laboratory may, if such information is available, include numerical estimates of the data quality for the reported result. Numerical estimates of data quality may be percent accuracy (+ a percentage of the reported value), numerical ranges (low to high), or any other means considered appropriate by the laboratory.

c. Sample results less than the laboratory's MDL shall be reported as "Not Detected," or ND.

d. Dischargers are to instruct laboratories to establish calibration standards so that the ML value (or its equivalent if there is differential treatment of samples relative to calibration standards) is the lowest calibration standard. At no time is the Discharger to use analytical data derived from extrapolation beyond the lowest point of the calibration curve.

5. **Compliance Determination.** Compliance with effluent limitations for priority pollutants shall be determined using sample reporting protocols defined above and in Attachment A of this Order. For purposes of reporting and administrative enforcement by the Regional Water Board and the State Water Board, the Discharger shall be deemed out of compliance with effluent limitations if the concentration of the priority pollutant in the monitoring sample is greater than the effluent limitation and greater than or equal to the reporting level (RL).

6. **Multiple Sample Data.** When determining compliance with an AMEL, AWEL, or MDEL for priority and non-priority pollutants and more than one sample result is available, the Discharger shall compute the arithmetic mean unless the data set contains one or more reported determinations of "Detected, but Not Quantified" (DNQ) or "Not Detected" (ND). In those cases, the Discharger shall compute the median in place of the arithmetic mean in accordance with the following procedure:

   a. The data set shall be ranked from low to high, ranking the reported ND determinations lowest, DNQ determinations next, followed by quantified values (if any). The order of the individual ND or DNQ determinations is unimportant.

   b. The median value of the data set shall be determined. If the data set has an odd number of data points, then the median is the middle value. If the data set has an even number of data points, then the median is the average of the two values around the middle unless one or both of the points are ND or DNQ, in which case the median value shall be the lower of the two data points where DNQ is lower than a value and ND is lower than DNQ.

7. The Discharger shall submit SMRs in accordance with the following requirements:

a. In reporting the monitoring data, the Discharger shall arrange the data in tabular form so that the date, the constituents, and the concentrations are readily discernible. The data shall be summarized in such a manner to illustrate clearly whether the discharge complies with waste discharge requirements (e.g., effluent limitations and discharge specifications, receiving water limitations, special provisions, etc.). The highest daily maximum for the month and monthly and weekly averages shall be determined and recorded as needed to demonstrate compliance. In addition, the following shall be calculated and reported in the SMRs:

i. **Annual Average Limitations**. For constituents with effluent limitations specified as "calendar annual average" (e.g., aluminum and EC) the Discharger shall report the calendar annual average in the December SMR. The calendar annual average shall be calculated as the average of the monthly averages for January through December.

ii. **Mass Loading Limitations**. For BOD_5, TSS, and ammonia, the Discharger shall calculate and report the mass loading (lbs/day) in the SMRs. The mass loading shall be calculated as follows:

Mass Loading (lbs/day) = Flow (MGD) x Concentration (mg/L) x 8.34

When calculating daily mass loading, the daily average flow and constituent concentration shall be used. For weekly average mass loading, the weekly average flow and constituent concentration shall be used. For monthly average mass loading, the monthly average flow and constituent concentration shall be used.

iii. **Mercury**. The Discharger shall calculate and report effluent total annual mass loading of total mercury in the December SMR. The total annual mass loading shall be calculated as specified in Section VII.C. of the Limitations and Discharge Requirements.

iv. **Removal Efficiency (BOD_5 and TSS)**. The Discharger shall calculate and report the percent removal of BOD_5 and TSS in the SMRs. The percent removal shall be calculated as specified in Section VII.A. of the Limitations and Discharger Requirements.

v. **Average Dry Weather Flow**. The Discharger shall calculate and report the average dry weather flow for the Facility discharge in the December SMR. The average dry weather flow shall be calculated annually as specified in Section VII.D. of the Limitations and Discharge Requirements.

vi. **Total Coliform Organisms Effluent Limitations.** Prior to Provision VI.C.6.a becoming effective, the Discharger shall calculate and report the weekly median total coliform organisms for the effluent. Beginning on the date Provision VI.C.6.a becomes effective, for May-October, the Discharger shall calculate and report the 7-day median of total coliform organisms for the effluent, and for November-April, the Discharger shall calculate and report the weekly median and monthly median of total coliform organisms for the effluent. The weekly median, 7-day median, and monthly median of total coliform organisms shall be calculated as specified in Section VII.E. of the Order.

vii. **Dissolved Oxygen Receiving Water Limitations.** The Discharger shall report monthly in the self-monitoring report the dissolved oxygen concentration of the receiving water.

viii. **Turbidity Receiving Water Limitations.** The Discharger shall calculate and report the turbidity increase in the receiving water applicable to the natural turbidity condition specified in Section V.A.17.a-e. of the Order.

b. Unless otherwise specified, all constituents monitored on a continuous basis (metered), shall be reported as daily maximums, daily minimums, and daily averages; flow shall be reported as the total volume discharged per day for each day of discharge.

c. A letter transmitting the SMRs shall accompany each report. Such a letter shall include a discussion of requirement violations found during the reporting period, and actions taken or planned for correcting noted violations, such as operation or facility modifications. If the Discharger has previously submitted a report describing corrective actions and/or a time schedule for implementing the corrective actions, reference to the previous correspondence will be satisfactory. The transmittal letter shall contain the penalty of perjury statement by the Discharger, or the Discharger's authorized agent, as described in the Standard Provisions.

d. SMRs must be submitted to the Regional Water Board, signed and certified as required by the Standard Provisions (Attachment D), to the address listed below:

Regional Water Quality Control Board
Central Valley Region
NPDES Compliance and Enforcement Unit
11020 Sun Center Dr., Suite #200
Rancho Cordova, CA 95670-6114

C. Discharge Monitoring Reports (DMRs)

1. DMRs must be signed and certified as required by the standard provisions (Attachment D). The Discharger shall submit the original DMR and one copy of the DMR to the address listed below:

STANDARD MAIL	FEDEX/UPS/ OTHER PRIVATE CARRIERS
State Water Resources Control Board Division of Water Quality c/o DMR Processing Center PO Box 100 Sacramento, CA 95812-1000	State Water Resources Control Board Division of Water Quality c/o DMR Processing Center 1001 I Street, 15th Floor Sacramento, CA 95814

2. All discharge monitoring results must be reported on the official USEPA pre-printed DMR forms (EPA Form 3320-1). Forms that are self-generated will not be accepted unless they follow the exact same format of EPA Form 3320-1.

D. Other Reports

1. **Progress Reports.** As specified in the compliance time schedules required in the Special Provisions contained in section VI.C. of the Order, progress reports shall be submitted in accordance with the following reporting requirements. At minimum, the progress reports shall include a discussion of the status of final compliance, whether the Discharger is on schedule to meet the final compliance date, and the remaining tasks to meet the final compliance date.

Table E-9. Reporting Requirements for Special Provisions Progress Reports

Special Provision	Reporting Requirements
Pollution Prevention Plan for mercury Annual Report (Section VI.C.3.a)	**1 February**, annually, after approval of updated pollution prevention plan
Title 22 Disinfection Requirements (Section VI.C.7.a)	**9 July 2014**, annually thereafter, until final compliance
Salinity Evaluation and Minimization Plan Annual Report (Section VI.C.3.b)	**1 February**, annually, after approval of plan
Compliance Schedules for Final Effluent Limitations for ammonia, compliance with final effluent limitations. (Section VI.C.7.b)	**13 July 2014**, annually thereafter, until final compliance

2. The Discharger shall report the results of any special studies such as acute and chronic toxicity testing, TRE/TIE, Pollution Prevention Plans, Salinity Evaluation and Minimization Plan, and 2,3,7,8-TCDD and other Dioxin and Furan Congeners Source Evaluation and Minimization Plan required in this Order. The Discharger shall report the progress in satisfaction of compliance schedule dates

specified in the Special Provision at section VI.C.7 of this Order. The Discharger shall submit reports with the first monthly SMR scheduled to be submitted on or immediately following the report due date AND/OR in compliance with SMR reporting requirements described in subsection X.B. above.

3. Within 90 days of permit adoption, the Discharger shall submit a report outlining reporting levels (RLs), method detection limits, and analytical methods for approval. The Discharger shall comply with the monitoring and reporting requirements for CTR constituents as outlined in section 2.3 and 2.4 of the SIP. The maximum required reporting levels for priority pollutant constituents shall be based on the minimum levels (MLs) contained in Appendix 4 of the SIP, determined in accordance with Section 2.4.2 and 2.4.3 of the SIP. In accordance with Section 2.4.2 of the SIP, when there is more than one ML value for a given substance, the Central Valley Water Board shall include as RLs, in the permit, all ML values, and their associated analytical methods, listed in Appendix 4 that are below the calculated effluent limitation. The Discharger may select any one of those cited analytical methods for compliance determination. If no ML value is below the effluent limitation, then the Central Valley Water Board shall select as the RL, the lowest ML value, and its associated analytical method, listed in Appendix 4 for inclusion in the permit.

4. Annual Operations Report. By 1 February of each year, the Discharger shall submit a written report to the Executive Officer containing the following:

a. The names, certificate grades, and general responsibilities of all persons employed at the Facility.

b. The names and telephone numbers of persons to contact regarding the plant for emergency and routine situations.

c. A statement certifying when the flow meter(s) and other monitoring instruments and devices were last calibrated, including identification of who performed the calibration.

d. A statement certifying whether the current operation and maintenance manual, and contingency plan, reflect the wastewater treatment plant as currently constructed and operated, and the dates when these documents were last revised and last reviewed for adequacy.

e. The Discharger may also be requested to submit an annual report to the Central Valley Water Board with both tabular and graphical summaries of the monitoring data obtained during the previous year. Any such request shall be made in writing. The report shall discuss the compliance record. If violations have occurred, the report shall also discuss the corrective actions taken and planned to bring the discharge into full compliance with the waste discharge requirements.

5. Annual Pretreatment Reporting Requirements

a. The Discharger shall submit annually a report to the Regional Water Board, with copies to USEPA Pacific Southwest Region and the State Water Board, describing its pretreatment activities over the previous 12 months. In the event that the Discharger is not in compliance with any conditions or requirements of this Order, then the Discharger shall also include the reasons for noncompliance and state how and when the Discharger shall comply with such conditions and requirements. This annual report shall cover operations from 1 January through 31 December and is due by **25 March** of each year. The report shall contain, but not be limited to, the following information:

i. A summary of analytical results from representative, flow proportioned, 24-hour composite sampling of the Publicly Owned Treatment Works (POTW's) influent and effluent for those pollutants USEPA has identified under section 307(a) of the CWA which are known or suspected to be discharged by nondomestic users. This will consist of an annual full priority pollutant scan, with quarterly samples analyzed only for those pollutants detected in the full scan. The Discharger is not required to sample and analyze for asbestos. Sampling and analysis shall be performed in accordance with the techniques prescribed in 40 CFR Part 136 and amendments thereto.

ii. A discussion of Upset, Interference, or Pass Through incidents, if any, at the treatment plant which the Discharger knows or suspects were caused by nondomestic users of the POTW system. The discussion shall include the reasons why the incidents occurred, the corrective actions taken and, if known, the name and address of, the nondomestic user(s) responsible. The discussion shall also include a review of the applicable pollutant limitations to determine whether any additional limitations, or changes to existing requirements, may be necessary to prevent pass through or interference, or noncompliance with sludge disposal requirements.

iii. The cumulative number of industrial users that the Discharger has notified regarding Baseline Monitoring Reports and the cumulative number of industrial user responses.

iv. An updated list of the Discharger's significant industrial users (SIUs) including their names and addresses, and a list of deletions, additions, and SIU name changes keyed to the previously submitted list. The Discharger shall provide a brief explanation for each change. The list shall identify the SIUs subject to federal categorical standards by specifying which set(s) of standards are applicable to each SIU. The list shall also indicate the SIUs subject to federal categorical standards by specifying which set(s) of standards are applicable to each SIU. The list shall also indicate which SIUs are subject to local discharge limitations.

v. The Discharger shall characterize the compliance status of each SIU through the year of record by providing a list or table which includes the following information for each industrial user:

a) Name of the SIU;

b) Category, if subject to federal categorical standards;

c) The type of wastewater treatment or control processes in place;

d) The number of samples taken by the Discharger during the year;

e) The number of samples taken by the SIU during the year;

f) For an SIU subject to discharge requirements for total toxic organics, whether all required certifications were provided;

g) Whether the SIU complied with baseline monitoring report requirements (where applicable);

h) Whether the SIU consistently achieved compliance;

i) Whether the SIU inconsistently achieved compliance;

j) A list of the standards violated during the year. Identify whether the violations were for categorical standards or local limits;

k) Whether the SIU is in significant noncompliance with applicable pretreatment requirements as defined by 40 CFR 403.8(f)(2)(vii);

l) Whether the SIU complied with schedule to achieve compliance (include the date final compliance is required);

m) Whether the SIU did not achieve compliance and not on a compliance schedule; and

n) Whether compliance status unknown.

o) A summary of enforcement or other actions taken during the year to return the SIU to compliance. Describe the type of action, final compliance date, and the amount of fines and penalties collected, if any. Describe any proposed actions for bringing the SIU into compliance.

A report describing the compliance status of each industrial user characterized by the descriptions in items a. through o. above shall be included as part of the annual report. The report shall identify the specific compliance status of each such industrial user and shall also identify the

compliance status of the POTW with regards to audit/pretreatment compliance inspection requirements.

vi. A brief description of any programs the Discharger implements to reduce pollutants from nondomestic users that are not classified as SIUs.

vii. A brief description of any significant changes in operating the pretreatment program which differ from the previous year including, but not limited to, changes concerning the program's administrative structure, local industrial discharge limitations, monitoring program or monitoring frequencies, legal authority or enforcement policy, funding mechanisms, or staffing levels.

viii. A summary of the annual pretreatment budget, including the cost of pretreatment program functions and equipment purchases.

ix. A summary of activities to involve and inform the public of the program including a copy of the newspaper notice, if any, required under 40 CFR 403.8(f)(2)(vii).

x. A summary of the inspection and sampling activities conducted by the Discharger during the past year to gather information and data regarding the industrial users. The summary shall include:

a) the names and addresses of the industrial users subjected to surveillance and an explanation of whether they were inspected, sampled, or both and the frequency of these activities at each user; and

b) the conclusions or results from the inspection or sampling of each industrial user.

xi. A summary of the compliance and enforcement activities during the past year. The summary shall include the names and addresses of the industrial users affected by the following actions:

a) Warning letters or notices of violation regarding the industrial users' apparent noncompliance with federal categorical standards or local discharge limitations. For each industrial user, identify whether the apparent violation concerned the federal categorical standards or local discharge limitations.

b) Administrative orders regarding the industrial users noncompliance with federal categorical standards or local discharge limitations. For each industrial user, identify whether the violation concerned the federal categorical standards or local discharge limitations.

c) Civil actions regarding the industrial users' noncompliance with federal categorical standards or local discharge limitations. For each industrial

user, identify whether the violation concerned the federal categorical standards or local discharge limitations.

d) Criminal actions regarding the industrial users noncompliance with federal categorical standards or local discharge limitations. For each industrial user, identify whether the violation concerned the federal categorical standards or local discharge limitations.

e) Assessment of monetary penalties. For each industrial user identify the amount of the penalties.

f) Restriction of flow to the POTW.

g) Disconnection from discharge to the POTW.

b. The Discharger shall submit a semi-annual SIU noncompliance status report to the Regional Water Board, USEPA Pacific Southwest Region, and the State Water Board. The report shall cover the period of 1 January through 30 June, and shall be submitted by 31 July. The report shall contain:

i. The name and address of all SIUs which violated any discharge or reporting requirements during the report period;

ii. A description of the violations including whether any discharge violations were for categorical standards or local limits;

iii. A description of the enforcement or other actions that were taken to remedy the noncompliance; and

iv. The status of active enforcement and other actions taken in response to SIU noncompliance identified in previous reports.

6. Municipal Water Supply Report. By 1 February of each year, the Discharger shall submit an annual Municipal Water Supply Report in accordance with Special Provisions VI.C.2.e.

Duplicate signed copies of these Pretreatment Program reports shall be submitted to the Regional Water Board and the:

State Water Resources Control Board
Division of Water Quality
1001 I Street or P.O. Box 100
Sacramento, CA 95812

and the

Regional Pretreatment Coordinator
CWA Compliance Office (WTR-7)
U.S. Environmental Protection Agency

75 Hawthorne Street
San Francisco, CA 94105-3901

7. **Filtration Operations Summary Reporting Requirement.** Effective on the date that Special Provision VI.C.6.a becomes effective, the Discharger shall, on a monthly basis, submit a summary report using existing data demonstrating operations consistent with the future Facility description with respect to operation of filtration facilities in section II.A.2 of the Fact Sheet and the Seasonal Operation Plan required in section VI.C.7.a, Task v.

ATTACHMENT F – FACT SHEET

Table of Contents

I. Permit Information F-3
II. Facility Description F-5
A. Description of Wastewater and Biosolids Treatment or Controls F-5
B. Discharge Points and Receiving Waters F-7
C. Summary of Existing Requirements and Self-Monitoring Report (SMR) Data F-8
D. Compliance Summary F-10
E. Planned Changes – Not Applicable F-11
III. Applicable Plans, Policies, and Regulations F-11
A. Legal Authorities F-11
B. California Environmental Quality Act (CEQA) F-11
C. State and Federal Regulations, Policies, and Plans F-11
D. Impaired Water Bodies on CWA 303(d) List F-20
E. Other Plans, Polices and Regulations F-21
IV. Rationale For Effluent Limitations and Discharge Specifications F-23
A. Discharge Prohibitions F-25
B. Technology-Based Effluent Limitations F-25
1. Scope and Authority F-25
2. Applicable Technology-Based Effluent Limitations F-26
C. Water Quality-Based Effluent Limitations (WQBELs) F-27
1. Scope and Authority F-27
2. Applicable Beneficial Uses and Water Quality Criteria and Objectives F-27
3. Determining the Need for WQBELs F-62
4. WQBEL Calculations F-105
5. Whole Effluent Toxicity (WET) F-109
D. Final Effluent Limitations F-110
1. Mass-based Effluent Limitations F-110
2. Averaging Periods for Effluent Limitations F-110
3. Satisfaction of Anti-Backsliding Requirements F-111
4. Satisfaction of Antidegradation Policy F-115
5. Stringency of Requirements for Individual Pollutants F-123
6. Performance-based Effluent Limitations. F-124
E. Interim Effluent Limitations F-127
F. Land Discharge Specifications – Not Applicable F-130
G. Reclamation Specifications – Not Applicable F-130
V. Rationale for Receiving Water Limitations F-130
A. Surface Water F-130
B. Groundwater F-130
VI. Rationale for Monitoring and Reporting Requirements F-131
A. Influent Monitoring F-131
B. Effluent Monitoring F-131
C. Whole Effluent Toxicity Testing Requirements F-133
D. Receiving Water Monitoring F-133

1. Surface Water F-133
2. Groundwater (Not Applicable) F-135
E. Other Monitoring Requirements F-135
1. Biosolids Monitoring F-135
2. Water Supply Monitoring F-135
VII. Rationale for Provisions F-136
A. Standard Provisions F-136
B. Special Provisions F-136
1. Reopener Provisions F-136
2. Special Studies and Additional Monitoring Requirements F-138
3. Best Management Practices and Pollution Prevention F-142
4. Construction, Operation, and Maintenance Specifications F-142
5. Special Provisions for Municipal Facilities (POTWs Only) F-143
6. Other Special Provisions F-144
7. Compliance Schedules F-144
VIII. Public Participation F-145
A. Notification of Interested Parties F-145
B. Written Comments F-145
C. Public Hearing F-145
D. Waste Discharge Requirements Petitions F-146
E. Information and Copying F-146
F. Register of Interested Persons F-146
G. Additional Information F-146

List of Tables

Table F-1. Facility Information F-3
Table F-2. Historic Effluent Limitations and Monitoring Data F-8
Table F-3. TMDLs in Delta F-21
Table F-4. Summary of Technology-based Effluent Limitations F-26
Table F-5. Basin Plan Beneficial Uses F-28
Table F-6. Summary of CTR Criteria for Hardness-dependent Metals F-31
Table F-7. Verification of CTR Compliance for Copper F-36
Table F-8. Verification of CTR Compliance for Silver F-36
Table F-9. Critical Receiving Water Flows F-48
Table F-10. WQBELs for Copper F-58
Table F-11. WQBELs for Cyanide F-59
Table F-12. Salinity Water Quality Criteria/Objectives F-67
Table F-13. Basin Plan Water Quality Objectives for EC F-67
Table F-14. Summary of Final Effluent Limitations F-107
Table F-15. Antidegradation Analysis F-122
Table F-16. Performance-based Effluent Limitations Statistics F-126
Table F-17. Dyntox Model Results for Percent Effluent 350 Feet from the SRWTP Diffuser at 181 mgd F-139

ATTACHMENT F – FACT SHEET

As described in the Findings in section II of this Order, this Fact Sheet includes the legal requirements and technical rationale that serve as the basis for the requirements of this Order.

This Order has been prepared under a standardized format to accommodate a broad range of discharge requirements for Dischargers in California. Only those sections or subsections of this Order that are specifically identified as "not applicable" have been determined not to apply to this Discharger. Sections or subsections of this Order not specifically identified as "not applicable" are fully applicable to this Discharger.

I. PERMIT INFORMATION

The following table summarizes administrative information related to the Facility.

Table F-1. Facility Information

WDID	5A340108002
Discharger	Sacramento Regional County Sanitation District
Name of Facility	Sacramento Regional Wastewater Treatment Plant
Facility Address	8521 Laguna Station Road
	Elk Grove, CA 95758
	Sacramento County
Facility Contact, Title and Phone	Prabhakar Somavarapu, District Engineer, (916) 875-9000
Authorized Person to Sign and Submit Reports	Prabhakar Somavarapu, District Engineer, (916) 875-9000
Mailing Address	10060 Goethe Road, Sacramento, CA 95827
Billing Address	Same
Type of Facility	POTW
Major or Minor Facility	Major
Threat to Water Quality	1
Complexity	A
Pretreatment Program	Y
Reclamation Requirements	Master Water Reclamation Permit No. 97-146
Facility Permitted Flow	181 million gallons per day (mgd)
Facility Design Flow	181 mgd
Watershed	Sacramento Watershed
Receiving Water	Sacramento River
Receiving Water Type	Sacramento-San Joaquin Delta

B. Sacramento Regional County Sanitation District (hereinafter Discharger) is the owner and operator of Sacramento Regional Wastewater Treatment Plant (hereinafter Facility), a Publicly-Owned Treatment Works.

For the purposes of this Order, references to the "discharger" or "permittee" in

applicable federal and state laws, regulations, plans, or policy are held to be equivalent to references to the Discharger herein.

C. The Facility discharges wastewater to the Sacramento River within the Sacramento-San Joaquin Delta, a water of the United States, and was previously regulated by Order No. 5-00-188 which was adopted on 4 August 2000 and expired on 1 August 2005. The terms and conditions of the previous Order were administratively continued and remained in effect until this Order, serving as new Waste Discharge Requirements (WDRs) and a renewed National Pollutant Discharge Elimination System (NPDES) permit, was adopted pursuant to this Order.

D. The Discharger filed a report of waste discharge and submitted an application for renewal of its Waste Discharge Requirements (WDRs) and National Pollutant Discharge Elimination System (NPDES) permit on 1 February 2005. Supplemental information was requested on 19 August 2008 and received on 24 August 2010**.** A site visit was conducted on 22 July 2008, to observe operations and collect additional data to develop permit limitations and conditions. Additional information and reports were submitted by the Discharger for development of this Order. This Order was adopted on 9 December 2010, and has been subsequently amended, as follows:

1. On 1 December 2011, this Order was amended by R5-2011-0083 including modifications to the Monitoring and Reporting Program, recycled water use, and manganese effluent limitation.

2. On 4 December 2012, this Order was amended by State Water Resources Control Board WQ 2012-2013, which required amendment of the final effluent limitations for ammonia nitrogen (Total as N) and the ammonia effluent limitations calculation table.

3. On 4 October 2013, this Order was amended by Order R5-2013-0124 including modifications to the Monitoring and Reporting Program, and effluent limitations for dichlorobromomethane, chlorodibromomethane, and N-nitrosodimethylamine.

4. On 8 August 2014, this Order was amended by Order R5-2014-0102 and Order R5-2014-0103, which included modifications to the interim ammonia effluent limitation, and seasonal disinfection requirements, respectively.

5. On 9 October 2014, this Order was amended by Order R5-2014-0122 adding provisions to allow participation in the Delta Regional Monitoring Program.

6. On 31 July 2015, this Order was amended by Order R5-2015-0097 to comply with the judgment and peremptory writ of mandate entered by the Sacramento County Superior Court in the matter of *California Sportfishing Protection Alliance* v. *California Regional Water Quality Control Board, Central Valley Region (Case No. 34-2013-80001358-CU-QM-GDS)* ~~from the~~. The amendment addressed ~~,~~ 1) hardness-dependent CTR metals criteria and resulting effluent limitations, 2) Thermal Plan exceptions, and 3) aluminum effluent limitations.

II. FACILITY DESCRIPTION

The Discharger provides wastewater treatment service to the Cities of Sacramento, Folsom, and West Sacramento, the communities of Courtland and Walnut Grove, and the Sacramento Area Sewer District. The Sacramento Area Sewer District service area includes the Cities of Elk Grove, Rancho Cordova, Citrus Heights, as well as, portions of the unincorporated areas of Sacramento County. The population served is approximately 1.3 million people. The collection systems are owned and operated by the various contributing agencies and not by the Discharger, and are regulated under the State Water Board general order, Water Quality Order No. 2006-0003, effective November 2006. The City of Sacramento operates both a separate sewer collection system and a combined (storm water and wastewater) collection system. During wet weather the Facility is contracted to accept up to 60 mgd of wastewater and storm runoff from the downtown Sacramento combined collection system. Combined collection flows in excess of 60 mgd are managed by the Combined Wastewater Collection and Treatment System (CWCTS) operated by the City of Sacramento. The CWCTS discharge is governed by Waste Discharge Requirements Order No. R5-2010-0004 issued to the City of Sacramento. Depending on treatment and conveyance capacity, flow in excess of 60 mgd maybe received at the Facility.

The Facility discharges to the Sacramento River just downstream of the Freeport Bridge via an outfall diffuser. The outfall diffuser is approximately 300 feet long with 74 ports and is placed perpendicular to the river flow. At times, the river flows in the reverse direction northeast towards the City of Sacramento, due to tidal activity during low river flows. The Discharger diverts its discharge to emergency storage basins whenever these conditions exist. The Discharger has determined in studies that River flows of at least 1,300 cubic feet per second (cfs) and providing a flow ratio of at least 14 to 1 (river:effluent) are required to allow for adequate mixing of the effluent through the outfall diffuser.

A. Description of Wastewater and Biosolids Treatment or Controls

1. **Existing Facility.** The Facility is staffed and operated 24 hours per day and consists of influent pumps, septage receiving station, mechanical bar screening; aerated grit handling, grit classifiers that wash and dewater grit, covered primary sedimentation tanks, pure oxygen biological treatment by activated sludge, secondary sedimentation, disinfection with chlorine gas, and dechlorination with sulfur dioxide. Effluent can be diverted to lined and unlined emergency storage basins as needed to meet effluent dilution, thermal, and disinfection requirements or divert excess flows. The current average dry weather flows are approximately 141 mgd and the Facility has a designed capacity of 181 mgd. Odors are controlled through stripping towers and carbon treatment.

Solids are thickened by dissolved air flotation and gravity belt thickeners. Primary and secondary sludge is mixed and sent to anaerobic digesters for approximately fifteen days or more, stored at the solids storage basins for three to five years then harvested and injected into lined dedicated land disposal sites. Some biosolids are recycled with the Synagro Organic Fertilizer Company and the Discharger can dispose of biosolids at the Keifer Landfill as an emergency disposal option. Separate Waste Discharge Requirements (Order No. R5-2003-0076) in conformance with Title 27, California Code of Regulations, Division 2, Subdivision 1 regulate the biosolids and solids storage and disposal facilities, the Class II dedicated land treatment units, unclassified solids storage basins, the Class III grit and screenings landfill closure and the groundwater Corrective Action Program (CAP).

2. **Future Facility.** Based on information provided by the Discharger, the Facility will be modified in order to comply with certain new requirements in this Order consistent with the applicable compliance deadlines. The future Facility and operation is as follows, and differs seasonally.

   The 181 mgd ADWF design capacity is unchanged. Facility modification will include replacement of the existing pure oxygen biological treatment facilities with biological nutrient removal (BNR) air activated treatment facilities capable of removing ammonia and nitrate nitrogen, addition of tertiary treatment in the form of filtration with granular media filters, and an increase in storage facilities. The Facility will continue to be staffed and operated 24 hours per day and will consist of influent pumps; septage receiving station; mechanical bar screening; aerated grit handling; grit classifiers that wash and dewater grit; covered primary sedimentation tanks; primary effluent peak-shaving facilities; BNR air activated sludge treatment; nitrifying sequencing batch reactor for treating high ammonia concentration waste streams from solids storage basins and biosolids reclamation facility; secondary sedimentation; granular media filtration; disinfection with chlorine liquid; and dechlorination with sodium bisulfite. Compliant effluent can be diverted to lined emergency storage basins as needed to meet effluent dilution and thermal limits before discharge to the river. Non-compliant effluent, primary influent or effluent, and raw wastewater can be diverted to lined emergency storage basins as needed for any reason including process upsets, or diversions for excess flows, and returned for additional treatment to the influent of the facility. Odors are controlled through biological fixed media scrubbers, chemical oxidizing towers and carbon treatment towers.

   The BNR activated sludge treatment facilities will be designed to process up to 330 mgd. Flows in excess of 330 mgd will be stored in peak-shaving storage facilities and returned for processing through the activated sludge treatment facilities when capacity is available. All wastewater will receive secondary treatment through the BNRs. The tertiary filters will be designed to process flows up to 217 mgd. This Order requires seasonal disinfection requirements and the Facility will be operated differently seasonally, as follows:

a. **1 May – 31 October.** The Facility will be operated to meet Title 22 or equivalent disinfection criteria (Provision VI.C.6.a).

b. **1 November – 30 April (commences 1 November 2023)**

In the descriptions below, "treated effluent discharge" means discharge to the river or storage basins, and "filtered" means tertiary filtration of BNR effluent under filter operations consistent with the design hydraulic loading rate necessary to comply with the Title 22, or equivalent, disinfection criteria.

i. When treated effluent discharge is 217 mgd, or less:

The entire treated effluent discharge will be filtered.

ii. When treated effluent discharge exceeds 217 mgd:

Treated effluent discharge flows up to 217 mgd will be filtered, and remaining wastewater will not be filtered. Filtered and non-filtered wastewater will be combined prior to disinfection by the chlorination/de-chlorination facilities.

Solids will be thickened by dissolved air flotation and gravity belt thickeners. Primary and secondary sludge will be mixed and sent to anaerobic digesters for approximately fifteen days or more, stored at the solids storage basins for three to five years then harvested and injected into lined dedicated land disposal sites. It is expected some biosolids will be recycled with the Synagro Organic Fertilizer Company and the Discharger will still dispose of biosolids at the Keifer Landfill as an emergency disposal option. Separate Waste Discharge Requirements (Order No. R5-2003-0076 or any updated order) in conformance with Title 27, California Code of Regulations, Division 2, Subdivision 1 will continue to regulate the biosolids and solids storage and disposal facilities, the Class II dedicated land treatment units, unclassified solids storage basins, the Class III grit and screenings landfill closure and groundwater Corrective Action Program (CAP).

B. Discharge Points and Receiving Waters

1. The Facility is located in Section 19, T7N, R5E, MDB&M, as shown in Attachment B, a part of this Order.

2. Treated municipal wastewater is discharged at Discharge Point No. 001 to Sacramento River, a water of the United States and within the legal boundary of the Sacramento-San Joaquin Delta at a point latitude 38° 27' 15" N and longitude 121° 30' 00" W.

3. The Facility and the Discharge Point are located near the community of Freeport outside the City of Sacramento and within the Sacramento River Watershed.

C. Summary of Existing Requirements and Self-Monitoring Report (SMR) Data

Effluent limitations and Discharge Specifications contained in Order No. 5-00-188 for discharges from Discharge Point No. 001 and representative monitoring data from the term of Order No. Order No. 5-00-188 are as follows:

Table F-2. Historic Effluent Limitations and Monitoring Data

Parameter	Units	Effluent Limitation			Monitoring Data (From June 2005 – July 2008)		
		Average Monthly	Average Weekly	Average Daily	Highest Average Monthly Discharge	Highest Average Weekly Discharge	Highest Daily Discharge
Biochemical Oxygen Demand (5-day @ 20°C)	mg/L	30	45	60	11.1	13	28
	lbs/day[1,2]	45,286	67,929	90,572	13,136	16,336	31,283
		98,078	147,118	196,157			
Total Suspended Solids	mg/L	30	45	90	11	15	25
	lbs/day[1,2]	45,286	67,929	90,572	12,266	17,219	37,232
		98,078	147,118	196,157			
Settleable Solids	mL/L	0.1	--	0.5[3]	0.0	--	2.5
Total Coliform Organisms	MPN/100 mL	--	23 median	500[4]	--	30	500
Oil & Grease	mg/L	10	--	--	<5.5	--	
Lead	µg/L	--	--	(5.1)[5] 7.8	--	--	1.19
	lbs/day[1,2]	--	--	12	--	--	1.3
		--	--	26	--	--	
Silver	µg/L	--	--	(0.57)[5] 0.72	--	--	0.149
	lbs/day[1,2]	--	--	1.1			0.175
		--	--	2.3	--	--	
Mercury	lbs/year	5.1[6]	--	--	--	--	2.49
Copper	µg/L	--	--	(9.7)[5] 22.8	--	--	6.34
	lbs/day[1,2]	--	--	34	--	--	9.9
		--	--	75	--	--	
Cyanide	µg/L	--	--	(6.1)[5] 10.8	--	--	10
	lbs/day[1,2]	--	--	16	--	--	10.9
		--	--	35	--	--	
Zinc	µg/L	--	--	(46.7)[5] 69.8	--	--	33.5
	lbs/day[1,2]	--	--	105	--	--	37
		--	--	228	--	--	
Dichlorobromomethane	µg/L	3.6	--	7.2	--	--	3.4
	lbs/day[1,2]	5.4	--	11	--	--	2.7
		12	--	24	--	--	

Parameter	Units	Effluent Limitation			Monitoring Data (From June 2005 – July 2008)		
		Average Monthly	Average Weekly	Average Daily	Highest Average Monthly Discharge	Highest Average Weekly Discharge	Highest Daily Discharge
Lindane (lbs/yr)	µg/L		--	ND[3]	--	--	<0.003
	lbs/year	19.6[6]	--		--	--	1.29
Methylene chloride	µg/L	14.3	--	32.1	--	--	5.4
	lbs/day[1,2]	22	--	48	--	--	6.4
		47	--	105	--	--	
Chloroform	µg/L	37.3	--	55.3	--	--	51
	lbs/day[1,2]	56	--	83			61.5
		122	--	181			
Chlorine, Total Residual	mg/L	0.011	--	0.018	--	--	0.07
	lbs/day[1,2]	17	--	27	--	--	82
		36	--	59	--	--	
Tetrachloroethylene	µg/L	14.1	--	35.6	--	--	0.9
Bis-2 (ethylhexyl) phthalate	µg/L	8.6	--	19.1	--	--	8.1
	lbs/day[1,2]	13	--	29	--	--	9.7
		28	--	62	--	--	
pH	standard units	--	--	6.0 – 7.5[7]	--	--	6 – 7.5
Average Dry Weather Flow	MGD	181	--	--	147	--	--
Peak Wet Weather Flow	MGD	392	--	--	179	--	345
Acute Toxicity	% Survival		[8]	--	--	--	50% (lowest)
Temperature	°F		[9]	--	--	--	23 over natural receiving water

Parameter	Units	Effluent Limitation			Monitoring Data (From June 2005 – July 2008)		
		Average Monthly	Average Weekly	Average Daily	Highest Average Monthly Discharge	Highest Average Weekly Discharge	Highest Daily Discharge

[1] Based on average dry weather flow capacity of 181 mgd, applicable from May through October
[2] Based on peak weather flow capacity of 392 mgd, applicable from November through April.
[3] Daily Maximum.
[4] Daily Maximum limit shall not be exceeded in any two (2) consecutive days.
[5] (Trigger) and interim limits. Exceedance of the trigger concentration is a not violation, but when exceeded requires immediate investigation and action plan. Trigger concentration are not subsequently expressed as mass limits. Interim limits were pending additional studies, however final limits were never established under Order No. 5-00-188.
[6] Based on lbs/year.
[7] The discharge shall not have a pH value of less than 6.0 nor greater than 8.5 as calculated by a running 20-minute average of continuously monitored effluent pH nor have a pH value greater than 7.5 as calculated by a running 1-hour average of continuously monitored effluent pH. As discussed in Finding 23 and 24 the upper limit of 7.5 as 1-hour average is an interim limit until completion of further studies at which time its necessity will be reassessed.
[8] Survival of aquatic organisms in 96-hour bioassays of undiluted waste shall be no less than:
Minimum for any one bioassay---------- 70%
Median for any three or more consecutive bioassays ----- 90%
[9] The maximum temperature of the discharge shall not exceed the natural receiving water temperature by more than 25°F from 1 October through 30 April or by more than 20°F from May through 30 September.

D. Compliance Summary

Year:	2005	2006	2007	2008	2009
Chlorine Residual	2	0	1	0	0
Minimum Dilution	0	1	0	0	0
Total Coliform Organisms	0	0	1	0	0
Acute Aquatic Toxicity	0	0	0	6	9
Settleable Solids	0	0	0	1	0

E. Planned Changes – Not Applicable

III. APPLICABLE PLANS, POLICIES, AND REGULATIONS

The requirements contained in this Order are based on the applicable plans, policies, and regulations identified in the Findings in section II of this Order. The applicable plans, policies, and regulations relevant to the discharge include the following:

A. Legal Authorities

This Order is issued pursuant to regulations in the Clean Water Act (CWA) and the California Water Code (CWC) as specified in the Finding contained at section II.C of this Order.

B. California Environmental Quality Act (CEQA)

This Order meets the requirements of CEQA as specified in the Finding contained at section II.E of this Order.

C. State and Federal Regulations, Policies, and Plans

1. **Water Quality Control Plans.** This Order implements the following water quality control plans as specified in the Finding contained at section II.H of this Order.

   a. *Water Quality Control Plan, Fourth Edition* (Revised February 2007), *for the Sacramento and San Joaquin River Basin* (Basin Plan).

   b. Water Quality Control Plan for the San Francisco Bay/Sacramento-San Joaquin Delta Estuary (Bay-Delta Plan)

   c. Water Quality Control Plan for Control of Temperature in the Coastal and Interstate Water and Enclosed Bays and Estuaries of California (Thermal Plan)

   For purposes of the Thermal Plan, the Discharger is considered to be an Existing Discharger of Elevated Temperature Waste. The Thermal Plan in section 5.A. contains the following temperature objectives for surface waters that are applicable to this discharge:

"*5. Estuaries*

A. Existing discharges

(1) Elevated temperature waste discharges shall comply with the following:

a. The maximum temperature shall not exceed the natural receiving water temperature by more than 20°F.

b. Elevated temperature waste discharges either individually or combined with other discharges shall not create a zone, defined by water temperatures of more than 1°F above natural receiving water temperature, which exceeds 25 percent of the cross-sectional area of a main river channel at any point.

c. No discharge shall cause a surface water temperature rise greater than 4°F above the natural temperature of the receiving waters at any time or place.

d. Additional limitations shall be imposed when necessary to assure protection of beneficial uses."

~~The Regional Water Board, on 26 May 1989, adopted Resolution No. 89-094 granting an exception to objectives 5A(1)(a) (from 1 October to 30 April) and 5A(1)(b) of the Thermal Plan. Additionally, Resolution 89-094 requires that the temperature of the discharge shall not exceed the natural receiving water temperature by more than 25°F from 1 October through 30 April. The State Water Board, on 20 September 1990, adopted Resolution No. 90-103 approving and modifying Central Valley Water Board Resolution No.89-094. State Water Board Resolution No. 90-103 approved the exception to objective 5A(1)(a), but not the one to 5A(1)(b). It further required a study of the feasibility of meeting the existing objective,5A(1)(b). The Discharger submitted the required study in a report in October 1991, with supplements in November and December 1991. Based on the study, the State Water Board adopted Resolution No. 92-82 on 22 October 1992, granting the Discharger an exception to objective 5A(1)(b). Specifically, the exception allows a maximum increase of 2 °F in a zone that does not exceed 25 percent of the cross sectional area of the main river channel at any point. The exception also limited any excursion of objective 5A(1)(b) to no more than one hour per day as an average in any thirty-day period when the upstream temperature of the Sacramento River is 65 °F or greater. This exception was carried over in Waste Discharge Order No. 5-00-188.~~

(1) Thermal Plan Exceptions

The Thermal Plan allows regional boards to provide exceptions to specific water quality objectives in the Thermal Plan so long as the exceptions comply with CWA section 316(a) and federal regulations. The applicable exception is promulgated in 40 CFR Section 125.73(a), which provides that, "*Thermal discharge effluent limitations or standards established in permits may be less stringent than those required by applicable standards*

and limitations if the discharger demonstrates to the satisfaction of the director that such effluent limitations are more stringent than necessary to assure the protection and propagation of a balanced, indigenous community of shellfish, fish and wildlife in and on the body of water into which the discharge is made. This demonstration must show that the alternative effluent limitation desired by the discharger, considering the cumulative impact of its thermal discharge together with all other significant impacts on the species affected, will assure the protection and propagation of a balanced indigenous community of shellfish, fish and wildlife in and on the body of water into which the discharge is to be made."

a) Background

- The Central Valley Water Board, on 26 May 1989, adopted Resolution 89-094 granting exceptions to objectives 5A(1)(a) and 5A(1)(b) of the Thermal Plan. Objective 5A(1)(a) was relaxed such that the temperature of the discharge shall not exceed the natural receiving water temperature by more than 25°F from 1 October through 30 April. Objective 5A(1)(b) was waived.

- The State Water Board, on 20 September 1990, adopted Resolution 90-103 approving and modifying Central Valley Water Board Resolution 89-094. State Water Board Resolution 90-103 approved the exception to objective 5A(1)(a), but deferred a decision on the exception to 5A(1)(b). It required the Discharger to study the feasibility of meeting objective 5A(1)(b). The Discharger submitted the required study in a report in October 1991, with supplements in November and December 1991. Based on the study, the State Water Board found that the heat load contributed by the Dischargers effluent did not pose a threat to aquatic life, including salmon, at any season. The Board adopted Resolution 92-82 on 22 October 1992, granting the Discharger a conditional exception to objective 5A(1)(b). Specifically, the exception allowed a maximum increase of 2 °F in a zone that does not exceed 25 percent of the cross sectional area of the main river channel at any point. The exception also limited any excursion of objective 5A(1)(b) to no more than one hour per day as an average in any thirty-day period when the upstream temperature of the Sacramento River is 65 °F or greater. These requirements were implemented in Waste Discharge Requirements Order 5-00-188 adopted in August 2000.

- As a condition of Order 5-00-188, the Discharger completed and submitted a study assessing the thermal impacts of its discharge in the Sacramento River to the NMFS, titled "Thermal Effects of Sacramento Regional Wastewater Treatment Plant Discharges on

Migrating Fishes of the Sacramento River, February 2005." The thermal impact assessment recommended continuation of the existing thermal plan exceptions. The 2005 Thermal Study was reviewed by NMFS staff and they did not indicate any concerns with the Thermal Plan exceptions.

b) 2010 Temperature Study

- In July 2010, the Discharger submitted a new temperature study developed by Robertson-Bryan, Inc., "Thermal Plan Exception Justification for the Sacramento Regional Wastewater Treatment Plant", (RBI 2010), and requested revised Thermal Plan exceptions. The study consisted of thermal assessment and fisheries assessment. The thermal assessment characterized the temperatures in the vicinity and downstream of the diffuser at design flow rate at worse-case and typical flow condition and evaluated the temperature conditions against the thermal tolerances, exposure times, and migration paths of fishes that pass the diffuser. The fisheries assessment addressed blockage/significant delay of upstream spawning migrations of adult anadromous fish caused by near-field thermal plume, population-level effects resulting from mortality in fish caused by acute exposure, and population or community-level effects on fish resulting from far-field thermal effects.

- Based on the dynamic model performed by Flow Science, under all near-field conditions modeled, a zone of passage approximately 75-100 ft wide occurs along the west bank and 175-200 ft wide occurs along the east bank. Also the warmest part of the thermal plume is located close to the bottom of the river where few fish are expected to be exposed and exposure time ranges from seconds to minutes. Actively swimming fishes can readily avoid unfavorable temperatures within the plume by swimming around or over the portions of the plume. Therefore, a thermally tolerable zone of passage exists for all actively swimming fish species that pass the diffuser, and the thermal plume would not cause lethality to emigrating fishes or have adverse population- or community level effects to the anadromous or resident fishes. In addition, far-field temperature modeling results indicate that under fully-mixed conditions downstream of the discharge would not adversely affect aquatic life resources of the Sacramento River.

- During the 2010 permit renewal process, Central Valley Water Board staff consulted with NFMS, USFWS, and CDFW (fishery agencies) regarding the Discharger's proposed Thermal Plan exceptions. Staff issued a public scoping document regarding

aquatic life and wildlife preservation related issues and provided the scoping document for public review and comment on 28 April 2010.

NMFS[1] stated, "…listed species have sufficient swimming abilities to readily avoid the thermal component of this stressor." However, NMFS expressed concerns that the area of thermal mixing at the outfall diffuser had a potential to attract non-native predators of the listed species under the Endangered Species Act (ESA)[2] and recommended a predation study be performed. USFWS[3] recommended the exception from Order 5-00-188 be retained and no further exception be permitted. Additionally, USFWS recommended the Discharger initiate planning to address future increases in the discharge with consideration for changes in the Sacramento River as a result of climate change without the need for sequential Thermal Plan exceptions. USFWS was also concerned about the potential of thermal discharges to create winter thermal refugia for non-native predators and the lack of information for the protection of delta smelt, and recommended the renewed 2010 permit include a temperature study requirement.

- The recommendations from the fishery agencies were incorporated into the tentative NPDES permit that was issued on 3 September 2010. The tentative permit continued the Thermal Plan exceptions from Order 5-00-188 and required the Discharger to conduct a new temperature study to evaluate the concerns regarding predation. NMFS, USFWS, and CDFW concurred with the temperature requirements in the tentative permit. In their comments to the tentative Order, NFMS reiterated its recommendation about the predation study; USFWS acknowledged the incorporation of the thermal study and consented the permit provisions were protective of fish and wildlife related beneficial uses; and CDFW supported the inclusion of the temperature study to evaluate the protection of delta smelt and the Sacramento River biota.

c) 2013 Temperature Study

- After adoption of the 2010 Order, the Discharger contracted with Robertson-Bryan, Inc. to begin development of a work plan for conducting the temperature study. The fishery agencies participated in the development of the study work plan, and in March 2013, the Discharger submitted the required temperature study, "Temperature Study to Assess the Thermal Impacts on the

[1] Letter from NMFS to the Central Valley Water Board dated 12 September 2010 (NMFS 2010).
[2] Specifically, Sacramento River winter-run Chinook Salmon (*Oncorhynchus tshawytscha*), Central Valley spring-run Chinook salmon (*O. tshawytscha*), California Central Valley steelhead (*O. mykiss*), and the Southern distinct population segment of North American green sturgeon (*Acipenser medirostris*).
[3] Letter from USFWS to Central Valley Water Board dated 18 August 2010 (USFWS 2010).

Sacramento Regional Wastewater Treatment Plant Discharge on Aquatic Life of the Lower Sacramento River" (RBI 2013), to address the concerns of the fishery agencies. The study determined that:

1) Fish species (Chinook salmon, steelhead, delta smelt, green sturgeon, longfin smelt,Sacramento splittail, hardhead, Pacific lamprey, or river lamprey), phytoplankton, zooplankton, and benthic macroinvertebrates (BMI) would not experience thermal exposures that would exceed lethal or sub-lethal thresholds.

2) The thermal plume near the diffuser did not block/delay upstream migration of adult fishes or downstream migration of larval and juvenile fishes. The discharge upon its full mixing with river flow would not block upstream adult migration of Chinook salmon or other migratory fish species.

3) Large numbers of predatory fishes were not holding at the diffuser site due to elevated water temperatures. The study found that predation rates on Chinook salmon smolts emigrating past the diffuser were no higher than elsewhere in the lower Sacramento River, upstream and downstream of the diffuser site.

4) The migratory and resident predatory fishes tracked did not congregate and hold within the plume for continuous periods of time sufficient to result in exposure durations that would cause acute or chronic toxicity, based on plume water quality.

5) Discharges did not increase river temperatures, upon full mixing, by magnitude and duration that would be of concern for aquatic life in the lower Sacramento River or Delta.

- NMFS[1] reviewed the study in June 2014 and found that, "…Chinook salmon, steelhead, green sturgeon, as well as the other aquatic species examined migrating past the diffuser location and within the thermal plume would not experience thermal exposure that would exceed lethal or sub-lethal thresholds… " , "…juvenile Chinook salmon are not delayed or blocked by the thermal plume in their downstream migration and that based on the tracks of the individual fish, do not exhibit any apparent erratic behavior when encountering the thermal plume.", and "…the predation upon juvenile Chinook salmon within the close vicinity of the diffuser appeared to be minimal to nonexistent."

- USFWS[2] reviewed the study and provided comments on 18 December 2013, which stated, "The final report of the

[1] Letter from NFMS to Central Valley Water Board dated 2 June 2014 (NMFS 2014).
[2] Letter from USFWS to Central Valley Water Board dated 18 December 2013 (USFWS 2013).

temperature study is generally complete and is mostly consistent with the Work Plan developed with stakeholders that was completed in June 2011. There are, however, a few omissions in the study which prevent the Service from fully evaluating the thermal effects of the facility on delta smelt." The USFWS recommended that the Discharger modify the current study or provide additional analyses on delta smelt.

d) 2015 Delta Smelt Addendum

- In May 2015, the Discharger submitted an addendum developed by Robertson-Bryan, Inc, "Temperature Study to Assess the Thermal Impacts on the Sacramento Regional Wastewater Treatment Plant Discharge on Aquatic Life of the Lower Sacramento River: Delta Smelt Addendum" (RBI 2015). This addendum assessed the potential direct and indirect effects of the thermal discharge on all delta smelt life stages such as adults, larvae, and post-spawn adults, and on delta smelt critical habitat. The study concluded that the discharge "…would not cause lethality to individual delta smelt, result in chronic, adverse sublethal effects, adversely modify delta smelt critical habitat, prevent sustainability or recovery of the delta smelt population, or eliminate access to critical habitat primary constituent elements."

- The USFWS reviewed the addendum and found that the addendum addresses its concerns and the temperature study is complete for the evaluation of Thermal Plan exceptions. The Central Valley Water Board consulted with USFWS. However, under the time constraints of the Court mandated permit amendment USFWS could not provide further recommendations. USFWS plans to review the Temperature Study in more detail and may provide additional recommendations during the upcoming permit renewal scheduled for early 2016.

The federal regulations do not require approval of the Thermal Plan exceptions by the fishery agencies. In this case however, the Central Valley Water Board consulted with the fishery agencies. After consideration of the Discharger's studies and consultation with the fishery agencies, the Central Valley Water Board finds the Discharger's studies adequately demonstrate the following:

- The thermal plume from the discharge will show no direct acute or chronic thermal effects on fishes (including larval and juvenile life stages), benthic macroinvertebrates, or plankton. The thermal exposures, either in the near-field plume area or far-field downstream areas would not exceed lethal or sub-lethal effect thresholds for aquatic life.

- There is a sufficient zone of passage such that the thermal plume from the discharge will not result in blockage or significant delay upstream migration of adult fishes or downstream migration of larval and juvenile fishes. The discharge upon its full mixing with river flow would not block or delay upstream adult migration of fish species.

- Predatory fishes were not holding in the warmer water plume near the diffuser, where they could prey upon ESA-listed fishes as they migrate past the diffuser.

- Fishes were not holding within the plume area due to the elevated water temperature for sufficient periods of time to experience toxicity, based on plume water quality.

The Discharger has demonstrated that Effluent and Receiving Water Limitations based on the Thermal Plan are more stringent than necessary to assure the protection and propagation of a balanced, indigenous community of shellfish, fish, and wildlife in and on the body of water into which the discharge is made. This demonstration has shown the Effluent and Receiving Water Limitations for temperature in this Order are sufficient, considering the cumulative impact of the thermal discharge together with all other significant impacts on the species affected, to assure the protection and propagation of a balanced, indigenous community of shellfish, fish and wildlife in and on the body of water into which the discharge is made.

The Central Valley Water Board adopts the above findings and Thermal Plan exceptions based on the current evidence in the record, including studies required by Order R5-2010-0114 completed in March 2013 and May 2015, and comments received from USFWS, CDFW and NMFS. The Central Valley Water Board plans to consider the renewal of this NPDES permit in early 2016. At that time, the Board will consider all evidence in the record including any new information received, and additional comments from the above-listed resource agencies to determine whether the evidence supports continued use of the Thermal Plan exceptions as implemented in this Order.

Therefore, in accordance with 40 CFR Section 125.73(a) this Order continues the exceptions to Thermal Plan objectives 5A(1)(a) and 5A(1)(b) from Order 5-00-188, as follows:

- **Thermal Plan Objective 5A(1)(a) Exception:**

  The maximum temperature of the discharge shall not exceed the natural receiving water temperature by more than:

  25º F from 1 October through 30 April;

  -and-

20º F from 1 May through 30 September

- **Thermal Plan Objective 5A(1)(b) Exception:**

  If the natural receiving water temperature is less than 65ºF, the discharge shall not create a zone, defined by water temperature of more than 2ºF above natural temperature, which exceeds 25 percent of the cross sectional area of the River at any point outside the zone of initial dilution.

  If the natural receiving water temperature is 65ºF or greater, the discharge shall not create a zone, defined by a water temperature of 1ºF or more above natural receiving water temperature which exceeds 25 percent of the cross sectional area of the River at any point outside the zone of initial dilution for more than one hour per day as an average in any month.

2. **National Toxics Rule (NTR) and California Toxics Rule (CTR).** This Order implements the NTR and CTR as specified in the Finding contained at section II.I of this Order.

3. **State Implementation Policy (SIP).** This Order implements the SIP as specified in the Finding contained at section II.I of this Order.

4. **Alaska Rule.** This Order is consistent with the Alaska Rule as specified in the Finding contained at section II.L of this Order.

5. **Antidegradation Policy.** As specified in the Finding contained at section II.N of this Order and as discussed in detail in the Fact Sheet (Attachment F, Section IV.D.4.), the discharge is consistent with the antidegradation provisions of 40 CFR section 131.12 and State Water Resources Control Board (State Water Board) Resolution 68-16.

6. **Anti-Backsliding Requirements.** This Order is consistent with anti-backsliding policies as specified in the Finding contained at section II.M of this Order. Compliance with the anti-backsliding requirements is discussed in the Fact Sheet (Attachment F, Section IV.D.3).

7. **Emergency Planning and Community Right to Know Act**

   Section 13263.6(a) of the CWC, requires that "*the Regional Water Board shall prescribe effluent limitations as part of the waste discharge requirements of a POTW for all substances that the most recent toxic chemical release data reported to the state emergency response commission pursuant to Section 313 of the Emergency Planning and Community Right to Know Act of 1986 (42 U.S.C. Sec. 11023) (EPCRA) indicate as discharged into the POTW, for which the State Water Board or*

the Regional Water Board has established numeric water quality objectives, and has determined that the discharge is or may be discharged at a level which will cause, have the reasonable potential to cause, or contribute to, an excursion above any numeric water quality objective".

The most recent toxic chemical data report indicates all reportable off-site releases or discharges to the collection system for this Facility were included in the effluent database. Off-site discharges included chromium and chromium compounds, copper and copper compounds, lead and lead compounds, styrene and zinc compounds. Therefore, a reasonable potential analysis based on information from EPCRA includes the data in the effluent database. Based on information from EPCRA, there is no additional reasonable potential to cause or contribute to an excursion above any numeric water quality objectives included within the Basin Plan or in any State Water Board plan, so no effluent limitations are included in this permit pursuant to CWC section 13263.6(a).

However, as detailed elsewhere in this Order, available effluent data indicate that there are constituents present in the effluent that have a reasonable potential to cause or contribute to exceedances of water quality standards and require inclusion of effluent limitations based on federal and state laws and regulations.

8. **Storm Water 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 storm water program and are obligated to comply with the federal regulations. The Discharger captures all storm water from the process areas, chemical storage facilities, administration and maintenance buildings, parking lots, undeveloped drainage areas immediately surrounding the Facilities and the Cogeneration/Ice Plant. All collected stormwater is conveyed to the stormwater pump station and is pumped to the headworks. Once or twice a year, during heavy storms, stormwater is discharged to Laguna Creek when the pumping capacity to the headworks is exceeded. This discharge is covered under the general Waste Discharge Order No. 97-03-DWQ.

9. **Endangered Species Act.** This Order is consistent with the Endangered Species Act as specified in the Finding contained at section II.P of this Order.

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

1. Under section 303(d) of the 1972 CWA, 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 Part 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 listing for the Sacramento-San Joaquin Delta includes: Chlorpyrifos, DDT, Diazinon, Exotic Species, Group A Pesticides, Mercury, Polychlorinated byphenyls (PCBs) and unknown toxicity.

2. **Total Maximum Daily Loads (TMDLs).** USEPA requires the Central Valley Water Board to develop TMDLs for each 303(d) listed pollutant and water body combination.

Table F-3. TMDLs in Delta

Pollutant	Potential Sources	Proposed TMDL Completion
Chlorpryrifos	Agriculture, Urban Runoff/Strom Sewers	Completed
DDT	Agriculture	2011
Diazinon	Agriculture, Urban Runoff/Stormwater Sewers	Completed
Exotic Species	Source Unknown	2019
Group A Pesticides	Agriculture	2011
Mercury	Resource Extraction	Phase I completed
PCBs (Polychlorinated biphenyls)	Source Unknown	2019
Unknown Toxicity	Source Unknown	2019

The 303(d) listings and TMDLs have been considered in the development of the Order. A pollutant-by-pollutant evaluation of each pollutant of concern is described in section IV.C.3. of this Fact Sheet.

E. Other Plans, Polices and Regulations

Title 27, California Code of Regulations (CCR), section 20005 et seq. (hereafter Title 27) Title 27 regulations contains the State Water Resources Control Board's water quality regulations for discharges of solid wastes to land. Exemption from Title 27 is provided if the discharges of domestic sewage or treated effluent are regulated by

WDRs and are consistent with applicable water quality objectives and treatment or storage facilities associated with municipal wastewater treatment plants, provided solid wastes are discharged only in accordance with Title 27. Historically discharges of wastewater to land, including but not limited to evaporation ponds or percolation ponds, storage ponds have been exempt from the requirements of Title 27, CCR, based on section 20090 et seq. However, the State Water Resources Control Board issued a decision on another municipal wastewater treatment plant, the City of Lodi, that storage basins must be part of the treatment process in order to be included in the Title 27 exemptions.

The Facility contains solids storage, land disposal and emergency influent and effluent storage. A determination has been made by the Central Valley Water Board whether the facilities meet the exemptions from Title 27. These facilities include the Solid Storage Basins (SSBs) and Dedicated Land Disposal areas (DLDs) and Emergency Storage Basins. The Central Valley Water Board's findings regarding Title 27 exemptions are discussed below.

1. **Solids Storage Basins (SSBs).** The SSBs are unlined storage ponds for anaerobically digested primary and secondary sludge and scum. The SSBs receive about 6,000 tons of wet sludge per day. The digested sludge has about 0.4 to 3% solids and is composed of 50 to 80% volatile solids. Digested sludge may also contain variable concentrations of contaminants such as heavy metals, chlorinated hydrocarbons and pathogens. The sludge remains in the basins from three to five years prior to discharge to the DLDs. The SSBs provide additional stabilization treatment, storage and evaporation of the sludge. The EIR states that settled sludge has created a barrier to groundwater similar to being lined. In July 2009, the District installed six new wells to monitor groundwater water quality. The results from those wells will determine if the SSBs are impacting groundwater and need to be lined. The SSBs are governed by Order No. R5-2003-0076, Sacramento Regional County Sanitation District Biosolids and Solids Storage and Disposal Facilities. Order No. R5-2003-0076 is scheduled to be renewed in 2013.

2. **Dedicated Land Disposal Areas (DLDs)**. The DLDs are lined land disposal units that receive stabilized sludge from the SSBs. The semi-liquid sludge is applied to the DLDs by subsurface injection during dry seasons. To prevent leaching of heavy metals, the District applies lime to maintain proper soil pH. The DLDs are not exempt from Title 27 and are governed by Order No. R5-2003-0076, Sacramento Regional County Sanitation District Biosolids and Solids Storage and Disposal Facilities.

3. **Corrective Action Program (CAP).** During the 1990's the groundwater beneath the DLDs were found to be impacted by elevated concentrations of nitrates, chlorides and total dissolved solids (TDS). To mitigate the impacted groundwater, the Class III landfill that took grit and screenings was closed and the DLDs were either lined or closed. The District implemented a Corrective Action Program in December 1995 to remediate the impacted groundwater and it consisted of extraction wells down gradient of the DLDs. The extraction wells keep the

groundwater from migrating off the Facility site. The groundwater is discharged downstream of the secondary clarifiers of the WWTP where it continues through the remaining treatment processes and discharged to the Sacramento River or to the onsite constructed wetlands. The CAP is operational and is regulated under Order No. R5-2003-0076, Sacramento Regional County Sanitation District Biosolids and Solids Storage and Disposal Facilities

4. **Emergency Storage Basins (ESBs).** The Facility includes five Emergency Storage Basins (ESBs), ESB-A through E with a total capacity of 302 million gallons (MG). ESB-A is lined with concrete and has 15.5 MG of capacity. The purpose of ESB-A is to store diverted influent flows above the SRWTP hydraulic capacity (peak wet weather flows) and store diverted effluent flows to meet various conditions to comply with the NPDES permit. Reasons to divert final effluent to ESB-A and not discharge to the Sacramento River include maintaining the minimum 14:1 river to effluent ratio, maintaining effluent temperature requirements, and maintaining chlorine limits. Flow stored in ESB-A is returned to the SRWTP headworks for treatment. Overflow from ESB-A discharges to unlined ESB-B that can if necessary overflow to unlined ESB-C. The combined capacity of ESB-B and C is 206 MG. Since construction of ESB-D, ESB-A is typically only used to store excess influent flows. ESB-A, B and C are exempt from Title 27 pursuant to CCR Title 27 § 20090(a) since these basins are integral to protecting the SRWTP treatment processes from washing out due to peak wet weather flows or for storage of diverted flow to comply NPDES permit conditions.

   ESB-D is lined with 60-mil reinforced polypropylene liner and has a capacity of 60-75 MG. The primary use of ESB-D is to store diverted chlorinated effluent to comply with flow dilution, potential chlorine excursions and thermal requirements. Chlorinated effluent from ESB-D is returned to the SRWTP for dechlorination prior to discharge to the Sacramento River. Since ESB-D is lined there is minimal threat to groundwater and is consistent with water quality objectives and therefore is exempt from Title 27 pursuant to CCR Title 27 § 20090(a).

   ESB-E is part of the surge relief mechanism and designed to relieve water hammer effects in the influent conduit. ESB-E stores raw influent in an unlined earthen 20 MG basin and is exempt from Title 27 pursuant to CCR Title 27 § 20090(a).

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 CWA and amendments thereto are applicable to the discharge.

The 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 dischargers 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 in the Code of Federal Regulations: 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 WQBELs 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 Basin Plan at 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 includes numeric site-specific water quality objectives and narrative objectives for toxicity, chemical constituents, discoloration, radionuclides, 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.) 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 narrative chemical constituents objective 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 Basin Plan further states that, to protect all beneficial uses, the Regional Water Board may apply limits more stringent than MCLs. 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."

A. Discharge Prohibitions

1. As stated in section 1.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.

2. Order No. 5-00-188 included the discharge prohibition of no discharge unless the river is flowing more than 1300 cfs and there is at least a 14 to 1 flow ratio (river:effluent). These conditions were based on previous studies that determined river flows of at least 1300 cfs and providing a flow ratio of at least 14 to 1 (river:effluent) are required to allow adequate mixing of the effluent. Although the diffuser configuration has changed from 99 ports to 74 ports and new dye studies confirmed the dynamic modeling showing mixing zones, all the recent analysis for the antidegradation, thermal plumes, dilution credits have been based on continuing these conditions. Therefore, these conditions remain in this Order.

B. Technology-Based Effluent Limitations

1. Scope and Authority

Section 301(b) of the CWA and implementing USEPA permit regulations at 40 CFR 122.44 require that permits include conditions meeting applicable technology-based requirements at a minimum, and any more stringent effluent limitations necessary to meet applicable water quality standards. The discharge authorized by this Order must meet minimum federal technology-based requirements based on Secondary Treatment Standards at 40 CFR Part 133.

Regulations promulgated in 40 CFR 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 40 CFR 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 5-day biochemical oxygen demand (BOD_5), total suspended solids (TSS), and pH.

2. Applicable Technology-Based Effluent Limitations

a. BOD_5 and TSS. Federal regulations, 40 CFR Part 133, establish the minimum weekly and monthly average level of effluent quality attainable by secondary treatment for BOD_5 and TSS. However, as described in section IV.C.3., this Order requires water quality-based effluent limitations (WQBELs) more stringent than the applicable technology-based effluent limitations which are based on tertiary treatment, which is necessary to protect the beneficial uses of the receiving stream. Effluent limitations prescribed by this Order are equal to or are more stringent than the Technology-Based Effluent Limits for BOD_5, TSS and pH. In addition, 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 BOD_5 and TSS over each calendar month.

b. Flow. The Facility was designed to provide a secondary level of treatment for up to a design flow of 181 mgd. Therefore, this Order contains an average dry weather discharge flow effluent limit of 181 mgd.

c. pH. The secondary treatment regulations at 40 CFR Part 133 also require that pH be maintained between 6.0 and 9.0 standard units.

Summary of Technology-based Effluent Limitations
Discharge Point No. 001

Table F-4. Summary of Technology-based Effluent Limitations

Parameter	Units	Effluent Limitations				
		Average Monthly	Average Weekly	Maximum Daily	Instantaneous Minimum	Instantaneous Maximum
BOD 5-day @ 20°C	mg/L	30	45	60	--	--
Total Suspended Solids	mg/L	30	45	60	--	--
PH	Standard Units	--	--	--	6.0	9.0
85% Removal of BOD 5-day @ 20ºC and Total Suspended Solids						

C. Water Quality-Based Effluent Limitations (WQBELs)

1. Scope and Authority

Section 301(b) of the CWA and 40 CFR 122.44(d) require that permits include limitations more stringent than applicable federal technology-based requirements where necessary to achieve applicable water quality standards. This Order contains requirements, expressed as a technology equivalence requirement, more stringent than secondary treatment requirements that are necessary to meet applicable water quality standards. The rationale for these requirements, which consist of tertiary treatment or equivalent requirements and other provisions, is discussed in section IV.C.3 of this Fact Sheet.

40 CFR 122.44(d)(1)(i) mandates that permits include effluent limitations for all pollutants that are or may be discharged at levels that have the reasonable potential to cause or contribute to an exceedance of a water quality standard, including numeric and narrative objectives within a standard. Where reasonable potential has been established for a pollutant, but there is no numeric criterion or objective for the pollutant, WQBELs must be established using: (1) USEPA criteria guidance under CWA section 304(a), supplemented where necessary by other relevant information; (2) an indicator parameter for the pollutant of concern; or (3) a calculated numeric water quality criterion, such as a proposed state criterion or policy interpreting the state's narrative criterion, supplemented with other relevant information, as provided in 40 CFR 122.44(d)(1)(vi).

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 CTR and NTR.

2. Applicable Beneficial Uses and Water Quality Criteria and Objectives

The Basin Plan designates beneficial uses, establishes water quality objectives, and contains implementation programs and policies to achieve those objectives for all waters addressed through the plan. In addition, the Basin Plan implements State Water Board Resolution No. 88-63, which established state policy that all waters, with certain exceptions, should be considered suitable or potentially suitable for municipal or domestic supply.

The Basin Plan on page II-1.00 states: "*Protection and enhancement of existing and potential beneficial uses are primary goals of water quality planning…*" and with respect to disposal of wastewaters states that "...*disposal of wastewaters is [not] a prohibited use of waters of the State; it is merely a use which cannot be satisfied to the detriment of beneficial uses.*"

The federal CWA section 101(a)(2), states: "it is the national goal that wherever attainable, an interim goal of water quality which provides for the protection and

propagation of fish, shellfish, and wildlife, and for recreation in and on the water be achieved by July 1, 1983." Federal Regulations, developed to implement the requirements of the CWA, create a rebuttable presumption that all waters be designated as fishable and swimmable. Federal Regulations, 40 CFR sections 131.2 and 131.10, require that all waters of the State regulated to protect the beneficial uses of public water supply, protection and propagation of fish, shell fish and wildlife, recreation in and on the water, agricultural, industrial and other purposes including navigation. Section 131.3(e), 40 CFR, defines existing beneficial uses as those uses actually attained after 28 November 1975, whether or not they are included in the water quality standards. Federal Regulation, 40 CFR section 131.10 requires that uses be obtained by implementing effluent limitations, requires that all downstream uses be protected and states that in no case shall a state adopt waste transport or waste assimilation as a beneficial use for any waters of the United States.

a. Receiving Water and Beneficial Uses. Beneficial uses applicable to Sacramento-San Joaquin Delta are as follows:

Table F-5. Basin Plan Beneficial Uses

Discharge Point	Receiving Water Name	Beneficial Use(s)
001	**Sacramento – San Joaquin Delta**	Existing: Municipal and domestic supply (MUN); Agricultural supply, including irrigation and stock watering (AGR); Industrial process supply (PROC); Industrial service supply (IND); Water contact recreation, including canoeing and rafting (REC-1); Non-contact water recreation (REC-2); Warm freshwater habitat (WARM); Cold freshwater habitat (COLD); Migration of aquatic organisms, warm and cold (MIGR); Spawning, reproduction, and/or early development, warm (SPWN); Wildlife habitat (WILD); and Navigation (NAV).
NA	**Groundwater**	Municipal and domestic water supply (MUN); Agricultural supply (AGR); Industrial service supply (IND), and Industrial process supply (PRO).

The Delta is vital to California and comprises over 700 miles of interconnected waterways and encompasses 1,153 square miles. The Delta is home to over two hundred eighty species of birds and more than fifty species of fish, making it one of the most ecologically important aquatic habitats in the State. Drinking water for over 25 million Californians is pumped from the Delta via the State Water Project, Central Valley Water Project, and local water intakes. The Delta supports California's trillion dollar economy with $27 billion annually for

agriculture. Additionally, the Delta has 12 million user-days for recreation each year.

b. Effluent and Ambient Background Data. The reasonable potential analysis (RPA), as described in section IV.C.3 of this Fact Sheet, was based on effluent data from 1 June 2005 through 30 July 2008 effluent and ambient background data from 1 January 1998 through 30 July 2008 submitted in SMRs, the Report of Waste Discharge (ROWD), the Pretreatment Program Annual Reports and the Coordinated Monitoring Program. Additional data outside of this range was also analyzed where there was inadequate data to perform an analysis. Effluent and ambient data for iron and manganese was collected in 2009 because this data was not included in the other databases described above. The Discharger collected effluent and receiving water dioxin and furan data in 2002 and 2004 and are included under a technical memorandum SRWTP 13267 Dioxin Data. For the metals with hardness-dependent CTR criteria including cadmium, copper, chromium III, lead, nickel, silver, and zinc, the RPA was based on the effluent and ambient background data from 1 January 2012 to 31 December 2014.

c. Hardness-Dependent CTR Metals Criteria. The CTR and the NTR 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 metals with hardness-dependent criteria include cadmium, copper, chromium III, lead, nickel, silver, and zinc.

This Order has established the criteria for hardness-dependent metals based on the hardness of the receiving water (actual ambient hardness) as required by the SIP[1] and the CTR[2]. The SIP and the CTR require the use of "receiving water" or "actual ambient" hardness, respectively, to determine effluent limitations for these metals. The CTR requires that the hardness values used shall be consistent with the design discharge conditions for design flows and mixing zones[3]. Where design flows for aquatic life criteria include the lowest one-day flow with an average reoccurrence frequency of once in ten years (1Q10) and the lowest average seven consecutive day flow with an average reoccurrence frequency of once in ten years (7Q10).[4] This section of the CTR also indicates that the design conditions should be established such that the appropriate criteria are not exceeded more than once in a three year period on average.[5] The CTR requires that when mixing zones are allowed the CTR criteria apply at the edge of the mixing zone, otherwise the criteria apply throughout the water body including at

[1] The SIP does not address how to determine the 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.
[2] 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 (40 C.F.R. § 131.38(c)(4)).
[3] 40 C.F.R. §131.3(c)(4)(ii)
[4] 40 C.F.R. §131.38(c)(2)(iii) Table 4
[5] 40 C.F.R. §131.38(c)(2)(iii) Table 4, notes 1 and 2

the point of discharge.[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.

Summary findings

Given the high variability in ambient hardness values (see Figure F-1 below), there is no single hardness value that describes the ambient receiving water for all possible scenarios (e.g., minimum, maximum). Because of this variability, staff has determined that, based on the ambient hardness concentrations measured in the receiving water, the Board has discretion to select ambient hardness values within the range of 34 mg/L (minimum) up to 100 mg/L (maximum). Staff recommends that the Board use the ambient hardness values shown in Table F-6 for the following reasons.

1. Using the ambient receiving water hardness values shown in Table F-6 will result in criteria and effluent limitations that ensure protection of beneficial uses under all ambient receiving water conditions.

2. The Water Code mandates that the Central Valley Water Board establish permit terms that will ensure the reasonable protection of beneficial uses. In this case, using the lowest measured ambient hardness to calculate effluent limitations is not reasonable, because it would result in overly conservative limits that will impart substantial costs to the Discharger and ratepayers without providing any additional protection of beneficial uses. In compliance with applicable state and federal regulatory requirements, Board staff has instead used the ambient hardness values shown in Table F-6 to calculate the proposed effluent limitations for hardness-dependent metals. The proposed effluent limitations will still be fully protective of all beneficial uses under all flow conditions.

3. Using an ambient hardness that is higher than the minimum of 34 mg/L will result in a limit that may allow increased metals to be discharged to the river, but such discharge is allowed under the antidegradation policy (State Water Board Resolution 68-16). The Board finds that this degradation is consistent with the antidegradation policy (see antidegradation findings in Section IV.D.4 of the Fact Sheet). The Antidegradation policy requires the Discharger to meet waste discharge requirements which will result in the best practicable treatment or control of the discharge necessary to assure that: a) a pollution or nuisance will not occur, and b) the highest water quality consistent with maximum benefit to the people of the State will be maintained.

4. Using the ambient hardness values shown in Table F-6 is fully consistent with the CTR and SIP's requirements for developing metals criteria.

[1] 40 C.F.R. §131.38(c)(2)(i)

Table F-6. Summary of CTR Criteria for Hardness-dependent Metals

CTR Metals	Ambient Hardness (mg/L)[2,3]	CTR Criteria (µg/L, total recoverable)[1]	
		acute	chronic
Copper	84	12	8.0
Chromium III	84	1500	180
Cadmium	78 (acute) 84 (chronic)	3.4	2.1
Lead	78	60	2.3
Nickel	84	400	45
Silver	72	2.3	--
Zinc	84	100	100

[1] Metal criteria rounded to two significant figures in accordance with the CTR (40 C.F.R. §131.38(b)(2)).

[2] The ambient hardness values in this table represent actual observed receiving water hardness measurements from the dataset shown in Figure F-1, observed within the past five years.

[3] The CTR's hardness dependent metals criteria equations vary differently depending on the metal, which results in differences in the range of ambient hardness values that may be used to develop effluent limitations that are protective of beneficial uses and comply with CTR criteria for all ambient flow conditions.

Background

The State Water Board provided direction regarding the selection of hardness in two precedential water quality orders; WQO 2008-0008 for the City of Davis Wastewater Treatment Plant (Davis Order) and WQO 2004-0013 for the Yuba City Wastewater Treatment Plant (Yuba City Order). The State Water Board recognized that the SIP and the CTR do not discuss the manner in which hardness is to be ascertained, thus regional water boards have considerable discretion in determining ambient hardness so long as the selected value is protective of water quality criteria under the given flow conditions. (Davis Order, p.10). The State Water Board explained that it is necessary that, "The [hardness] value selected should provide protection for all times of discharge under varying hardness conditions." (Yuba City Order, p. 8). The Davis Order also provides that, "Regardless of the hardness used, the resulting limits must always be protective of water quality criteria under all flow conditions." (Davis Order, p. 11)

The equation describing the total recoverable regulatory criterion, as established in the CTR, is as follows:

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

Where:

H = ambient hardness (as $CaCO_3$) [1]

WER = water-effect ratio

[1] For this discussion, all hardness values are expressed in mg/L as $CaCO_3$.

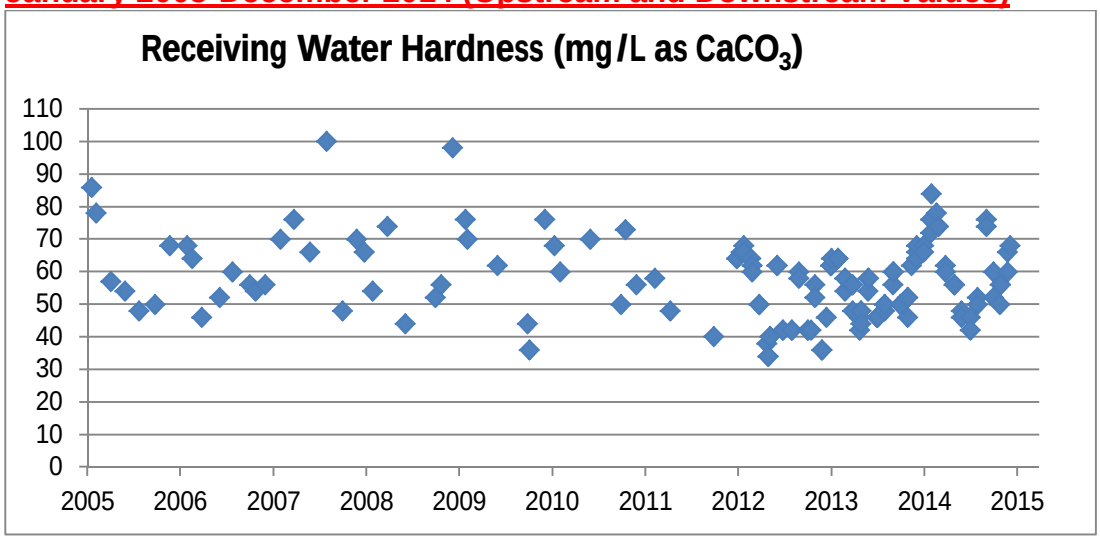
m, b = metal- and criterion-specific constants

The direction in the CTR regarding hardness selection is that it must be based on ambient hardness and consistent with design discharge conditions for design flows and mixing zones. Consistent with design discharge conditions and design flows means that the selected "design" hardness must result in effluent limitations under design discharge conditions that do not result in more than one exceedance of the applicable criteria in a three year period.[1] Where design flows for aquatic life criteria include the lowest one-day flow with an average reoccurrence frequency of once in ten years (1Q10) and the lowest average seven consecutive day flow with an average reoccurrence frequency of once in ten years (7Q10). The 1Q10 and 7Q10 Sacramento River flows are 5,060 cfs and 5,846 cfs, respectively.

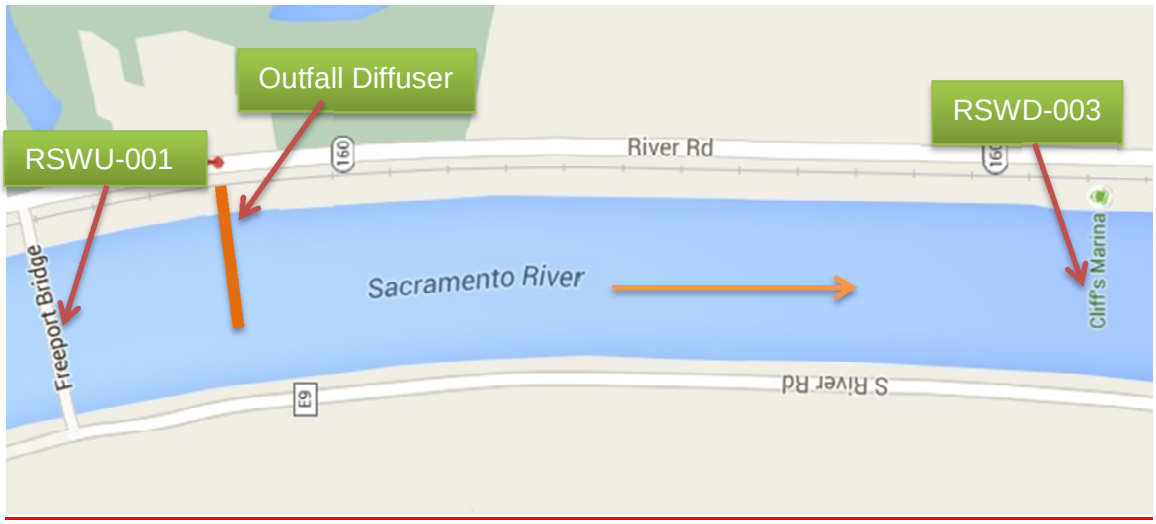
Ambient conditions

The upstream receiving water hardness at receiving water monitoring location RSWU-001 (Sacramento River at Freeport Bridge) varied from 34 mg/L to 100 mg/L, based on 107 samples from January 2005 to December 2014; the downstream receiving water hardness at receiving water monitoring location RSWD-003 (Sacramento River at Cliff's Marina) varied from 34 mg/L to 76 mg/L, based on 38 samples from January 2012 through December 2014. The Board has found that downstream hardness must be considered in developing metals criteria because it best represents the ambient receiving water downstream of the facility. In the location of the discharge, the receiving water periodically reverses direction, so both upstream and downstream hardness have been used in this analysis. Figure F-1 below shows the observed hardness data measured in the receiving water.

Figure F-1. Observed Receiving Water Hardness Concentrations January 2005-December 2014 (Upstream and Downstream Values)



[1] 40 C.F.R. §131.38(c)(2)(iii) Table 4, notes 1 and 2



In this analysis, the entire range of ambient hardness concentrations shown in Figure F-1 were considered to determine the appropriate ambient hardness to calculate the CTR criteria and effluent limitations that are protective under all discharge conditions.

Approach to derivation of criteria

As shown above, ambient hardness varies substantially. Because of the variation, there is no single hardness value that describes the ambient receiving water for all possible scenarios (e.g., minimum, maximum, mid--point). While the hardness selected must be hardness of the ambient receiving water, selection of an ambient receiving water hardness that is too high would result in effluent limitations that do not protect beneficial uses. Also, the use of minimum ambient hardness would result in criteria that are protective of beneficial uses, but such criteria may not be representative or fair and reasonable considering the wide range of ambient conditions.

Reasonable worst-case ambient conditions. To determine whether a selected ambient hardness value results in fair and reasonable effluent limitations that are fully protective while complying with federal regulations and state policy, staff have conducted an analysis considering varying ambient hardness and flow conditions. To do this, the Board has ensured that the receiving water hardness and criteria selected for effluent limitations are protective under "reasonable-worst case ambient conditions." These conditions represent the receiving water conditions under which derived effluent limitations would ensure protection of beneficial uses under all ambient flow and hardness conditions.

Reasonable worst-case ambient conditions:

- "Low receiving water flow." CTR design discharge conditions (1Q10 and 7Q10) have been selected to represent reasonable worst case receiving water flow conditions.

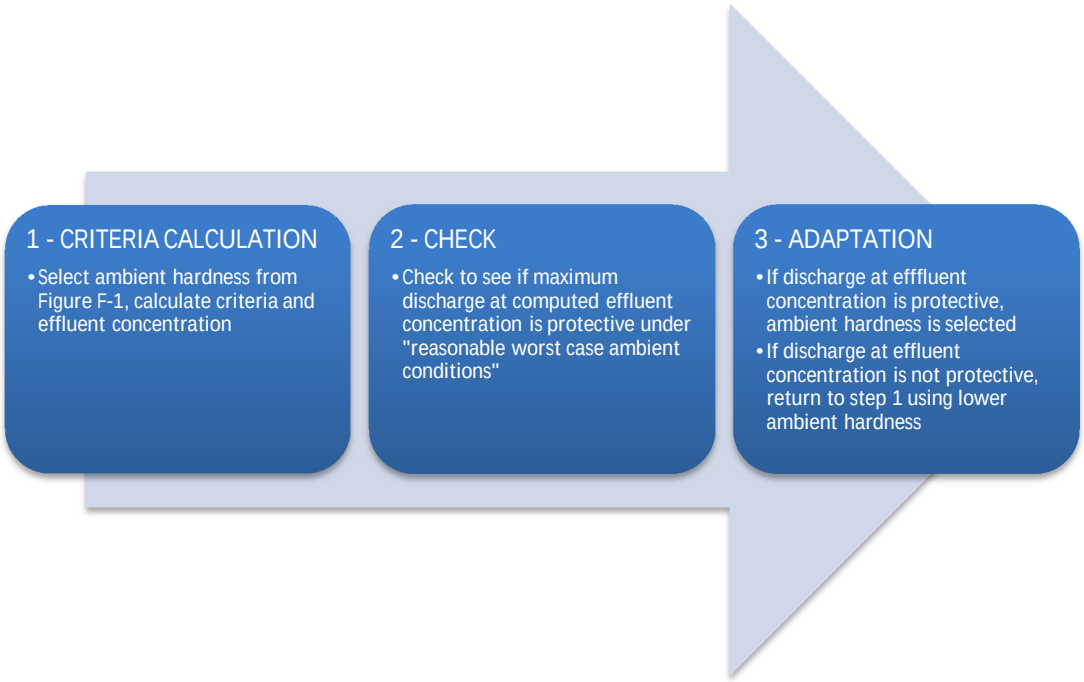
- "High receiving water flow (maximum receiving water flow)." This additional flow condition has been selected consistent with the Davis Order, which required that the hardness selected be protective of water quality criteria under all flow conditions.

- "Low receiving water hardness." The minimum receiving water hardness condition of 34 mg/L was selected to represent the reasonable worst case receiving water hardness.

- "Upstream ambient metal concentration at criteria." This condition assumes that the metal concentration in the upstream receiving water is equal to CTR criteria (upstream of the facility's discharge).

Iterative approach. An iterative analysis has been used to select the ambient hardness to calculate the criteria that will result in ~~fair and reasonable~~ effluent limitations that protect beneficial uses under all flow conditions.

The iterative approach is summarized in the following algorithm and described below in more detail.



1. CRITERIA CALCULATION. CTR criteria are calculated based on actual measured ambient hardness sample results, starting with the maximum observed ambient hardness of 100 mg/L. Effluent concentrations are calculated.

2. CHECK. Using USEPA's simple mass balance equation[1], maximum discharge at the computed effluent concentration is assumed. Resultant downstream metal concentration is then compared with downstream calculated CTR criteria under reasonable worst-case ambient conditions.

3. ADAPT. If step 2 results in:

   (A) receiving water metal concentration that complies with CTR criteria under reasonable worst-case ambient conditions, then the hardness value is selected.

   (B) receiving water metal concentration greater than CTR criteria, then return to bullet 1, selecting a lower ambient hardness value.

The CTR's hardness dependent metals criteria equation contains metal-specific constants, so the criteria vary differently depending on the metal. Therefore, steps 1 through 3 must be repeated separately for each metal until ambient hardness values are determined that will result in criteria and effluent limitations that comply with the CTR and protect beneficial uses for all metals. This is the reason for the differences in the selected ambient hardness values shown in Table F-6 above.

Results of iterative analysis

The above iterative analysis for each CTR hardness-dependent metal results in the selected ambient hardness values shown in Table F-6, above. Using these hardness values to calculate criteria, which are actual sample results collected in the receiving water, will result in effluent limitations that are protective under all ambient flow conditions. Copper and silver are used as examples below to illustrate the results of the analysis. Tables F-7 and F-8 below summarize the numeric results of the three step iterative approach for copper and silver. As shown in the example tables, ambient hardness values of 84 mg/L (copper) and 72 mg/L (silver) are used to derive criteria and effluent limitations. Then under the "check" step, worst-case ambient receiving water conditions are used to test whether discharge at the computed effluent limitations results in compliance with CTR criteria and protection of beneficial uses.

The results of the above analysis, summarized in the tables below, show that the ambient hardness values selected using the three-step iterative process results in protective effluent limitations that achieve CTR criteria under all flow conditions. Tables F-7 and F-8 below, summarize the critical flow conditions. However, the analysis evaluated all flow conditions to ensure compliance with the CTR criteria at all times.

[1] U.S. EPA NPDES Permit Writers' Handbook (EPA 833-K-10-001 September 2010, pg. 6-24)

Table F-7. Verification of CTR Compliance for Copper

Receiving water hardness used to compute effluent limitations				**84 mg/L**
Effluent Concentration Allowance for Copper				**8.0 µg/L**
Effluent Limitations for Copper				**7.4/10[2] µg/L**
	Downstream Ambient Concentrations Under Worst-Case Ambient Receiving Water Conditions			**Complies with CTR Criteria?**
	Hardness	**CTR Criteria (µg/L)**	**Ambient Copper Concentration[1] (µg/L)**	
1Q10	36.7	4.0	3.9	**Yes**
7Q10	36.4	3.9	3.9	**Yes**
Max receiving water flow	34.2	3.7	3.7	**Yes**

[1] This concentration is derived using worst-case ambient conditions. These conservative assumptions will ensure that the receiving water always complies with CTR criteria.
[2] Average monthly effluent limit of 7.4 µg/L and maximum daily effluent limit of 10 µg/L were calculated based on the effluent concentration allowance in accordance with section 1.4 of the SIP.

Table F-8. Verification of CTR Compliance for Silver

Receiving water hardness used to compute effluent limitations				**72 mg/L**
Effluent Concentration Allowance for Silver				**2.3 µg/L**
Effluent Limitations for Silver				**N/A[2]**
	Downstream Ambient Concentrations Under Worst-Case Ambient Receiving Water Conditions			**Complies with CTR Criteria?**
	Hardness	**CTR Criteria (µg/L)**	**Ambient Silver Concentration[1] (µg/L)**	
1Q10	36.7	0.7	0.7	**Yes**
7Q10	36.4	0.7	0.7	**Yes**
Max receiving water flow	34.2	0.6	0.6	**Yes**

[1] This concentration is derived using worst-case ambient conditions. These conservative assumptions will ensure that the receiving water always complies with CTR criteria.
[2] There is no effluent limitation for silver as it demonstrates no reasonable potential.

~~c. Priority Pollutant Metals~~

~~i. **Hardness Dependent CTR Metals Criteria.** 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 metals with hardness-dependent criteria include cadmium, copper, chromium III, lead, nickel, silver, and zinc.~~

~~This Order has established the criteria for hardness-dependent metals based on the reasonable worst-case ambient hardness as required by the SIP[1], the CTR[2] and State Water Board Order No. WQO 2008-0008 (City of Davis). The SIP and the CTR require the use of "receiving water" or "actual ambient" hardness, respectively, to determine effluent limitations for these metals. (SIP, § 1.2; 40 CFR § 131.38(c)(4), Table 4, note 4.) 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. Therefore, where reliable, representative data are available, the hardness value for calculating criteria can be the downstream receiving water hardness, after mixing with the effluent (Order WQO 2008-0008, p. 11). The Central Valley Water Board thus has considerable discretion in determining ambient hardness (*Id.*, p.10.).~~

~~The hardness values must also be protective under all flow conditions (*Id.*, pp. 10-11). As discussed below, scientific literature provides a reliable method for calculating protective hardness-dependent CTR criteria, considering all discharge conditions. This methodology produces criteria that ensure these metals do not cause receiving water toxicity, while avoiding criteria that are unnecessarily stringent.~~

~~**(a) Reasonable Potential Analysis (RPA).** The SIP in Section 1.3 states, "The RWQCB shall…determine whether a discharge may: (1) cause, (2) have a reasonable potential to cause, or (3) contribute to an excursion above any applicable priority pollutant criterion or objective." Section 1.3 provides a step-by-step procedure for conducting the RPA. The procedure requires the comparison of the Maximum Effluent Concentration (MEC) and Maximum Ambient Background Concentration to the applicable criterion that has been properly adjusted for hardness. Unless otherwise noted, for the hardness-dependent CTR metals criteria the following procedures were followed for properly adjusting the criterion for hardness when conducting the RPA.~~

- ~~For comparing the MEC to the applicable criterion, in accordance with the SIP, CTR, and Order WQO 2008-0008, the reasonable worst-case downstream hardness was used to adjust the criterion. In this evaluation the portion of the receiving water affected by the discharge is analyzed. For hardness-dependent criteria, the hardness of the effluent has an impact on the determination of the applicable criterion in areas in the receiving water affected by the discharge. Therefore,~~

~~[1] The SIP does not address how to determine the 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.~~

~~[2] 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.~~

~~for this situation it is necessary to consider the hardness of the effluent in determining the applicable hardness to adjust the criterion. The procedures for determining the applicable criterion after proper adjustment using the reasonable worst-case downstream hardness is outlined in subsection ii, below.~~

- ~~For comparing the Maximum Ambient Background Concentration to the applicable criterion, in accordance with the SIP, CTR, and Order WQO 2008-0008, the reasonable worst-case upstream hardness was used to adjust the criterion. In this evaluation the area outside the influence of the discharge is analyzed. For this situation, the discharge does not impact the upstream hardness. Therefore, the effect of the effluent hardness was not included in this evaluation. Upstream receiving water hardness data for the Sacramento River ranged from 26 mg/L to 100 mg/L (as CaCO3), based on 100 samples from June 2005 to July 2008. The minimum observed upstream receiving water hardness, 26 mg/L as $CaCO_3$, was used to adjust the CTR criteria when comparing Maximum Background Ambient Concentration to the criterion.~~

~~**(b) Effluent Concentration Allowances (ECA) Calculations.** A 2006 Study[1] developed procedures for calculating the effluent concentration allowance (ECA)[2] for CTR hardness-dependent metals. The 2006 Study demonstrated that it is necessary to evaluate all discharge conditions (e.g. high and low flow conditions) and the hardness and metals concentrations of the effluent and receiving water when determining the appropriate ECA for these hardness-dependent metals. Simply using the lowest recorded upstream receiving water hardness to calculate the ECA may result in over or under protective water quality-based effluent limitations.~~

~~The equation describing the total recoverable regulatory criterion, as established in the CTR, is as follows:~~

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

~~Where:~~

~~H = hardness (as $CaCO_3$)~~
~~WER = water-effect ratio~~
~~m, b = metal- and criterion-specific constants~~

~~In accordance with the CTR, the default value for the WER is 1. A WER study must be conducted to use a value other than 1. The constants "m"~~

~~[1] Emerick, R.W.; Borroum, Y.; & Pedri, J.E., 2006. California and National Toxics Rule Implementation and Development of Protective Hardness Based Metal Effluent Limitations. WEFTEC, Chicago, Ill.~~
~~[2] The ECA is defined in Appendix 1 of the SIP (page Appendix 1-2). The ECA is used to calculate water quality-based effluent limitations in accordance with Section 1.4 of the SIP.~~

~~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 equation for the ECA is defined in Section 1.4, Step 2, of the SIP and is as follows:~~

~~ECA = C (when C ≤ B)[1] (Equation 2)~~

~~Where~~

~~C = the priority pollutant criterion/objective, adjusted for hardness (see Equation 1, above)~~
~~B = the ambient background concentration~~

~~The 2006 Study demonstrated that the relationship between hardness and the calculated criteria is the same for some metals, so the same procedure for calculating the ECA may be used for these metals. The same procedure can be used for chronic cadmium, chromium III, copper, nickel, and zinc. These metals are hereinafter referred to as "Concave Down Metals". "Concave Down" refers to the shape of the curve represented by the relationship between hardness and the CTR criteria in Equation 1. Another similar procedure can be used for determining the ECA for acute cadmium, lead, and acute silver, which are referred to hereafter as "Concave Up Metals".~~

~~**ECA for Concave Down Metals** – For Concave Down Metals (i.e., chronic cadmium, chromium III, copper, nickel, and zinc) the 2006 Study demonstrates that when the effluent is in compliance with the CTR criteria and the upstream receiving water is in compliance with the CTR criteria, any mixture of the effluent and receiving water will always be in compliance with the CTR criteria. Therefore, based on any observed ambient background hardness, no receiving water assimilative capacity for metals (i.e., ambient background metals concentrations are at their respective CTR criterion) and the minimum effluent hardness, the ECA calculated using Equation 1 with a hardness equivalent to the minimum effluent hardness is protective under all discharge conditions (i.e., high and low dilution conditions and under all mixtures of effluent and receiving water as the effluent mixes with the receiving water). This is applicable whether the effluent hardness is less than or greater than the ambient background receiving water hardness.~~

~~The effluent hardness ranged from 80 mg/L to 150 mg/L (as CaCO3), based on 216 samples from June 2005 to July 2008. The upstream~~

~~[1] The 2006 Study assumes the ambient background metals concentration is equal to the CTR criterion (i.e. C ≤ B)~~

~~receiving water hardness varied from 26 mg/L to 100 mg/L (as CaCO3), based on 100 samples from June 2005 to July 2008. Using a hardness of 80 mg/L (as $CaCO_3$) to calculate the ECA for all Concave Down Metals will result in water quality-based effluent limitations that are protective under all potential effluent/receiving water mixing scenarios and under all known hardness conditions, as demonstrated in the example using copper shown in Table F-6, below. This example assumes the following conservative conditions for the upstream receiving water:~~

- ~~Upstream receiving water always at the lowest observed upstream receiving water hardness (i.e., 26 mg/L as $CaCO_3$).~~
- ~~Upstream receiving water copper concentration always at the CTR criteria (i.e., no assimilative capacity). Based on available data, the receiving water never exceeded the CTR criteria for any metal with hardness-dependent criteria.~~

~~As demonstrated in Table F-6, using a hardness of 80 mg/L (as $CaCO_3$) to calculate the ECA for Concave Down Metals ensures the discharge is protective under all discharge and mixing conditions. In this example, the effluent is in compliance with the CTR criteria and any mixture of the effluent and receiving water is in compliance with the CTR criteria. An ECA based on a lower hardness (e.g. lowest upstream receiving water hardness) would also be protective, but would result in unreasonably stringent effluent limits considering the known conditions. Therefore, in this Order the ECA for all Concave Down Metals has been calculated using Equation 1 with a hardness of 80 mg/L (as $CaCO_3$).~~

~~Table F-6. Copper ECA Evaluation~~

~~Minimum Observed Effluent Hardness~~	~~80 mg/L (as $CaCO_3$)~~
~~Minimum Observed Upstream Receiving Water Hardness~~	~~26 mg/L (as $CaCO_3$)~~
~~Maximum Assumed Dissolved Upstream Receiving Water Copper Concentration~~	~~3.0 µg/L[1]~~
~~Dissolved Copper $ECA_{chronic}$[2]~~	~~7.7 µg/L~~

~~Effluent Fraction~~	**~~Mixed Downstream Ambient Concentration~~**		
	~~Hardness[3] (mg/L) (as $CaCO_3$)~~	**~~CTR Criteria[4] (µg/L)~~**	**~~Copper[5] (µg/L)~~**
~~1%~~	~~26.5~~	~~3.0~~	~~3.0~~
~~5%~~	~~28.7~~	~~3.2~~	~~3.2~~
~~15%~~	~~34.1~~	~~3.7~~	~~3.7~~
~~25%~~	~~39.5~~	~~4.2~~	~~4.1~~
~~50%~~	~~53~~	~~5.4~~	~~5.3~~
~~75%~~	~~66.5~~	~~6.6~~	~~6.5~~
~~100%~~	~~80~~	~~7.7~~	~~7.7~~

~~[1] Maximum assumed upstream receiving water dissolved copper concentration calculated using Equation 1 for chronic criterion at a hardness of 26 mg/L (as $CaCO_3$).~~

~~[2] Dissolved ECA calculated using Equation 1 for chronic criterion at a hardness of 80 mg/L (as $CaCO_3$).~~

~~[3] Mixed downstream ambient hardness is the mixture of the receiving water and effluent hardness at the applicable effluent fraction.~~

~~[4] Mixed downstream ambient criteria (as dissolved) are the chronic criteria calculated using Equation 1 at the mixed hardness.~~

~~[5] Mixed downstream ambient copper concentration (dissolved) is the mixture of the receiving water and effluent dissolved copper concentrations at the applicable effluent fraction.~~

~~**ECA for Concave Up Metals -** For Concave Up Metals (i.e., acute cadmium, lead, and acute silver), the 2006 Study demonstrates that due to a different relationship between hardness and the metals criteria, the effluent and upstream receiving water can be in compliance with the CTR criteria, but the resulting mixture may be out of compliance. Therefore, the 2006 Study provides a mathematical approach to calculate the ECA to ensure that any mixture of effluent and receiving water is in compliance with the CTR criteria (see Equation 3, below). The ECA, as calculated using Equation 3, is based on the reasonable worst-case ambient background hardness, no receiving water assimilative capacity for metals (i.e., ambient background metals concentrations are at their respective CTR criterion), and the minimum observed effluent hardness. The reasonable worst-case ambient background hardness depends on whether the effluent hardness is greater than or less than the upstream receiving water hardness. There are circumstances where the conservative ambient background hardness assumption is to assume that the upstream receiving water is at the highest observed hardness concentration. The conservative upstream receiving water condition as used in the Equation 3 below is defined by the term H_{rw}.~~

$$ECA_{l} = \left(\frac{m(H_e - H_{rw})\left(e^{m\{\ln(H_{rw})\}+b}\right)}{H_{rw}} \right) + e^{m\{\ln(H_{rw})\}+b} \qquad \text{(Equation 3)}$$

~~m, b = criterion specific constants (from CTR)~~

~~H_e = minimum observed effluent hardness~~

~~H_{rw} = minimum observed upstream receiving water hardness when the minimum effluent hardness is always greater than observed upstream receiving water hardness ($H_{rw} < H_e$)~~

~~-or-~~

~~maximum observed upstream receiving water hardness when the minimum effluent hardness is always less than observed upstream receiving water hardness ($H_{rw} > H_e$)[1]~~

~~[1] When the minimum effluent hardness falls within the range of observed receiving water hardness concentrations, Equation 3 is used to calculate two ECAs, one based on the minimum observed upstream~~

~~A similar example as was done for the Concave Down Metals is shown for lead, a Concave Up Metal, in Tables F-7 and F-8, below. As previously mentioned, the minimum effluent hardness is 80 mg/L (as $CaCO_3$), while the upstream receiving water hardness ranged from 26 mg/L to 100 mg/L (as CaCO3), based on 100 samples from June 2005 to July 2008. In this case, the minimum effluent concentration is within the range of observed upstream receiving water hardness concentrations. Therefore, Equation 3 was used to calculate two ECAs, one based on the minimum observed upstream receiving water hardness and one based on the maximum observed upstream receiving water hardness. Using Equation 3, the lowest ECA results from using the minimum upstream receiving water hardness, the minimum effluent hardness, and assuming no receiving water assimilative capacity for lead (i.e., ambient background lead concentration is at the CTR chronic criterion).~~

~~receiving water hardness and one based on the maximum observed upstream receiving water hardness. The minimum of the two calculated ECAs represents the ECA that ensures any mixture of effluent and receiving water is in compliance with the CTR criteria.~~

~~Table F-7. Lead ECA Evaluation Using Minimum Receiving Water Hardness~~

~~Minimum Observed Effluent Hardness~~	~~80 mg/L (as $CaCO_3$)~~
~~Minimum Observed Upstream Receiving Water Hardness~~	~~26 mg/L (as $CaCO_3$)~~
~~Maximum Assumed Upstream Receiving Water Lead Concentration~~	~~0.57 µg/L~~[1]
~~Lead ECA_{acute}~~[2]	~~2.1 µg/L~~

~~Effluent Fraction~~	**~~Mixed Downstream Ambient Concentration~~**		
	~~Hardness~~[3] **~~(mg/L)~~** ~~(as $CaCO_3$)~~	**~~CTR Criteria~~**[4] **~~(µg/L)~~**	**~~Lead~~**[5] **~~(µg/L)~~**
~~1%~~	~~26.5~~	~~0.6~~	~~0.6~~
~~5%~~	~~28.7~~	~~0.6~~	~~0.6~~
~~15%~~	~~34.1~~	~~0.8~~	~~0.8~~
~~25%~~	~~39.5~~	~~1.0~~	~~1.0~~
~~50%~~	~~53.0~~	~~1.4~~	~~1.3~~
~~75%~~	~~66.5~~	~~1.9~~	~~1.7~~
~~100%~~	~~80.0~~	~~2.4~~	~~2.1~~

~~[1] Maximum assumed upstream receiving water lead concentration calculated using Equation 1 for acute criterion at a hardness of 26 mg/L (as $CaCO_3$).~~

~~[2] ECA calculated using Equation 3 for chronic criteria.~~

~~[3] Mixed downstream ambient hardness is the mixture of the receiving water and effluent hardness at the applicable effluent fraction.~~

~~[4] Mixed downstream ambient criteria and the chronic criteria calculated using Equation 1 at the mixed hardness.~~

~~[5] Mixed downstream ambient lead concentration is the mixture of the receiving water and effluent lead concentrations at the applicable effluent fraction.~~

~~Table F-8. Lead ECA Evaluation Using Maximum Receiving Water Hardness~~

~~Minimum Observed Effluent Hardness~~	~~80 mg/L (as $CaCO_3$)~~
~~Maximum Observed Upstream Receiving Water Hardness~~	~~100 mg/L (as $CaCO_3$)~~
~~Maximum Assumed Upstream Receiving Water Lead Concentration~~	~~3.2 µg/L[1]~~
~~Lead ECA_{acute}[2]~~	~~2.4 µg/L~~

~~Effluent Fraction~~	~~Mixed Downstream Ambient Concentration~~		
	~~Hardness[3] (mg/L) (as $CaCO_3$)~~	~~CTR Criteria[4] (µg/L)~~	~~Lead[5] (µg/L)~~
~~1%~~	~~99.8~~	~~3.2~~	~~3.2~~
~~5%~~	~~99.0~~	~~3.1~~	~~3.1~~
~~15%~~	~~97.0~~	~~3.1~~	~~3.1~~
~~25%~~	~~95.0~~	~~3.0~~	~~3.0~~
~~50%~~	~~90.0~~	~~2.8~~	~~2.8~~
~~75%~~	~~85.0~~	~~2.6~~	~~2.6~~
~~100%~~	~~80.0~~	~~2.4~~	~~2.4~~

~~[1] Maximum assumed upstream receiving water lead concentration calculated using Equation 1 for chronic criterion at a hardness of 100 mg/L (as $CaCO_3$).~~

~~[2] ECA calculated using Equation 3 for chronic criteria.~~

~~[3] Mixed downstream ambient hardness is the mixture of the receiving water and effluent hardness at the applicable effluent fraction.~~

~~[4] Mixed downstream ambient criteria and the acute criteria calculated using Equation 1 at the mixed hardness.~~

~~[5] Mixed downstream ambient lead concentration is the mixture of the receiving water and effluent lead concentrations at the applicable effluent fraction.~~

~~Using Equation 3 to calculate the ECA for all Concave Up Metals will result in water quality-based effluent limitations that are protective under all potential effluent/receiving water mixing scenarios and under all known hardness conditions, as demonstrated in Tables F-7 and F-8, for lead. In this example, the effluent is in compliance with the CTR criteria and any mixture of the effluent and receiving water is in compliance with the CTR criteria. Use of a lower ECA (e.g., calculated based solely on the lowest upstream receiving water hardness) is also protective, but would lead to unreasonably stringent effluent limits considering the known conditions. Therefore, Equation 3 has been used to calculate the ECA for all Concave Up Metals in this Order.~~

~~Table F-9 summarizes the ECAs calculated for all hardness-dependant metals.~~

~~**Table F-9. Summary of ECA Evaluations**~~

~~Metals~~	~~Effluent Concentration Allowances, ECAs (ug/L) as total recoverable metals~~	
	~~acute~~	~~chronic~~
~~Copper~~	~~11~~	~~7.7~~
~~Chromium III~~	~~1500~~	~~72~~
~~Cadmium~~	~~3.3~~	~~2.1~~
~~Lead~~	~~54~~	~~2.1~~
~~Nickel~~	~~390~~	~~43~~
~~Silver~~	~~1.8~~	~~--~~
~~Zinc~~	~~99~~	~~99~~

d. Conversion Factors. The CTR contains aquatic life criteria for arsenic, cadmium, chromium III, chromium VI, copper, lead, nickel, silver, and zinc which are presented in dissolved concentrations. USEPA recommends conversion factors to translate dissolved concentrations to total concentrations. The default USEPA conversion factors contained in Appendix 3 of the SIP were used to convert the applicable dissolved criteria to total recoverable criteria.

e. Dilution Credits/Mixing Zones. The SRCSD has requested mixing zones and dilution credits for compliance with acute and chronic aquatic life water quality criteria, and human carcinogen water quality criteria. The Central Valley Water Board has the discretion to accept or deny mixing zones and dilution credits. The CWA directs states to adopt water quality standards to protect the quality of its waters. USEPA's current water quality standards regulation authorizes states to adopt general policies, such as mixing zones, to implement state water quality standards (40 CFR section 122.44 and section 122.45). The USEPA allows states to have broad flexibility in designing its mixing zone policies. Primary policy and guidance on determining mixing zone and dilution credits is provided by the SIP and the Basin Plan. If no procedure applies in the SIP or the Basin Plan, then the Central Valley Water Board may use the USEPA Technical Support Document for Water Quality-Based Toxics Control (EPA/505/2-90-001) (TSD).

The TSD defines a mixing zone as follows, "…*a mixing zone is an area where an effluent discharge undergoes initial dilution and is extended to cover the secondary mixing in the ambient waterbody. A mixing zone is an allocated impact zone where water quality criteria can be exceeded as long as acutely toxic conditions are prevented.*"[1] The SIP provides guidance on mixing zones and dilution credits in establishing water quality-based effluent limitations. Water quality criteria and objectives must be met throughout a water body except within a mixing zone. All mixing zones shall be as small as practicable and must meet specific conditions. The allowance of mixing zones by the Central Valley Water

1 TSD, Glossary

Board is discretionary and can be granted parameter-by-parameter and/or type of criteria (e.g., acute or chronic aquatic life criteria).

The allowance of mixing zones by the Central Valley Water Board is discussed in the Basin Plan, Policy for Application of Water Quality Objectives, which states in part, "*In conjunction with the issuance of NPDES and storm water permits, the Regional Board may designate mixing zones within which water quality objectives will not apply provided the discharger has demonstrated to the satisfaction of the Regional Board that the mixing zone will not adversely impact beneficial uses. If allowed, different mixing zones may be designated for different types of objectives, including, but not limited to, acute aquatic life objectives, chronic aquatic life objectives, human health objectives, and acute and chronic whole effluent toxicity objectives, depending in part on the averaging period over which the objectives apply. In determining the size of such mixing zones, the Regional Board will consider the applicable procedures and guidelines in the EPA's Water Quality Standards Handbook and the [TSD]. Pursuant to EPA guidelines, mixing zones designated for acute aquatic life objectives will generally be limited to a small zone of initial dilution in the immediate vicinity of the discharge*."[1]

Section 1.4.2 of the SIP states, in part, "…*with the exception of effluent limitations derived from TMDLs, in establishing and determining compliance with effluent limitations for applicable human health, acute aquatic life, or chronic aquatic life priority pollutant criteria/objectives or the toxicity objective for aquatic life protection in a basin plan, the Regional Board may grant mixing zones and dilution credits to dischargers ... The applicable priority pollutant criteria and objectives are to be met throughout a water body except within any mixing zone granted by the Regional Board. The allowance of mixing zones is discretionary and shall be determined on a discharge-by-discharge basis. The Regional Board may consider allowing mixing zones and dilution credits only for discharges with a physically identifiable point of discharge that is regulated through an NPDES permit issued by the Regional Board.*"[2]

Both federal and state guidance include similar mixing zone conditions, the SIP conditions are as follows:

"*A mixing zone shall be as small as practicable. The following conditions must be met in allowing a mixing zone:*

A: A mixing zone shall not:

1. *compromise the integrity of the entire water body;*

1 Basin Plan, page IV-16.00
2 SIP, pg. 15

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."*[1]

The mixing zone is thus an administrative construct defined as an area around the outfall that may exceed water quality objectives, but is otherwise protective of the beneficial uses. Dilution is defined as the amount of mixing that has occurred at the edge of this mixing zone under critical conditions, thus protecting the beneficial uses at the concentration and for the duration and frequency required.

i. Sacramento River Hydrology. The lower Sacramento River in the vicinity of the discharge is a large river with sufficient flows for dilution. The Sacramento watershed is a heavily managed system of reservoirs and diversions. The Sacramento River near the discharge location (Freeport) drains a 26,146-square-mile basin that spans the entire northern Central Valley of California from the crest of the Coast Range to the crest of the Sierra Nevada. Flows in the Sacramento River are influenced by precipitation (rainfall and snowpack/snowmelt), but are also influenced by several reservoirs on the tributaries and main stem, which are managed for flood control, water supply, and hydroelectric power generation. Irrigation diversions and agricultural return flows also affect the river regime. Winter and spring flows in the Sacramento River often exceed 50,000 cfs. While

1 SIP, pg. 17

summer flows average 10,000 cfs, they can fall below 4,000 cfs. Daily flow probabilities for the Sacramento River at Freeport, based on U.S. Geologic Survey gauged flow data from 1942-1989, indicate that there is only a 10% probability of flows less than or equal to 10,000 cfs, and a 10% probability of flows greater than 70,000 cfs. Therefore, typical flows in the Sacramento range from 10,000 to 70,000 cfs. The critical low flows for the Sacramento River based on flow data at Freeport from 1970 to 2009 are shown in Table F-10, below.

Table F-~~10~~9. Critical Receiving Water Flows

Critical Low Flows	Receiving Water Flow (cfs)
1Q10[1]	5060
7Q10[2]	5846
30Q5[3]	8234
Harmonic Mean[4]	15733

[1] Lowest daily average flow with a return frequency of 10 years.
[2] Lowest 7-day average flow with a return frequency of 10 years.
[3] Lowest 30-day average flow with a return frequency of 5 years.
[4] At Freeport from 1 January 1970 through 31 December 2009.

ii. **Water Quality Models.** For completely-mixed discharges, the Central Valley Water Board may grant a mixing zone and apply a dilution credit in accordance with Section 1.4.2.1 of the SIP, based on the dilution ratio. For incompletely-mixed discharges, the Discharger must perform a mixing zone study to demonstrate to the Central Valley Water Board that a dilution credit is appropriate. The SRWTP discharge is considered an incompletely-mixed discharge, so the Discharger conducted a mixing zone study. A mathematical dynamic model was developed by Flow Sciences Incorporated and consists of five models linked in series, with the output from previous models used as part of the inputs to subsequent models. The models are linked as shown in Figure F-1 and are described below.

PROSIM – *U.S. Bureau of Reclamation's Project Simulation Model*. PROSIM simulates the existing hydrologic conditions in the Delta study area and was used to calculate the 70-year period of record (1922-1991) that served as the basis for the SRCSD study. Flow and storage calculated by PROSIM was used as input to the Temperature Models. Also, output from PROSIM were used as input to the Fischer Delta Model (FDM) and includes: export pumping rates from Tracy and Banks; Contra Costa Water District pumping at Rock Slough and Old River; North Bay Aqueduct pumping; City of Vallejo pumping; net Delta consumptive use; Delta Cross Channel position; and Delta inflows from Yolo Bypass, San Joaquin River, Calaveras River, Cosumnes River, Mokelumne River, and Sacramento River.

Temperature Models – *U.S. Bureau of Reclamation models*. The Bureau of Reclamation has developed temperature models for five reservoirs (Trinity,

Whiskytown, Shasta, Oroville, and Folsom) and three river systems (Sacramento, Feather, and American). These models estimate mean monthly water temperatures based on flow and storage quantities calculated by PROSIM.

FDM – Fischer Delta Model. The Fischer Delta Model was used to support both the near-field and far-field modeling. For the near-field region, FDM was used to disaggregate hourly flow rates for the Sacramento River at Freeport from the 70-year record of monthly flows calculated by PROSIM. The hourly flow data were then used as input to the 3-D near-field model (FLOWMOD) as well as the Longitudinal Dispersion model. For the far-field region, FDM was used to simulate the contribution of SRWTP discharges to water quality concentrations at various critical locations in the Delta

FLOWMOD – Flow Science's computational fluid dynamics model. The near-field modeling was accomplished with the 3-dimensional FLOWMOD computational fluid dynamics model developed by Flow Science. FLOWMOD was used to calculate the steady-state concentration of effluent in each grid cell of the model domain for specific combinations of river and effluent flow rates. A horizontal grid resolution of 6 feet was defined from the diffuser to a point 300 feet downstream of the diffuser. The grid resolution increased geometrically from 300 feet to 700 feet downstream of the diffuser. Results from the model defined the average effluent concentration in the area of impact (i.e., within the 200:1 dilution contour) downstream of the diffuser. SRCSD is using this model to separately evaluate the thermal characteristics of the discharge plume.

LD – Flow Science's Longitudinal Dispersion Model. The LD model was developed by Flow Science and the computer code is written in the Matlab programming language for implementation on an IBM-PC compatible microcomputer. This 1-dimensional model simulates the advection and dispersion of effluent discharged to the Sacramento River including reverse tidal flow conditions. The LD model is used to estimate the concentration in the near-field vicinity of the diffuser following the start of a diversion event in which the effluent discharge is diverted to storage when the Sacramento River flow rate falls below the minimum required 14:1 dilution ratio[1].

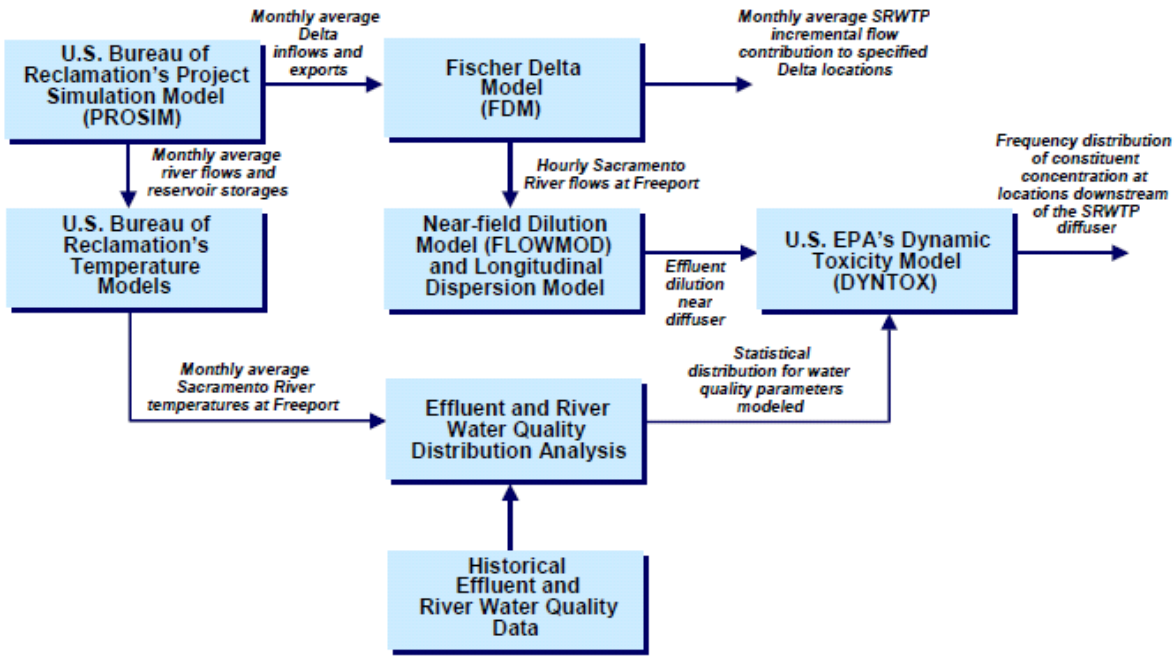
The results from the LD model are combined with the results from the FLOWMOD model (by method of superposition) to estimate the concentrations of the effluent in the near-field zone that result from "double dosing" during the flow reversal events. The length of the LD model domain is 53,000 feet (about 10 miles) and includes the diffuser. The model domain

[1] The Discharger is prohibited from discharging when the dilution ratio (river:effluent) is less than 14:1 or if river flows are less than 1300 cfs and diverts all effluent discharge to emergency storage basins. These requirements ensure the diffuser is operating as designed and limits double-dosing of the discharge during flow reversals.

is represented by 530 discrete spatial intervals, each 100 feet long. Calculations are made at a 400-second time step.

DYNTOX – U.S. EPA's Dynamic Toxicity Model. DYNTOX was developed in 1985 with funding support provided by EPA. The model is designed for waste load allocations of toxic substances. DYNTOX contains three procedures to define the frequency and duration of exposure above a specific water quality criterion: (1) continuous simulation, (2) Monte Carlo simulation, and (3) log normal analysis. The continuous simulation procedure with randomly generated water quality distributions was used for the SRWTP study. Hourly values for the 70-year simulation period resulted in over 600,000 data points that were representative of the statistical concentration distribution at 6 key locations downstream of the diffuser.

Figure F-1: Dynamic Model Flow Diagram



In the period from 2005 through 2007, the Discharger performed several field validation studies to corroborate the effectiveness of the modeling tools in representing water quality conditions in the Sacramento River. Due to the complexity of the mathematical models, in 2006 the Central Valley Water Board used the services of Tetra Tech, a USEPA contractor, to assist with the review of the dynamic model. Tetra Tech's modeling experts 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 only perceived short coming noted by

the model experts from a regulatory perspective was the complexity of the system of linked models and the proprietary status of some of the model components preventing its transmittal and direct use by Central Valley Water Board staff. The results of Tetra Tech's review are summarized in a Tetra Tech memorandum dated 30 June 2008.

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.*"[1] 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.*"[2] 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 minutes[3]. 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

[1] USEPA Region VIII Mixing Zones and Dilution Policy, December 1994 (Updated September 1995), (page 18)
[2] TSD, pg. 33
[3] Memorandum from Larry Walker Associates to SRCSD, Mixing Zones and Prevention of Acutely Toxic Conditions, dated 13 July 2009.

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 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 geometry[1]. 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.

[1] Model Verification Results for FLOWMOD Simulations of SRCSD Effluent Discharge to the Sacramento River at Freeport, November 2007 Field Study, Flow Science

(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.

Although 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, 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.

iv. Evaluation of Available Dilution for Chronic Aquatic Life Criteria. The chronic aquatic life mixing zone is sized to protect the water body as a whole and is generally larger than the acute mixing zone. A mixing zone for chronic aquatic life criteria has been allowed in this Order for development of the WQBELs for cyanide.

The chronic aquatic life mixing zone is 400 feet wide and extends 350 feet downstream of the diffuser. The chronic 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.*"[1] The Sacramento River is approximately 600 feet wide at the surface. The chronic mixing zone is approximately 400 ft x 350 ft. The Sacramento River is a very large waterbody. Except as noted for ammonia in subsection vi., below, the chronic 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 chronic mixing zone does not allow acute aquatic life criteria to be exceeded and this Order requires acute bioassays to be conducted using 100% effluent. Compliance with these requirements

[1] TSD, pg. 33

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 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 geometry[1]. 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 chronic 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, a chronic mixing zone for ammonia is not allowed. With these requirements the chronic 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 chronic 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.

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

(7) *Shall not be allowed at or near any drinking water intake* – The chronic 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.

The chronic aquatic life 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 Central Valley Water Board 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.

v. Evaluation of Available Dilution for Human Health Criteria. The Discharger's dynamic model is useful in determining the mixing and dilution near the discharge (i.e., near-field) and the model domain extends 700 feet downstream. Human health-based criteria are generally based long-term exposures, such as safe levels for lifetime exposure (e.g., for carcinogens, consumption of 1 liter/day for 70 years) and the mixing zones typically extend beyond the near-field mixing estimated by the Discharger's dynamic model. Since the human health mixing zone extends beyond the model domain of the dynamic model, the Discharger conducted a study titled "Sacramento River Harmonic Mean Mixing Zone Report" (June 2010) to establish the human health mixing zone and dilution. The June 2010 study identified the point downstream of the discharge where complete mixing occurs. Based on the results of the June 2010 study, the discharge is completely mixed approximately 3 miles downstream. The Discharger has requested the human health mixing zone extend to this point.

In determining the available receiving water dilution for compliance with human carcinogen criteria, the SIP, section 1.4.2.1 requires that the harmonic mean of the receiving water flow be compared against the arithmetic mean of the effluent flow of the observed discharge period. Based on Sacramento River flow data at Freeport from 1 January 1970 to 31 December 2009 the harmonic mean river flow is 15,733 cfs. The permitted average dry weather flow for the Facility is 181 mgd (280 cfs). Therefore, a dilution ratio of 56:1 is available for compliance with human carcinogen criteria. This Order allows a dilution credit for human carcinogen criteria of 56:1 and the mixing zone extends 3 miles downstream of the discharge. For non-human carcinogen human health criteria, the TSD recommends dilution based on a 30Q5 receiving water flow[1], which is the lowest 30 day average flow with a recurrence frequency of once in five years. Based on Sacramento River flow

1 USEPA Water Quality Handbook, Section 5.2

data at Freeport from 1 January 1970 to 31 December 2009 the 30Q5 flow is 8234 cfs, resulting in a dilution credit of 29:1.

The human health 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.*"[1] The Sacramento River is a very large waterbody and the human health mixing zone is not applicable to aquatic life criteria. Except as noted for nitrate in subsection vi., below, the human health mixing zone does not compromise the integrity of the entire waterbody.

(2) *Shall not cause acutely toxic conditions to aquatic life passing through the mixing zone* –The human health mixing zone is not applicable to aquatic life criteria. Therefore, acutely toxic conditions will not occur in the mixing zone.

(3) *Shall not restrict the passage of aquatic life* – The human health mixing zone is not applicable to aquatic life criteria. Therefore, the mixing zone will not restrict the passage of aquatic life.

(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 human health mixing zone is not applicable to aquatic life criteria. Except as noted for nitrate in subsection vi., below, the mixing zone will not impact 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* – Except as noted for nitrate (see subsection vi, below), the allowance of a human health 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 human health 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.

1 TSD, pg. 33

(7) *Shall not be allowed at or near any drinking water intake* – There are no drinking water intakes within the human health mixing zone. The nearest drinking water intake is the Freeport Regional Water Authority intake one mile upstream of the discharge at Freeport, which is owned and operated by East Bay Municipal Utility District (EBMUD) and Sacramento County Water Agency (SCWA). An operating agreement between the Freeport Regional Water Authority and the Discharger dated 2006 will prevent diversion of river water containing diluted treated wastewater at the Freeport water intake. The nearest downstream drinking water intake is the Barker Slough Pumping Plant, which is approximately 40 miles downstream of the discharge.

The human health 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 Central Valley Water Board 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.

vi. Evaluation of Available Dilution for Specific Constituents (Pollutant-by-Pollutant Evaluation). When determining to allow dilution credits for a specific pollutant several factors must be considered, such as, available assimilative capacity, facility performance, and best practicable treatment or control. In this subsection a pollutant-by-pollutant evaluation of dilution is discussed. The SRCSD requested acute and chronic aquatic life dilution credits for ammonia, copper, cyanide, and chlorpyrifos. Human carcinogen dilution credits were requested for carbon tetrachloride, chlorodibromomethane, dichlorobromomethane, methlyene chloride, tetrachloroethylene, pentachlorophenol, bis(2-ethylhexyl)phthalate, and dibenzo(ah)anthracene. Additionally, human health dilution credits were requested for manganese, nitrate, and MTBE. A pollutant-by-pollutant evaluation is discussed below.

Ammonia – An acute or chronic mixing zone for ammonia does not meet the mixing zone requirements of the SIP. The SIP requires, in part, that mixing zones do not;

(1) compromise the integrity of the entire water body;

(2) adversely impact biologically sensitive or critical habitats, including, but not limited to, habitat of species listed under federal or State endangered species laws; and

(3) produce undesirable or nuisance aquatic life;

The allowance of acute or chronic mixing zones for ammonia do not meet these requirements, because ammonia discharges from the Facility have been shown to be negatively affecting the receiving water far downstream of the discharge within the Delta, not just the areas defined by the requested mixing zones. The allowance of the requested mixing zones for ammonia would comprise the integrity of the entire water body, adversely impact biologically sensitive or critical habitats, and produce undesirable or nuisance aquatic life.

Acute and chronic aquatic life dilution credits for ammonia have not been granted. This Order requires full nitrification for removal of ammonia. See Section IV.C.3 of the Fact Sheet for a detailed discussion.

Copper – Assimilative capacity is available for copper in the receiving water. However, based on facility performance, dilution credits for copper are not needed, therefore, dilution credits have not been allowed for copper. Table F-10~~1~~, below, shows the WQBELs calculated using SRCSD's dynamic model with the allowance of ~~acute and~~ chronic aquatic life dilution, end-of-pipe effluent limitations using a reasonable worst-case steady-state approach, and the Facility's performance. This information demonstrates the Facility can meet end-of-pipe effluent limitations, therefore, no dilution credits have been allowed for copper.

Table F-~~16~~10. WQBELs for Copper

	Average Monthly Effluent Limitation	Maximum Daily Effluent Limitation
Dynamic Modeling	7.7 µg/L	9.8 µg/L
Steady-State Approach	~~7.3~~7.4 µg/L	~~9.3~~10 µg/L
Facility Performance[1]	~~6.8~~ 6.5 µg/L (maximum observed monthly average)	8.1 µg/L (99.9th percentile)[1]

[1] Projected 99.9th percentile of effluent copper data from 1 January 2012 to 31 December 2014~~June 2005-October 2009~~

Cyanide – Table F-11~~2~~, below, shows the WQBELs for cyanide calculated using SRCSD's dynamic model with the allowance of acute and chronic aquatic life dilution, WQBELs calculated using SRCSD's dynamic model with the allowance of only chronic aquatic life dilution, end-of-pipe effluent limitations using a reasonable worst-case steady-state approach, and the Facility's performance. This information demonstrates the Facility cannot meet end-of-pipe effluent limits, but can meet WQBELs calculated with the allowance of chronic aquatic life dilution. Acute aquatic life dilution is not needed for cyanide. Assimilative capacity is available for cyanide in the receiving water, and, as discussed above, the chronic aquatic life mixing zone meets the requirements of the SIP and Basin Plan. Therefore, the WQBELs for cyanide have been developed considering the allowance of chronic aquatic life dilution.

Table F-~~17~~11. WQBELs for Cyanide

	Average Monthly Effluent Limitation	Maximum Daily Effluent Limitation
Dynamic Modeling (acute and chronic dilution)	21 µg/L	40 µg/L
Dynamic Modeling (chronic dilution only)	11 µg/L	22 µg/L
Steady-State Approach	4.3 µg/L	8.3 µg/L
Facility Performance[1]	11 µg/L	

[1] Projected 99.9th percentile of effluent cyanide data from June 2005-October 2009

Chlorpyrifos – A TMDL has been adopted for chlorpyrifos and diazinon and includes waste load allocations (WLA) for NPDES dischargers. The WLA have been adopted in the Basin Plan as water quality objectives and dilution are not allowed. Therefore, end-of-pipe effluent limitations based on the Basin Plan water quality objectives are required by the Basin Plan.

Aluminum– Based on existing effluent data from ~~June 2005~~January 2012 – ~~October 2009~~December 2014, the Facility can meet end-of-pipe effluent limitations for aluminum of 200 µg/L annual average. Therefore, a dilution credit has not been allowed. Additionally, there is no assimilative capacity in the receiving water. The Sacramento River maximum aluminum concentrations are over ~~8000~~ 900 µg/L. The Discharger collected ~~61~~ 104 effluent samples during this time period resulting in samples ranging from ~~12~~ 5.7 to ~~35.2~~38 µg/L. ~~The effluent sampling was part of the three times per year sampling required in the previous permit, which required daily sampling for one week three times per year.~~ The discharge never exceeded the new ~~AMEL or MDEL~~effluent limitations.

Carbon tetrachloride - Based on existing effluent data from June 2005- October 2009, it appears that the Facility cannot meet end-of-pipe effluent limitations for carbon tetrachloride of 0.25 µg/L and 0.50 µg/L, as an average monthly effluent limitation (AMEL) and maximum daily effluent limitation (MDEL), respectively. The Discharger collected 101 samples during this time period resulting in 95 non-detect samples (i.e., ranging from <0.06 µg/L to <0.5 µg/L), three J-flagged estimates of 0.1 µg/L, 0.1 µg/L, and 0.2 µg/L, and three samples above the reporting level at 0.5 µg/L, 1.4 µg/L, and 1.7 µg/L. The effluent sampling was part of the three times per year sampling required in the previous permit, which required daily sampling for one week three times per year. Assimilative capacity is available for carbon tetrachloride in the receiving water, and, as discussed above, the human health mixing zone meets the requirements of the SIP and Basin Plan. Therefore, the WQBELs for carbon tetrachloride have been developed considering the allowance of human carcinogen dilution credits.

Chlorodibromomethane – Based on existing effluent data from June 2005 – October 2009, the Facility cannot meet end-of-pipe effluent limitations for chlorodibromomethane of 0.41 µg/L and 0.82 µg/L, as an AMEL and MDEL, respectively. Assimilative capacity is available for chlorodibromomethane in the receiving water, and, as discussed above, the human health mixing zone meets the requirements of the SIP and Basin Plan. Therefore, the WQBELs for chlorodibromomethane have been developed considering the allowance of human carcinogen dilution credits.

Dichlorobromomethane – Based on existing effluent data from June 2005– October 2009, it appears that the Facility cannot meet end-of-pipe effluent limitations for dichlorobromomethane of 0.56 µg/L and 1.1 µg/L, as an AMEL and MDEL, respectively. Assimilative capacity is available for dichlorobromomethane in the receiving water, and, as discussed above, the human health mixing zone meets the requirements of the SIP and Basin Plan. Therefore, the WQBELs for dichlorobromomethane have been developed considering the allowance of human carcinogen dilution credits.

Methylene chloride – Based on existing effluent data from June 2005- October 2009, the Facility cannot meet end-of-pipe effluent limitations for methylene chloride of 4.7 µg/L and 11 µg/L, as an AMEL and MDEL, respectively. Assimilative capacity is available for methylene chloride in the receiving water, and, as discussed above, the human health mixing zone meets the requirements of the SIP and Basin Plan. Therefore, the WQBELs for methylene chloride have been developed considering the allowance of human carcinogen dilution credits.

Tetrachloroethylene – Based on existing effluent data from June 2005- October 2009, the Facility cannot meet end-of-pipe effluent limitations for tetrachloroethylene of 0.8 µg/L and 1.6 µg/L, as an AMEL and MDEL, respectively. Assimilative capacity is available for tetrachloroethylene in the receiving water, and, as discussed above, the human health mixing zone meets the requirements of the SIP and Basin Plan. Therefore, the WQBELs for tetrachloroethylene have been developed considering the allowance of human carcinogen dilution credits.

Pentachlorophenol – Based on existing effluent data from June 2005- October 2009, it appears that the Facility cannot meet end-of-pipe effluent limitations for pentachlorophenol of 0.28 µg/L and 0.56 µg/L, as an AMEL and MDEL, respectively. Assimilative capacity is available for pentachlorophenol in the receiving water, and, as discussed above, the human health mixing zone meets the requirements of the SIP and Basin Plan. Therefore, the WQBELs for pentachlorophenol have been developed considering the allowance of human carcinogen dilution credits.

Bis(2-ethylhexyl)phthalate – Based on existing effluent data from June 2005- October 2009, it appears that the Facility cannot meet end-of-pipe effluent limitations for bis(2-ethylhexyl)phthalate of 1.8 µg/L and 3.4 µg/L, as an AMEL and MDEL, respectively. Assimilative capacity is available for bis(2-ethylhexyl)phthalate in the receiving water, and, as discussed above, the human health mixing zone meets the requirements of the SIP and Basin Plan. Therefore, the WQBELs for bis(2-ethylhexyl)phthalate have been developed considering the allowance of human carcinogen dilution credits.

Dibenzo(ah)anthracene – Based on existing effluent data from June 2005- October 2009, it appears that the Facility cannot meet end-of-pipe effluent limitations for dibenzo(ah)anthracene of 4 ng/L and 9 ng/L, as an AMEL and MDEL, respectively. Assimilative capacity is available for dibenzo(ah)anthracene in the receiving water, and, as discussed above, the human health mixing zone meets the requirements of the SIP and Basin Plan. Therefore, the WQBELs for dibenzo(ah)anthracene have been developed considering the allowance of human carcinogen dilution credits.

Manganese – Based on existing effluent data from April 2009-June 2011 , it appears that the Facility cannot meet an end-of-pipe AMEL for manganese of 50 µg/L. The Discharger collected 51 samples during this time period and the maximum effluent concentration was 270 µg/L and averaged 76 µg/L. Assimilative capacity is available for manganese in the receiving water, and, as discussed above, the human health mixing zone meets the requirements of the SIP and Basin Plan. Therefore, the WQBELs for manganese have been developed considering the allowance of non-human carcinogen dilution credits.

Nitrate – Currently, the Discharger's effluent contains very low concentrations of nitrate, ranging from 0.016 to 1.4 mg/L with an average of 0.13 mg/L. However, this Order requires the Discharger nitrify its effluent, therefore, the ammonia will convert to nitrate and the nitrate concentrations will increase. Consequently, the Facility will not be able to meet end-of-pipe effluent limits for Nitrate, based on the primary MCL of 10 mg/L (as N). Although assimilative capacity and dilution is available in the receiving water for compliance with the primary MCL, a human health mixing zone for nitrate does not meet the mixing zone requirements of the SIP. The SIP requires, in part, that mixing zones do not;

(1) compromise the integrity of the entire water body;

(2) adversely impact biologically sensitive or critical habitats, including, but not limited to, habitat of species listed under federal or State endangered species laws; and

(3) produce undesirable or nuisance aquatic life;

The allowance of a human health mixing zone for nitrate does not meet these requirements, because elevated nitrogen discharges from the Facility have been shown to be negatively affecting the receiving water far downstream of the discharge within the Delta, not just the areas defined by the requested mixing zone. The allowance of the requested mixing zone for nitrate would compromise the integrity of the entire water body, adversely impact biologically sensitive or critical habitats, and produce undesirable or nuisance aquatic life.

Human health dilution credits for nitrate have not been granted. This Order requires denitrification for removal of nitrate to meet the primary MCL at the end-of-pipe. See Section IV.C.3 of the Fact Sheet for a detailed discussion.

MTBE – Based on existing effluent data from June 2005- October 2009, it appears that the Facility cannot meet an end-of-pipe annual average effluent limitation for MTBE of 5 µg/L. Assimilative capacity is available for MTBE in the receiving water, and, as discussed above, the human health mixing zone meets the requirements of the SIP and Basin Plan. Therefore, the WQBELs for MTBE have been developed considering the allowance of non-human carcinogen dilution credits.

3. Determining the Need for WQBELs

a. Unless otherwise stated, the Central Valley 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 Central Valley Water Board may use the SIP as guidance for water quality-based toxics control.[1] 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, unless otherwise stated, in this Order the RPA procedures from the SIP were used to evaluate reasonable potential for both CTR and non-CTR constituents based on information submitted as part of the application, in studies, and as directed by monitoring and reporting programs.

b. Constituents with Limited Data. Reasonable potential cannot be determined for the following constituents because effluent data are limited, ambient background concentrations are not available, or available data are unreliable due to limitations associated with available analytical techniques. The Discharger is required to continue to monitor for these constituents in the effluent using appropriate analytical methods. When additional data become available, further analysis will be conducted to determine whether to add numeric effluent limitations or to continue monitoring.

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

i. 2,3,7,8-TCDD and TCDD-Equivalents. The CTR includes a criterion for 2,3,7,8-TCDD of 0.013 pg/l for the protection of human health based on consumption of water and organisms and 0.014 pg/L for ingestion of organisms only. The CTR does not include criteria for other dioxin congeners and there are no formally promulgated numeric water quality criteria for the other dioxin congeners. Therefore, determination of reasonable potential and effluent limitations, when appropriate, would be based on an interpretation of the Basin Plan narrative toxicity standard. The SIP does not explicitly direct the Regional Water Boards to establish effluent limits when dioxin congeners are detected in the effluent. Rather it directs the discharger to report the data and in its report to multiply each measured or estimated congener concentration by its respective toxic equivalency factors (TEF) value and report the sum of these values to the Regional Boards.

2,3,7,8-TCDD was not detected in any of the samples collected in the Facility effluent or in the receiving water. The MEC for TCDD-equivalents was 26.0 µg/L. In the effluent two of the congeners, OCDD and 1,2,3,4,6,7,8-HpCDD were reported as detected. The maximum observed upstream receiving water TCDD-equivalents concentration was 28.0. The CTR includes a criterion for 2,3,7,8-TCDD of 0.013 pg/L for the protection of human health based on consumption of water and organisms and 0.014 pg/L for ingestion of organisms only. The CTR does not include criteria for other dioxin congeners and there are no formally promulgated numeric water quality criteria for the other dioxin congeners. Therefore, determination of reasonable potential and effluent limitations, when appropriate, would be based on an interpretation of the Basin Plan narrative toxicity standard. In the receiving water, two of the congeners OCDD and 1,2,3,4,6,7,8-HpCDD were reported as detected.

Based on the limited data provided, the Central Valley Water Board is unable to determine if the discharge has a reasonable potential to cause or contribute to an in-stream excursion above the CTR criterion for TCDD-equivalents. WQBELs for TCDD-equivalents are not included in this Order due to the fact that 1) only TCDD-equivalents were detected in the effluent and receiving water and not TCDD and, 2) the Sacramento-San Joaquin Delta is not listed as impaired for dioxins and furans.

Due to the concerns of the potential impacts of dioxins and furans on the receiving water, this Order will require semi-annual monitoring of all 2,3,7,8 TCDD congeners starting in 2013 as described in Attachment I. If monitoring data indicates the potential for exceedance of applicable criteria, then the Central Valley Water Board will reopen the Order and establish applicable WQBELs for TCDD-equivalents. This Order also requires the Discharger to implement measures to evaluate and reduce detected dioxins OCDD and 1,2,3,4,6,7,8-HpCDD in its discharge to the receiving water. The Special Provision in section VI.C.3.c of this Order requires the Discharger to prepare a 2,3,7,8-TCDD congeners source evaluation and minimization plan.

Implementation measures to reduce detectable amounts of cogeners may include source control and other effective means. Compliance with these requirements should result in the reduction of detectable amounts of TCDD-equivalents in the effluent discharged to the receiving water.

ii. Perchlorate. The primary MCL for perchlorate is 6 µg/L. As part of the pretreatment monitoring program the Discharger began monitoring for perchlorate in February 2000. The MEC for perchlorate is 600 µg/L and was detected 14 out of 81 samples. All R-1 samples showed no detection for perchlorate. The analytical test method used was EPA 300.0 followed by EPA 314 starting in October 2008. Neither EPA 300.0 or 314 are recommended for wastewater analyses, instead these tests are used for surface and ground water. Both these tests can be influenced by salts and give false positive readings. Starting in February 2009, any detection of perchlorate by EPA 314 is further confirmed with EPA 331. Since initiating the confirmation testing with EPA 331, no perchlorate has been detected in the effluent. This Order requires the Discharger conduct a study for perchlorate to evaluate if perchlorate is actually present in the discharge. If monitoring indicates exceedance of applicable criteria, then the Central Valley Water Board will reopen the Order and will establish applicable WQBELs for perchlorate.

iii. N-nitrosodimethylamine

The CTR includes a criterion of 0.00069 µg/L for N-nitrosodimethylamine (NDMA) for the protection of human health for waters from which both water and organisms are consumed. NDMA is a highly mutagenic compound suspected of carcinogenic activity to the human body. NDMA is formed as a disinfection by-product from wastewater and chlorination. Historically, NDMA was used to make rocket fuel until contamination was found in air, soil and water. NDMA is produced currently only as a research chemical. Detection levels for NDMA are greater than the water quality criterion and can range from 0.002 µg/L to 30 µg/L. Further, ultra low reporting levels for NDMA are not reliable and currently there is no laboratory that can achieve valid and reliable results for NDMA at ultra low reporting levels.

SIP Section 2.4.2 states that the Minimum Level (ML) is the lowest quantifiable concentration in a sample based on the proper application of all method-based analytical procedures and the absence of any matrix interferences.

i. Required MLs are listed in Appendix 4 of the SIP. Where more than one ML is listed in Appendix 4, the discharger may select any one of the cited analytical methods for compliance determination. The selected ML used for compliance determination is referred to as the Reporting Level (RL).

ii. A Reporting Level can be lower than the Minimum Level in Appendix 4 only when the discharger agrees to use a Reporting Level that is lower than the Minimum Level listed in Appendix 4. The Central Valley Water Board and the Discharger have no agreement to use a Reporting Limit lower than the Minimum Levels.

iii. SIP Section 1.2 requires that the Regional Board use all available, valid, relevant, representative data and information, as determined by the Regional Board, to implement the SIP. SIP Section 1.2 further states that the Regional Board has the discretion to consider if any data are inappropriate or insufficient for use in implementing the SIP.

iv. Data reported below the Minimum Level indicate the data may not be valid due to possible matrix interferences during the analytical procedure.

v. Further, SIP Section 2.4.5 (Compliance Determination) supports the insufficiency of data reported below the Minimum Level or Reporting Level. In part it states, "Dischargers shall be deemed out of compliance with an effluent limitation, for reporting and administrative enforcement purposes, if the concentration of the priority pollutant in the monitoring sample is greater than the effluent limitation and greater than or equal to the RL." Thus, if submitted data are below the Reporting Limit, those data cannot be used to determine compliance with effluent limitations.

vi. Data reported below the Minimum Level are not considered valid data for use in determining Reasonable Potential. Therefore, in accordance with Section 1.2 of the SIP, the Central Valley Water Board has determined that data reported below the Minimum Level are inappropriate and insufficient to be used to determine Reasonable Potential.

vii. In implementing its discretion, the Central Valley Water Board is not finding that Reasonable Potential does not exist; rather the Central Valley Water Board cannot make such a determination given the invalid data. Therefore, the Central Valley Water Board will require monitoring until such time a determination can be made in accordance with the SIP policy.

SIP Appendix 4 cites several MLs for NDMA. The lowest applicable ML cited for NDMA is 5 μg/L. The Discharger used an analytical method that was more sensitive than the minimum level required by the SIP. The effluent results were all estimated values (i.e., DNQ). Therefore, the submitted effluent NDMA data are inappropriate and insufficient to determine reasonable potential under the SIP.

Section 1.3, Step 8 of the SIP allows the Central Valley Water Board to require monitoring for a pollutant in place of an effluent limitation if data are unavailable or insufficient. Instead of limitations, monitoring has been established for NDMA in the effluent.

c. Constituents with No Reasonable Potential. WQBELs are not included in this Order for constituents that do not demonstrate reasonable potential; however, monitoring for those pollutants is established in this Order as required by the SIP. If the results of effluent monitoring demonstrate reasonable potential, this Order may be reopened and modified by adding an appropriate effluent limitation.

i. Oil and Grease. The Basin Plan contains a narrative oil and grease objective which states, "Waters shall not contain oils, greases, waxes, or other materials in concentrations that cause nuisance, result in a visible film or coating on the surface of the water or on objects in the water, or otherwise adversely affect beneficial uses."

Effluent oil and grease concentrations from June 2005 to July 2008 are always less than 6 mg/L. Therefore, oil and grease in the discharge has no reasonable potential to cause or contribute to an in-stream excursion above the narrative toxicity objective or Basin Plan numeric objectives and waste load allocation.

ii. Persistent Chlorinated Hydrocarbon Pesticides. The Basin Plan requires that no individual pesticides shall be present in concentrations that adversely affect beneficial uses; discharges shall not result in pesticide concentrations in bottom sediments or aquatic life that adversely affect beneficial uses; persistent chlorinated hydrocarbon pesticides shall not be present in the water column at detectable concentrations; and pesticide concentrations shall not exceed those allowable by applicable antidegradation policies. Persistent chlorinated hydrocarbon pesticides include aldrin; alpha-BHC; beta-BHC; gamma-BHC (lindane); delta-BHC; chlordane; 4,4-DDT; 4,4-DDE; 4,4-DDD; dieldrin; alpha-endosulfan; beta-endosulfan; endosulfan sulfate; endrin; endrin aldehyde; heptachlor; heptachlor epoxide; and toxaphene.

Aldrin; alpha-BHC; beta-BHC; gamma-BHC; delta-BHC; chlordane; 4,4-DDT; 4,4-DDE; 4,4-DDD; dieldrin; alpha-endosulfan; beta-endosulfan; endosulfan sulfate; endrin; endrin aldehyde; heptachlor; heptachlor epoxide; and toxaphene were not detected in the effluent in concentrations with detection levels ranging from as high as 0.04 µg/L to 0.002. There is no reasonable potential for these constituents to exceed the Basin Plan objectives for persistent chlorinated hydrocarbon pesticides.

iii. Salinity. There are no USEPA water quality criteria for the protection of aquatic organisms for electrical conductivity, total dissolved solids, sulfate, and chloride. The Basin Plan contains a chemical constituent objective that incorporates state MCLs, contains a narrative objective, and contains numeric water quality objectives for electrical conductivity, total dissolved solids, sulfate, and chloride.

Table F-~~18~~12. Salinity Water Quality Criteria/Objectives

Parameter	Agricultural WQ Goal[1]	Secondary MCL[3]	Average Ambient Background	Effluent	
				Average	Maximum
EC (µmhos/cm)	Varies[2]	900, 1600, 2200	163	764	960
TDS (mg/L)	Varies	500, 1000, 1500	98	410	540
Sulfate (mg/L)	Varies	250, 500, 600	--	90	110
Chloride (mg/L)	Varies	250, 500, 600	5.1	90	100

1 Agricultural water quality goals based on *Water Quality for Agriculture*, Food and Agriculture Organization of the United Nations—Irrigation and Drainage Paper No. 29, Rev. 1 (R.S. Ayers and D.W. Westcot, Rome, 1985)

2 The EC level in irrigation water that harms crop production depends on the crop type, soil type, irrigation methods, rainfall, and other factors. An EC level of 700 umhos/cm is generally considered to present no risk of salinity impacts to crops. However, many crops are grown successfully with higher salinities.

3 The secondary MCLs are stated as a recommended level, upper level, and a short-term maximum level.

Table F-~~19~~13. Basin Plan Water Quality Objectives for EC Sacramento River at Emmaton, Based on Water Year Type (maximum 14-day running average of mean daily EC in µmhos/cm)

Date	Water Year Type				
	Wet	Above Normal	Below Normal	Dry	Critical
1 April – 14 June	450	450	450	450	2780
15 June – 19 June	450	450	450	1670	2780
20 June – 30 June	450	450	1140	1670	2780
1 July - 15 August	450	630	1140	1670	2780

For priority pollutants, the SIP dictates the procedures for conducting the RPA. EC, TDS, chloride, and sulfate are not priority pollutants. Therefore, the Central Valley Water Board is not restricted to one particular RPA method. Due to the site-specific conditions of the discharge, the Central Valley Water Board has used best professional judgment in determining the appropriate method for conducting the RPA for these non-priority pollutant salinity constituents. For conducting the RPA, the USEPA recommends using a mass-balance approach to determine the expected critical downstream receiving water concentration using a steady-state approach[1]. This downstream receiving water concentration is then compared to the applicable water quality objectives to determine if the discharge has reasonable potential to cause or contribute to an in-stream excursion. This approach allows assimilative capacity and dilution to be factored into the RPA. This USEPA recommended approach has been used for these salinity constituents. The

[1] USEPA NPDES Permit Writers' Course (EPA 833-B-97-001 rev. October 2009)

critical downstream receiving water concentration is calculated using equation 2 below:

$$C_r = \frac{Q_s C_s + Q_d C_d}{Q_r} \qquad \text{(Equation 2)}$$

Where,

Q_s = Critical stream flow (30Q5) recommended by USEPA for non-carcinogen human health criteria.

Q_d = Critical effluent flow from discharge flow data (maximum permitted discharge)

Q_r = Sum of critical stream flow and critical effluent flow

C_s = Critical upstream pollutant concentration

C_d = Critical effluent pollutant concentration

C_r = Critical downstream receiving water pollutant concentration

The critical stream flow used in this evaluation for the salinity constituents is a 30Q5 flow of 8234 cubic feet per second (cfs) The critical stream flow was calculated based on USGS flow data for the Sacramento River at the Freeport Bridge for the period of 1970 – 2009.

The critical effluent flow, Q_d, is 181 million gallons per day (mgd) (i.e., 281 cfs), which is the maximum permitted flow allowed in this Order. The critical effluent pollutant concentration, C_d, was determined using statistics recommended in the TSD for statistically calculating the projected maximum effluent concentration (MEC) (i.e., Table 3-1 of the TSD using the 99% probability basis and 99% confidence level).

(a) Chloride. Chloride concentrations in the effluent ranged from 76 mg/L to 100 mg/L, with an average of 91 mg/L. Background concentrations in Sacramento-San Joaquin Delta ranged from 2.1 mg/L to 11 mg/L, with an average of 5.2 mg/L, for 98 samples collected by the Discharger from 15 January 1998 through 12 June 2008. The effluent and receiving water chloride levels do not exceed the agricultural water goal. Therefore, there is no reasonable potential for the discharge to cause or contribute to an instream excursion of the applicable water quality objectives for chloride.

(b) Electrical Conductivity. A review of the Discharger's monitoring reports shows an average effluent EC of 764 µmhos/cm, with a range from 369 µmhos/cm to 960 µmhos/cm. The projected maximum effluent concentration, calculated as discussed above, is 972 µmhos/cm. The maximum background receiving water concentration was 260 µmhos/cm, and averaged 160 µmhos/cm, based on 72 samples collected from

November 2000 to July 2008. The maximum instream EC concentration is 283 µmhos/cm, using Equation 2, above. The maximum instream EC concentration is less than all applicable water quality objectives for EC. Therefore, there is no reasonable potential for the discharge to cause or contribute to an instream excursion of the applicable water quality objectives for EC.

(c) Sulfate. Sulfate concentrations in the effluent ranged from 50 mg/L to 110 mg/L, with an average of 90 mg/L. Background concentrations in the Sacramento-San Joaquin Delta were not monitored. However, based on the low chloride, electrical conductivity, the sulfate concentrations are probably also low. There is no reasonable potential for the discharge to cause or contribute to an instream excursion of the applicable water quality objectives for sulfate.

(d) Total Dissolved Solids. The average TDS effluent concentration was 410 mg/L with concentrations ranging from 200 mg/L to 540 mg/L. The projected maximum effluent concentration, calculated as discussed above, is 547 mg/L. The background receiving water TDS ranged from 35 mg/L to 180 mg/L, with an average of 98 mg/L. The maximum instream TDS concentration is 192 mg/L, using Equation 2, above. The maximum instream TDS concentration is less than all applicable water quality objectives for TDS. Therefore, there is no reasonable potential for the discharge to cause or contribute to an instream excursion of the applicable water quality objectives for TDS.

Based on the relatively low reported salinity, the discharge does not have reasonable potential to cause or contribute to an in-stream excursion of water quality objectives for salinity. However, since the discharge is to the Sacramento-San Joaquin Delta, an additional concern is the salt contribution to Delta waters. Allowing the Discharger to increase its current salt loading may be contrary to the Region-wide effort to address salinity in the Central Valley. Therefore, this Order includes a performance-based effluent limitation of 900 µmhos/cm for EC to be applied as an annual average to limit the discharge to current levels. This performance-based effluent limitation was calculated as the 99.9th percentile of the running annual average effluent EC based on effluent data from June 2006 through April 2010.

In order to ensure that the Discharger will continue to control the discharge of salinity, this Order includes a requirement to develop and implement a salinity evaluation and minimization plan. Also water supply monitoring is required to evaluate the relative contribution of salt from the source water to the effluent.

iv. Lead.

(a) WQO. The CTR includes hardness-dependeant criteria for the protection of freshwater aquatic life for lead. The criteria for lead are presented in

dissolved concentrations. USEPA recommends conversion factors to translate dissolved concentration to total concentrations. The USEPA default conversion factors for lead were used for the discharge.

(b) RPA Results. ~~For the effluent, the~~The applicable lead chronic criterion (maximum 4-day average concentration) is 2.~~1~~ 3 µg/L and the applicable acute criterion (maximum (1-hour concentration) is ~~54~~ 60 µg/L, as total recoverable, (see Table F-~~9~~ 6, above). ~~The MEC for total lead was 1.19 µg/L, b~~Based on data collected between ~~June~~ January ~~2005~~ 2012 and ~~July~~ December ~~2008~~2014, the MEC for total lead was 0.5 µg/L. ~~For the receiving water, the applicable lead chronic criterion is 0.57 µg/L and the applicable acute criterion is 15 µg/L, as total recoverable, based on a hardness of 26 mg/L (as $CaCO_3$), using USEPA default translators. The maximum observed upstream~~ Upstream total lead concentration ~~was~~ varied from ~~0.12~~0.067 µg/L to 1.3 µg/L~~,~~. ~~based on data from 1992-2008~~Using paired hardness and lead data, the maximum ambient receiving water concentration did not exceed the applicable CTR criteria for lead. ~~.~~ Based on this information, lead in the discharge does not exhibit reasonable potential to cause or contribute to an in-stream excursion above the CTR criterion for the protection of freshwater aquatic life.

v. Silver.

(a) WQO. The CTR includes hardness-depend~~e~~ant criteria for the protection of freshwater aquatic life for silver. The criteria for silver are presented in dissolved concentrations. USEPA recommends conversion factors to translate dissolved concentration to total concentrations. The USEPA default conversion factors for silver were used for the discharge.

(b) RPA Results. ~~For the effluent, t~~The applicable silver acute criterion (maximum (1-hour concentration) is ~~1.8~~2.3 µg/L, as total recoverable, (see Table F-~~9~~ 6, above). The MEC for total silver was 0.~~15~~ 046 µg/L, based on data collected between January 2012 and December 2014~~June 2005 and July 2008~~. ~~For the receiving water, the applicable silver acute criterion is 0.4~~ 63 µg/L, as total recoverable, based on a hardness of 26 34 ~~mg/L (as $CaCO_3$), using USEPA default translators. The maximum observed~~All upstream total silver concentrations ~~was~~ were ~~0.02 µg/L~~non detect, based on data from 2012-2014~~1992-2008~~. Using paired hardness and silver data, the maximum ambient receiving water concentration did not exceed the applicable CTR criteria for silver. Based on this information, silver in the discharge does not exhibit reasonable potential to cause or contribute to an in-stream excursion above the CTR criterion for the protection of freshwater aquatic life.

vi. Zinc.

(a) WQO. The CTR includes hardness-depend~~e~~ant criteria for the protection of freshwater aquatic life for zinc. The criteria for zinc are presented in dissolved concentrations. USEPA recommends conversion factors to translate dissolved concentration to total concentrations. The USEPA default conversion factors for ~~silver~~ zinc were used for the discharge.

(b) RPA Results. ~~For the effluent, t~~The applicable zinc chronic criterion (maximum 4-day average concentration) is ~~99~~ 103 µg/L and the applicable acute criterion (maximum (1-hour concentration) is ~~99~~ 103 µg/L, as total recoverable, (see Table F-~~9~~ 6, above). The MEC for total zinc was ~~33.5~~41 µg/L, based on data collected between January 2012 and December 2014~~June 2005 and July 2008~~. ~~For the receiving water, the applicable zinc acute and chronic criterion is 38 µg/L, as total recoverable, based on a hardness of 26 mg/L (as $CaCO_3$), using USEPA default translators. The maximum observed upstream~~ Upstream total zinc concentrations varied from ~~X~~0.99 µg/L to 9.7µg/L ~~was 2.17 µg/L~~, based on data from 2012-2014~~1992-2008~~. Using paired hardness and zinc data, the maximum ambient receiving water concentration did not exceed the applicable CTR criteria for zinc. Based on this information, zinc in the discharge does not exhibit reasonable potential to cause or contribute to an in-stream excursion above the CTR criterion for the protection of freshwater aquatic life.

vi. 1,2-Diphenyl-hydrazine

(a) WQO. The CTR includes a criterion of 0.04 µg/L for 1,2-diphenyl-hydrazine for the protection of human health for waters from which both water and organisms are consumed.

(b) RPA Results. The maximum observed upstream receiving water concentration was not detected out of 17 samples at a MDL of <0.1 µg/L. The maximum effluent concentration (MEC) for 1,2-diphenyl-hydrazine was 2.8 µg/L J-flagged on 8 June 2007 with another J-flagged of 2.1 µg/L on 9 June 2007 out of 85 samples. However, the Discharger submitted a technical memorandum (TM) from Larry Walker Associates dated 26 May 2010 that provided evidence that the two detected samples are not representative of the effluent. The TM found that, "1,2-diphenyl-hydrazine rapidly oxidizes to azobenzene in water. The Agency for Toxic Substances and Disease Registry (ATSDR) toxicological profile[1] reports that analysis of 1,2-diphenylhydrazine in wastewater is "virtually meaningless" because, due to this oxidation, the concentration measured in the sample cannot be directly related to the actual concentration at the time of collection. One study referenced in the ATSDR toxicological profile reported that 1,2-diphenylhydrazine, '. . . instantaneously decomposes to azobenzene in the GC injection port,' and therefore gas

[1] ATSDR, 1990. Toxicological Profile for 1,2,-Diphenylhydrazine. Available at: http://www.atsdr.cdc.gov/toxprofiles/tp136.html.

chromatography (GC) is not suitable for detecting 1,2-diphenyl-hydrazine." This information puts into question the two j-flagged samples that were measured using EPA Method 625, which is a gas chromatography method.

Therefore, at this time there is insufficient information to make a determination whether 1,2-diphenyl-hydrazine in the discharge has reasonable potential to cause or contribute to an in-stream excursion above the CTR criterion for the protection of human health. This Order requires the Discharger conduct a study to evaluate the effluent for 1,2-diphenyl-hydrazine using appropriate analytical methods to determine if there is reasonable potential.

d. Constituents with Reasonable Potential. The Central Valley 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 copper, mercury, cyanide, carbon tetrachloride, chlorodibromomethane, dichlorobromomethane, methylene chloride, tetrachloroethylene, pentachlorophenol, bis(2-ethylhexyl)phthalate, dibenzo(ah)anthracene, aluminum, ammonia, nitrate, manganese, chlorpyrifos and MTBE. WQBELs for these constituents are included in this Order. A summary of the RPA is provided in Attachment G, and a detailed discussion of the RPA for each constituent is provided below.

i. Aluminum

(a) WQO. 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. The recommended 4-day average (chronic) and 1-hour average (acute) criteria for aluminum are 87 µg/L and 750 µg/L, respectively, for waters with a pH of 6.5 to 9.0. USEPA recommends that the ambient criteria are protective of the aquatic beneficial uses of receiving waters in lieu of site-specific criteria. 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 $CaCO_3$). The Sacramento River (SR) has been measured to have hardness values—typically between 26 and 100 mg/L as $CaCO_3$. The SR has been measured above the discharge to have a pH between 6.4 to 8.8. Thus, it is unlikely that application of the chronic criterion of 87 µg/L is necessary to protect aquatic life in the Sacramento River in the vicinity of the discharge. For similar reasons, the Utah Department of Environmental Quality (Department) only applies the 87 µg/L chronic criterion for aluminum where the pH is less than 7.0 and the hardness is less than 50 mg/L as $CaCO_3$ the receiving water after mixing. For conditions where the pH equals or exceeds 7.0 and the hardness is equal to or exceeds 50 mg/L as $CaCO_3$, the Department

regulates aluminum based on the 750 µg/L acute criterion. In this site-specific case it is likely that application of the stringent chronic criteria (87µg/L) is overly protective.

(b) RPA Results. The maximum effluent concentration (MEC) for acid soluble aluminum was ~~35.2~~38 µg/L out of ~~61~~ 104 samples while the maximum observed upstream receiving water total concentration was ~~8800~~ 900 µg/L out of ~~32~~ 12 samples. Therefore, aluminum in the discharge has a reasonable potential to cause or contribute to an in-stream excursion above both the NAWQC~~A~~ chronic water quality object and the secondary MCL.

(c) WQBELs. Due to no assimilative capacity, dilution credits are not allowed for development of the WQBELs for aluminum. This Order contains a final annual average effluent limitation for aluminum of 200 µg/L based on the secondary MCL. In addition, an AMEL of ~~503~~ 470 µg/L and AWEL of 683 µg/L, ~~and MDEL of 750 µg/L~~ has been applied based on USEPA's NAWQC for aluminum for protection of aquatic life.

(d) Plant Performance and Attainability. Analysis of the effluent data shows that the MEC of ~~35.2~~38 µg/L is less than the applicable WQBELs. The Central Valley Water Board concludes, therefore, that immediate compliance with these effluent limitations is feasible.

ii. Ammonia

(a) WQO. The NAWQC for the protection of freshwater aquatic life for total ammonia, recommends acute (1-hour average; criteria maximum concentration or CMC) standards based on pH and chronic (30-day average; criteria continuous concentration or CCC) standards based on pH and temperature. USEPA also recommends that no 4-day average concentration should exceed 2.5 times the 30-day CCC. 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. Because the Sacramento-San Joaquin Delta has a beneficial use of cold freshwater habitat and the presence of salmonids and early fish life stages in the Sacramento-San Joaquin Delta is well-documented, the recommended criteria for waters where salmonids and early life stages are present were used.

(b) RPA Results. Untreated domestic 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 Discharger does not currently use

nitrification to remove ammonia from the waste stream. Ammonia is known to cause acute and/or chronic toxicity to aquatic organisms. Therefore, the discharge has reasonable potential to cause or contribute to an exceedance of the Basin Plan's narrative toxicity objective in the receiving water.

(c) Dilution Considerations. As discussed in Section IV.C.2.d of the Fact Sheet, an allowance for 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:

(1) Recent studies suggest that ammonia at ambient concentrations in the Sacramento River, Delta and Suisun Bay may be acutely toxic to native *Pseudodiaptomus forbesi (copepod).*

(2) A consensus of scientific experts concluded the SRWTP is a major source of ammonia to the Delta[1].

(3) Recent studies provide evidence that ammonia from the SRWTP discharge is contributing to the inhibition nitrogen uptake by diatoms in Suisun Bay.

(4) Ammonia along with the clam, *Corbula* and high turbidity are attributed to reducing diatom production and standing biomass in the Suisun Bay.

(5) Downstream of the discharge point, ammonia may be a cause in the shift of the aquatic community from diatoms to smaller phytoplankton species that are less desirable as food species.

(6) Regardless of whether ammonia is directly or indirectly contributing to the POD, ammonia is shown to affect adult *Pseudodiaptomus forbesi* reproduction at concentrations greater than or equal to 0.79 mg/L. And nauplii and juvenile *Pseudodiaptomus forbesi* are affected at ammonia concentrations greater to or equal 0.36 mg/L. These ammonia concentrations can be found downstream of the discharge. The beneficial use protection extends to all aquatic life and not limited to pelagic organisms.

(7) USEPA expects to publish the 2009 Ammonia Criteria Update which includes more stringent ammonia criteria for freshwater mussels

[1] Sommer, T., Cl Armor, R. Baxter, L. Brown, M. Chotkowski, S. Culberson, F. Feyrer, M. Gingras, B. Herbold, W. Kimmerer, A. Mueller-Solger, M. Nobriga, and K Souza. 2007. The Collapse of Pelagic Fishes in the Upper San Franisco Estuary. Fisheries 32(6):270-277.

compared with criteria for salmonids in early 2011[1]. Freshwater mussels reside in the Upper Sacramento River above and likely below the SRWTP discharge.

(8) The Discharger's effluent contains ammonia and BOD at levels that use all the assimilative capacity for oxygen demanding substances in the Sacramento-San Joaquin Delta. This results in no assimilative capacity for other cities and communities to discharge oxygen demanding constituents, which is needed for them to grow despite the fact that most of these cities and communities are already implementing Best Practical Treatment and Control (BPTC) at their own facilities and SRWTP is not.

(9) The Discharger's effluent contains nitrosoamines at levels that are greater than 100 times the primary MCL. Nitrosamines are disinfection byproducts that are created when wastewater effluent contains ammonia and is then disinfected with chlorine, which is the case at the SRWTP.

(10) The Discharger must fully comply with Resolution No. 68-16 that requires Best Practical Treatment and Control, which for this discharge includes nitrification and denitrification of their wastewater.

(11) The mixing zone requirement for the SIP are not met for ammonia:

a. Compromise the integrity of the entire water body;

b. Adversely impact biologically sensitive or critical habitats, including, but not limited to, habitat of species listed under federal or state endangered species laws; and

c. Produce undesirable or nuisance aquatic life.

(d) WQBELs. WQ 2012-0013 revised the WQBELs for ammonia as follows. Based on a pH of 8.0 and a temperature of 22.5ºC, the 1999 NAWQC recommend acute and chronic criteria for ammonia nitrogen of 5.62 mg/L as nitrogen and 1.45 mg/L as nitrogen, respectively. Using the SIP procedures to calculate the WQBELs results in a final average monthly effluent limitation (AMEL) and maximum daily effluent limitation (MDEL) for ammonia of 1.5 mg/L and 2.0 mg/L, respectively, based on the NAWQC ammonia criteria for aquatic toxicity with no dilution credit.

These effluent limitations are protective for discharge year-round. Seasonal effluent limitations are also protective and can be applied during the colder months of 1 November through 31 March. Based on

[1] Personal Communication with Lisa Huff USEPA with Kathy Harder, August 2010.

downstream receiving water seasonal data from 2000 through 2010 at Cliff's Marina, 4,200 feet downstream of the discharge, the worst-case receiving water temperature is 14.4^{o}C. Using this temperature and a pH of 8.0, the acute criterion is 5.62 mg/L and the chronic criterion is 2.43 mg/L. This Order contains final AMEL and MDEL for ammonia (as N) of 2.4 mg/L and 3.3 mg/L, respectively, from 1 November through 31 March. The remainder of the year, from 1 April – 31 October, the final AMEL and MDEL for ammonia (as N) is 1.5 mg/L and 2.0 mg/L, respectively. See Attachment H for detailed calculations of the WQBELs.

(e) Plant Performance and Attainability. Analysis of the effluent data shows that the MEC of 45 mg/L is greater than the applicable WQBELs. See Table F-19. Performance-based Effluent Limitations Statistics. The Central Valley Water Board concludes, therefore, that immediate compliance with these effluent limitations is not feasible and appears to put the Discharger in immediate non-compliance with the ammonia final effluent limitations. 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. The Discharger submitted an infeasibility analysis dated August 2010. As discussed in section IV.E of this Fact Sheet, a compliance schedule has been included in this Order for ammonia.

iii. Bis(2-ethylhexyl) phthalate

(a) WQO. The CTR includes a criterion of 1.8 µg/L for bis(2-ethylhexyl) phthalate for the protection of human health for waters from which both water and organisms are consumed.

(b) RPA Results. The maximum effluent concentration (MEC) for bis(2-ethylhexyl) phthalate was 8.1 µg/L out of 87 samples while the maximum observed upstream receiving water concentration was 0.58 µg/L out of 55 samples. Therefore, bis(2-ethylhexyl) phthalate in the discharge has a reasonable potential to cause or contribute to an in-stream excursion above the CTR criterion for the protection of human health.

(c) WQBELs. The receiving water contains assimilative capacity for bis(2-ethylhexyl) phthalate, therefore, a dilution credit of 56:1 was allowed in the development of the WQBELs for bis(2-ethylhexyl) phthalate . Based on the allowable dilution credit, an AMEL of 94 µg/L and a MDEL of 180 µg/L is calculated. The Central Valley Water Board finds that granting of this dilution credit could allocate an unnecessarily large portion of the receiving water's assimilative capacity of bis(2-ethylhexyl) phthalate and could violate the Antidegradation Policy. For this reason, a performance-based effluent limitation is calculated (see See Table F-19. Performance-based

Effluent Limitations Statistics.). This Order contains a final maximum daily effluent limitation (MDEL) for bis(2-ethylhexyl) phthalate of 13 µg/L.

(d) Plant Performance and Attainability. Analysis of the effluent data shows that the MEC of 8.1 µg/L is less than the applicable WQBELs. The Central Valley Water Board concludes, therefore, that immediate compliance with these effluent limitations is feasible.

iv. Carbon Tetrachloride

(a) WQO. The CTR includes a criterion of 0.25 µg/L for carbon tetrachloride for the protection of human health for waters from which both water and organisms are consumed.

(b) RPA Results. The Discharger collected 101 samples during this time period resulting in 95 non-detect samples (i.e., ranging from <0.06 µg/L to <0.5 µg/L), three J-flagged estimates of 0.1 µg/L, 0.1 µg/L, and 0.2 µg/L, and three samples above the reporting level at 0.5 µg/L, 1.4 µg/L, and 1.7 µg/L. Therefore, carbon tetrachloride in the discharge has a reasonable potential to cause or contribute to an in-stream excursion above the CTR criterion for the protection of human health.

(c) WQBELs. The receiving water contains assimilative capacity for carbon tetrachloride, therefore, a dilution credit of 56:1 was allowed in the development of the WQBELs for carbon tetrachloride. Based on the allowable dilution credit, an AMEL of 9 µg/L and a MDEL of 17 µg/L is calculated. The Central Valley Water Board finds that granting of this dilution credit could allocate an unnecessarily large portion of the receiving water's assimilation capacity of carbon tetrachloride and could violate the Antidegradation Policy. For this reason, a performance-based effluent limitation is calculated (See Table F-19. Performance-based Effluent Limitations Statistics). This Order contains a maximum daily effluent limitation (MDEL) for carbon tetrachloride of 5.3 µg/L.

(d) Plant Performance and Attainability. Analysis of the effluent data shows that the MEC of 1.7 µg/L is less than the applicable WQBELs. The Central Valley Water Board concludes, therefore, that immediate compliance with these effluent limitations is feasible.

v. Dibenzo(ah)anthracene

(a) WQO. The CTR includes a criterion of 0.0044 µg/L for dibenzo(ah)antracene for the protection of human health for waters from which both water and organisms are consumed.

(b) RPA Results. The maximum effluent concentration (MEC) for dibenzo(ah)anthracene was 0.51 µg/L with only one out of 117 samples showing detection while the maximum observed upstream receiving water

concentration was 0.0026 µg/L with one detected sample and a J-flagged sample out of 23 samples showing detection. The detection levels varied from 0.001 to10 µg/L. Therefore, dibenzo(ah)anthracene in the discharge has a reasonable potential to cause or contribute to an in-stream excursion above the CTR criterion for the protection of human health.

(c) WQBELs. Assimilative capacity within a water body is determined using detected and non-detected receiving water samples. Sampling for dibenzo(ah)anthracene was conducted between January 1998 to July 2008. Several analytical laboratory methods were used to detect dibenzo(ah)anthracene with MDLs varying from 10 µg/L to 0.00029 µg/L. To determine assimilative capacity the detected and non-detected sample concentrations are averaged and the averaged number is subtracted from the water quality criterion. If all the non-detected samples are used in determined assimilative capacity calculations then no assimilative capacity for dibenzo(ah)anthracene exists in the receiving water. However, this calculation may not provide an accurate assessment of assimilative capacity. Since October 2003 EPA method 625 with a MDL of 0.001 µg/L was used to determine if dibenzo(ah) anthracene was detected in the receiving water. One sample was detected with a J-flagged estimate of 0.0021 µg/L. Using 23 samples with EPA method 625 to determine assimilative capacity for dibenzo(ah)anthracene appears to be reasonable without using the samples with greater MDLs. The receiving water contains assimilative capacity for dibenzo(ah)anthracene, therefore, a dilution credit of 56:1 based on the harmonic mean of the river flow was allowed in the development of the WQBELs for dibenzo(ah)anthracene. Based on the allowable dilution credit, an AMEL of 0.2 µg/L and a MDEL of 0.4 µg/L is calculated. This Order contains a final average monthly effluent limitation (AMEL) and maximum daily effluent limitation (MDEL) for dibenzo(ah)anthracene of 0.2 µg/L and 0.4 µg/L, respectively, based on the CTR criterion for the protection of human health.

(d) Plant Performance and Attainability. Analysis of the effluent data shows that the MEC of 0.51 µg/L is greater than applicable WQBELs. Based on the sample results for the effluent, the limitations appear to put the Discharger in immediate non-compliance. 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 dibenzo(ah)anthracene 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 dibenzo(ah)anthracene effluent limitations is established in TSO No. R5-2010-0115 in accordance with CWC section 13300, that requires preparation and implementation of a pollution prevention plan in compliance with CWC section 13263.3.

vi. Chlorodibromomethane

(a) WQO. The CTR includes a criterion of 0.41 µg/L for chlorodibromomethane for the protection of human health for waters from which both water and organisms are consumed.

(b) RPA Results. The maximum effluent concentration (MEC) for chlorodibromomethane was 0.7 µg/L out of 73 samples while the maximum observed upstream receiving water concentration was not detected out of 44 samples at a MDL of <0.18 µg/L. Therefore, chlorodibromomethane in the discharge has a reasonable potential to cause or contribute to an in-stream excursion above the CTR criterion for the protection of human health.

(c) WQBELs. The receiving water contains assimilative capacity for chlorodibromomethane, therefore, a dilution credit of 56:1 was allowed in the development of the WQBELs for chlorodibromomethane. Based on the allowable dilution credit, an AMEL of 12 µg/L and a MDEL of 25 µg/L is calculated. The Central Valley Water Board finds that granting of this dilution credit could allocate an unnecessarily large portion of the receiving water's assimilation capacity of chlorodibromomethane and could violate the Antidegradation Policy. For this reason, a performance-based effluent limitation for the current pure-oxygen treatment facility is calculated (See Table F-19. Performance-based Effluent Limitations Statistics). When the treatment facilities are upgraded to provide ammonia and nitrate removal, it is expected that the effluent will contain increased concentrations of chlorodibromomethane. Based on data collected from the Discharger's pilot test of small-scale new treatment facilities and including a 40% process scale-up factor to take into consideration uncertainties and variability, an additional performance-based effluent limitation is calculated that will apply when the discharge includes effluent from the ammonia and nitrate removal wastewater system. This Order contains a maximum daily effluent limitation (MDEL) for chlorodibromomethane of 2.2 µg/L from the pure oxygen treatment facility, and a maximum daily effluent limitation (MDEL) for Chlorodibromomethane of 12 µg/L that is applicable commencing the first day of discharge that includes effluent from the ammonia and nitrate removal wastewater treatment system.

(d) Plant Performance and Attainability. Analysis of the effluent data shows that the MEC of 0.7 µg/L is less than the applicable WQBELs. The Central Valley Water Board concludes, therefore, that immediate compliance with these effluent limitations is feasible.

vii. Dichlorobromomethane

(a) WQO. The CTR includes a criterion of 0.56 µg/L for dichlorobromomethane for the protection of human health for waters from which both water and organisms are consumed.

(b) RPA Results. The maximum effluent concentration (MEC) for dichlorobromomethane was 2.5 µg/L out of 73 samples while the maximum observed upstream receiving water concentration was not detected out of 44 samples at a MDL of <0.14 µg/L. Therefore, dichlorobromomethane in the discharge has a reasonable potential to cause or contribute to an in-stream excursion above the CTR criterion for the protection of human health.

(c) WQBELs. The receiving water contains assimilative capacity for dichlorobromomethane, therefore, a dilution credit of 56:1 was allowed in the development of the WQBELs for dichlorobromomethane. Based on the allowable dilution credit, an AMEL of 27 µg/L and a MDEL of 47 µg/L is calculated. The Central Valley Water Board finds that granting of this dilution credit could allocate an unnecessarily large portion of the receiving water's assimilation capacity of dichlorobromomethane and could violate the Antidegradation Policy. For this reason, a performance-based effluent limitation for the current pure-oxygen treatment system is calculated (See Table F-19. Performance-based Effluent Limitations Statistics). When the treatment facilities are upgraded to provide ammonia and nitrate removal, it is expected that the effluent will contain increased concentrations of dichlorobromomethane. Based on data collected from the Discharger's pilot test of small-scale new treatment facilities and including a 40% process scale-up factor to take into consideration uncertainties and variability, an additional performance-based effluent limitation is calculated that will apply when the discharge includes effluent from the ammonia and nitrate removal wastewater treatment system. The performance-based effluent MDEL is 3.4 µg/L from the pure oxygen treatment facility, and the maximum daily effluent limitation (MDEL) for dichlorobromomethane is 35 µg/L that is applicable commencing the first day of discharge that includes effluent from the ammonia and nitrate removal wastewater treatment system. **Plant Performance and Attainability.** Analysis of the effluent data shows that the MEC of 2.5 µg/L is less than the applicable WQBELs. The Central Valley Water Board concludes, therefore, that immediate compliance with these effluent limitations is feasible.

viii. Methylene Chloride

(a) WQO. The CTR includes a criterion of 4.7 µg/L for methylene chloride for the protection of human health for waters from which both water and organisms are consumed.

(b) RPA Results. The maximum effluent concentration (MEC) for methylene chloride was 5.4 µg/L out of 73 samples while the maximum observed upstream receiving water concentration was not detected out of 44 samples at MDL of <0.35 µg/L. Therefore, methylene chloride in the discharge has a reasonable potential to cause or contribute to an in-

stream excursion above the CTR criterion for the protection of human health.

(c) WQBELs. Although the receiving water contains assimilative capacity for methylene chloride, the Discharger can immediately comply with the applicable WQBELs without dilution. This Order contains a final average monthly effluent limitation (AMEL) and maximum daily effluent limitation (MDEL) for methylene chloride of 4.7 µg/L and 11 µg/L, respectively, based on the CTR criterion for the protection of human health.

(d) Plant Performance and Attainability. Analysis of the effluent data shows that the effluent never exceeded the WQBELs. The Central Valley Water Board concludes, therefore, that immediate compliance with these effluent limitations is feasible.

ix. Pentachlorophenol

(a) WQO. The CTR includes a criterion of 0.28 µg/L for pentachlorophenol for the protection of human health for waters from which both water and organisms are consumed.

(b) RPA Results. The maximum effluent concentration (MEC) for pentachlorophenol was 5.7 µg/L out of 87 samples while the maximum observed upstream receiving water concentration was 0.026 µg/L out of 60 samples. Therefore, pentachlorophenol in the discharge has a reasonable potential to cause or contribute to an in-stream excursion above the CTR criterion for the protection of human health.

(c) WQBELs. The receiving water contains assimilative capacity for pentachlorophenol, therefore, a dilution credit of 56:1 was allowed in the development of the WQBELs for pentachlorophenol. Based on the allowable dilution credit, an AMEL of 12 µg/L and a MDEL of 24 µg/L is calculated. The Central Valley Water Board finds that granting of this dilution credit could allocate an unnecessarily large portion of the receiving water's assimilation capacity of pentachlorophenol and could violate the Antidegradation Policy. For this reason, a performance-based effluent limitation is calculated (See Table F-19. Performance-based Effluent Limitations Statistics). This Order contains a final MDEL for pentachlorophenol of 18 µg/L.

(d) Plant Performance and Attainability. Analysis of the effluent data shows that the MEC of 5.7 µg/L is less than the applicable WQBELs. The Central Valley Water Board concludes, therefore, that immediate compliance with these effluent limitations is feasible

x. Tetrachloroethylene

(a) WQO. The CTR includes a criterion of 0.8 µg/L for tetrachloroethylene for the protection of human health for waters from which both water and organisms are consumed.

(b) RPA Results. The maximum effluent concentration (MEC) for tetrachloroethylene was 0.9 µg/L out of 73 samples while the maximum observed upstream receiving water concentration was 0.21 µg/L out of 43 samples. Therefore, tetrachloroethylene in the discharge has a reasonable potential to cause or contribute to an in-stream excursion above the CTR criterion for the protection of human health.

(c) WQBELs. The receiving water contains assimilative capacity for pentachlorophenol, therefore, a dilution credit of 56:1 was allowed in the development of the WQBELs for tetrachloroethylene. Based on the allowable dilution credit, an AMEL of 37 µg/L and a MDEL of 75 µg/L is calculated. The Central Valley Water Board finds that granting of this dilution credit could allocate an unnecessarily large portion of the receiving water's assimilation capacity of tetrachloroethylene and could violate the Antidegradation Policy. For this reason, a performance-based effluent limitation is calculated (See Table F-19. Performance-based Effluent Limitations Statistics). This Order contains a final MDEL for tetrachloroethylene of 4.4 µg/L.

(d) Plant Performance and Attainability. Analysis of the effluent data shows that the MEC of 0.9 µg/L is less than the applicable WQBELs. The Central Valley Water Board concludes, therefore, that immediate compliance with these effluent limitations is feasible.

xi. Copper

(a) WQO. The CTR includes hardness-depend~~e~~ant 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 concentration to total concentrations. The USEPA default conversion factors for copper in freshwater of 0.96 for both the acute and the chronic criteria were used for the discharge.

(b) RPA Results. ~~For the effluent, t~~The applicable copper chronic criterion (maximum 4-day average concentration) is ~~7.7~~8.0 µg/L and the applicable acute criterion (maximum (1-hour concentration) is ~~11~~ 12 µg/L, as total recoverable, (see Table F-6~~9~~, above). The MEC for total copper was ~~6.34~~10 µg/L, based on data collected between ~~June 2005 and July 2008~~January 2012 and December 2014. ~~For the receiving water,~~ Upstream total copper concentration varied from 0.89 µg/L to 5.8 µg/L. Using paired hardness and copper data, the maximum ambient receiving water concentration did not exceed the applicable CTR criteria for copper. ~~the applicable copper chronic criterion is 3.0 µg/L and the applicable acute criterion is 4.0 µg/L, as total recoverable, based on a hardness of 26 mg/L~~

~~(as $CaCO_3$), using USEPA default translators. The maximum observed upstream total copper concentration was 20.4 µg/L, based on data from 1992-2008.~~ Based on this information, copper in the discharge has a reasonable potential to cause or contribute to an in-stream excursion above the CTR criterion for the protection of freshwater aquatic life.

(c) WQBELs. As discussed in Section IV.C.3.d.vi of the Fact Sheet, the Facility can meet end-of-pipe effluent limits for copper. Therefore, dilution credits have not been applied in the calculation of the WQBELs.

Using the acute and chronic ECAs for copper shown in Table F-~~9~~ 6, above, this Order contains final Average Monthly Effluent Limitations (AMEL) and Maximum Daily Effluent Limitations (MDEL) for copper of ~~7.3~~7.4 µg/L and ~~9.3~~10 µg/L (total recoverable), respectively.

(d) Plant Performance and Attainability. ~~Analysis of the effluent data shows that the MEC of 6.7 µg/L is less than the applicable WQBELs.~~ The Central Valley Water Board concludes, ~~therefore~~based on an analysis of the effluent data, that immediate compliance with these effluent limitations is feasible.

xii. Cyanide

(a) WQO. The CTR includes maximum 1-hour average and 4-day average criteria of 22 µg/L and 5.2 µg/L, respectively, for cyanide for the protection of freshwater aquatic life.

(b) RPA Results. The maximum effluent concentration (MEC) for cyanide was 10 µg/L while the maximum observed upstream receiving water concentration was 5.0 µg/L. Therefore, cyanide in the discharge has a reasonable potential to cause or contribute to an in-stream excursion above the CTR criterion for the protection of freshwater aquatic life.

(c) WQBELs. As discussed in Section IV.C.3.d.vi of the Fact Sheet, based on Facility performance acute aquatic life dilution is not needed and has not been allowed for cyanide. However, chronic aquatic life dilution may be allowed for cyanide. Based on results of the Discharger's dynamic model for compliance with the CTR criteria for cyanide at the edge of the chronic aquatic life mixing zone, MDEL of 22 µg/L, and an AMEL of 11 µg/L is calculated. The Central Valley Water Board finds that granting of this dilution credit could allocate an unnecessarily large portion of the receiving water's assimilation capacity of cyanide and could violate the Antidegradation Policy. For this reason, a performance-based effluent limitation is calculated (See Table F-19. Performance-based Effluent Limitations Statistics). This Order contains a maximum daily effluent limitation (MDEL) for cyanide of 11 µg/L.

(d) Plant Performance and Attainability. Analysis of the effluent data shows that the MEC of 10 µg/L is less than the MDEL. The Central Valley Water Board concludes, therefore, that immediate compliance with these effluent limitations is feasible.

xiii. Manganese

(a) WQO. The Secondary MCL – Consumer Acceptance Limit for manganese is 50 µg/L which is used to implement the Basin Plan's chemical constituent objective for the protection of municipal and domestic supply.

(b) RPA Results. Based on effluent data from 19 April to 8 June 2011, the maximum effluent concentration (MEC) for dissolved manganese was 270 µg/L out of 51 samples while the maximum observed upstream receiving water concentration was 5 µg/L out of 7 samples. Therefore, manganese in the discharge has a reasonable potential to cause or contribute to an in-stream excursion above the secondary MCL.

(c) WQBELs. The receiving water contains assimilative capacity for manganese, therefore, a dilution credit of 56:1 was allowed in the development of the WQBELs for manganese. Based on the allowable dilution credit, an annual average effluent limit of 2700 µg/L is calculated. The Central Valley Water Board finds that granting of this dilution credit could allocate an unnecessarily large portion of the receiving water's assimilation capacity of manganese and could violate the Antidegradation Policy. For this reason, a performance-based effluent limitation is calculated (See Table F-19. Performance-based Effluent Limitations Statistics). The performance-based MDEL is 270 µg/L. This Order contains an MDEL for manganese of 270 µg/L.

(d) Plant Performance and Attainability. The effluent limit is a performance-based limit, thus, representing the maximum projected effluent concentration achievable by the Facility. The Central Valley Water Board concludes, therefore, that immediate compliance with these effluent limitations is feasible.

xiv. Methyl Tertiary Butyl Ether (MTBE)

(a) WQO. The Secondary MCL – Consumer Acceptance Limit for MTBE is 5.0 µg/L, which is used to implement the Basin Plan's chemical constituent objective for the protection of municipal and domestic supply.

(b) RPA Results. The maximum effluent concentration (MEC) for methyl tertiary butyl ether (MTBE) was 5.8 µg/L out 101 samples while the maximum observed upstream receiving water concentration was 1.9 µg/L out of 30 samples. Therefore, MTBE in the discharge has a reasonable

potential to cause or contribute to an in-stream excursion above the secondary MCL.

(c) WQBELs. The receiving water contains assimilative capacity for MTBE, therefore, a dilution credit of 56:1 was allowed in the development of the WQBELs for MTBE. Based on the allowable dilution credit, an annual average effluent limit of 260 µg/L is calculated. The Central Valley Water Board finds that granting of this dilution credit could allocate an unnecessarily large portion of the receiving water's assimilation capacity of MTBE and could violate the Antidegradation Policy. For this reason, a performance-based effluent limitation is calculated (See Table F-19. Performance-based Effluent Limitations Statistics). This Order contains MDEL for MTBE of 18 µg/L.

(d) Plant Performance and Attainability. Analysis of the effluent data shows that the MEC of 5.8 µg/L is less than the applicable WQBELs. The Central Valley Water Board concludes, therefore, that immediate compliance with these effluent limitations is feasible.

xv. Chlorine Residual

(a) WQO. USEPA developed NAWQC for protection of freshwater aquatic life for chlorine residual. The recommended 4-day average (chronic) and 1-hour average (acute) criteria for chlorine residual are 0.011 mg/L and 0.019 mg/L, respectively. These criteria are protective of the Basin Plan's narrative toxicity objective.

(b) RPA Results. 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 Sacramento 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 NAWQC.

(c) WQBELs. 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 an average daily limitation. This Order contains a 4-day average effluent limitation and 1-hour average effluent limitation for chlorine residual of 0.011 mg/L and 0.019 mg/L, respectively, based on USEPA's NAWQC, which implements the Basin Plan's narrative toxicity objective for protection of aquatic life.

(d) Plant Performance and Attainability. Although, the Discharger violated the chlorine residual limit twice since June 2005, the Central Valley Water Board believes that immediate compliance with these effluent limitations is feasible.

xvi. Chlorpyrifos and Diazinon

(a) WQO. The Central Valley Water Board recently completed a total maximum daily load (TMDL) for chlorpyrifos and diazinon in the Sacramento and Feather Rivers and amended the Basin Plan to include chlorpyrifos and diazinon waste load allocations and water quality objectives on 23 June 2006. The Basin Plan contains water quality objectives for chlorpyrifos of 0.025 µg/L as a 1-hour average and 0.015 µg/L as a 4-day average for the Sacramento River from the Colusa Basin Drain to the I Street Bridge. The Basin Plan also states that "Compliance with water quality objectives, waste load allocations, and load allocations for diazinon and chlorpyrifos in the Sacramento and Feather Rivers is required by August 11, 2008"

(b) RPA Results. The maximum effluent concentration (MEC) for chlorpyrifos was 0.039 µg/L while the maximum observed upstream receiving water concentration was 0.006 µg/L. Therefore, chlorpyrifos in the discharge has reasonable potential to cause or contribute to an in-stream excursion above the Basin Plan's water quality objective for chlorpyrifos. Diazinon has not be detected in the effluent.

(c) WQBELs. The waste load allocations (WLA) for chlorpyrifos and diazinon have been adopted as water quality objectives in the Basin Plan. NPDES dischargers must meet the WLA, therefore, no dilution can be granted for compliance with the water quality objectives for chlorpyrifos and diazinon. Due to the additive toxicity of chlorpyrifos and diazinon, the Basin Plan established that the WLA for all NPDES-permitted dischargers shall not exceed the sum (S) of one (1) as defined below."

$$S = \frac{C_D}{WQO_D} + \frac{C_C}{WQO_C} \leq 1.0$$

Where:

C_D = diazinon effluent concentration in µg/L
C_C = chlorpyrifos effluent concentration in µg/L
WQO_D = acute or chronic diazinon water quality objective in µg/L.
WQO_C = acute or chronic chlorpyrifos water quality objective in µg/L.

Average monthly effluent limits and maximum daily effluent limits have been calculated using the procedures in Section 1.4 of the SIP resulting in the following effluent limits for chlorpyrifos and diazinon:

Average Monthly Effluent Limit

$$S_{AMEL} = \frac{C_{D\text{-}avg}}{0.08} + \frac{C_{C\text{-}avg}}{0.012} \leq 1.0$$

$C_{D\text{-}avg}$ = average monthly diazinon effluent concentration in µg/L
$C_{C\text{-}avg}$ = average monthly chlorpyrifos effluent concentration in µg/L

Maximum Daily Effluent Limit

$$S_{MDEL} = \frac{C_{D\text{-}max}}{0.16} + \frac{C_{C\text{-}max}}{0.025} \leq 1.0$$

$C_{D\text{-}max}$ = maximum daily diazinon effluent concentration in µg/L
$C_{C\text{-}max}$ = maximum daily chlorpyrifos effluent concentration in µg/L

(d) Plant Performance and Attainability. Analysis of the effluent data shows that the MEC of 0.039 µg/L is greater than applicable WQBELs. Based on the sample results for the effluent, the limitations appear to put the Discharger in immediate non-compliance. 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 chlorpyrifos and diazinon 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 chlorpyrifos and diazinon effluent limitations is established in TSO No. R5-2010-0115 in accordance with CWC section 13300, that requires preparation and implementation of a pollution prevention plan in compliance with CWC section 13263.3.

xvii. Mercury

(a) WQO. The Central Valley Water Board adopted Resolution No. R5-2010-0043 on 22 April 2010, Amendments to the Water Quality Control Plan for the Sacramento River and San Joaquin River Basins for the Control of Methylmercury and total mercury in the Sacramento-San Joaquin Delta Estuary. The methylmercury amendment adopts an implementation plan for limiting methylmercury discharged by point sources, including the Discharger. Phase I of the amendments requires a performance limit based on the 99.9 percentile of 12-month running effluent inorganic (total) mercury loads (lbs/year). Additionally, the amendments assign wastewater methylmercury (MeHg) allocations, for the Discharger, the load allocation is 89 g/year as described in Table B – Municipal and

Industrial Wastewater Methylmercury (MeHg) Allocations, Attachment 1 of the amendments.

The current NAWQC 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 threshold dose level causing neurological effects in infants) 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.

(b) RPA Results. According to the April 2010 Delta methylmercury TMDL staff report, during water years 2000-2003 and the mercury TMDL staff, SRCSD contributed an annual average methylmercury load of 162 g/yr to the Delta. The March 2008 SRCSD Localized Bioaccumulation Study determined that SRCSD's effluent contributes about the same amount of methylmercury to bioaccumulation in the Sacramento River as expected from effluent and river methylmercury load estimates. SRCSD's discharge during the field work (July-November 2006, a low flow period during an overall wet year) represented about 1.5% of the flow and about 7% of the methylmercury load in the Sacramento River. Mercury in short-lived biosentinel fish (silversides and juvenile bass) increased 9 to 13% downstream of the outfall, but longer-lived fish (prickly sculpin) decreased by 9%. The Study report stated, "There was a measurable (i.e., statistically significant) effect of SRWTP effluent on most bio-indicator organisms downstream of the outfall during low-flow river conditions that provide the least amount of dilution. But, the evidence of localized environmental risk is not so clear and convincing that a reasonable decision maker would conclude that some action must be taken locally." The evidence presented in this report argues that an offset program "is acceptable for addressing the regional problem of mercury levels in fish." SRCSD methylmercury loading to the Sacramento River has generally decreased during the last several years. However, SRCSD has contributed as much as 20 to 30% of loading to the river at peak times during drier periods when effluent methylmercury concentrations were higher, and could make similarly substantial contributions during future dry periods, especially if SRCSD increases its discharge.

The maximum observed effluent mercury concentration was 0.0106 µg/L. Mercury bioaccumulates in fish tissue and, therefore, the discharge of mercury to the receiving water may contribute to exceedances of the narrative toxicity objective and impact beneficial uses. The Sacramento-San Joaquin Delta has been listed as an impaired water body pursuant to

CWA section 303(d) because of mercury and the discharge must not cause or contribute to increased mercury levels.

(c) WQBELs. This Order contains a performance-based mass effluent limitation of 2.3 lbs/year for total mercury for the effluent discharged to the receiving water. The mass limitation was derived in accordance with the Delta Methylmercury TMDL (The 99.9th percentile of running annual total mercury loading based on effluent data from January 2005 through April 2010.) Order No. 5-00-188 prescribed a mercury mass load limit and a mercury "credit" program. The Discharger discharged less than the prescribed load limit, so has accumulated mercury discharge credits. Since this permit establishes a performance-based mercury limit with which the discharger can comply, the accumulated credit is not applied against future discharges under this Order.

(d) Plant Performance and Attainability. The new effluent limitation for mercury is based on the performance of the Facility, therefore, immediate compliance can be achieved.

xviii. Nitrate and Nitrite

(a) WQO. DPH has adopted Primary MCLs for the protection of human health for nitrite and nitrate that are equal to 1 mg/L and 10 mg/L (measured as nitrogen), respectively. DPH has also adopted a primary MCL of 10 mg/L for the sum of nitrate and nitrite, measured as nitrogen.

USEPA has developed a primary MCL and an MCL goal of 1 mg/L for nitrite (as nitrogen). For nitrate, USEPA has developed Drinking Water Standards (10 mg/L as Primary MCL) and NAWQC for protection of human health (10 mg/L for non-cancer health effects). Recent toxicity studies have indicated a possibility that nitrate is toxic to aquatic organisms.

(b) RPA Results. Untreated domestic 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. Nitrate and nitrite are known to cause adverse health effects in humans. Inadequate or incomplete denitrification may result in the discharge of nitrate and/or nitrite to the receiving stream. The conversion of ammonia to nitrites and the conversion of nitrites to nitrates present a reasonable potential for the discharge to cause or contribute to an in-stream excursion above the Primary MCLs for nitrite and nitrate.

Currently, the Discharger's effluent contains very low concentrations of nitrate, ranging from 0.016 to 1.4 mg/L with an average of 0.13 mg/L. However, this Order requires the Discharger fully nitrify its effluent,

therefore, the ammonia will convert to nitrate and the nitrate concentrations will increase. Therefore, the discharge has reasonable potential to cause or contribute to an exceedance of the water quality objectives for nitrite and nitrate in the receiving water.

(c) WQBELs. As discussed in Section IV.C.2.d no dilution is allowed for nitrate. Therefore, this Order requires the wastewater is denitrified to meet the primary MCL at the end-of-pipe. An average monthly effluent limit of 10 mg/L for nitrate (as nitrogen) is included in this Order. This is based on the primary MCL of 10 mg/L (as N).

(d) Plant Performance and Attainability. Analysis of the effluent data demonstrates that the Facility can immediately comply with the new WQBELs for nitrate.

xix. Pathogens

(a) WQO. DPH has developed reclamation criteria, CCR, Division 4, Chapter 3 (Title 22), for the reuse of wastewater. Title 22 requires that for spray irrigation of food crops, parks, playgrounds, schoolyards, and other areas of similar public access, wastewater be adequately disinfected, oxidized, coagulated, clarified, and filtered, and that the effluent total coliform levels not exceed 2.2 MPN/100 mL as a 7-day median. As coliform organisms are living and mobile, it is impracticable to quantify an exact number of coliform organisms and to establish weekly average limitations. Instead, coliform organisms are measured as a most probable number and regulated based on a median.

Title 22 also requires that recycled water used as a source of water supply for non-restricted recreational impoundments be disinfected tertiary recycled water that has been subjected to conventional treatment. A non-restricted recreational impoundment is defined as *"…an impoundment of recycled water, in which no limitations are imposed on body-contact water recreational activities.*" Title 22 is not directly applicable to surface waters; however, the Central Valley Water Board finds that it is appropriate to apply an equivalent level of treatment to that required by the Department of Public Health's reclamation criteria as provided herein because the receiving water is used for irrigation of agricultural land and for contact recreation purposes. The stringent disinfection criteria of Title 22 as provided herein, in the circumstances of the discharge, are appropriate since the partially diluted effluent may be used for the irrigation of food crops and/or for body-contact water recreation. Coliform organisms are intended as an indicator of the effectiveness of the entire treatment train and the effectiveness of removing other pathogens.

(b) RPA Results. The beneficial uses of the Sacramento-San Joaquin Delta include municipal and domestic supply, water contact recreation, and

agricultural irrigation supply. To protect these beneficial uses, the Central Valley Water Board finds that the wastewater must be disinfected and adequately treated to prevent disease. The method of treatment is not prescribed by this Order; however, wastewater must be treated to a level equivalent to that recommended by DPH in the Title 22 regulation during May-October. The Discharger will also operate filters in all other months.

Pathogens include bacterium, viruses and protozoans, which exist in natural waters and wastewater. Pathogens are difficult to detect, because of the typically low abundance in most waters. Therefore, indicator bacteria (e.g., total coliform organisms) are used as a barometer of pathogen water quality. NPDES permits include total coliform limitations to measure the effectiveness of disinfection processes. Specific protozoans of concern for the Central Valley Drinking Water Group are *Giardia* and *Cryptospordium* from human and animal fecal waste. Both protozoans are in municipal wastewater and can cause diarrhea, vomiting and cramps. For immune suppressed individuals, the illness can be very serious, including death.

The Sacramento River near the diffuser is a popular sport fishing area[1]. In addition, there are at least 20 agricultural diversions within 1 mile upstream and 2 miles downstream of the discharge[2]. Based upon information submitted by SRCSD, the typical construction of the agricultural irrigation water intakes in the vicinity of the outfall would draw water from near the bank of the river, below the water surface (deep enough to not go dry during low river levels, but far enough from the river bottom to not be impacted by bottom sediments). It appears that undiluted effluent will not be drawn into the agricultural intakes, but varying mixtures of effluent and river water will be diverted from the partially mixed discharge plume. The nearest drinking water intake is approximately one mile upstream at the new Freeport water intake. River flow modeling conducted by SRCSD concluded that the SRCSD discharge will not be carried far enough upriver during incoming tides to be captured by the Freeport intake, however an operating agreement between the Freeport Regional Water Authority and SRCSD will prevent diversion of river water possibly containing diluted treated wastewater at the Freeport water intake. The diffuser for the discharge to the Sacramento River is located in the vicinity of many agricultural water intakes and an area popular with fishermen.

[1] "Localized Mercury Bioaccumulation Study", Larry Walker Associates, March 2008, Figure ES-1.

[2] NPDES Permit Renewal Issues – Drinking Water Supply and Public Health, SRWTP, 14 December 2009, CVRWQCB

The Central Valley Water Board generally follows a November 1980 general recommendations by the Department of Public Health (DPH) on the appropriate levels of disinfection for protection of body-contact recreation in waters downstream of a sewage treatment plant discharge. The general DPH recommendation allows a discharge of secondary treatment with chlorination when there is a minimum of 20-to-1 dilution (river to discharge), and suggests tertiary filtration when less than 20-to-1 dilution is available. The DPH recommendations are a "rule of thumb" and are not regulation. Site-specific disinfection recommendations are often sought from DPH in preparing NPDES permits.

Even when the 20-to-1 "rule of thumb" is followed, the available dilution often far exceeds a 20-to-1 river to discharge flow ratio. The dilution ratio for the District's discharge is typically greater than 20-to-1, but can be at times less than 20:1. The following is a list of all municipal sewage treatment plant discharges to the Sacramento River downstream of Shasta Dam and the associated average dilution ratios (river-to-effluent). As noted, some of these treatment facilities have a tertiary filtration process preceding the disinfection process, which reduces the pathogen concentrations, although the filtration systems themselves are not designed and operated to produce a pathogen-free effluent (i.e. Title 22, or equivalent, filtration system).

Facility	Permitted Flow	Average Dilution
Sacramento Regional CSD WWTP (no filtration)	**181 mgd**	**50-to-1**
City of Redding Stillwater WWTP (filtered)	4 mgd	1200-to-1
City of Redding Clear Creek WWTP (filtered)	8.8 mgd	600-to-1
City of Corning WWTP (no filtration)	1.4 mgd	4100-to-1
City of Anderson WWTP (filtered)	1.4 mgd	2400-to-1
City of Rio Vista Beach WWTP (no filtration)	0.65 mgd	10,000-to-1
City of Chico WWTP (no filtration)	12 mgd	400-to-1
City of Red Bluff WWTP (filtered)	2.5 mgd	2600-to-1

Due to site-specific circumstances of the discharge to the Delta being a major drinking water supply and the high degree of direct public contact with the river at the point of discharge and downstream of the point of discharge, the Central Valley Water Board staff sought a recommendation of DPH rather than rely on the 1980 general recommendation. In a 11 May 2009 letter to the DPH, Central Valley Water Board staff requested guidance on the appropriate disinfection requirements for the removal of pathogens in the renewed NPDES permit for protection of beneficial uses for contact recreation and agricultural irrigation. Central Valley Water Board staff also requested DPH's advice on whether the Discharger's chlorine disinfection system would be expected to provide adequate disinfection to kill pathogenic organisms. Furthermore, Central Valley

Water Board staff requested guidance on whether Dr. Robert Emerick's[1] research that the Discharger's effluent had high (20) percent of coliform associated particles could be under estimating the pathogenic risk of the discharge. This concern is due to the fact that the multiple-tube fermentation test used to measure the total coliform organisms in the effluent does not adequately enumerate target organisms that occur in a particle-associated state.

DPH requested a formal health risk assessment be conducted to determine the risk of *Giardia* cysts and *Cryptosporidium* oocysts might pose to persons engaging in body contact recreation in the portions of the Sacramento River affected by the discharge. DPH determined that if contact recreation is protected then agricultural irrigation and other Delta beneificial uses that could be impacted by pathogens would also be protected.

The Discharger engaged the professional services of Dr. Charles Gerba of the University of Arizona to conduct the human health risk assessment. The assessment determined the risk to pathogenic protozoans nearly quadruples from upstream of the discharge to downstream of the discharge. Dr. Gerba's risk assessment concluded that SRWTP discharge did not exceed the USEPA's water quality criteria for contact recreation. Based on Dr. Gerba's "Estimated Risk of Illness from Swimming in the Sacramento River", 23 February 2010, the DPH recommended in a letter dated, 15 June 2010, to Central Valley Water Board that the Discharger provide "additional treatment sufficient to reduce the additional risk of infection posed by exposure to its discharge to as close to 1 in 10,000 as can be achieved by a cost-effective combination of using filtration and/or a disinfection process that effectively inactivates *Giardia* cysts and *Cryptosporidium* oocysts". DPH concluded that providing additional treatment would also address the concerns with the lack of a chlorine contact chamber as well as particle-associated coliform in the SRWTP's effluent.

The Discharger disagreed with the DPH in a letter to the Central Valley Water Board dated and 30 June 2010. The Discharger contended:

(1) Risk levels due to *Cryptosporidium* and *Giardia* in the Sacramento River do not show a statistically significant difference between upstream of the discharge and immediately downstream of the discharge, however, minor statistically significant change in risk is determined 1.5 miles downstream of the discharge and may be due to other impacts.

[1] Emerick, Robert W., Factors Influencing Ultraviolet Disinfection Performance Part II: Association of Coliform Bacteria with Wastewater Particles, Water Environment Research, Volume 71, Number 6, 2000.

(2) DPH's risk of 1 in 10,000 is contrary to 1986 USEPA's national risk criteria of 8 illnesses in 1,000 exposures.
(3) DPH's contention that the 1986 criteria for contact recreational use protection are outdated or did not consider human pathogens is incorrect.
(4) Dr. Gerba's assumptions are very conservative and changing just one assumption would reduce the risk to less than 1 in 10,000.
(5) DPH's recommendation is establishing a new unadopted standard that exceeds requirements for other NPDES permits.

SRCSD recommends, instead, that the USEPA Beach Standard[1] for freshwater recreational exposure of 8 illnesses per 1000 exposures, be used as the level of human health protection. SRCSD additionally states that the discharge does not create a health risk greater than the USEPA Beach Standard.

The USEPA Beach Standard is not an appropriate or applicable standard for the discharge of treated sewage, a controllable source of pathogens. In the Forward of the Beach Standards, the then Director of the USEPA Criteria and Standards Division states: "The bacteriological water quality criteria recommended in this document are based on an estimate of bacterial indicator counts and gastrointestinal illness rates that are currently being accepted, albeit unknowingly, in many circumstances, by the States." The Beach Standard of 8 illnesses for 1000 exposures is not a policy of USEPA nor does it state that this is an acceptable rate of illness. It is instead a recognition that there is a health risk associated with recreational use of freshwaters, even when those waters in and of themselves are considered to be free of health risk. Wildlife, non-point source discharges, and the recreationists themselves, all contribute pathogens to the freshwaters used for recreation. If a controllable sewage treatment plant discharge is allowed to add pathogens to a receiving water such that the health risk is at the USEPA Beach Standard, the uncontrollable sources and contribution of pathogens from wildlife, non-point source pollution, and the recreationalists, will cause the overall health risk to exceed the 8 illness per 1000 exposures. If the Beach Standard is applied to the SRCSD discharge, under the most critical river conditions, the SRCSD discharge would cause nearly 1 of every 100 people ingesting river water during recreation to become ill from pathogens in the SRCSD discharge, which is in addition to any contribution of health risk from other sources.

Given the very high level of public contact with the receiving water, the use of the receiving water for irrigation which can result in human contact with pathogens, and extensive use of Delta waters as private and public water supplies, increased risk of illness and infection from exposure to the

[1] "Ambient Water Quality Criteria for Bacteria – 1986" EPA 440/5-84-002, January 1986

wastewater must be prevented to protect the municipal, agricultural or recreational beneficial use. This permit requires an essentially pathogen-free wastewater, which will incidentally implement DPH's recommendation to improve the level of disinfection to remove protozoa in addition to bacteria, enteric virus and other pathogens. Several technologies are available to remove pathogens, all essentially involving filtration to produce a very low-solids effluent, which is then dosed with a disinfectant (usually chlorine or UV light). The combination of filtration and disinfectant effectively removes all pathogens. Requirements of Title 22 will be adequate to meet the 1 in 10,000 risk recommended by the DPH.

The Discharger has determined that the existing pure oxygen activated sludge secondary treatment system will be replaced by a biological nitrogen removal (BNR) secondary wastewater treatment system. Pilot testing of the BNR secondary treatment system indicates that the BNR secondary effluent will have lower pathogen concentrations (cryptosporidium and giardia) than the current pure oxygen activated sludge secondary effluent, which will reduce the pathogens discharged to the Sacramento River relative to the current wastewater discharge, even without addition of effluent filtration.[1] Expansion and enhancement of wastewater storage within the wastewater treatment plant that will occur as part of the treatment plant upgrades will allow the Discharger improved control of the varying flow of wastewater, including during peak wet weather flow events. The Discharger would need to construct an effluent filtration system with a design effluent flow of 330 mgd in order to filter peak wet weather flows that occur during sustained wet weather. The 330 mgd flow takes into consideration the flow equalization that will occur with operation of the wastewater storage facilities.

Construction of a smaller filtration system to treat a discharge flow of 217 mgd will allow the Discharger to fully filter the wastewater during dry weather, which would include the times when dilution is the lowest in the Sacramento River and when potential for public contact with the discharged wastewater is the highest, and additionally during most wet weather periods. The Discharger estimated that filters designed for 217 mgd, operated year-round, would provide tertiary filtration for approximately 97 percent of the annual wastewater flow discharged from the Facility to the Sacramento River.[2] At this filter design, during May - October the Title 22, or equivalent, disinfection requirements would be met. During November - April, the filters would be operated to the 217 mgd design capacity. Treated wastewater effluent flows to the river or storage basins in excess of the 217 mgd design capacity would not be

[1] Technical Memorandum to District Leadership from Ken Abraham, "Draft Answers to Question Raised by Regional Water Quality Board", 28 February 2014.

[2] Technical Memorandum to District Leadership from Ken Abraham, "Additional Tables Calculation Projected Blend Volumes", 11 March 2014.

filtered, but would be of improved BNR secondary effluent quality with a reduced pathogen concentration relative to the current wastewater discharge. Unfiltered BNR effluent and filtered wastewater would be combined and disinfected with chlorine and dechlorinated prior to discharge to the Sacramento River. This combined discharge would occur at times when wet weather and other conditions minimize public use of the river, and high river dilution is generally available, minimizing any increased risk of public contact with wastewater pathogens. By allowing for construction of a smaller filtration facility, the Discharger estimated savings of over $100 million in capital and operational costs.

In November-April, when potential exposure is less extensive, strict compliance with the Title 22, or equivalent, disinfection criteria is not required. However, as described in Section II.A.2 of this Fact Sheet, the Facility will be operated to provide filtration for effluent discharges up to 217 mgd resulting in most effluent receiving filtration. DPH was consulted in the development of the seasonally-based requirements of this order and agrees the beneficial uses of the Sacramento River will be protected with seasonal total coliform effluent limitations.

In addition to protecting the beneficial uses of agricultural irrigation and contact recreation, filtration will also reduce total organic carbon (TOC), a constituent of concern for the Drinking Water Advisory Group, and substantial reductions in effluent concentrations for copper, mercury, TSS and BOD. BOD is a concern due to its oxygen demand to the Sacramento River. Improved effluent treatment may also reduce concentrations of other constituents, such as Constituents of Emerging Concern (CECs), although whether or not reductions of these chemicals do occur, and the magnitude of any such reductions, is unknown at this time. Similar POTWs that implement tertiary treatment and discharge to the Sacramento-San Joaquin Delta or its tributaries include:

Community of El Dorado Hills	City of Roseville
City of Manteca	City of Woodland
City of Stockton	City of Placerville
City of Lodi	Community of Colfax
City of Galt	Live Oak
City of Tracy	Community of Mountain House
City of Rio Vista, Northwest Plant	Linda County Water District

The health risk study conducted by SRCSD focused on pathogen impacts from body contact recreation because that was determined, through consultation with DPH, that recreational contact with the Sacramento River has the highest degree of water contact and risk of illness. If contact recreation is fully protected from pathogen risk, other beneficial uses will also be protected. There are other beneficial uses that can be impacted by pathogens in the SRCSD discharge.

- Agricultural irrigation beneficial use. Some crops, such as strawberries and carrots, can transmit pathogens in the irrigation water to human consumers. Irrigation water intakes in the immediate vicinity of the discharge are not an issue because the irrigation water is drawn from the sides of the river outside of the SRCSD mixing zone, so those agricultural irrigation diversions contain no SRCSD wastewater. Any agricultural diversion more than a mile or so downstream of the discharge point will contain some amount of SRCSD discharge and the pathogens in the discharge. For any agricultural irrigation with water containing SRCSD discharge, there is an increased pathogen loading onto the crops due the SRCSD discharge. No specific study was conducted to quantify this health risk. However, tertiary filtration to remove pathogens will eliminate this increased health risk.

- Drinking Water (MUN) beneficial use. The Sacramento River and Delta downstream of the SRCSD discharge are used extensively for municipal and domestic drinking water supply. The raw water supply for these drinking water systems contains increased concentrations of pathogens as the result of SRCSD's existing discharge, although the health risk caused by the increased pathogen concentrations has not been studied. Municipal drinking water intakes that provide full drinking water treatment required by State and Federal regulations should be able to remove the increased pathogens without a health risk to the consumers. However, there are small drinking water systems throughout the Delta that are not legally required to meet these State and Federal regulations, and so may not have treatment systems that can dependably remove the pathogens. Additionally, there can be incidental drinking of raw Delta water by the public.

(c) WQBELs. In accordance with the requirements of Title 22, this Order includes effluent limitations for May-October for total coliform organisms of 2.2 MPN/100 mL as a 7-day median; 23 MPN/100 mL, not to be exceeded more than once in a 30-day period; and 240 MPN/100 mL as an instantaneous maximum. For November-April, the effluent limitations for total coliform organisms are 2.2 MPN/100mL as a monthly median; 23 MPN/100 mL as a weekly median; and 240 MPN/100mL as an instantaneous maximum.

In addition to coliform limitations, a turbidity specification has been included as a second indicator of the effectiveness of the treatment process and to assure compliance with the applicable required level of treatment. The tertiary treatment process, or equivalent, is capable of reliably meeting a turbidity of 2 nephelometric turbidity units (NTU) as a daily average. Failure of the filtration system such that virus removal is impaired would normally result in increased particles in the filter effluent, which result in higher effluent turbidity. Turbidity has a major advantage

for monitoring filter performance, allowing immediate detection of filter failure and rapid corrective action. Coliform testing, by comparison, is not conducted continuously and requires several hours, to days, to identify high coliform concentrations. To ensure compliance with applicable DPH Title 22 disinfection criteria and ensure effective performance of filters year-round, this Order contains operational turbidity specifications to be met prior to disinfection of effluent from tertiary filters.

This Order contains effluent limitations and requires a tertiary level of treatment, or equivalent, necessary to protect the beneficial uses of the receiving water. The Regional Water Board has considered the following factors in CWC section 13241:

(1) The past, present and probable future beneficial uses of the Sacramento River and Delta include municipal and domestic supply, agricultural irrigation, agricultural stock watering, industrial process water supply, industrial service supply, body contact water recreation, other non-body contact water recreation, warm freshwater aquatic habitat, cold freshwater aquatic habitat, warm fish migration habitat, cold fish migration habitat, warm spawning habitat, wildlife habitat, and navigation.

(2) The environmental characteristics of the hydrographic unit, including the quality of the available water, will be improved by the requirement to provide tertiary treatment for this wastewater discharge. Tertiary treatment will allow for the reuse of the diluted wastewater for food crop irrigation and contact recreation activities that would otherwise be unsafe according to recommendations from DPH.

(3) Fishable and swimmable water quality conditions can be reasonably achieved through the coordinated control of all factors that affect water quality in the area. These factors include regulation of point source municipal and industrial discharges with appropriate NPDES Permits, regulation of urban storm water runoff with Municipal Storm water NPDES Permits, and non-point source discharges such as timber harvesting and irrigated agriculture. All of these regulatory programs control the discharge of pollutants to surface waters to protect existing and potential beneficial uses.

(4) The economic impact of requiring an increased level of treatment has been considered. The Discharger and others estimated that the increased level of treatment will cost approximately between $500 million to $1.3 billion. The loss of beneficial uses within downstream waters, without the tertiary treatment requirement, which includes prohibiting the irrigation of food crops and prohibiting public access for contact recreational purposes, would have a detrimental economic impact. In addition to pathogen removal to protect irrigation and

recreation, tertiary treatment may also aid in meeting future discharge limitations for other pollutants, such as heavy metals, reducing the need for advanced treatment specific for those pollutants. The sizing of filtration facilities consistent with the Facility Description is expected to reduce capital and operational costs by over $100 million without any significant consequence for beneficial uses.

(5) The requirement to provide tertiary treatment for this discharge will not adversely impact the need for housing in the area any more than for other adjacent communities. The potential for developing housing in the area will be facilitated by improved water quality, which protects the contact recreation and irrigation uses of the receiving water. DPH recommends that, in order to protect the public health, diluted wastewater effluent must be treated to a tertiary level for contact recreational and food crop irrigation uses. Without tertiary treatment, the downstream waters could not be safely utilized for contact recreation or the irrigation of food crops.

(6) It is the Regional Water Board's policy, (Basin Plan, page IV-12.00, Policy 2) to encourage the reuse of wastewater. The Regional Water Board requires dischargers to evaluate how reuse or land disposal of wastewater can be optimized. The need to develop and use recycled water is facilitated by providing a tertiary level of wastewater treatment that will allow for a greater variety of uses in accordance with CCR, Title 22.

(7) The Regional Water Board has considered the factors specified in CWC section 13263, including considering the provisions in CWC section 13241, in adopting the disinfection and filtration requirements under Title 22 criteria and as provided herein. The Regional Water Board finds, on balance, that these requirements are necessary to protect the beneficial uses of the Sacramento River and Delta, including water contact recreation and irrigation uses.

(d) Plant Performance and Attainability. New or modified control measures will be necessary in order to comply with the effluent limitations for total coliform organisms, and the new or modified control measures cannot be designed, installed and put into operation within 30 calendar days. Furthermore, the effluent limitations for filtration 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. The Discharger submitted an infeasibility analysis dated August 2010 for compliance with these disinfection requirements. Therefore, a compliance time schedule for compliance with the total coliform organisms effluent limitations and a requirement to provide Title 22 (or equivalent) tertiary filtration is established in this Order.

xx. pH

(a) WQO. The Basin Plan includes a water quality objective for surface waters (except for Goose Lake) that the "…pH shall not be depressed below 6.5 nor raised above 8.5. Changes in normal ambient pH levels shall not exceed 0.5 in fresh waters with designated COLD or WARM beneficial uses."

(b) RPA Results. The discharge of domestic wastewater has a reasonable potential to cause or contribute to an excursion above the Basin Plan's numeric objectives for pH.

(c) WQBELs. Effluent limitations for pH of 6.0 as an instantaneous minimum and 8.0 as an instantaneous maximum are included in this Order. The instantaneous maximum effluent limit is more stringent than the Basin Plan objective and is based on Facility performance. Based on modeling performed by the Discharger, an instantaneous minimum effluent limit of 6.0 ensures compliance with the Basin Plan's minimum objective within the chronic mixing zone.

(d) Plant Performance and Attainability. Analysis of the effluent data demonstrates that the Facility can immediately comply with the effluent limitations for pH.

xxi. Settleable Solids

(a) WQO. For inland surface waters, the Basin Plan states that "[w]ater shall not contain substances in concentrations that result in the deposition of material that causes nuisance or adversely affects beneficial uses."

(b) RPA Results. The discharge of domestic wastewater has a reasonable potential to cause or contribute to an excursion above the Basin Plan's narrative objective for settleable solids. The maximum effluent concentration (MEC) for settleable solids was 2.5 ml/L. Therefore, settleable solids in the discharge has reasonable potential to cause or contribute to an in-stream excursion above the narrative toxicity objective or Basin Plan numeric objectives and waste load allocation.

(c) WQBELs. This Order contains average monthly and average daily effluent limitations for settleable solids. Because the amount of settleable solids is measured in terms of volume per volume without a mass component, it is impracticable to calculate mass limitations for inclusion in this Order. A daily maximum effluent limitation for settleable solids is included in the Order, in lieu of a weekly average, to ensure that the treatment works operate in accordance with design capabilities.

(d) Plant Performance and Attainability. Only one violation of the settleable solids occurred since 2005. Therefore, based on existing

performance the Facility can immediately comply with the new final WQBELs for settleable solids.

xxii. Temperature

(a) WQO. The Thermal Plan requires that, "*The maximum temperature shall not exceed the natural receiving water temperature by more than 20°F*."

(b) RPA Results. The highest daily temperature of the discharge was more than 20° F above the natural receiving water temperature. The discharge is an elevated temperature waste, which could cause or threaten to cause the receiving water temperature to exceed temperature objectives established in the Thermal Plan. Therefore, reasonable potential exists for temperature and WQBELs are required.

~~**(b)** The SRWTP discharges to the Sacramento River via a 400-foot outfall (300-foot diffuser with 74 ports) that is placed on the bottom of the river perpendicular to the river flow. The Sacramento River in the vicinity of the discharge is approximately 600 feet wide at the surface, about 400 feet wide at the bottom and 25 - 30 feet deep. The Sacramento River at the point of discharge experiences tidal flows that slow the river flow, and at times cause flow reversals. The existing NPDES permit adopted in 2000 (Order No. 5-00-188), prohibits river discharge when the flow ratio (Sacramento River: effluent) is less than 14:1. The existing permit also prohibits discharge when river flows are less than 1,300 cubic feet per second (cfs). These discharge prohibitions are based on the design of the outfall diffuser to ensure adequate mixing of effluent with river water. When either of these two conditions exists, the SRCSD ceases its surface water discharge and diverts treated effluent to storage basins.~~

~~The Lower Sacramento River and Delta serve as a migration corridor and/or provide other types of habitat (e.g., spawning, rearing) for many anadromous fish species. In addition, the lower Sacramento River supports numerous resident native and introduced fish species and diverse assemblage of BMIs, an important source for many adult and juvenile fishes. The following table lists those species of concern that may be impacted within the vicinity of the discharge:~~

~~Common Name~~	~~Scientific Name~~	~~Anadromous/ Resident~~	~~Status~~
~~Chinook salmon~~	~~Onocorhynchus Ishawytscha~~		
~~Fall-run~~	~~Onocorhynchus Ishawytscha~~	~~Anadromous~~	~~FSC~~
~~Late-fall run~~	~~Onocorhynchus Ishawytscha~~	~~Anadromous~~	~~CSC, FSC~~
~~Spring-run~~	~~Onocorhynchus Ishawytscha~~	~~Anadromous~~	~~ST, FT~~
~~Winter-run~~	~~Onocorhynchus Ishawytscha~~	~~Anadromous~~	~~SE, FE~~
~~Steelhead trout~~	~~O. mykiss~~	~~Anadromous~~	~~FT~~
~~Green sturgeon~~	~~Acipenser medirostros~~	~~Anadromous~~	~~FC, CSC/C1~~
~~Striped bass~~	~~Morone saxatills~~	~~Anadromous~~	~~I~~

~~American shad~~	~~Alsoa sapidissima~~	~~Anadromous~~	~~I~~
~~White sturgeon~~	~~A. transmontanus~~	~~Anadromous~~	~~N~~
~~River lamprey~~	~~Lampetra ayresi~~	~~Anadromous~~	~~CSC/C2~~
~~Pacific lamprey~~	~~L. tridentate~~	~~Anadromous~~	~~FSC~~
~~Hardhead~~	~~Mylopharidib conocephalus~~	~~Resident~~	~~CSC/C2~~
~~Splittail~~	~~Pogonichthys macrolepdiotus~~	~~Resident~~	~~CSC~~
~~Delta smelt~~	~~Hypomesus traspacificus~~	~~Resident~~	~~FT, SE~~
~~Status Codes~~	~~FE = Federally listed as endangered~~ ~~FT = Federally listed as threatened~~ ~~FSC = Federal Species of Concern~~ ~~SE = Listed as endangered by California~~ ~~N= Native species, no State or federal status~~	~~ST = Listed as threatened by California~~ ~~CSC= CA Species of Concern~~ ~~C1=Should be listed as threatened or endangered~~ ~~C2 = Declining, potentially threatened~~ ~~I= Introduced, no State or federal status~~	

~~As a condition of Waste Discharge Order No. 5-00-188, the Discharger completed and submitted a study assessing the thermal impacts of its discharge in the Sacramento River to the National Marine Fisheries Services (NMFS), titled "Thermal Effects of Sacramento Regional Wastewater Treatment Plant Discharges on Migrating Fishes of the Sacramento River, February 2005." This thermal impact assessment recommended continuation of the existing thermal plan exemptions. The 2005 Thermal Study was previously reviewed by NMFS staff and they did not indicate any concerns with the proposed Thermal Plan exception. Since this time, however, conditions under which the evaluation was made have changed. There has been a significant pelagic organism decline in the Delta, new species are threatened and there has been a change in the diffuser configuration. In December 2009, the Discharger requested revised changes to their Thermal Plan exemption. In June 2010, the Discharger in a letter to the Central Valley Water Board withdrew its request for an expanded wastewater treatment plant. Due to these changes the Discharger prepared a new study, "Thermal Plan Exception Justification for the Sacramento Regional Wastewater Treatment Plant", July 2010. With this revised July 2010 study, new thermal plan exemptions were requested.~~

~~Table F-15 below outlines the Thermal Plan requirements, the Thermal Plan exception allowed in the current NPDES permit (Order 5-00-188), and the Discharger's most recent proposed Thermal Plan exception request for the NPDES permit renewal.~~

~~Table F-15. Existing and Proposed Thermal Plan Exception Requirements~~

~~Thermal Plan Requirements (Section 5.A.(1)a-c)~~	~~Existing NPDES Permit Requirements (181 mgd discharge)~~	~~SRCSD Proposed NPDES Requirements (181 mgd)~~
~~5.A.(1)a~~ ~~The maximum effluent temperature shall not exceed the natural receiving water temperature by more than~~	~~The maximum temperature of the discharge shall not exceed the natural receiving water temperature by more than:~~ ~~25°F from 1 October through 30 April;~~ ~~-or-~~	~~The daily average temperature of the effluent shall not exceed the daily average natural receiving water temperature by more the 20°F 1 April through 30 September, or by more the 25°F 1 October through 31 March~~

~~20°F~~	~~20° F from 1 May through 30 September *(meets Thermal Plan requirements)*~~	
~~**5.A.(1)b**~~ ~~Elevated temperature waste discharges either individually or combined with other discharges shall not create a zone, defined by water temperatures of more than **1°F** above natural receiving water temperature, which exceeds 25 percent of the cross-sectional area of a main river channel at any point.~~	~~If the natural receiving water temperature is less than 65º F: The discharge shall not create a zone, defined by water temperature of more than **2° F** above the natural receiving water temperature, which exceeds 25 percent of the cross sectional area of the River at any point outside the zone of initial dilution.~~ ~~If the natural receiving water temperature is 65º F or greater: Meets Thermal Plan requirements at any point outside the zone of initial dilution.~~	~~The discharge shall not create a zone, defined by water temperatures of more than 2.5°F above natural receiving water temperature, which exceeds 50 percent of the cross-sectional area of the river at any point, evaluated as a daily average.~~
~~**5.A.(1)c**~~ ~~No discharge shall cause a surface water temperature rise greater than 4°F above the natural temperature of the receiving waters at any time or place.~~	~~No Exception (*Meets Thermal Plan Requirements)*~~	~~No Exception (*Meets Thermal Plan Requirements)*~~

~~The July 2010 thermal plan exception justification study is based on the dynamic model for temperature performed by Flow Science. The modeled temperature plumes show a zone of passage at the surface of the Sacramento River approximately 75-100 feet wide on the west bank and 175-200 feet wide on the east bank. The surface width of the river at the diffuser is 600 feet. The zone of passage at the bottom of the river is smaller due to the configuration of the west bank. The study concluded that both surface water swimming fish and bottom water swimming fish would avoid the heated plume by swimming around or on top of it.~~

~~According to the United States Fish and Wildlife Service, the range of delta smelt extends from San Pablo Bay upstream to about Verona on the Sacramento River, though the majority of the population occupies from western Suisun Bay to about the City of Sacramento. Delta smelt enter the Sacramento River and Deep Water Ship Channel year round and specifically from late December to June to spawn in temperatures between about 12-18°C. Pre-spawning adults could be expected in the vicinity of the City of Sacramento from the latter part of December through June. Some larvae could be expected in the vicinity of the City of Sacramento during February through June. During the larval stage delta smelt are at their most vulnerable to zones of poor water quality or high water temperature due to their small size and limited mobility.~~

~~The Critical Thermal Maxima (CTM) is the temperature for a given species above which most individuals respond with unorganized locomotion and is considered to be the lethal temperature, for juvenile and adult delta smelt it is reported as 25.4°C (77.7°F)[1]. Delta smelt egg survival decreases at temperatures above 15-16°C (about 60°F) and is greatly reduced by 20°C (68°F)[2]. Other ways to affect aquatic organisms include the rate of temperature change and the organism's ability to avoid or move to more favorable temperatures.~~

~~Central Valley Water Board staff requested the National Marine Fisheries Service (NMFS), the United States Fish and Wildlife Service (USFWS) and the California Department of Fish and Game Wildlife (CDFW) evaluate the July 2010 study and make recommendations on the thermal plan exception request by the Discharger.~~

~~The USFWS expressed several concerns about the lack of knowledge on the synergistic effects of multiple pollutants, like chemical and thermal contamination. The concern that potential of thermal discharges may create winter refugia for non-native predator species and uncertainty about the near-field thermal conditions and delta smelt's migration behavior.~~

~~The USFWS recommends the exception from WDR Order No. 5-00-188 be retained and no further exception be permitted for protection of Delta smelt. Additionally, the USFWS recommends the Discharger initiate planning to address future increases in the discharge with consideration for changes in the Sacramento River as a result of climate change without the need for sequential Thermal Plan exceptions. To determine whether permitted conditions are protective of delta smelt and Sacramento River biota, tThe USFWS requesteds specific monitoring and studies be conducted and include the following:~~

~~**(1)** Continuous monitoring of the thermal discharge in coordination with mixing zone monitoring during December-June.~~
~~**(2)** Study using hydroacoustic technology to determine if there are aggregations of large fish or schools of small fish in the zone of elevated water temperature that are atypical compared to other nearby mid-channel river reaches.~~
~~**(3)** Acute and chronic testing with rainbow trout bi-weekly during December-June for two years with ambient water upstream of Freeport~~

~~[1] Swanson, Christina, Turid Reid, Paciencia S. Young and Joseph J. Cech, Jr. 2000. Comparative environmental tolerances of threatened delta smelt (Hypomesus transpacificus) and introduced wakasagi (H. nipponensis) is an altered California estuary. Oecologia 123: 384-390.~~
~~[2] Bennett, WA. 2005. Critical assessment of the delta smelt population in the San Francisco Estuary, California. San Francisco Estuary and Watershed Science 3.~~

~~Bridge and 65 feet for acute and 360 feet for chronic downstream of the diffuser.~~

(c) **WQBELs.** The temperature effluent limitation is carried forward from the previous Order ~~.~~ and the WQBELs for temperature are consistent with the Thermal Plan exception, as follows:

The maximum temperature of the discharge shall not exceed the natural receiving water temperature at RSWU-001 by more than 20°F from 1 May through 30 September and more than 25°F from 1 October through 30 April.

~~(c)~~**(d)** **Plant Performance and Attainability.** The temperature effluent limitation is carried forward from the previous Order. The Discharger has demonstrated continuous compliance with the effluent limitation. Therefore, based on existing performance the Facility can immediately comply with the temperature effluent limit.

4. WQBEL Calculations

a. This Order includes WQBELs for copper, ammonia, cyanide, carbon tetrachloride, chlorodibromomethane, dichlorobromomethane, methylene chloride, tetrachloroethylene, pentachlorophenol, bis(2-ethylhexyl) phthalate, dibenxon(ah)anthracene, aluminum, nitrate, nitrite, manganese, MTBE, mercury, temperature, settleable solids, diazinon, and chlorpyrifos. As discussed above in Section IV.C.2.d, the Discharger developed a dynamic mathematical model to evaluate near-field dilution and a mixing zone for compliance with chronic aquatic life criteria has been granted. The Discharger's dynamic model has been used to calculate the WQBELs for cyanide. For the remaining constituents a steady-state approach has been used to calculate the WQBELs. The general steady-state methodology for calculating WQBELs based on the different criteria/objectives is described in subsections IV.C.4.b through e, below. See Attachment H for the WQBEL calculations. The methodology for calculating WQBELs using the dynamic model is discussed in subsection IV.C.4.f, below.

b. **Effluent Concentration Allowance.** For each water quality criterion/objective, the ECA is calculated using the following steady-state mass balance equation from Section 1.4 of the SIP:

$ECA = C + D(C - B)$ *where C>B, and*
$ECA = C$ *where C≤B*

where:
ECA = effluent concentration allowance
D = dilution credit
C = the priority pollutant criterion/objective
B = the ambient background concentration.

According to the SIP, the ambient background concentration (B) in the equation above shall be the observed maximum with the exception that an ECA calculated from a priority pollutant criterion/objective that is intended to protect human health from carcinogenic effects shall use the arithmetic mean concentration of the ambient background samples. For ECAs based on MCLs, which implement the Basin Plan's chemical constituents objective and are applied as annual averages, an arithmetic mean is also used for B due to the long-term basis of the criteria.

c. **Basin Plan Objectives and MCLs.** For WQBELs based on site-specific numeric Basin Plan objectives or MCLs, the effluent limitations are applied directly as the ECA as either an MDEL, AMEL, or average annual effluent limitations, depending on the averaging period of the objective.

d. **Aquatic Toxicity Criteria.** WQBELs based on acute and chronic aquatic toxicity criteria are calculated in accordance with Section 1.4 of the SIP. The ECAs are converted to equivalent long-term averages (i.e. LTA_{acute} and $LTA_{chronic}$) using statistical multipliers and the lowest LTA is used to calculate the AMEL and MDEL using additional statistical multipliers.

e. **Human Health Criteria.** WQBELs based on human health criteria, are also calculated in accordance with Section 1.4 of the SIP. The ECAs are set equal to the AMEL and a statistical multiplier was used to calculate the MDEL.

$$AMEL = mult_{AMEL}\left[\min\left(\overbrace{M_A ECA_{acute}}^{LTA_{acute}}, M_C ECA_{chronic}\right)\right]$$

$$MDEL = mult_{MDEL}\left[\min\left(M_A ECA_{acute}, \underbrace{M_C ECA_{chronic}}_{LTA_{chronic}}\right)\right]$$

$$MDEL_{HH} = \left(\frac{mult_{MDEL}}{mult_{AMEL}}\right) AMEL_{HH}$$

where:
multAMEL = statistical multiplier converting minimum LTA to AMEL
multMDEL = statistical multiplier converting minimum LTA to MDEL
MA = statistical multiplier converting acute ECA to LTA_{acute}
MC = statistical multiplier converting chronic ECA to $LTA_{chronic}$

f. **Dynamic Model.** Section 1.4.D. of the SIP allows the use of a dynamic model to calculate WQBELs. Chapter 5.4.1 of the TSD (see page 101) provides guidance

for deriving WQBELs using a dynamic model. A three step process has been used in this Order to derive WQBELs using the Discharger's dynamic model[1].

(1) A point of compliance (edge of mixing zone) is selected. For acute aquatic life criteria the edge of the acute mixing zone is selected and for chronic aquatic life criteria the edge of the chronic mixing zone is selected.

(2) An LTA is developed for both acute and chronic criteria (i.e., LTA_{acute} and $LTA_{chronic}$) by iteratively running the dynamic model with successively lower [or higher] LTAs until the model shows compliance with the water quality criteria at the edge of the mixing zone at the appropriate frequency of compliance and averaging period (e.g., acute criteria are typically based on a 1-hour average exposure and chronic criteria are based on a 4-day exposure).

(3) The LTA and CV are used to derive MDELs and AMELs using the steady-state procedures described in Step 5 of Section 1.4 of the SIP. WQBELs are calculated using the LTA_{acute} and $LTA_{chronic}$ and the more stringent WQBELs are applied.

Summary of Final Effluent Limitations
Discharge Point No. EFF- 001

Table F-~~20~~14. Summary of Final Effluent Limitations

Parameter	Units	Effluent Limitations				
		Average Monthly	Average Weekly	Maximum Daily	Instantaneous Minimum	Instantaneous Maximum
Conventional Pollutants						
Biochemical Oxygen Demand, 5-day @ 20°C	mg/L	10	15	20	--	--
	lbs/day[1]	15,100	22,700	30,200	--	--
	% Removal	85	--	--	--	--
Total Suspended Solids	mg/L	10	15	20	--	--
	lbs/day[1]	15,100	22,700	30,200	--	--
	% Removal	85	--	--	--	--
pH	standard units	--	--	--	6.0	8.5
Priority Pollutants						
Bis(2-ethylhexyl)phthalate	µg/L	--	--	13		
Carbon Tetrachloride	µg/L	--	--	5.3	--	--
Chlorodibromomethane	µg/L	--	--	2.2/12[11]	--	--
Copper, Total Recoverable	µg/L	~~7.3~~7.4	--	~~9.3~~10	--	--
Cyanide	µg/L	--	--	11	--	--
Dibenzo(ah)anthracene	µg/L	0.2	--	0.4	--	--

[1] These procedures are discussed in more detail in a Technical Memorandum from Larry Walker Associates to SRCSD titled, "Calculation of WQBEL via Output from a Dynamic Model – DRAFT", 23 February 2009.

Parameter	Units	Effluent Limitations				
		Average Monthly	Average Weekly	Maximum Daily	Instantaneous Minimum	Instantaneous Maximum
Dichlorobromomethane	µg/L	--	--	3.4/35[11]	--	--
Methylene Chloride	µg/L	4.7	--	11	--	--
Mercury, Total Recoverable	lbs/year	2.3[10]	--	--	--	--
Pentachlorophenol	µg/L	--	--	18	--	--
Tetrachloroethylene	µg/L	--	--	4.4	--	--
Non-Conventional Pollutants						
Settleable Solids	ml/L	0.1	--	0.2	--	--
Aluminum, Total Recoverable[2]	µg/L	~~503~~470	~~--~~683	~~750~~ --	--	--
Ammonia Nitrogen, Total (as N) (Apr-Oct)	mg/L	1.5	--	2.0	--	--
	lbs/day[1]	2264	--	3019	--	--
Ammonia Nitrogen, Total (as N) (Nov-Mar)	mg/L	2.4	--	3.3	--	--
	lbs/day[1]	3622	--	4981	--	--
Nitrate, Total (as N)	mg/L	10	--	--	--	--
Manganese, Total Recoverable	µg/L	--	--	270	--	--
Methyl Tertiary Butyl Ether	µg/L	--	--	18	--	--
Electrical Conductivity	µmhos/cm	900[9]				
Total Coliform Organisms[3]	MPN/100mL	--	--	--	--	--
Total Residual Chlorine[4]	mg/L	--	--	--	--	--
Acute Toxicity[5]	--	--	--	--	--	--
Chronic Toxicity[6]	--	--	--	--	--	--
Temperature[7]	ºF	--	--	--	--	--
Average Dry Weather Flow[8]	mgd	--	--	--	--	--

1. Based on a design average dry weather flow of 181 MGD.
2. Shall not exceed 200 µg/L as an annual average.
3. Effective **9 May 2023**, effluent total coliform organisms shall not exceed, from May-October, i.) 2.2 MPN/100ml, as a 7-day median; ii). 23 MPN/100ml, more than once in any 30-day period; and iii) 240 MPN/100 mL at any time, and from November-April, i.) 2.2 MPN/100ml, as a monthly median; ii). 23 MPN/100ml, as a weekly median; and iii) 240 MPN/100 mL at any time.
4. Effluent total residual chlorine shall not exceed i) 0.011 mg/L as a 4-day average; and ii) 0.019 mg/L as a 1-hour average.
5. Survival of aquatic organisms in 96-hour bioassays of undiluted waste shall be no less than 70%, minimum for any one bioassay and no less than 90%, median for any three consecutive bioassays.
6. There shall be no chronic toxicity in the effluent discharge.
7. The maximum temperature of the discharge shall not exceed the natural receiving water temperature by more than 20ºF from 1 May through 30 September and more than 25ºF from 1 October through 30 April.
8. The average dry weather discharge flow shall not exceed 181 mgd.
9. Annual average effluent limit
10. For a calendar year, the performance-based interim annual mass load of total mercury shall not exceed 2.3 lbs/year.
11. The two limits represent the MDELs prior to implementation of nitrification/after implementation of nitrification.

5. Whole Effluent Toxicity (WET)

For compliance with the Basin Plan's narrative toxicity objective, this Order requires the Discharger to conduct whole effluent toxicity testing for acute and chronic toxicity, as specified in the Monitoring and Reporting Program (Attachment E section V.). This Order also contains numeric effluent limitations for acute toxicity, a narrative effluent limitation for chronic toxicity, and requires the Discharger to implement best management practices to investigate the causes of, and identify corrective actions to reduce or eliminate effluent toxicity.

a. Acute Aquatic Toxicity. The Basin Plan contains a narrative toxicity objective that 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 page III-8.01). The Basin Plan also states that, "*…effluent limits based upon acute biotoxicity tests of effluents will be prescribed where appropriate…*". USEPA Region 9 provided guidance for the development of acute toxicity effluent limitations in the absence of numeric water quality objectives for toxicity in its document titled "Guidance for NPDES Permit Issuance", dated February 1994. In section B.2. "Toxicity Requirements" (pgs. 14-15) it states that, "*In the absence of specific numeric water quality objectives for acute and chronic toxicity, the narrative criterion 'no toxics in toxic amounts' applies. Achievement of the narrative criterion, as applied herein, means that ambient waters shall not demonstrate for acute toxicity: 1) less than 90% survival, 50% of the time, based on the monthly median, or 2) less than 70% survival, 10% of the time, based on any monthly median. For chronic toxicity, ambient waters shall not demonstrate a test result of greater than 1 TUc.*" Accordingly, effluent limitations for acute toxicity have been included in this Order as follows:

> **Acute Toxicity.** Survival of aquatic organisms in 96-hour bioassays of undiluted waste shall be no less than:
>
> Minimum for any one bioassay-- ---------- 70%
> Median for any three consecutive bioassays ---------- 90%

The previous permit required the acute bioassays be performed using 100% effluent and using fathead minnows (*Pimephales promelas*) as the test species. This order continues to require the acute bioassays be performed using 100% effluent and changes the test species to rainbow trout (*Oncorhynchus mykiss*) due to the presence of salmonids in the receiving water. The Discharger will need six months to modify its system to use rainbow trout and obtain ELAP certification. Therefore, this Order includes an effective date of 1 July 2011 to begin using rainbow trout. In the interim, this Order allows the testing be performed using fathead minnows.

b. Chronic Aquatic Toxicity. The Basin Plan contains a narrative toxicity objective that 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 page III-8.00. Since the Facility is a publicly-owned treatment works that is categorized as a major facility, the influent can be highly variable due to commercial, industrial, and other inputs. Therefore, it is assumed that the discharge has chronic whole effluent toxicity (WET) levels that have a reasonable potential to cause or contribute to an in-stream excursion above of the Basin Plan's narrative toxicity objective. This Order includes a narrative effluent limitation for chronic toxicity, chronic WET monitoring requirements, and a provision that requires the Discharger to investigate the causes of, and identify and implement corrective actions to reduce or eliminate effluent toxicity.

The Monitoring and Reporting Program of this Order requires quarterly chronic WET monitoring for demonstration of compliance with the narrative toxicity objective. In addition to WET monitoring, the Special Provision in section VI.C.2.a. of the Order requires the Discharger to submit to the Central Valley Water Board an updated TRE Workplan for approval by the Executive Officer. The provision also includes a numeric toxicity monitoring trigger, requirements for accelerated monitoring, and requirements for TRE initiation if toxicity is demonstrated.

D. Final Effluent Limitations

1. Mass-based Effluent Limitations

40 CFR 122.45(f)(1) requires effluent limitations be expressed in terms of mass, with some exceptions, and 40 CFR 122.45(f)(2) allows pollutants that are limited in terms of mass to additionally be limited in terms of other units of measurement. This Order includes effluent limitations expressed in terms of mass and concentration. In addition, pursuant to the exceptions to mass limitations provided in 40 CFR 122.45(f)(1), some effluent limitations are not expressed in terms of mass, such as pH and temperature, and when the applicable standards are expressed in terms of concentration (e.g., CTR criteria and MCLs) and mass limitations are not necessary to protect the beneficial uses of the receiving water.

Mass-based effluent limitations were calculated based upon the design flow (Average Dry Weather Flow) permitted in section IV.A.1.h. of this Order.

2. Averaging Periods for Effluent Limitations

40 CFR 122.45 (d) requires average weekly and average monthly discharge limitations for publicly owned treatment works (POTWs) unless impracticable. However, for toxic pollutants and pollutant parameters in water quality permitting, USEPA recommends the use of a maximum daily effluent limitation in lieu of average weekly effluent limitations for two reasons. "*First, the basis for the 7-day average for POTWs derives from the secondary treatment requirements. This basis*

is not related to the need for assuring achievement of water quality standards. Second, a 7-day average, which could comprise up to seven or more daily samples, could average out peak toxic concentrations and therefore the discharge's potential for causing acute toxic effects would be missed." (TSD, pg. 96) This Order utilizes maximum daily effluent limitations in lieu of average weekly effluent limitations for ~~aluminum,~~ ammonia, manganese, MTBE, bis(2-ethylhexyl)phthalate, carbon tetrachloride, chlorpyrifos, diazinon, copper, cyanide, chlorodibromomethane, dichlorobromomethane, dibenzon(a,h)anthracene, methylene chloride, pentachlorophenol and tetrachloroethylene as recommended by the TSD for the achievement of water quality standards and for the protection of the beneficial uses of the receiving stream. Furthermore, for BOD_5, TSS, pH, chlorine residual, and total coliform organisms**,** weekly average effluent limitations have been replaced or supplemented with effluent limitations utilizing shorter averaging periods. The rationale for using shorter averaging periods for these constituents is discussed in section IV.C.3. of this Fact Sheet.

For effluent limitations based on Secondary MCLs, this Order includes annual average effluent limitations. The Secondary MCLs are drinking water standards contained in Title 22 of the California Code of Regulations. Title 22 requires compliance with these standards on an annual average basis, when sampling at least quarterly. Since it is necessary to determine compliance on an annual average basis, it is impracticable to calculate average weekly and average monthly effluent limitations.

3. Satisfaction of Anti-Backsliding Requirements

The effluent limitations in this Order are at least as stringent as the effluent limitations in Order No. 5-00-188, with the exception of effluent limitations for chloroform, lindane, silver, lead, zinc and cyanide. The effluent limitations for these pollutants are less stringent than those in Order No. 5-00-188. The effluent limitations in this Order for N-nitrosodimethylamine (NDMA), chlorodibromomethane (CDBM), and dichlorobromomethane (DCBM) are less stringent than those in Order R5-2010-0114-01. This relaxation of effluent limitations is consistent with the anti-backsliding requirements of the CWA and federal regulations. The effluent limits for copper in ~~this~~ Order R5-2010-0114-04 are not less stringent than the limits contained in previous Order 5-00-188, which is the baseline for backsliding due to the CSPA Court Decision. However, should the baseline be previous Order R5-2010-0114 the new effluent limits are less stringent, therefore an antibacksliding evaluation was conducted.

Order No. 5-00-188 included effluent limitations for chloroform, lindane, silver, lead, zinc and cyanide. Based on monitoring data collected from June 2005 – July 2008, the discharge does not indicate reasonable potential to exceed water quality objectives for chloroform, lindane, silver, lead and zinc. Therefore, effluent limitations for these parameters were not included in this Order. The lack of effluent limitations in this Order does not constitute backsliding.

The effluent limits for copper in Order R5-2010-0114-04 are not less stringent, because the baseline for backsliding should be Order 5-00-188 which included no effluent limits for copper. However, if backsliding must be considered CWA section 402(o)(1) provides an exception to the anti-backsliding regulations. CWA section 402(o)(1) prohibits the establishment of less stringent water quality-based effluent limits "except in compliance with Section 303(d)(4)." For attainment waters, CWA section 303(d)(4)(B) specifies that a limitation based on a water quality standard may be relaxed where the action is consistent with the antidegradation policy. The Sacramento River is considered an attainment water for copper, and as discussed in section IV.D.4, below, relaxation of the effluent limits complies with federal and state antidegradation requirements. Thus, relaxation of the effluent limitations for copper from Order R5-2010-0114 meets the exception in CWA section 303(d)(4)(B).

CWA section 402(o)(2) provides several exceptions to the anti-backsliding regulations. CWA 402(o)(2)(B)(i) allows a renewed, reissued, or modified permit to contain a less stringent effluent limitation for a pollutant if information is available which was not available at the time of permit issuance (other than revised regulations, guidance, or test methods) and which would have justified the application of a less stringent effluent limitation at the time of permit issuance. 40 CFR § 122.44(l) further clarifies what constitutes an exception of the CWA statutory provisions, and states that material and substantial alterations or additions to the permitted facility that occur after permit issuance may justify the application of a less stringent effluent limitation.

As described further in section IV.C.3 of this Fact Sheet, updated information that was not available at the time the previous permits were issued indicates dilution is available to calculate WQBELs for cyanide, insufficient information is available to conduct the reasonable potential analysis for NDMA, and oil and grease does not exhibit reasonable potential to cause or contribute to an exceedance of water quality objectives in the receiving water. Additionally, updated information indicates that less stringent effluent limitations for CDBM and DCBM due to proposed facility changes, and less stringent limits for copper based on updated hardness data for calculating the hardness-dependent CTR criteria for copper. This new information satisfy requirements in CWA section 402(o)(2). The updated information that supports the relaxation of effluent limitations for these constituents includes the following:

~~ii.~~i. **Cyanide.** Order No. 5-00-188 established effluent limitations for cyanide of 10.8 µg/L as a daily average with a trigger of 6.1 µg/L. The cyanide limitation of 10.8 µg/L was based on the MEC of 9.0 µg/L times a safety factor of 1.2 (which was proposed by the Discharger and accepted by the Central Valley Water Board). A trigger concentration exceedance results in an investigation and Central Valley Water Board notification with the Central Valley Water Board may require an action plan to address the cause of the exceedance. The Central Valley Water Board found that the trigger concentration would be protective and appropriate if established as the 95th percentile value assuming that historical data follows a lognormal probability distribution which was 6.1 mg/L. The

Discharger performed a dynamic model for cyanide which resulted in a chronic LTA of 13.9 mg/L. The calculated limit is 11.0 mg/L as an AMEL with a MDEL of 22.0 mg/L. As discussed in Section IV.C.2.d, the dynamic model represents a more accurate picture of the mixing zone concentrations. This Order relaxes the effluent limitation for cyanide from Order No. 5-00-188. The dynamic model data submitted by the Discharger is considered new information by the Central Valley Water Board.

~~iii.~~ii. **Oil and Grease.** Order No. 5-00-188 established effluent limitations for oil and grease. As discussed further in section IV.C.3, monitoring data over the term of Order No. 5-00-188 indicated that the discharge no longer exhibits reasonable potential to exceed water quality objectives for oil and grease. Therefore, the effluent limitation is not retained in this Order. The monitoring data submitted by the Discharger is considered new information by the Central Valley Water Board.

~~iv.~~iii. **NDMA.** Order R5-2010-0014-01 included WQBELs for NDMA of 0.69 ng/L and 1.4 ng/L, as a AMEL and MDEL, respectively, because it was determined that the effluent had reasonable potential to cause or contribute to an exceedance of the CTR criterion. NDMA laboratory data used to determine reasonable potential and subsequent effluent limitation was analyzed using EPA Method 521 with a reporting level (RL) of 2 ng/L. Subsequent to Order R5-2010-0114-01, the Discharger completed an evaluation of literature reviews of NDMA treatment technologies and sources, NDMA laboratory analysis methods and laboratories that conduct the analyses at low RLs, and other NDMA pollution prevention activities. Two analytical methods for NDMA that can meet low RLs are EPA Method 521 for drinking water and a modified EPA Method 1625 for wastewater. The Discharger investigated and found only six commercial laboratories that conducted analyses of NDMA with advertised RLs of 2 ng/L. The Discharger conducted further evaluation of the laboratories to determine if the low RL could be met by developing a blind test with a sample of known NDMA concentration and a blank sample. The Discharger found high variability between the laboratories' results and NDMA detection in some of the blank samples. The Discharger concluded that none of the laboratories at this time can reliably meet a RL of 2 ng/L for NDMA analysis of wastewater. Based on this new information, the previous data results for NDMA submitted by the Discharger have been changed to detected but not quantified (DNQ). Therefore, the data the Central Valley Water Board relied on to conduct the reasonable potential analysis (RPA) was insufficient to determine reasonable potential under the terms of the SIP. In accordance with the SIP, a finding that insufficient information was available to conduct the RPA should have been made and monitoring should have been required in lieu of WQBELs. Based on this new information provided by the Discharger, the WQBELs for NDMA have been removed.

~~v.~~iv. **CDBM and DCBM**. Order R5-2010-0114-01 established maximum daily effluent limitations for CDBM and DCBM of 2.2 µg/L and 3.4 µg/L, respectively.

The maximum daily effluent limitations were based on current plant performance and did not consider changes in plant performance due to the upgrading of the Facility to nitrify final effluent. The Discharger conducted pilot testing of a small-scale ammonia and nitrate removal treatment system. Based on data collected from the pilot test, the Discharger estimated the concentrations of CDBM and DCBM that may be discharged from full-scale ammonia and nitrate removal systems once in operation. This Order relaxes the effluent limitations for CDBM and DCBM from Order R5-2010-0114-01 for when effluent starts to be discharged from the ammonia and nitrate removal systems. The pilot testing data submitted by the Discharger is considered new information by the Central Valley Water Board and the addition of ammonia and nitrate removal systems are material and substantial alterations or additions to the permitted facility that occurred after permit issuance which justify the application of less stringent effluent limitations.

~~vi.~~v. **Total coliform organisms**. Order R5-2010-0114-02 includes new effluent limitations for total coliform organisms of 2.2 most probable number (MPN) per 100 mL as a 7-day median; 23 MPN/100 mL not to be exceeded more than once in any 30 day period; and 240 MPN/100 mL not to be exceeded at any time. The effluent limitations were based on a site-specific DPH recommendation considering the pathogen loadings from the current treatment facility. As discussed in Section IV.C.3.d.xix. (i.e., the Pathogens RPA), seasonal disinfection requirements have been required, including less stringent effluent limits for total coliform organisms from 1 November – 30 April. This reduction in disinfection requirements is based on new information regarding the pathogen loadings expected from the Discharger's proposed upgraded biological nutrient removal (BNR) facilities that are demonstrated to be more effective in removing pathogens through pilot testing. DPH was consulted and agrees the seasonal limitations are protective of beneficial uses. The pilot testing data for the proposed BNR facilities submitted by the Discharger is considered new information by the Central Valley Water Board and the addition of tertiary filtration with ammonia and nitrate removal systems are material and substantial alterations or additions to the permitted facility that occurred after permit issuance which justify the application of less stringent effluent limitations.

Clean Water Act section 303(d)(4)(B) allows for the relaxation of a water quality-based effluent limitation if the less stringent limitation is consistent with federal anti-degradation regulations and the State antidegradation policy. In this case, the Central Valley Water Board has determined that the background water quality is higher than necessary to support beneficial uses affected by pathogens. The Central Valley Water Board finds that any lowering of water quality will be de minimis and will accommodate important economic or social development in the Sacramento area. Any such change is also consistent with State Water Board Resolution No. 68-16. The de minimis change will not unreasonably affect present and anticipated beneficial uses and will not result in water quality less than prescribed in State Board policies or the Sacramento-San Joaquin Basin Plan.

Changes to the Discharger's facilities will result in best practicable treatment or control of the discharge to assure that a pollution or nuisance will not occur and the highest water quality consistent with maximum benefit to the people of the State will be maintained. In this particular case, the sizing and operation of filters to treat 217 million gallons per day of effluent during November through April and treating remaining effluent flow with secondary treatment will result in a minor amount of effluent not receiving filtration and would result in significant reduction of project costs compared to a project based on full Title 22 disinfection of all flows at all times. More specifically, filters designed for 217 mgd effluent flow would provide tertiary filtration for approximately 97 percent of the annual wastewater flow discharged from the Facility to the Sacramento River. In addition, the change in the Facility to enhanced secondary treatment using BNR will result in improved secondary effluent than the existing Facility. The Discharger has indicated that the construction and operation of a smaller filtration facility will result in savings of over $100 million in capital and operational costs that would otherwise have been expended. There would be virtually no corresponding decrease in water quality to the Sacramento River.

~~vii.~~vi. **Total Recoverable Copper**. Amended Order R5-2010-0114-04 includes revised effluent limitations for total recoverable copper that are less stringent than the effluent limitations adopted in Order R5-2010-0114. The revised effluent limitations are based on updated receiving water hardness data since adoption of R5-2010-0114. The new receiving water hardness data submitted by the Discharger is considered new information by the Central Valley Water Board.

The revision of the cyanide, CDBM, DCBM, ~~and~~ total coliform organisms, and copper effluent limitations, and the removal of effluent limitations for NDMA, oil and grease, chloroform, lindane, silver, lead and zinc are consistent with the antidegradation provisions of 40 CFR 131.12 and State Water Board Resolution No. 68-16. Any impact on existing water quality will be insignificant.

4. Satisfaction of Antidegradation Policy

~~This~~ Order R5-2010-0114 does not allow for an increase in flow or mass of pollutants to the receiving water with the exception of cyanide, chlorodibromomethane and dichlorobromomethane as discussed in section D.3 of the Fact Sheet. The amended permit, Order R5-2010-0114-04, allows for an increase in the discharge of copper from that allowed in Order R5-2010-0114. Antidegradation analyses were completed prior to adoption of the ~~existing~~ 2000 NPDES permit~~s~~ that grants a discharge capacity of 181 mgd. However, conditions in the Sacramento River and Delta downstream of the discharge have significantly changed since prior antidegradation analyses were conducted, so for the 2010 permit renewal it was~~it is~~ required that a new antidegradation analysis be conducted for the existing discharge.

A complete antidegradation analysis "Antidegradation Analysis for Proposed Wastewater Treatment Plant discharge Modification" was submitted by the Discharger with the Report of Waste Discharge in February 2005. The Discharger's antidegradation analysis was based on the incremental increase of the SRWTP capacity expansion from 181 mgd to 218 mgd. This antidegradation analysis was updated and revised based on the Central Valley Water Board staff's comments and more recent water quality data in the Discharger's "Antidegradation Analysis for Proposed Discharge Modification for the Sacramento Regional Wastewater Treatment Plant" dated 20 May 2009. Along with the 37 mgd increase in capacity, the antidegradation analysis also modeled the worst-case concentrations at the discharge of 181 mgd and for 154 mgd (baseline data for the EIR).

The Discharger's Antidegradation Analysis (ADA) identified the constituents of concern and categorized them as Category 1, Category 2, and Category 3 pollutants (see Table F-18). Category 1 pollutants are of concern regionally and have potential impacts on the Delta ecosystem and its water quality. Category 2 pollutants are constituents that may cause localized impacts, but negligible impacts in far-field receiving waters. Category 3 pollutants are constituents that were detected in the discharge, but have no history of contributing adverse impacts in the Sacramento River.

The Discharger evaluated background river concentrations and effluent concentrations and determined which constituents were of concern for impacting beneficial uses or of concern by stakeholders. Those constituents were placed into three categories. The first category includes constituents that are of regional concern and could impact the beneficial uses both locally (near field) and in farther reaches of the Delta (far field). Those constituents are: ammonia, total nitrogen, nitrate plus nitrite, total Kjeldahl nitrogen (TKN), total phosphorus, electrical conductivity (EC), total dissolved solids (TDS), chloride, total organic carbon, mercury, and dissolved oxygen.

The second category includes constituents that may impact within 700 feet downstream of the diffuser or the near field. These constituents include: aluminum, cadmium, copper, zinc, total coliform organisms and temperature. The antidegradation analysis performed in support of the Central Valley Water Board's adoption of Order R5-2010-0114 is applicable to the new effluent limits for copper in Order R5-2010-0114-04. The increase in the effluent limits for copper in the amended permit (Order R5-2010-0114-04) is minor. The Central Valley Water Board's finds that the prior antidegradation analysis and findings apply to this minimal increase (0.1 µg/L). The Central Valley Water Board finds that any lowering of water quality will be de minimus and will accommodate important economic or social development in the Sacramento area. Further, any change to water quality will not unreasonably affect present and anticipated beneficial uses and will not result in water quality less than prescribed in State Water Board policies or the Basin Plan. As outlined below, the measures implemented by the Discharger and required by this Order constitute BPTC. Any change in water quality complies with the

antidegradation provisions of 40 CFR 131.12 and State Water Board Resolution No. 68-16.

The third category includes constituents of concern that generally had no history of impacts to the Sacramento River. The constituents evaluated in the ADA are shown in Table F-18, below.

The Near Field and Far Field models previously described were used to determine reasonable worst-case impacts on the receiving waters. In the ADA, the focus was on the incremental increase from an average dry weather discharge flow of 181 mgd to 218 mgd. However, due to a legal challenge of the Discharger's EIR and due to an overall slow down in the economy and growth in the Sacramento area, the Discharger withdrew its request for an expansion of discharge flow. Therefore, the information provided in the ADA was used by Central Valley Water Board staff to evaluate the impacts of the discharge at the permitted discharge flow of 181 mgd. For each pollutant the amount of reduced assimilative capacity was calculated to determine whether the increased pollutant loading was significant. Table F-18, below, summarizes the antidegradation impacts for the constituents of concern. The constituents with the largest impacts include ammonia, salinity (e.g., electrical conductivity, total dissolved solids, and chloride), copper, cyanide, bis(2-ethylhexyl)phthalate, dichlorobromomethane, chloroform, and chlorpyrifos.

As shown in Table F-18, the existing permitted discharge is degrading the receiving water. Therefore, the Discharger must use best practicable treatment or control (BPTC) of the discharge in accordance with State Water Board Resolution 68-16. The Sacramento River and Sacramento-San Joaquin Delta are high quality waters of exceptional recreation, economical, and ecological significance to the people of the State of California. As discussed below, the Central Valley Water Board finds that in order to maintain and enhance the water quality of the Sacramento River and Sacramento-San Joaquin Delta, the Discharger must implement BPTC. For the following reasons, BPTC for this facility includes implementation of nitrification, denitrification, and the equivalent of Title 22 filtration in May-October, and filtration consistent with the Facility Description, with ultraviolet light, ozone or chlorine disinfection treatment.

- The Sacramento River and Sacramento-San Joaquin Delta at the vicinity of the outfall are home to at least nine state and federally protected threatened or endangered species[1].

- The Sacramento River and Sacramento-San Joaquin Delta support a trillion dollar economy with $27 billion economy for agriculture.[2]

- The Sacramento River and Sacramento-San Joaquin Delta provide drinking water to 25 million people of the State.[1]

[1] Comment letter from USFWS to Kathy Harder dated 15 June 2010.
[2] http://www.delta.ca.gov/res/docs/Sacto-SanJoaqin_fact.pdf

- The Sacramento River and Sacramento-San Joaquin Delta support 12 million recreational user days per year, including 290 shoreline recreational areas, 300 marinas and half a million boaters.[2]

- Ammonia, along with BOD, from the SRWTP reduces the dissolved oxygen in the Sacramento River and Sacramento-San Joaquin Delta for nearly 40 miles below its discharge[3]. The oxygen depleting constituents from the SRWTP use or will use all the assimilative capacity of the River and Delta leaving no assimilative capacity available to other communities that currently reduce oxygen demanding constituents by implementing advanced treatment processes.

- The ammonia from the SRWTP contributes to the water quality problems in the Suisun Bay[4].

- The ammonia from the SRWTP is acutely and chronically toxic to species, including copepods[5] and freshwater mussels that reside in the Sacramento River and Sacramento-San Joaquin Delta.

- Ammonia in the SRWTP effluent combined with chlorine disinfection creates nitrosoamines at levels 100 times greater than the CTR human health water quality objective. Nitrosoamines are highly mutagenic and potentially carcinogenic.

- At times the risk of illness or infection from pathogenic protozoans nearly quadruples between upstream and downstream of the SRWTP discharge[6].

- Filtration of disinfected SRWTP effluent will result in reduction of total organic carbon, copper, mercury, phosphorus, TSS, BOD_5 and possibly Constituents of Emerging Concern (CECs)[7].

- Reduction or elimination of ammonia, nitrate and protozoans will reduce impacts to the beneficial uses of the Sacramento River and Sacramento-San Joaquin Delta from the SRWTP discharge.

- Other existing wastewater treatment plants that discharge directly or indirectly to the Sacramento River and Sacramento-San Joaquin Delta are or will be implementing advanced treatment processes to reduce or eliminate ammonia, nitrate and pathogens.

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[1] Id.
[2] Id.
[3] Memorandum from Mitchell J. Mysliwiec (LWA) to Bob Seyfried, SRCSD "Response to Tetra Tech Comments on the LDOPA", 26 August 2010.
[4] Letter from Bruce Wolfe, SFRWQCB to Kathy Harder, dated 4 June 2010.
[5] Swee Teh, Presentation at Contaminants Workshop, July 6, 2010
[6] Gerba, Charles P., "Estimated Risk of Illness from Swimming in the Sacramento River", 23 February 2010.
[7] Technical Memorandum: Analysis of Costs and Benefits of Advanced Treatment Alternatives for the Sacramento Regional Wastewater Treatment Plant, LWA, May 2010.

- The costs per capita to implement advanced treatment processes at other POTWs are similar to the projected costs per capita for advanced treatment at the SRWTP. Project costs can vary greatly depending on how much existing treatment facilities can be incorporated into the advanced treatment process. In some cases, the cost is for a new treatment facility, differing treatment processes and/or the costs are based on construction completed several years ago.

Table F-17. Per Capita Costs for Tertiary Upgrades[1]

Discharger	Population (July 2008) www.city-data.com	Upgrade and Expansion Costs	Approximate per capita cost ($)
Ironhouse Sanitary District	30,000	$54,500,000	$1,800
City of Roseville – Dry Creek WWTP	56,330	$95,000,000	$1,700
City of Roseville – Pleasant Grove WWTP	56,330	$120,000,000	$2,100
City of Manteca	65,028	$22,800,000	$350
City of Lodi	61,301	$60,000,000	$1000
City of Woodland	54,567	$17,000,000	$300
City of Tracy	79,196	$40,000,000	$500
City of Vacaville	92,219	$150,000,000	$1,600
Sacramento Regional County Sanitation District	1,300,000	$2,066,000,000	$1,600

This Order requires compliance with applicable federal technology-based standards and with WQBELs where the discharge could have the reasonable potential to cause or contribute to an exceedance of water quality standards.

Various alternative measures, including those alternatives provided as part of the proposed waste discharge requirements, have been considered. After considering the alternatives, these waste discharge requirements which implement Title 22 (or equivalent) tertiary filtration, nitrification and denitrification will result in the best practicable treatment or control of the discharge necessary to assure that a pollution or nuisance will not occur and the highest water quality consistent with maximum benefit to the people of the State will be maintained.

Economic and socioeconomic studies provided by the Sacramento Regional County Sanitation District, various water agencies, the North State Building Industry Association, and the University of Pacific have been considered. The purported costs vary widely depending on the study with the Sacramento Regional County Sanitation District's proposed costs of upgrades to be approximately $2 billion as the

[1] Telephone Survey by Elizabeth Lee, CVWQCB

highest purported cost. Even if the approximately $2 billion costs projected by the Sacramento Regional County Sanitation District are correct, the increased sewage treatment rate of $60 per month is reasonable because (1) many communities discharging to surface waters pay substantially more for sewer service; and (2) the increased sewage treatment rate of $60 per month may be overestimated given that other large communities in the Sacramento/Delta area that have already upgraded their treatment facilities to advanced treatment also similar to that proposed in these waste discharge requirements have sewer fees substantially less than the monthly fees projected by the Sacramento Regional County Sanitation District, including the Cities of Stockton, Roseville, Tracy, and Lodi.

The action to adopt these waste discharge requirements is justified by socioeconomic considerations because (1) all large wastewater treatment plants in the Delta (namely, the Cities of Lodi, Manteca, Stockton, and Tracy) already provide tertiary filtration treatment; (2) the effluent discharged by the Cities of Lodi, Manteca, Stockton, and Tracy is much cleaner than the SRCSD effluent by significantly reducing the pathogens discharged to Delta waters, reducing the oxygen demand on Delta waters, reducing the loading of heavy metals and mercury to the Delta; and reducing aquatic toxicity caused by ammonia, (3) the Cities of Lodi, Manteca, Stockton, and Tracy have constructed and are operating similar advanced treatment systems and have not suffered significant adverse economic impacts as a result of these upgrades, and (4) the Sacramento Regional County Sanitation District's failure to implement tertiary filtration, nitrification, and denitrification may result or will likely result in an adverse impact to the REC-1, municipal and domestic water supply, aquatic life, and agricultural beneficial uses. Consequently, these waste discharge requirements will result in the best practicable treatment or control of the discharge necessary to assure that pollution or nuisance will not occur and the highest water quality consistent with maximum benefit to the people of the State will be maintained.

The Discharger submitted memorandum dated 31 May 2013 regarding an Antidegradation Analysis in Consideration of Increased Effluent Limits for Chlorodibromomethane and Dichlorobromomethane at the SRCSD AWTP (Chlorodibromomethane and Dichlorobromomethane ADA). The Chlorodibromomethane and Dichlorobromomethane ADA followed the guidance provided by the State Water Board in APU 90-004 for a "complete" anti-degradation analysis and evaluated if changes in Sacramento River water quality resulting from the use of chlorine disinfection after ammonia and nitrate removal were added to the SRWTP would be consistent with maximum benefit to the people of the State, not unreasonably affect actual or potential beneficial uses, and not cause water quality less than water quality objectives established to protect existing in-stream beneficial uses. Based on the Discharger's Chlorodibromomethane and Dichlorobromomethane ADA, for chlorodibromomethane, an increased performance-based effluent limitation that accommodates chlorine disinfection would allow increased use of assimilative capacity from 48% for permitted conditions under Order R5-2010-0114-01 to 69% of assimilative capacity. For dichlorobromomethane, an increased performance-based effluent limitation that

accommodates chlorine disinfection would allow increased use of assimilative capacity from 31% for permitted conditions under Order R5-2010-0114-01 to 79% of assimilative capacity. For both chlorodibromomethane and dichlorobromomethane, the increased performance based limits are within available assimilative capacity of the Sacramento River and will not adversely impact beneficial uses of the river.

By allowing for increased performance-based effluent limitations for chlorodibromomethane and dichlorobromomethane, the Discharger may disinfect effluent with chlorine disinfection rather than pre-ozonation + ultraviolet irradiation (UV disinfection). As part of the Chlorodibromomethane and Dichlorobromomethane ADA, the Discharger evaluated the costs, benefits and potential impacts associated with three alternatives: chlorine gas disinfection, liquid chlorine disinfection, and pre-ozonation + UV disinfection. The costs and benefits between chlorine gas and liquid disinfection were relatively minor and the incremental increase in use of assimilative capacity in the Sacramento River was identical. However, chlorine gas poses additional safety hazards due to risks associated with transportation, handling and storage. Accordingly, the Discharger has determined that liquid chlorine disinfection is a better alternative. Between liquid chlorine disinfection and pre-ozonation + UV disinfection, liquid chlorine disinfection is preferred based on consideration of economic and social development and maximum benefit to the people of the State. Pre-ozonation + UV disinfection costs significantly more than liquid chlorine disinfection (i.e., 153% more), and although pre-ozonation + UV disinfection would allow the Discharger to meet existing performance-based effluent limitations, it would dramatically expand the District's carbon footprint, and would result in emission of 210 times more green house gases on an annual bases than liquid chlorine disinfection. Considering the significant economic and environmental impact of pre-ozonation + UV disinfection, the Central Valley Water Board finds chlorine disinfection to be best practicable treatment or control consistent with maximum benefit to people of the state.

The permitted discharge is consistent with the antidegradation provisions of 40 CFR 131.12 and State Water Board Resolution No. 68-16. Compliance with these requirements will result in the use of best practicable treatment or control of the discharge.

Table F-~~21~~15. Antidegradation Analysis

Constituent	Units	Mean Effluent Conc.[1]	Mean R-1 Conc.[1]	Median 181 mgd Conc @ Hood[2]	Mean 181 mgd Conc @ 700 ft[2]	Applicable Water Quality Objective	Percent Assimilative Capacity Used
Category 1 Pollutants							
Ammonia (summer)	mg/L	24	0.1	0.25	0.64	1.55-6.7	2.3%-10.3%
Ammonia (winter)	mg/L	24	0.1	0.31	0.85	1.55-6.7	3.2%-14.5%
Total Nitrogen (summer)	mg/L	24	0.39	0.64	0.94	--	--
Total Nitrogen (winter)	mg/L	24	0.39	0.7	1.15	--	--
Nitrate plus nitrite	mg/L	0.13	0.16	0.12	0.16	10	0.0%
TKN	mg/L	26	0.35	0.57	0.95	--	--
Total Phosphorus	mg/L	2.34	0.11	0.08	0.18	--	--
EC	µmhos/cm	764	163	157	182	700	3.5%
TDS	mg/L	410	98	--	108	450	2.8%
Chloride	mg/L	91	5.1	5.7	7.81	106	2.7%
TOC	mg/L	17.5	2.34	2.3	2.82	--	--
Mercury	ng/L	4.1	5.6		5.54	--	--
Category 2 Pollutants							
Aluminum	µg/L	23.3	969	--	327.3	200	--
Cadmium	µg/L	0.023	0.0081	--	0.009	1.5	0.1%
Copper	µg/L	4.31	1.47	--	1.56	5.62	2.2%
Zinc	µg/L	21.2	0.57	--	1.22	74.5	0.9%
Temperature		23	15.5	--	--	--	--
Total Coliform		7.8	1983	--	--	--	--
Category 3 Pollutants							
Antimony	µg/L	0.32	0.066	--	0.074	6	0.1%
Arsenic	µg/L	1.64	1.35	--	1.36	10	0.1%
Chromium	µg/L	0.69	0.15	--	0.176	--	--
Lead	µg/L	0.25	0.03	--	0.037	1.38	0.5%
Molybdenum	µg/L	2.83	0.51	--	0.584	10	0.8%
Nickel	µg/L	2.37	0.67	--	0.72	32.8	0.2%
Selenium	µg/L	0.79	0.21	--	0.23	5	0.4%
Silver	µg/L	0.063	0.014	--	0.016	1.35	0.1%
BOD	mg/L	7.59	<2.13	--	--	--	--
Manganese	µg/L	64.2	3.7	--	---	50	
Cyanide	µg/L	5.12	3.92	--	3.95	5.2	2.3%
TSS	mg/L	6.68	29.4	--	28.6	--	--
1,4-Dichlorobenzene	µg/L	0.68	<0.27	--	0.28	5	0.2%
Bis(2-ethylhexyl)phthalate	µg/L	2.6	0.11	--	0.19	1.8	4.7%
Dichlorobromomethane	µg/L	0.95	<0.37	--	0.39	0.56	10.5%
Chloroethane	µg/L	0.28	<0.42	--	0.42	75	0.0%
Chloroform	µg/L	15	0.93	--	1.38	80	0.6%
Diethyl Phthalate	µg/L	1.46	0.047	--	0.095	23000	0.0%
Di-n-butyl Phthalate	µg/L	1.35	0.072	--	0.21	2700	0.0%
Methyl Chloride	µg/L	0.73	0.47	--	0.48	3	0.4%

Constituent	Units	Mean Effluent Conc.[1]	Mean R-1 Conc.[1]	Median 181 mgd Conc @ Hood[2]	Mean 181 mgd Conc @ 700 ft[2]	Applicable Water Quality Objective	Percent Assimilative Capacity Used
Methylene Chloride	µg/L	1	<0.69	--	0.7	4.7	0.2%
Tetrachloroethylene	µg/L	0.13	0.38	--	0.37	0.8	--
Toluene	µg/L	0.25	0.36	--	0.36	150	0.0%
Chlorpyrifos	µg/L	0.015	0.006	--	0.01	0.015	44.4%
Dibromochloromethane	µg/L	0.14	<0.42	--	--	0.41	--
n-Nitrosodimethylamine	µg/L	0.72	<2.69	--	--	0.00069	--

1 Table 5-2, "Antidegradation Analysis for Proposed Discharge Modification for the Sacramento Regional Wastewater Treatment Plant" 20 May 2009

2 Chapter 5, ibid. The constituent concentrations at Hood are representative of the completely mixed conditions, whereas, the constituent concentrations at 700 feet downstream of the outfall is representative of the average concentration of the plume.

5. Stringency of Requirements for Individual Pollutants

This Order contains both technology-based effluent limitations and WQBELs for individual pollutants. The technology-based effluent limitations consist of restrictions on flow and percent removal requirements for BOD_5 and TSS. The WQBELs consist of restrictions on ammonia, copper, cyanide, chlorpyrifos, diazinon, aluminum, carbon tetrachloride, dichlorobromomethane, chlorodibromomethane, bis(2-ethlyhexyl) phthalate, methylene chloride, tetrachlorethylene, pentachlorophenol, dibenzo(ah)anthracene, manganese, methyl-tertairy-butyl-ether, nitrite, nitrate, chlorine residual, settleable solids, mercury and electrical conductivity. This Order's technology-based pollutant restrictions implement the minimum, applicable federal technology-based requirements. In addition, this Order includes new effluent limitations for BOD_5, total coliform and TSS to meet numeric objectives or protect beneficial uses. The rationale for including these limitations is explained in the Fact Sheet. In addition, the Regional Water Board has considered the factors in CWC section 13241 in establishing these requirements.

WQBELs have been scientifically derived to implement water quality objectives that protect beneficial uses. Both the beneficial uses and the water quality objectives have been approved pursuant to federal law and are the applicable federal water quality standards. To the extent that toxic pollutant WQBELs were derived from the CTR, the CTR is the applicable standard pursuant to 40 CFR 131.38. The scientific procedures for calculating the individual WQBELs for priority pollutants are based on the CTR-SIP, which was approved by USEPA on 18 May 2000. All beneficial uses and water quality objectives contained in the Basin Plan were approved under state law and submitted to and approved by USEPA prior to 30 May 2000. Any water quality objectives and beneficial uses submitted to USEPA prior to 30 May 2000, but not approved by USEPA before that date, are nonetheless "applicable water quality standards for purposes of the CWA" pursuant to 40 CFR 131.21(c)(1). Collectively, this Order's restrictions on individual pollutants are no more stringent than required to implement the requirements of the CWA.

This Order contains pollutant restrictions that are more stringent than applicable federal requirements and standards. Specifically, this Order includes effluent limitations for BOD_5 and TSS that are more stringent than applicable federal standards, but that are nonetheless necessary to meet numeric objectives or protect beneficial uses. The rationale for including these limitations is explained in section IV.C.3 of this Fact Sheet.

6. Performance-based Effluent Limitations.

Performance-based effluent limitations have been used in this Order to establish interim effluent limitations and final effluent limitations where the calculated WQBEL (w/dilution credit) results in effluent limitations that exceed facility performance. Table F-19, below, displays the information used in developing the performance-based effluent limitations and the procedures for calculating performance-based effluent limitations are discussed below.

In developing the performance-based effluent limitation, where there are 10 sampling data points or more, sampling and laboratory variability is accounted for by establishing interim limits that are based on normally distributed data where 99.9% of the data points will lie within 3.3 standard deviations of the mean (Basic Statistical Methods for Engineers and Scientists, Kennedy and Neville, Harper and Row). Therefore, the interim limitations in this Order are established as the mean plus 3.3 standard deviations of the available data. However, if the maximum effluent concentration (MEC) exceeds the mean plus 3.3 standard deviation, then the MEC is the used for the interim limitation. When there are less than 10 sampling data points available, the EPA *Technical Support Document for Water Quality-based Toxics Control* ((EPA/505/2-90-001), TSD) recommends a coefficient of variation of 0.6 be utilized as representative of wastewater effluent sampling. The TSD recognizes that a minimum of 10 data points is necessary to conduct a valid statistical analysis. The multipliers contained in Table 5-2 of the TSD are used to determine a maximum daily limitation based on a long-term average objective. In this case, the long-term average objective is to maintain, at a minimum, the current plant performance level. Therefore, when there are less than 10 sampling points for a constituent, interim limitations are based on 3.11 times the maximum observed effluent concentration to obtain the daily maximum interim limitation (TSD, Table 5 2).

At the time this Order was originally adopted in December 2010, the interim ammonia limitations were calculated based on Facility performance using effluent ammonia data from June 2005 – April 2010. However, effluent ammonia concentrations have been steadily increasing. In December 2013, the Discharger violated the average monthly interim limit and investigated the reason for the excursion. It was determined that influent flows had been steadily decreasing due to water conservation, which was resulting in increasing influent ammonia concentrations. The current Facility does not remove ammonia, so increased influent concentrations will result in increased effluent concentrations. The Discharger has implemented all feasible controls to limit the discharge of ammonia.

Pursuant to Water Code section 10608, the Governor has called for a 20 percent reduction in urban water use statewide by 2020 and urban water agencies are required to meet their urban water use target by 2020. In addition, pursuant to Water Code section 10608.16, subdivision (a), the State shall achieve a 20 percent reduction in urban per capita water use in California on or before December 31, 2020. Therefore, the interim ammonia limitations have been recalculated to take into account the effects of decreasing influent flow due to water conservation. Taking this water conservation into consideration, along with current trends for ammonia concentration increases as a function of lower influent flows, a future annual average ammonia concentration of 30.3 mg/L (as N) was predicted. For ammonia, average monthly, average weekly, and maximum daily performance-based interim limits have been established. The maximum daily limit was projected using the 99.91 percentile as discussed above. Based on a daily monitoring frequency, the average monthly and average weekly interim limits have been projected using the 97.22 percentile and 99.36 percentile, respectively, representing once-in-three-years frequency consistent with the maximum daily projection. Using the statistics from an effluent ammonia dataset from January 2005 – January 2014, and the future predicted annual average ammonia concentration of 30.3 mg/L (as N), the interim ammonia limits were established as 39 mg/L (as N) for the monthly average, 43 mg/L (as N) for the weekly average, and 47 mg/L (as N) for maximum daily limit. Since, the increasing ammonia concentrations were due to water conservation, the influent mass loading of ammonia did not increase. Therefore, the corresponding interim mass limits for ammonia were not increased.

Where a dataset includes data reported below the laboratory detection limits (non-detects) the statistics, described above, becomes uncertain. In these situations, the regression on order statistics (ROS) technique was used to develop summary statistics and probability distribution functions. The ROS method was chosen because numerous studies have found that substituting one-half the reporting limit "results in substantial bias unless the proportion of missing data is small, 10 percent or less"[1]. This technique is often used with water quality data and is a useful tool for evaluating data sets with at least 40% detected data[2]. Furthermore, the ROS method was chosen because imputation methods, such as ROS, depend less on assumptions of distributional shape than the maximum likelihood estimation (MLE) method[3]. The ROS technique develops probability plotting positions for each detected and non-detect data point based on the ordering of all data. A least squares line is fit by regressing the log transformed concentrations to the detected probability plotting positions. Fill-in concentrations are assigned to the non-detect data points for calculation of summary statistics based on the detected data probability plotting positions and the ordered statistics regression line equation. The

[1] Dennis R. Helsel, "More Than Obvious: Better Methods for Interpreting Nondetect Data," *Environmental Science and Technology* (15 October 2005): 419A

[2] Robert H. Shumway, Rahman S. Azari, and Masoud Kayhanian, "Statistical Approaches to Estimating Mean Water Quality Concentrations with Detection Limits," *Environmental Science and Technology* 36, no. 15 (2002): 3345-3353.

[3] Dennis R. Helsel, "More Than Obvious: Better Methods for Interpreting Nondetect Data," *Environmental Science and Technology* (15 October 2005): 420A

summary statistics are calculated from the detected data points and the fill-in values for non-detect data. An estimated mean and standard deviation are used to calculate the 99.9th percentile performance-based effluent limitation, as described above.

Table F-~~22~~16. Performance-based Effluent Limitations Statistics

Parameter	Units	MEC	# of Samples	% Detected	Mean	Std. Dev.	Performance-based Effluent Limitation
Ammonia[1,2]	mg/L	45	1124	100	27.2	4.11	39, 43, 47
Copper[9]	µg/L	~~6.34~~10	~~114~~108	100	4.~~16~~62	~~0.803~~1.06	~~6.8~~8.1
Cyanide[3]	µg/L	10	176	58.5	4.85	1.89	11.1
Aluminum[3,9]	µg/L	~~35.2~~38	~~61~~104	~~93.4~~90.4	~~17.6~~14.4	~~5.39~~5.10	~~35.4~~46.9
Carbon Tetrachloride[4]	µg/L	1.7	101	5.9	--	--	5.3
Chlorodibromomethane[4]	µg/L	0.7	101	16.8	--	--	2.2
Chlorodibromomethane (after nitrification)	µg/L	8.3	12	100	2.9	1.9	12[8]
Dichlorobromomethane	µg/L	3.4	101	91.1	1.10	0.583	3.4
Dichlorobromomethane (after nitrification)	µg/L	25	12	100	14.6	5.3	35[8]
Bis(2-ethylhexyl) phthalate[5]	µg/L	8.1	115	99.1	0.854	0.506	12.5
Methylene Chloride[1,3]	µg/L	5.4	101	91.1	1.18	0.901	5.4
Tetrachloroethylene[4]	µg/L	1.4	101	13.9	--	--	4.4
Pentachlorophenol[4]	µg/L	5.7	115	0.9	--	--	17.7
Dibenzo(ah)antharacene[4]	µg/L	0.51	145	0.7	--	--	1.6
Manganese[1,5,6]	µg/L	270	51	100	4.28	0.25	270
Methyl Tertiary Butyl Ether[4] (MTBE)	µg/L	5.8	128	2.3	--	--	18.0

Note: Data set are based on data collected between 12 June 2005 and 10 October 2009 unless noted.

1 Average monthly, average weekly, and maximum daily interim limits established for ammonia and calculated as described in Technical Memorandum from Airy Krich-Brinton to Robert Seyfried dated 9 May 2014 "Ammonia Interim Limits Re-Calculation for Regional San"..

2 Data set ranges from January 2005 to January 2014.

3 Regression on order statistics (ROS) method used.

4 Performance-based effluent limit estimated as 3.11 times the MEC because the amount of detected data is less than 20%

5 Mean and standard deviation are expressed as natural logarithms because the log-normal distribution is the best fit for the dataset.

6 Data set ranges from 19 April 2009 to 8 June 2011.

7 Data set ranges from 5 June 2005 to 6 October 2009.

8 For chlorodibromomethane and dichlorobromomethane the performance-based effluent limitations increase after nitrification facilities are operating. The performance-based effluent limitations were calculated based on estimated maximum effluent concentrations from pilot study data results plus a process scale-up factor of 40% to take into consideration uncertainties and variability. The potential need for further adjustment based on full scale implementation is not known at this time.~~,~~

9 Data set ranges from 1 January 2012 to 31 December 2014.

E. Interim Effluent Limitations

1. **Compliance Schedules for ammonia and Seasonal Title 22 (or Equivalent) Requirements.** The permit limitations for ammonia, BOD_5, TSS, and total coliform organisms are more stringent than the limitations previously imposed. These new limitations are based on effluent sampling and the California Department of Public Health's recommendations.

   The establishment of seasonal Title 22 (or equivalent) disinfection and ammonia requirements has not been previously required for this discharge. This Order requires the Discharger to meet new ammonia requirements for all flows. Furthermore, during May-October, the Discharger must comply with Title 22 (or equivalent) disinfection criteria and meet accompanying more stringent total coliform organisms effluent limits, and from November-April, comply with other new, more stringent total coliform organism limits, all of which represent a newly interpreted water quality objective that results in a permit limitation more stringent than the limitation previously imposed.

   The Discharger has complied with the application requirements in paragraph 4 of the State Water Board's Compliance Schedule Policy, and the Discharger's application demonstrates the need for additional time to implement actions to comply with the new limitations, as described below. Based on the sample results for the effluent, it appears that the Discharger may be in immediate non-compliance with effluent limitations for ammonia, BOD_5, TSS, and total coliform organisms 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. The Basin Plan for the Sacramento and San Joaquin River Basins includes a provision that authorizes the use of compliance schedules in NPDES permits for water quality objectives adopted after 25 September 1995 (see Basin Plan at page IV-16). The WQBELs for ammonia, BOD_5, TSS, and total coliform organisms are based on a new interpretation of the narrative standard for protection of receiving water beneficial uses. Therefore, a compliance schedule for compliance with the effluent limitations for ammonia, BOD_5, TSS, and total coliform organisms is established in the Order.

   a. **Demonstration that the Discharger needs time to implement actions to comply with a more stringent permit limitation specified to implement a new, revised, or newly interpreted water quality objective or criterion in a water quality standard.** Table 2.2 of the Infeasibility Report identifies constituents with the potential to exceed effluent limitations in the proposed NPDES Permit based on monitoring data collected between June 2005 and July 2008, including ammonia, chlorpyrifos, BOD_5, total coliform organisms, and TSS. The Discharger states that the requested compliance schedules are driven primarily by the need to construct treatment plant upgrades.

b. **Diligent efforts have been made to quantify pollutant levels in the discharge and the sources of the pollutant in the waste stream, and the results of those efforts.** The Infeasibility Report states that the Discharger has pretreatment program that regulates industrial discharges and an active source control program. The discharger issues permits to significant and non-significant users which require monitoring of pollutants of concern and implementation of limits where deemed necessary to control a point source. Table 2-3 of the Infeasibility Report identifies 33 categorical industrial users, 27 significant industrial users and 306 non-significant users. Potential sources of ammonia, chlorpyrifos, BOD_5, TSS and total coliform organisms include domestic and non-domestic sources.

c. **Source control efforts are currently underway or completed, including compliance with any pollution prevention programs that have been established.** The Discharger has active source reduction programs targeting mercury, pesticides (including chlorpyrifos, diazinon and lindane) and waste medications.

d. **A proposed schedule for additional source control measures or waste treatment.** Table 2-4 of the Infeasibility Report provided a proposed compliance schedules, which includes source control for chlorpyrifos with achieving compliance with final effluent limits 6 years after the permit effective date. For ammonia pilot testing, design of improvements and construction to be achieved 10 years from the permit effective date and full compliance with effluent limitations by 1 December 2020. For BOD_5, TSS, and total coliform organisms, pilot testing, design and construction to be achieved 9 years from the permit effective date and full compliance with effluent limitations by 1 December 2019.

e. **Data demonstrating current treatment facility performance to compare against existing permit effluent limits, as necessary to determine which is the more stringent interim permit effluent limit to apply if a schedule of compliance is granted.** Interim effluent limitations must be based on current treatment plant performance or existing permit limitations, whichever is more stringent. The Discharger can consistently comply with the effluent limitations for BOD_5, total coliform organisms, and TSS required by Order No. 5-00-188. Therefore, the proposed NPDES Permit requires compliance with interim effluent limitations based on the effluent limitations required by Order No. 5-00-188. There are no existing permit effluent limitations for ammonia, so the interim limits have been calculated based on facility performance (see Table F-19).

f. **The highest discharge quality that can reasonably be achieved until final compliance is attained.** Compliance with the interim effluent limitations will ensure that the Discharger maintains the discharge at levels that can reasonably be achieved until final compliance is attained.

g. **The proposed compliance schedule is as short as possible**, given the type of facilities being constructed or programs being implemented, and industry

experience with the time typically required to construct similar facilities or implement similar programs. The Discharger determined in the Infeasibility Report that the compliance schedule is as short as possible. The estimated durations for each task and estimated completion dates were included in Table 2-4 of the Infeasibility Report. Interim performance-based MDELs have been established in this Order. The interim limitations were determined as described in section IV.E.2. below, and are in effect through 11 May 2021 (ammonia) and 9 May 2023 (total coliform) until the final limitations take effect. As part of the compliance schedule, this Order requires the Discharger to submit a corrective action plan and implementation schedule to assure compliance with the final effluent limitations for ammonia, BOD_5, TSS, and total coliform organisms. In addition, the Discharger shall update prepare and implement the existing a pollution prevention plan that is in compliance with CWC section 13263.3(d)(3). The interim numeric effluent limitations and source control measures will result in the highest discharge quality that can reasonably be achieved until final compliance is attained.

2. **Interim Limitations for Ammonia and Title 22 (or Equivalent) and Total Coliform Requirements.** The SIP, section 2.2.1, The Compliance Schedule Policy requires that if a compliance schedule is granted for a CTR or NTR constituent, the Central Valley Water Board shall establish interim requirements and dates for their achievement in the NPDES permit. Interim numeric effluent limitations are required for compliance schedules longer than 1 year. The interim effluent limitations must be based on current treatment plant performance or existing permit limitations, whichever is more stringent. The State Water Board has held that the SIP may be used as guidance for non-CTR constituents. Therefore, the SIP requirement for interim effluent limitations has been applied to both CTR and non-CTR constituents in this Order.

   The interim limitations for ammonia in this Order are based on the current treatment plant performance and were developed as discussed in section IV.D.6, above.

   Interim limitations for Title 22 (or equivalent) requirements (i.e., for BOD_5, total coliform organisms, and TSS) are established at the levels recommended by DPH for secondary treatment-level disinfection.

   The Central Valley Water Board finds that the Discharger can undertake source control and treatment plant measures to maintain compliance with the interim limitations included in this Order. Interim limitations are established when compliance with final effluent limitations cannot be achieved by the existing discharge. Discharge of constituents in concentrations in excess of the final effluent limitations, but in compliance with the interim effluent limitations, can significantly degrade water quality and adversely affect the beneficial uses of the receiving stream on a long-term basis. The interim limitations, however, establish an enforceable ceiling concentration until compliance with the effluent limitation can be achieved. The limited, short-term degradation associated with the compliance

schedule is consistent with State and federal policies and is authorized by 40 CFR 122.47 and the Compliance Schedule Policy.

F. Land Discharge Specifications – Not Applicable

G. Reclamation Specifications – Not Applicable

Treated wastewater discharged for reclamation is regulated under separate waste discharge requirements and must meet the requirements of CCR, Title 22.

V. RATIONALE FOR RECEIVING WATER LIMITATIONS

Basin Plan water quality objectives to protect the beneficial uses of surface water and groundwater include numeric objectives and narrative objectives, including objectives for chemical constituents, toxicity, and tastes and odors. The toxicity objective requires that surface water and groundwater be maintained free of toxic substances in concentrations that produce detrimental physiological responses in humans, plants, animals, or aquatic life. The chemical constituent objective requires that surface water and groundwater shall not contain chemical constituents in concentrations that adversely affect any beneficial use or that exceed the maximum contaminant levels (MCLs) in Title 22, CCR. The tastes and odors objective states that surface water and groundwater shall not contain taste- or odor-producing substances in concentrations that cause nuisance or adversely affect beneficial uses. The Basin Plan requires the application of the most stringent objective necessary to ensure that surface water and groundwater do not contain chemical constituents, toxic substances, radionuclides, or taste and odor producing substances in concentrations that adversely affect domestic drinking water supply, agricultural supply, or any other beneficial use.

A. Surface Water

CWA section 303(a-c), requires states to adopt water quality standards, including criteria where they are necessary to protect beneficial uses. The Central Valley Water Board adopted water quality criteria as water quality objectives in the Basin Plan. The Basin Plan states that "[t]*he numerical and narrative water quality objectives define the least stringent standards that the Regional Water Board will apply to regional waters in order to protect the beneficial uses.*" The Basin Plan includes numeric and narrative water quality objectives for various beneficial uses and water bodies. This Order contains receiving surface water limitations based on the Basin Plan numerical and narrative water quality objectives for bacteria, biostimulatory substances, color, chemical constituents, dissolved oxygen, floating material, oil and grease, pH, pesticides, radioactivity, suspended sediment, settleable substances, suspended material, tastes and odors, temperature, toxicity, and turbidity.

B. Groundwater

1. The beneficial uses of the underlying ground water are municipal and domestic supply, industrial service supply, industrial process supply, and agricultural supply.

2. Basin Plan water quality objectives include narrative objectives for chemical constituents, tastes and odors, and toxicity of groundwater. The toxicity objective requires that groundwater be maintained free of toxic substances in concentrations that produce detrimental physiological responses in humans, plants, animals, or aquatic life. The chemical constituent objective states groundwater shall not contain chemical constituents in concentrations that adversely affect any beneficial use. The tastes and odors objective prohibits taste- or odor-producing substances in concentrations that cause nuisance or adversely affect beneficial uses. The Basin Plan also establishes numerical water quality objectives for chemical constituents and radioactivity in groundwaters designated as municipal supply. These include, at a minimum, compliance with MCLs in Title 22 of the CCR. The bacteria objective prohibits coliform organisms at or above 2.2 MPN/100 mL. The Basin Plan requires the application of the most stringent objective necessary to ensure that waters do not contain chemical constituents, toxic substances, radionuclides, taste- or odor-producing substances, or bacteria in concentrations that adversely affect municipal or domestic supply, agricultural supply, industrial supply or some other beneficial use.

VI. RATIONALE FOR MONITORING AND REPORTING REQUIREMENTS

40 CFR 122.48 requires that all NPDES permits specify requirements for recording and reporting monitoring results. Water Code sections 13267 and 13383 authorizes the Central Valley Water Board to require technical and monitoring reports. The Monitoring and Reporting Program (Attachment E) of this Order, establishes monitoring and reporting requirements to implement federal and state requirements. The following provides the rationale for the monitoring and reporting requirements contained in the Monitoring and Reporting Program for the Facility.

A. Influent Monitoring

1. Influent monitoring is required to collect data on the characteristics of the wastewater and to assess compliance with effluent limitations (e.g., BOD_5 and TSS reduction requirements). The monitoring frequencies for flow (continuous), BOD_5 and Total Suspended Solids once per day) have been retained from Order No. 5-00-188. In addition, pH (continuous), electrical conductivity (once per week) and total dissolved solids (once per month) are monitored for a more complete characterization of the influent.

2. Influent monitoring is required to collect data on the characteristics of the Groundwater Corrective Action Program (CAP) Discharge Monitoring. The monitoring frequencies for flow (once per month), priority pollutants, total dissolved solids, electrical conductivity and nitrates (twice per year) have been retained from Order No. 5-00-188. .

B. Effluent Monitoring

1. Pursuant to the requirements of 40 CFR 122.44(i)(2) effluent monitoring is required for all constituents with effluent limitations. Effluent monitoring is necessary to

assess compliance with effluent limitations, assess the effectiveness of the treatment process, and to assess the impacts of the discharge on the receiving stream and groundwater.

2. Effluent monitoring frequencies and sample types for flow, chlorine residual, sulfur dioxide, temperature, pH, BOD, TSS, total coliforms, ammonia, settleable solids, electrical conductivity, total dissolved solids, total organic carbon, cyanide, arsenic, mercury, copper, silver, methylene chloride, lead, tetrachloroethylene, bis(2-ethylhexyl) phthalate, chlorodibromomethane, dichlorobromomethane, carbon tetrachloride, MTBE, hardness, alkalinity, standard minerals, and priority pollutants have been retained from Order No. 5-00-188 to determine compliance with effluent limitations for these parameters.

3. Monitoring data collected over the existing permit term for lindane, lead, zinc, silver and arsenic did not demonstrate reasonable potential to exceed water quality objectives/criteria. Thus, specific monitoring requirements for these parameters have not been retained from Order No. 5-00-188.

4. This Order specifies lower reporting limits sufficient for comparison with the applicable water quality objectives as follows:

Pentachlorophenol	µg/L	EPA method 625 w/ MDL 0.05 µg/L
Dibenzo(a,h)anthracene	µg/L	EPA method 625 w/MDL 0.001-0.005 µg/L
Chlorpyrifos	µg/L	EPA Method 625M; Method 8141 or equivalent
Diazinon	µg/L	EPA Method 625M; Method 8141 or equivalent

5. In addition to priority pollutant data for the effluent, non-priority pollutants also need to be monitored to conduct a meaningful reasonable potential analysis. Similar to priority pollutant monitoring, periodic monitoring for non-priority pollutants is needed to provide the data necessary for determining the reasonable potential for those pollutants for which no WQBELs were established. Thus, monitoring for non-priority pollutants include pyrethroids, nitrosoamines, dioxin and congeners, furans, and other constituents of concern as described in Table E-3b.

6. In order to determine compliance with the effluent limitations, aluminum, methylmercury, manganese, pentachlorophenol, dibenzo(ah)anthracene, chlorpyrifos, and diazinon, are include in the effluent monitoring at minimum frequencies .

7. In addition to the constituents addressed above, perchlorate and 1,2-diphenyl hydrazine in the effluent may have reasonable potential to impact municipal beneficial uses. Perchlorate was detected in the effluent 11 out of 81 samples above the water quality criteria, however, the analytical method was not appropriate for wastewater and could give false positive detections due to salt interferences. 1,2- diphenyl hydrazine was detected by two J-flagged samples. Therefore, to determine if perchlorate has reasonable potential this Order requires the Discharge conduct a special study for perchlorate and for 1,2-diphenyl hydrazine.

8. The California Department of Public Health (DPH) recommends a 1 in 10,000 risk for *cryptosporidium* and *giardia*. Therefore, weekly monitoring for these pathogenic protozoans is required to meet the recommendations.

9. Timing, duration and purpose of wastewater diversions, effluent or influent, is a measure of proper operation of the wastewater treatment plant and is required to be reported on a monthly basis.

C. Whole Effluent Toxicity Testing Requirements

1. **Acute Toxicity.** Flow through 96-hour bioassay testing is required to demonstrate compliance with the effluent limitation for acute toxicity. The test species have changed from fathead minnow *(Pimephales promela)* to rainbow trout (*Oncorhynchus mykiss*) because rainbow trout are salmonids similar to resident species and are more sensitive than fathead minnows to wastewater effluent. Using fathead minnows may underestimate effluent toxicity.

2. **Chronic Toxicity.** Monthly chronic whole effluent toxicity testing is required in order to demonstrate compliance with the Basin Plan's narrative toxicity objective. Order No. 5-00-188 included chronic toxicity testing quarterly, the TSD recommends monthly chronic toxicity testing for major wastewater treatment facilities.

D. Receiving Water Monitoring

1. Surface Water

Receiving water monitoring is necessary to assess compliance with receiving water limitations and to assess the impacts of the discharge on the receiving stream. New monitoring locations have been added at River Mile 44 and River Mile 43, RSWD-004 and RSWD-005, respectively, to better evaluate impacts in the receiving water.

<u>Delta Regional Monitoring Program</u>

The Central Valley Water Board requires individual dischargers and discharger groups to conduct monitoring of Delta waters and Delta tributary waters in the vicinity of their discharge, known as ambient (or receiving) water quality monitoring. This monitoring provides information on the impacts of waste discharges on Delta waters, and on the extant condition of the Delta waters.

However, the equivalent funds spent on current monitoring efforts could be used more efficiently and productively, and provide a better understanding of geographic and temporal distributions of contaminants and physical conditions in the Delta, and of other Delta water quality issues, if those funds were used for a coordinated ambient monitoring effort, rather than continue to be used in individual, uncoordinated ambient water quality monitoring programs. The Delta Regional Monitoring Program (RMP) will provide data to better inform management and policy decisions regarding the Delta.

This Order will allow Dischargers to elect to participate in the Delta RMP in lieu of conducting all or part of the individual receiving water monitoring required in the Monitoring and Reporting Program. If the Discharger elects to cease individual receiving water monitoring and participate in the Delta Regional Monitoring Program, the Discharger shall submit a letter signed by an authorized representative to the Executive Officer informing the Board that the Discharger will participate in the Delta Regional Monitoring Program and the date on which individual receiving water monitoring under Attachment E, Sections VIII.A.1, VIII.A.2 and VIII.A.3, will cease or be modified. Approval by the Executive Officer is required, and contingent on Delta RMP Steering Committee action on the forthcoming RMP monitoring plan.

Delta RMP data is not intended to be used directly to represent either upstream or downstream water quality for purposes of determining compliance with this Permit. Delta RMP monitoring stations are established generally as “integrator sites” to evaluate the combined impacts on water quality of multiple discharges into the Delta; Delta RMP monitoring stations would not normally be able to identify the source of any specific constituent, but would be used to identify water quality issues needing further evaluation. Delta RMP monitoring data may be used to help establish background receiving water quality for Reasonable Potential analyses in an NPDES Permit after evaluation of the applicability of the data for that purpose. In general, monitoring data from samples collected in the immediate vicinity of the discharge will be given greater weight in permitting decisions than receiving water monitoring data collected at greater distances from the discharge point. Delta RMP data, as with all environmental monitoring data, can provide an assessment of water quality at a specific place and time that can be used in conjunction with other information, such as other receiving water monitoring data, spatial and temporal distribution and trends of receiving water data, effluent data from the Discharger’s discharge and other point and non-point source discharges, receiving water flow volume, speed and direction, and other information to determine the likely source or sources of a constituent that resulted in exceedance of a receiving water quality objective.

If the Discharger begins to participate in the Delta Regional Monitoring Program in lieu of individual receiving water monitoring, the Discharger shall continue to participate in the Delta Regional Monitoring Program until such time as the Discharger informs the Board that participation in the Delta RMP will cease and individual monitoring is reinstituted. Receiving water monitoring under

Attachment E, Sections VIII.A.1, VIII.A.2 and VIII.A.3, is not required under this Order so long as the Discharger adequately supports the Delta Regional Monitoring Program. Participation in the Delta RMP by a Discharger shall consist of providing funds and/or in-kind services to the Delta RMP at least equivalent to discontinued individual monitoring and study efforts. If a discharger or discharger group fails to maintain adequate participation in the Delta RMP, as determined through criteria to be developed by the Delta RMP Steering Committee, the Steering Committee will recommend to the Central Valley Water Board that an individual monitoring program be reinstated for that discharger or discharger group.

If the Discharger is participating in the Delta Regional Monitoring Program as described in Attachment E, Section VIII, the Receiving Water portion of the required Characterization Monitoring need not be conducted by the Discharger. Instead, data from the Delta Regional Monitoring Program will be utilized to characterize the receiving water in the permit renewal. The Discharger may, however, conduct any site-specific receiving water monitoring deemed appropriate by the Discharger and submit that monitoring data with this Characterization Monitoring. In general, monitoring data from samples collected in the immediate vicinity of the discharge will be given greater weight in permitting decisions than receiving water monitoring data collected at greater distances from the discharge point. Historic receiving water monitoring data taken by the discharger and from other sources may also be evaluated to determine whether or not that data is representative of current receiving water conditions. If found to be representative of current conditions, then that historic data may be used in characterizing receiving water quality for the purposes of Reasonable Potential analysis.

2. Groundwater (Not Applicable)

E. Other Monitoring Requirements

1. Biosolids Monitoring

Biosolids monitoring is required to ensure compliance with the biosolids disposal requirements contained in the Special Provision contained in section VI.C.6.a. of this Order. Biosolids disposal requirements are imposed pursuant to 40 CFR Part 503 to protect public health and prevent groundwater degradation.

2. Water Supply Monitoring

Water supply monitoring is required to evaluate the source of constituents in the wastewater.

VII. RATIONALE FOR PROVISIONS

A. Standard Provisions

Standard Provisions, which apply to all NPDES permits in accordance with 40 CFR 122.41, and additional conditions applicable to specified categories of permits in accordance with 40 CFR 122.42, are provided in Attachment D. The discharger must comply with all standard provisions and with those additional conditions that are applicable under 40 CFR 122.42.

40 CFR 122.41(a)(1) and (b) through (n) establish conditions that apply to all State-issued NPDES permits. These conditions must be incorporated into the permits either expressly or by reference. If incorporated by reference, a specific citation to the regulations must be included in the Order. 40 CFR 123.25(a)(12) allows the state to omit or modify conditions to impose more stringent requirements. In accordance with 40 CFR 123.25, this Order omits federal conditions that address enforcement authority specified in 40 CFR 122.41(j)(5) and (k)(2) because the enforcement authority under the CWC is more stringent. In lieu of these conditions, this Order incorporates by reference CWC section 13387(e).

B. Special Provisions

1. Reopener Provisions

a. Temperature ~~Study~~Requirements. ~~There are uncertainties that the discharge may impact aquatic life in the vicinity of the discharge as regulated under the existing thermal exemption conditions.~~ When Order 2010-0114 was adopted the USFWS and the NMFS requested studies to characterize fish behavior in the affected river reach to determine how fish behave in response to the discharge field, and whether predator concentrations are elevated in the thermal discharge field. ~~This~~ Order R5-2010-0114 ~~requires~~ required the Discharger to complete a study of temperature's potential effect in the receiving water. The Discharger submitted the required studies in March 2013 and May 2015. Based on a review of those studies, the Central Valley Water Board has determined that exceptions to the Thermal Plan requirements may be granted in compliance with 40 CFR § 125.73 (a). This reopener provision allows the Central Valley Water Board to reopen this Order for modification of effluent limitations and receiving water limitations and requirements for temperature, as appropriate. ~~if after review of the study results it is determined that the discharge impacts beneficial uses~~.

b. Pollution Prevention. This Order requires the Discharger prepare pollution prevention plans following CWC section 13263.3(d)(3) for ammonia and mercury. This reopener provision allows the Central Valley Water Board to reopen this Order for addition and/or modification of effluent limitations and requirements for these constituents based on a review of the pollution prevention plans.

c. Whole Effluent Toxicity. This Order requires the Discharger to investigate the causes of, and identify corrective actions to reduce or eliminate effluent toxicity

through a Toxicity Reduction Evaluation (TRE). This Order may be reopened to include a numeric chronic toxicity limitation, a new acute toxicity limitation, and/or a limitation for a specific toxicant identified in the TRE. Additionally, if a numeric chronic toxicity water quality objective is adopted by the State Water Board, this Order may be reopened to include a numeric chronic toxicity limitation based on that objective.

d. **Water Effects Ratio (WER) and Metal Translators.** A default WER of 1.0 has been used in this Order for calculating CTR criteria for applicable priority pollutant inorganic constituents. In addition, default dissolved-to-total metal translators have been used to convert water quality objectives from dissolved to total recoverable when developing effluent limitations for copper. If the Discharger performs studies to determine site-specific WERs and/or site-specific dissolved-to-total metal translators, this Order may be reopened to modify the effluent limitations for the applicable inorganic constituents.

e. **Perchlorate and 1,2-diphenyl hydrazine Studies.** There are indications that the discharge may contain constituents that have a reasonable potential to cause or contribute to an exceedance of water quality objectives. This Order requires the Discharger to complete a study of these constituents' potential effect in the receiving water. This reopener provision allows the Central Valley Water Board to reopen this Order for addition of effluent limitations and requirements for these constituents if after review of the study results it is determined that the discharge has reasonable potential to cause or contribute to an exceedance of a water quality objective.

f. **Central Valley Drinking Water Policy**. If water quality objectives are adopted for organic carbon, nutrients, salinity, bromide, or pathogens to protect drinking water supplies in the Central Valley Region, this Order may be reopened for addition and/or modification of effluent limitations and requirements, as appropriate, to require compliance with the applicable water quality objectives.

g. **Ammonia Studies.** The ammonia effluent limitations in this Order are based on USEPA's recommended National Ambient Water Quality Criteria for protection of aquatic life. However, studies are ongoing to evaluate the effect of ammonia on the inhibition of growth of diatoms in the Bay-Delta, studies to evaluate the sensitivity of delta smelt to ammonia toxicity, and studies of the technological feasibility of ammonia removal processes. Based on the result of these studies, this Order may be reopened to modify the ammonia effluent limitations, as appropriate.

h. ***Hyalella azteca* Study**. There are indications that the discharge may contain constituents that are toxic to native species at very low levels.[1] *Hyalella azteca* is a native species in the Sacramento-San Joaquin Delta, it is sensitive to pyrethroids and it is an interface organism between sediment and the water

[1] Weston, Donald P., "Urban and Agricultural Sources of Pyrethroid Insecticides to the Sacramento-San Joaquin Delta of Califronia", Environmental Science & Technology, Vol. 44, No. 5, 2010.

column. Although testing with *Hyalella azteca* is not commonly used for wastewater effluent, it is a common species for determining toxicity in the Delta. Researchers are using a modified version of Methods for Measuring the Toxicity and Bioaccumulation of Sediment-associated Contaminants with Freshwater Invertebrates, USEPA Method #600-R-99-064. A study is needed to determine if a 4 or 10 water column test for growth or 10 day survival or both growth and survival is best for determining toxicity.

i. **The Bay-Delta Plan**. The South Delta salinity standards are currently under review by the State Water Board in accordance with implementation provisions contained in the Bay-Delta Water Quality Control Plan. This review in process includes an updated independent scientific investigation of irrigation salinity needs in the southern Delta. If applicable water quality objectives of the Bay-Delta Plan are adopted, this Order may be reopened for addition and/or modification of effluent limitations and requirements, as appropriate.

2. Special Studies and Additional Monitoring Requirements

a. **Chronic Whole Effluent Toxicity Requirements.** The Basin Plan contains a narrative toxicity objective that 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 page III-8.00). The discharge may contain chronic WET that has reasonable potential to cause or contribute to an in-stream excursion above of the Basin Plan's narrative toxicity objective.

This provision requires the Discharger to update its TRE Workplan in accordance with USEPA guidance. In addition, the provision provides a numeric toxicity monitoring trigger and requirements for accelerated monitoring, as well as, requirements for TRE initiation if toxicity has been demonstrated.

Monitoring Trigger. As discussed in Section IV.C.5, above, this Order allows a chronic aquatic toxicity mixing zone. The chronic toxicity mixing zone extends 350 feet downstream of the outfall. A numeric toxicity monitoring trigger of **8** TUc (where TUc = 100/NOEC) is applied in the provision, allowing for the dilution granted within the mixing zone. Therefore, a TRE is triggered when the effluent exhibits toxicity at 12.5% effluent. The numeric monitoring trigger represents the in-stream waste concentration at the edge of the chronic mixing zone. The in-stream waste concentration is the concentration of the effluent in the receiving water after mixing (i.e., inverse of the dilution factor). The Discharger has conducted extensive modeling of the discharge and has estimated the 4-day average dilution at the edge of the chronic mixing zone. Table F-20, below, shows modeling results for the percent effluent 350 feet from the diffuser that was provided by the Discharger as part of its comments on the Tentative Order.

Table F-~~23~~17. Dyntox Model Results for Percent Effluent 350 Feet from the SRWTP Diffuser at 181 mgd

	4-Day Average 350 Feet from Diffuser	
Statistic	Percent Effluent	Dilution
Mean	3.93	25.5
Median	3.94	25.4
95%-ile	6.35	15.8
99.91%-ile	7.50	13.3
5%-ile	1.91	52.4

Based on the results of the modeling shown in Table F-20, above, the 4-day average effluent concentration at the edge of the chronic mixing zone, with a one-in-three year exceedance (i.e., 99.91 percentile), is 7.5 percent. This corresponds to a toxicity trigger of 13.3 TUc. Although the modeling demonstrates a chronic toxicity trigger of 13.3 TUc at the edge of the chronic mixing zone, the toxicity trigger has been set at 8 TUc, which is the toxicity trigger in Order 5-00-188 (previous Order). The Discharger has shown consistent compliance with this trigger and it will require proactive efforts to evaluate effluent toxicity before chronic toxicity is experienced outside the chronic toxicity mixing zone.

Accelerated Monitoring. The provision requires accelerated WET testing when a regular WET test result exceeds the monitoring trigger. The purpose of accelerated monitoring is to determine, in an expedient manner, whether there is toxicity before requiring the implementation of a TRE. Due to possible seasonality of the toxicity, the accelerated monitoring should be performed in a timely manner, preferably taking no more than 2 to 3 months to complete.

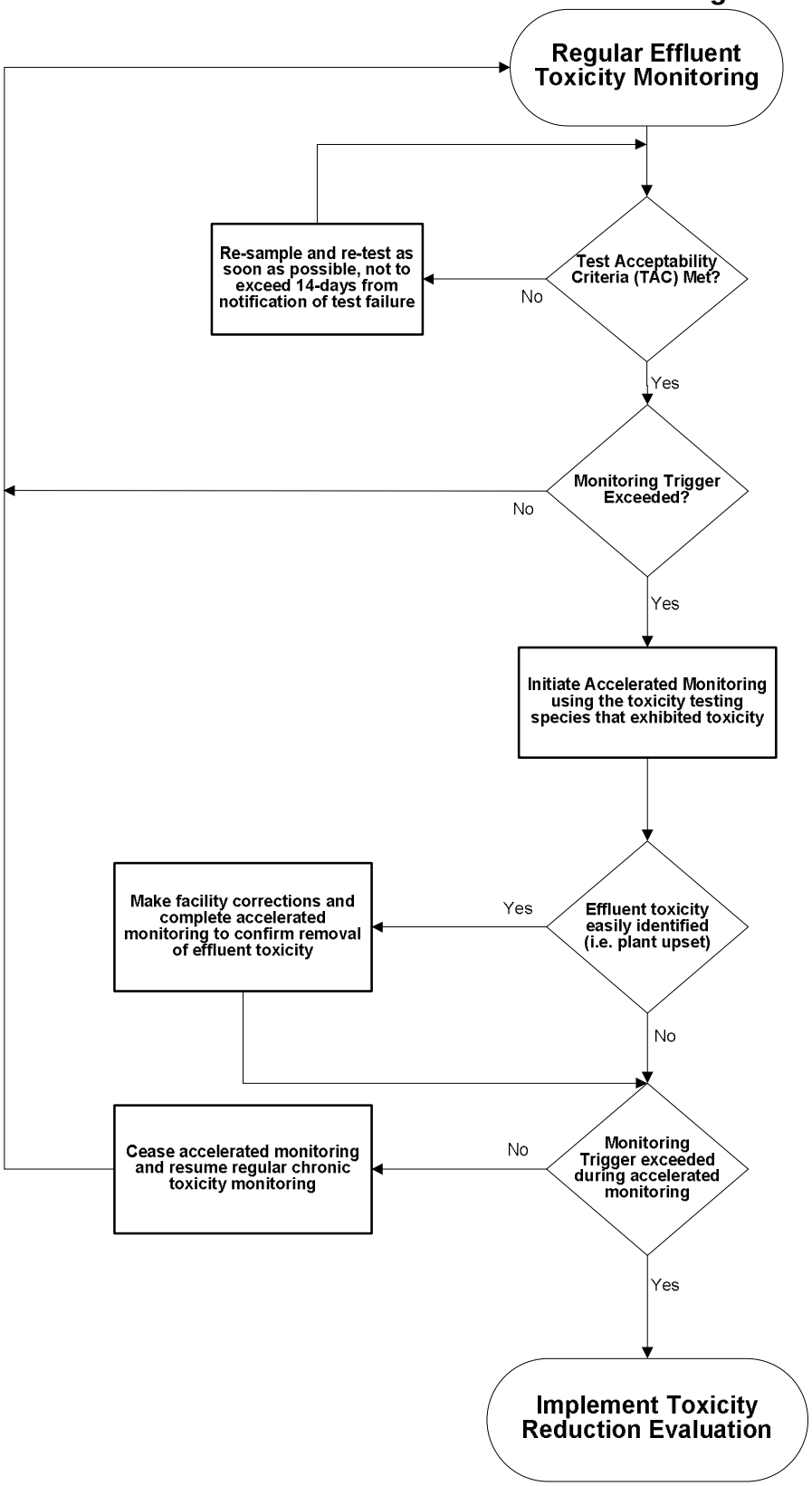
The provision requires accelerated monitoring consisting of four chronic toxicity tests in a six-week period (i.e., one test every two weeks) using the species that exhibited toxicity. Guidance regarding accelerated monitoring and TRE initiation is provided in the *Technical Support Document for Water Quality-based Toxics Control,* EPA/505/2-90-001, March 1991 (TSD). The TSD at page 118 states, "*EPA recommends if toxicity is repeatedly or periodically present at levels above effluent limits more than 20 percent of the time, a TRE should be required.*" Therefore, four accelerated monitoring tests are required in this provision. If no toxicity is demonstrated in the four accelerated tests, then it demonstrates that toxicity is not present at levels above the monitoring trigger more than 20 percent of the time (only 1 of 5 tests are toxic, including the initial test). However, notwithstanding the accelerated monitoring results, if there is adequate evidence of effluent toxicity (i.e. toxicity present exceeding the monitoring trigger more than 20 percent of the time), the Executive Officer may require that the Discharger initiate a TRE.

See the WET Accelerated Monitoring Flow Chart (Figure F-2), below, for further clarification of the accelerated monitoring requirements and for the decision points for determining the need for TRE initiation.

TRE Guidance. The Discharger is required to prepare a TRE Workplan in accordance with USEPA guidance. Numerous guidance documents are available, as identified below:

- Toxicity Reduction Evaluation Guidance for Municipal Wastewater Treatment Plants, EPA/833-B-99/002, August 1999.
- Generalized Methodology for Conducting Industrial Toxicity Reduction Evaluations (TREs), EPA/600/2-88/070, April 1989.
- Methods for Aquatic Toxicity Identification Evaluations: Phase I Toxicity Characterization Procedures, Second Edition, EPA 600/6-91/003, February 1991.
- Toxicity Identification Evaluation: Characterization of Chronically Toxic Effluents, Phase I, EPA/600/6-91/005F, May 1992.
- Methods for Aquatic Toxicity Identification Evaluations: Phase II Toxicity Identification Procedures for Samples Exhibiting Acute and Chronic Toxicity, Second Edition, EPA/600/R-92/080, September 1993.
- Methods for Aquatic Toxicity Identification Evaluations: Phase III Toxicity Confirmation Procedures for Samples Exhibiting Acute and Chronic Toxicity, Second Edition, EPA 600/R-92/081, September 1993.
- Methods for Measuring the Acute Toxicity of Effluents and Receiving Waters to Freshwater and Marine Organisms, Fifth Edition, EPA-821-R-02-012, October 2002.
- Short-term Methods for Estimating the Chronic Toxicity of Effluents and Receiving Waters to Freshwater Organisms, Fourth Edition, EPA-821-R-02-013, October 2002.
- Technical Support Document for Water Quality-based Toxics Control, EPA/505/2-90-001, March 1991.

Figure F-2
WET Accelerated Monitoring Flow Chart



b. Temperature Study. ~~The Discharger shall submit a workplan and time schedule for Executive Officer approval for determining whether permitted conditions are protective of aquatic life beneficial uses in the Sacramento River. This~~ Order R5-2010-0114 ~~requires~~ required the Discharger to submit a workplan and time schedule for Executive Officer approval for development of a temperature study to evaluate the thermal effects of the discharge, including ~~determining whether permitted conditions are protective of the aquatic life beneficial uses of the Sacramento River. The work plan shall be implemented upon approval by the Executive Officer. The study will include~~ an evaluation of: (1) the existing Thermal Plan Exception and its effects on aquatic life, and (2) any proposed request for new Thermal Plan Exception(s). The Discharger ~~must~~ was also required to consult with the U.S. Fish and Wildlife Service, the National Marine Fisheries Service, and the California Department of Fish and Game, to consider additional issues (such as fish attractively to mixing zone areas) in development of the workplan for the Study. The Discharger submitted the study in March 2013.

c. **Municipal Water Supply Annual Report**. The Discharger shall submit an annual report characterizing the water supply water quality. The water supply characterization will include data from the water purveyors and other public databases. The water supply characterization report will provide a weighted average of groundwater and surface water TDS and EC. The purpose of this monitoring is to evaluate the efficacy of salt minimization plans.

3. Best Management Practices and Pollution Prevention

a. Salinity Evaluation and Minimization Plan. An Evaluation and Minimization Plan for salinity is required in this Order to ensure adequate measures are developed and implemented by the Discharger to reduce the discharge of salinity to Sacramento River.

b. 2,3,7,8-TCDD and Other Dioxin and Furan Congeners Source Evaluation and Minimization Plan. The Discharger will be required to prepare a 2,3,7,8-TCDD and other dioxin and furan congeners evaluation and minimization plan to address sources of detectable dioxins (OCDD and 1,2,3,4,6,7,8-HpCDD) and furans (OCDF) from the Facility. The plan is required in this Order to ensure adequate measures are developed and implemented by the Discharger to reduce the discharge of dioxin and furan congeners to the receiving water.

4. Construction, Operation, and Maintenance Specifications

a. Emergency Storage Basin Operating Requirements. The operation and maintenance specifications for the emergency storage basin are necessary to ensure proper operation of the emergency storage basin and minimize the potential for impacts to groundwater quality.

b. Turbidity. Operations specifications for turbidity are included as an indicator of the effectiveness of the treatment process and to assure compliance with effluent

limitations for total coliform organisms. The tertiary treatment process is capable of reliably meeting a turbidity limitation of 2 nephelometric turbidity units (NTU) as a daily average. Failure of the treatment system such that virus removal is impaired would normally result in increased particles in the effluent, which result in higher effluent turbidity. Turbidity has a major advantage for monitoring filter performance, allowing immediate detection of filter failure and rapid corrective action. The operational specification requires that filter effluent turbidity shall not exceed 2 NTU as a daily average; 5 NTU, more than 5 percent of the time within a 24-hour period; and an instantaneous maximum of 10 NTU.

5. Special Provisions for Municipal Facilities (POTWs Only)

a. Pretreatment Requirements. The federal CWA section 307(b), and federal regulations, 40 CFR Part 403, require publicly owned treatment works to develop an acceptable industrial pretreatment program. A pretreatment program is required to prevent the introduction of pollutants, which will interfere with treatment plant operations or sludge disposal, and prevent pass through of pollutants that exceed water quality objectives, standards or permit limitations. Pretreatment requirements are imposed pursuant to 40 CFR Part 403.

The Discharger shall implement and enforce its approved pretreatment program and is an enforceable condition of this Order. If the Discharger fails to perform the pretreatment functions, the Central Valley Water Board, the State Water Board or USEPA may take enforcement actions against the Discharger as authorized by the CWA.

b. The State Water Board issued General Waste Discharge Requirements for Sanitary Sewer Systems, Water Quality Order No. 2006-0003-DWQ (General Order) on 2 May 2006. The General Order requires public agencies that own or operate sanitary sewer systems with greater than one mile of pipes or sewer lines to enroll for coverage under the General Order. The General Order requires agencies to develop sanitary sewer management plans (SSMPs) and report all sanitary sewer overflows (SSOs), among other requirements and prohibitions.

Furthermore, the General Order contains requirements for operation and maintenance of collection systems and for reporting and mitigating sanitary sewer overflows. Inasmuch that the Discharger's collection system is part of the system that is subject to this Order, certain standard provisions are applicable as specified in Provisions, section VI.C.5. For instance, the 24-hour reporting requirements in this Order are not included in the General Order. The Discharger must comply with both the General Order and this Order. The Discharger and public agencies that are discharging wastewater into the facility were required to obtain enrollment for regulation under the General Order by 1 December 2006.

6. Other Special Provisions

a. Ownership Change. To maintain the accountability of the operation of the Facility, the Discharger is required to notify the succeeding owner or operator of the existence of this Order by letter if, and when, there is any change in control or ownership of land or waste discharge facilities presently owned or controlled by the Discharger.

7. Compliance Schedules

a. The Discharger submitted a request, and justification (dated 20 August 2010), for a compliance schedule for BOD_5, TSS, ammonia, and total coliform organisms. The compliance schedule justification included all items specified in Paragraph 3, items (a) through (d), of section 2.1 of the SIP. This Order establishes compliance schedules for the new, final WQBELs for BOD_5, TSS, and total coliform organisms with compliance required by 9 May 2023, and ammonia with full compliance by 11 May 2021. The compliance schedule for the ammonia effluent limitations requires full compliance by 11 May 2021. These final compliance dates were originally 1 December 2020, but have been stayed by certain orders issued by the Sacramento County Superior Court, Honorable Michael Kenny. The stays resulted in change, or shift by a period of time, in the compliance deadlines as well as in the schedule for certain steps toward compliance. The operative orders were issued by the Superior Court on 13 July 2012 and 6 May 2013.

b. A pollution prevention plan for ammonia and for mercury is required in this Order per CWC section 13263.3(d)(1)(C). In accordance with CWC section 13263.3(d)(3), the pollution prevention plans for ammonia and mercury shall, at a minimum, meet the following requirements:

(1) An estimate of all of the sources of a pollutant contributing, or potentially contributing, to the loadings of a pollutant in the treatment plant influent.

(2) An analysis of the methods that could be used to prevent the discharge of the pollutants into the Facility, including application of local limits to industrial or commercial dischargers regarding pollution prevention techniques, public education and outreach, or other innovative and alternative approaches to reduce discharges of the pollutant to the Facility. The analysis also shall identify sources, or potential sources, not within the ability or authority of the Discharger to control, such as pollutants in the potable water supply, airborne pollutants, pharmaceuticals, or pesticides, and estimate the magnitude of those sources, to the extent feasible.

(3) An estimate of load reductions that may be attained through the methods identified in subparagraph ii.

(4) A plan for monitoring the results of the pollution prevention program.

(5) A description of the tasks, cost, and time required to investigate and implement various elements in the pollution prevention plan.

(6) A statement of the Discharger's pollution prevention goals and strategies, including priorities for short-term and long-term action, and a description of the Discharger's intended pollution prevention activities for the immediate future.

(7) A description of the Discharger's existing pollution prevention programs.

(8) An analysis, to the extent feasible, of any adverse environmental impacts, including cross-media impacts or substitute chemicals that may result from the implementation of the pollution prevention program.

(9) An analysis, to the extent feasible, of the costs and benefits that may be incurred to implement the pollution prevention program.

VIII. PUBLIC PARTICIPATION

The Central Valley Water Board is considering the issuance of WDRs that will serve as an NPDES permit for the Facility. As a step in the WDR adoption process, the Central Valley Water Board staff has developed tentative WDRs. The Central Valley Water Board encourages public participation in the WDR adoption process.

A. Notification of Interested Parties

The Central Valley Water Board has notified the Discharger and interested agencies and persons of its intent to prescribe waste discharge requirements for the discharge and has provided them with an opportunity to submit their written comments and recommendations. Notification was provided through publication of a Notice of Public Hearing in the Sacramento Bee. The Notice was also posted at the Sacramento City Hall and at the entrance to the Facility.

B. Written Comments

The staff determinations are tentative. Interested persons are invited to submit written comments concerning these tentative WDRs. Comments must be submitted either in person or by mail to the Executive Office at the Central Valley Water Board at the address above on the cover page of this Order.

To be fully responded to by staff and considered by the Central Valley Water Board, written comments must be received at the Central Valley Water Board offices by 5:00 p.m. on **8 October 2010.**

C. Public Hearing

The Central Valley Water Board will hold a public hearing on the tentative WDRs during its regular Board meeting on the following date and time and at the following location:

Date: 9 December 2010
Time: 8:30 a.m.
Location: Regional Water Quality Control Board, Central Valley Region
11020 Sun Center Dr., Suite #200
Rancho Cordova, CA 95670

Interested persons are invited to attend. At the public hearing, the Central Valley Water Board will hear testimony, if any, pertinent to the discharge, WDRs, and permit. Oral testimony will be heard; however, for accuracy of the record, important testimony should be in writing.

Please be aware that dates and venues may change. Our Web address is www.waterboards.ca.gov/centralvalley where you can access the current agenda for changes in dates and locations.

D. Waste Discharge Requirements Petitions

Any aggrieved person may petition the State Water Board to review the decision of the Central Valley Water Board regarding the final WDRs. The petition must be received by the State Water Resources Control Board within 30 days of the Central Valley Water Board's action to the following address:

State Water Resources Control Board
Office of Chief Counsel
P.O. Box 100, 1001 I Street
Sacramento, CA 95812-0100

E. Information and Copying

The Report of Waste Discharge, related documents, tentative effluent limitations and special provisions, comments received, and other information are on file and may be inspected at the address above at any time between 8:30 a.m. and 4:45 p.m., Monday through Friday. Copying of documents may be arranged through the Central Valley Water Board by calling (916) 464-3291.

F. Register of Interested Persons

Any person interested in being placed on the mailing list for information regarding the WDRs and NPDES permit should contact the Central Valley Water Board, reference this Facility, and provide a name, address, and phone number.

G. Additional Information

Requests for additional information or questions regarding this order should be directed to Ms. Kathy Harder at (916) 464-4778 or kharder@waterboards.ca.gov.

ATTACHMENT G – SUMMARY OF REASONABLE POTENTIAL ANALYSIS

Constituent	Applicable Water Quality Objective/Criteria {Basis} (C)	Maximum Effluent Concentration (MEC)	Receiving Water Concentration (Sacramento River @ Freeport) (B)	Reason for Reasonable Potential
Copper	~~7.7~~8.0/~~3.0~~[1] {CTR Aquatic Life}	~~6.34~~10	~~20.4~~5.8	MEC~~B~~ > C
Mercury[2]	0.05 {CTR Human Health}	0.01	0.0892	B > C
Cyanide	5.2 {CTR Aquatic Life}	10	5	MEC > C
Carbon Tetrachloride	0.25 {CTR Human Health}	0.5	<0.1	MEC > C
Chlorodibromomethane	0.41 {CTR Human Health}	0.7	<0.18	MEC > C
Dichlorobromomethane	0.56 {CTR Human Health}	2.5	<0.14	MEC > C
Methylene Chloride	4.7 {CTR Human Health}	5.4	<0.35	MEC > C
Tetrachloroethylene	0.8 {CTR Human Health}	0.9	0.21	MEC > C
Pentachlorophenol	0.28 {CTR Human Health}	5.7	0.026	MEC > C
Bis(2-Ethylhexyl) Phthalate	1.8 {CTR Human Health}	8.1	0.57	MEC > C
Dibenzo(ah) anthracene	0.0044 {CTR Human Health}	0.51	0.0026	MEC > C
Aluminum	200 {Secondary MCL}	~~44.4~~38	~~8800~~900	B > C
Ammonia (mg/L)	1.23[3] {USEPA NAWQC}	45	1.3	B > C & MEC > C
Manganese	50 {Basin Plan}	270	130	B > C & MEC > C
MTBE	5 {Secondary MCL}	5.8	1.9	MEC > C
Chlorpyrifos	0.025 (Basin Plan)	0.039	0.0058	MEC>C

[1] Effluent copper criterion~~a~~ is ~~7.7~~8.0 µg/L based on a ~~minimum effluent~~receiving water hardness of ~~80~~ 84 mg/L (as $CaCO_3$)~~ and background copper criteria is 3.0 µg/L based on a minimum upstream receiving water hardness of 26 mg/L (as $CaCO_3$)~~. Default EPA translators were used.

[2] Receiving Water concentration from Coordinated Monitoring Program (CMP) @ Freeport Summary 1992-2008

[3] Water quality criteria (chronic criterion) calculated using the maximum upstream receiving water pH of 8.8 and corresponding temperature of 15.1C^0 that occurred on 10/21/1998

General Notes:

- Effluent data from June 2005-July 2008 from discharger self-monitoring reports (SMRs); Receiving water data from 1992-2008 from SMRs & CMP; manganese data updated to April 2011; aluminum and copper data from January 2012 to December 2014.~~.~~
- All units in µg/L unless specified
- All metals criteria is expressed as total recoverable
- MCL = Maximum Contaminant Level
- NAWQC = National Ambient Water Quality Criteria
- CTR = California Toxics Rule

ATTACHMENT H – CALCULATION OF WQBELS

SACRAMENTO REGIONAL COUNTY SANITATION DISTRICT	Copper (acute and chronic dilution)	Copper (chronic dilution only)	Copper (no dilution)	Cyanide (acute and chronic dilution)	Cyanide (chronic dilution only)	Cyanide (no dilution)	Chlorpyrifos (acute and chronic dilution)	Chlorpyrifos (chronic dilution only)	Chlorpyrifos (no dilution)	Aluminum	Carbon Tetrachloride (w/dilution)	Carbon Tetrachloride (no dilution)	DBCM (w/dilution)	DBCM (no dilution)	DCBM (w/dilution)	DCBM (no dilution)	Bis(2-ethylhexyl) phthalate (w/dilution)	Bis(2-ethylhexyl) phthalate (no dilution)	Methylene Chloride (w/dilution)	Methylene Chloride (no dilution)	Tetrachloroethylene (w/dilution)	Tetrachloroethylene (no dilution)	Pentachlorophenol (w/dilution)	Pentachlorophenol (no dilution)	Dibenzo(a,h)anthracene (w/dilution)	Dibenzo(a,h)anthracene (no dilution)	1,2-Diphenylhydrazine (w/dilution)	1,2-Diphenylhydrazine (no dilution)	Manganese (w/dilution)	Manganese (no dilution)	MTBE (w/dilution)	MTBE (no dilution)
Units	ug/L			ug/L			ug/L			ug/L	ug/L		ug/L		ug/L		ug/L		ug/L		ug/L		ug/L		ug/L		ug/L		ug/L		ug/L	
Applicable Criteria																																
Basis and Criteria type	CTR			CTR			Basin Plan			MCL	(carcinogen)		(carcinogen)		(carcinogen)		(carcinogen)		(carcinogen)		(carcinogen)		(carcinogen)		(carcinogen)		(carcinogen)		MCL		MCL	
Acute Aquatic Life Criterion	variable	11	11	22			0.025			750	n/a		n/a		n/a		n/a		n/a		n/a		n/a		n/a		n/a		n/a		n/a	
Chronic Aquatic Life Criterion	variable	variable	7.7	5.2			0.015			750	n/a		n/a		n/a		n/a		n/a		n/a		n/a		n/a		n/a		n/a		n/a	
Human Health Criterion	n/a	n/a	n/a	n/a			n/a			200	0.25		0.41		0.56		1.8		4.7		0.8		0.28		0.0044		0.04		50		5	
Effluent Concentration Allowance (ECA)																																
Ambient Background Concentration	5.1			2.5			0.006			970	0.1		0.2		0.14		0.16		0.35		0.15		0.07		0.001		1		3.8		0.52	
Dilution Credit (acute)	Model	0	0	Model	0	0	Model	0	0	Model	n/a		n/a		n/a		n/a		n/a		n/a		n/a		n/a		n/a		n/a		n/a	
Dilution Credit (chronic)	Model	Model	0	Model	Model	0	Model	Model	0	Model	n/a		n/a		n/a		n/a		n/a		n/a		n/a		n/a		n/a		n/a		n/a	
Dilution Credit (human health)	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	56	56	0	56	0	56	0	56	0	56	0	56	0	56	0	56	0	56	0	56	0	56	0
ECA acute	variable	11	11	variable	22	22	0.025	0.025	0.025	750	n/a		n/a		n/a		n/a		n/a		n/a		n/a		n/a		n/a		n/a		n/a	
ECA chronic	variable	variable	7.7	variable	variable	5.2	0.015	0.015	0.015	750	n/a		n/a		n/a		n/a		n/a		n/a		n/a		n/a		n/a		n/a		n/a	
ECA Human Health	n/a			n/a			n/a			200	8.7	0.25	12.2	0.41	24.1	0.6	93.6	1.8	248	5	37.2	0.8	12.0	0.3	0.2	0.0	0.04	0.04	2637	50	256	5
Effluent Statistics (6/1/2005 - 7/31/2008)																																
Number of Samples	86			148						67	73		73		73		87		73		73		87		116		85		34		101	
Mean	4.30			4.60			0.01			18.00	0.12		0.14		0.92		2.60		0.98		0.18		0.51		0.32		0.46		64.00		0.12	
Standard Deviation	0.73			2.5			0.009			5.3	0.06		0.09		0.51		1.4		0.78		0.12		0.56		0.24		0.33		5.7		0.57	
Coefficient of Variation	0.17			0.54			0.60			0.29	0.60		0.64		0.55		0.54		0.80		0.60		0.60		0.60		0.60		0.09		0.60	
WQBELs Calculations																																
σ^2	0.028			0.259			0.307			0.083	0.307		0.346		0.268		0.255		0.491		0.307		0.307		0.307		0.307		0.008		0.307	
σ_4^2	0.007			0.071			0.086			0.021	0.086		0.098		0.074		0.070		0.147		0.086		0.086		0.086		0.086		0.002		0.086	
σ^{30}	n/a			n/a			n/a			n/a	n/a		n/a		n/a		n/a		n/a		n/a		n/a		n/a		n/a		n/a		n/a	
ECA Multiplier acute	0.685			0.349			0.321			0.533	n/a		n/a		n/a		n/a		n/a		n/a		n/a		n/a		n/a		n/a		n/a	
ECA Multiplier chronic	0.824			0.557			0.527			0.719	n/a		n/a		n/a		n/a		n/a		n/a		n/a		n/a		n/a		n/a		n/a	
LTA acute	6.70	7.54	7.54	21.30	7.67	7.67	0.019	0.008	0.008	399.8	n/a		n/a		n/a		n/a		n/a		n/a		n/a		n/a		n/a		n/a		n/a	
LTA chronic	66.00	66.00	6.35	13.90	13.90	2.90	0.114	0.114	0.008	539.3	n/a		n/a		n/a		n/a		n/a		n/a		n/a		n/a		n/a		n/a		n/a	
minimum of LTAs	6.70	7.54	6.35	13.90	7.67	2.90	0.019	0.008	0.008	399.8	n/a		n/a		n/a		n/a		n/a		n/a		n/a		n/a		n/a		n/a		n/a	
MDEL mult99	1.459			2.869			3.114			1.876	3.114		3.304		2.916		2.847		3.991		3.114		3.114		3.114		3.114		n/a		n/a	
AMEL mult95	1.145			1.497			1.552			1.259	1.552		1.595		1.508		1.492		1.746		1.552		1.552		1.552		1.552		n/a		n/a	
MDEL/AMEL Multiplier	n/a			n/a			n/a			n/a	2.01		2.07		1.93		1.91		2.29		2.01		2.01		2.01		2.01		n/a		n/a	
WQBELs																																
Average Monthly Effluent Limitation	7.7	8.6	7.3	21	11	4.3	0.029	0.012	0.012	503	9	0.25	12	0.41	24	0.56	94	1.80	248	4.7	37	0.80	12	0.28	0.19	0.004	0.04		n/a		n/a	
Maximum Daily Effluent Limitation	9.8	11.0	9.3	40	22	8.3	0.059	0.025	0.025	750	17	0.50	25	0.85	47	1.08	179	3.43	568	10.7	75	1.6	24	0.56	0.39	0.009	0.08		n/a		n/a	
Annual Average Effluent Limitation	n/a			n/a			n/a			200	n/a		n/a		n/a		n/a		n/a		n/a		n/a		n/a		n/a		2637	50	256	5
Facility Performance	6.8			11			0.120			35	5.30		2.20		3.4		13.0		5.4		4.4		18.0		1.6		8.7		270.0		18.0	

General Notes: Unless noted otherwise, all concentrations given as total recoverable
1)Cu criteria are total concentrations
2) ECA calculated per Section 1.4.B, Step 2 of SIP. This allows for consideration of dilution
3) Acute and Chronic ECA Multiplier calculate at 99th percentile per Section 1.4.B Step 3 of SIP or per Sections 5.4.1 and 5.5.4 of the TSD
4) Calculation of AMEL and MDEL multipliers assumes sampling frequency n=>4
5) The probability basis for AMEL is 95th percentile per Section 1.4.B, Step 5 of SIP
6) The probability basis for MDEL is 99th percentile per Section 1.4.B, Step 5 of SIP
7) Harmonic Mean Dilution = 56 (used for carcinogins)
8) 30Q5 Dilution = 29 (used for nitrate and perchlorate)
9) Acute and Chronic LTAs developed by the dynamic model for copper, ammonia and cyanide
10) LTA chronic for ammonia is modified to meet NAWQC for Ammonia 1999 Update recommendations
11) Facility performance determined as described in Section IV.D.6. of the Fact Sheet.
12) Acute ammonia criteria based on maximum permitted pH of 7.5
13) Chronic ammonia criterion based on 30-day rolling average pH and temperature measured at R-1 from June 2005 to July 2008
14) CV set equal to 0.6 in accordance with Section 1.4.B, Step 3 of SIP as applicable

Ammonia WQBEL Calculation (Apr-Oct)

Description	**Ammonia**	
Effluent Concentrations		
Sample Dates – Begin	Jun-1-2005	
Sample Dates – End	Jul-31-2008	
At least 80% of Data ND?	No	
Sample Count	334	
MEC (mg/l)	45.0	
Mean (mg/l)	24.0	
Std. Deviation (mg/l)	3.70	
Coefficient of Variation (CV) (mg/l)	0.1542	
Background Concentrations		
Max Background (mg/l)	1.3	
Are Salmonids Present?	Yes	
Are Early Life Stages Present?	Yes	
Criteria	Acute	Chronic
Hardness (mg/l as $CaCO_3$)	N/A	N/A
BP Objective (mg/l)^(USEPA Ambient)	5.62	1.45
Translator	N/A	N/A
Design pH	8.0	8.0
Temperature, max 30day Avg (◦C)	22.5	22.5
Criteria (total recoverable)	5.62	1.455
Effluent Limit Calculations		
Dilution Credit	0	0
ECA (mg/l)	5.62	1.455
σ^2	0.02	0.023
σ_{30}^2	0.0008	0.0008
ECA Multiplier	0.708	N/A
Long-Term Average	3.98	1.455
AMEL Multiplier	N/A	1.047
AMEL	N/A	1.5
MDEL Multiplier	N/A	1.41
MDEL	N/A	2.0

Ammonia WQBEL Calculation (Nov-Mar)

Description	**Ammonia**	
Effluent Concentrations		
Sample Dates – Begin	Jun-1-2005	
Sample Dates – End	Jul-31-2008	
At least 80% of Data ND?	No	
Sample Count	334	
MEC (mg/l)	45.0	
Mean (mg/l)	24.0	
Std. Deviation (mg/l)	3.70	
Coefficient of Variation (CV) (mg/l)	0.1542	
Background Concentrations		
Max Background (mg/l)	1.3	
Are Salmonids Present?	Yes	
Are Early Life Stages Present?	Yes	
Criteria	Acute	Chronic
Hardness (mg/l as $CaCO_3$)	N/A	N/A
BP Objective (mg/l)^(USEPA Ambient)	5.62	1.45
Translator	N/A	N/A
Design pH	8.0	8.0
Temperature, max 30day Avg (◦C)	14.4	14.4
Criteria (total recoverable)	5.62	2.43
Effluent Limit Calculations		
Dilution Credit	0	0
ECA (mg/l)	5.62	2.43
σ^2	0.02	0.023
σ_{30}^2	0.0008	0.0008
ECA Multiplier	0.708	N/A
Long-Term Average	3.98	2.43
AMEL Multiplier	N/A	1.047
AMEL	N/A	2.4
MDEL Multiplier	N/A	1.41
MDEL	N/A	3.3

ATTACHMENT I – DIOXIN AND FURAN SAMPLING

The CTR includes criteria for 2,3,7,8-tetrachlorodibenzo-pdioxin (2,3,7,8-TCDD). In addition to this compound, there are many congeners of chlorinated dibenzodioxins (2,3,7,8-CDDs) and chlorinated dibenzofurans (2,3,7,8-CDFs) that exhibit toxic effects similar to those of 2,3,7,8-TCDD. The USEPA has published toxic equivalency factors (TEFs) for 17 of the congeners. The TEFs express the relative toxicities of the congeners compared to 2,3,7,8-TCDD (whose TEF equals 1.0). In June 1997, participants in a World Health Organization (WHO) expert meeting revised TEF values for 1,2,3,7,8-PentaCDD, OctaCDD, and OctaCDF. The current TEFs for the 17 congeners, which include the three revised values, are shown below:

Toxic Equivalency Factors (TEFs) for 2,3,7,8-TCDD Equivalents

Congener	TEF
2,3,7,8-TetraCDD	1
1,2,3,7,8-PentaCDD	1.0
1,2,3,4,7,8-HexaCDD	0.1
1,2,3,6,7,8-HexaCDD	0.1
1,2,3,7,8,9-HexaCDD	0.1
1,2,3,4,6,7,8-HeptaCDD	0.01
OctaCDD	0.0001
2,3,7,8-TetraCDF	0.1
1,2,3,7,8-PentaCDF	0.05
2,3,4,7,8-PentaCDF	0.5
1,2,3,4,7,8-HexaCDF	0.1
1,2,3,6,7,8-HexaCDF	0.1
1,2,3,7,8,9-HexaCDF	0.1
2,3,4,6,7,8-HexaCDF	0.1
1,2,3,4,6,7,8-HeptaCDF	0.01
1,2,3,4,7,8,9-HeptaCDF	0.01
OctaCDF	0.0001

Pursuant to Section 13267 of the California Water Code, the Discharger shall conduct effluent and receiving water monitoring, at EFF-001 and RSWU-001, respectively, for the 2,3,7,8-TCDD congeners listed above to assess the presence and amounts of the congeners being discharged and present in the receiving water. For the 2013 calendar year and every other calendar year thereafter, the effluent and upstream receiving water shall be monitored for the presence of the 17 congeners once during dry weather and once during wet weather. The semi-annual monitoring results shall be submitted by **1 February** of the year following the calendar year of monitoring, and shall be submitted with the effluent and receiving water monitoring report containing the monitoring results as required by section IV.B. and section VIII.A.2. of the MRP.
The Discharger shall report, for each congener, the analytical results of the effluent and receiving water monitoring, including the quantifiable limit and the method detection limit, and the measured or estimated concentration.

In addition, the Discharger shall multiply each measured or estimated congener concentration by its respective TEF value and report the sum of these values.

ATTACHMENT J – AMMONIA-RELATED ISSUES

Ammonia-Related Issues

The Discharger's undiluted effluent contains ammonia and other chemicals in toxic concentrations. The SRWTP discharges approximately 14 tons of ammonia daily to the Sacramento River at Freeport. The ammonia toxicity is demonstrated by the numerous acute toxicity violations[1], and ammonia studies by Dr. Werner[2] and by Dr.Teh[3]. Recent Pelagic Organism Decline (POD) has been documented in Sommer, T., C. Armor, R. Baxter, L. Brown, M. Chotkowski, S. Culberson, F. Feyrer, M. Gingras, B. Herbold, W. Kimmerer, A. Mueller-Solger, M. Nobriga, and K. Souza. 2007. The collapse of pelagic fishes in the upper San Franisco Estuary. Fisheries 32(6):270-277.

POD related hypotheses include that ammonia from the SRWTP maybe; (1) inhibiting diatom primary production in the Sacramento River downstream of the discharge point, in Suisun Bay and in the Delta, (2) causing acute and/or chronic toxicity to delta smelt and *Pseudodiaptomus forbesi*, an important food organism for larval and juvenile fish, and (3) causing a shift in the algal community from nutritious species of diatoms to less desirable forms like *Microcystis (blue green algae)*.

Ammonia Toxicity Criteria – Ammonia is toxic to aquatic life with the toxicity varying with the species and with the pH and temperature of the water. Numeric water quality criteria to address both acute and chronic toxicity have been developed by USEPA in its "1999 Update of Ambient Water Quality Criteria for Ammonia" (September 1999). In the USEPA ammonia criteria, acute ammonia toxicity is represented by the effect on salmonids with acute ammonia toxicity increasing with increasing pH. Acute toxicity is represented by the death of the salmonid indicator species. Chronic ammonia toxicity is represented by the effects on fish early life stages, with chronic ammonia toxicity increasing with increasing pH and temperature. Chronic toxicity is represented by the end points: growth, reproduction and survival of the indicator fish early life stages. The discharge, when the approved mixing zones are considered, is in compliance with current USEPA acute and chronic ammonia criteria.

Acute Ammonia Toxicity -Recent studies show Delta smelt are as acutely sensitive to ammonia as salmonids[4] are. Thus the USEPA acute ammonia criteria are protective of the

[1] 1 July 2009 and 12 January 2010 Notices of Violations to Ms. Mary Snyder from Mr. Victor R. Vasquez, Senior Engineer for the NPDES Compliance and Enforcement Unit, Central Valley Regional Water Quality Control Board

[2] Werner, I, "Effects of Ammonia/um and Other Wastewater Effluent Associated Contaminants on Delta Smelt", presented at the 18-19 August 2009 Ammonia Summit at the Central Valley Regional Water Quality Control Board.

[3] Teh, S.J., "Acute Toxicity of Ammonia, Copper, and Pesticides to Key Copepods, *Pseudodiaptomus forbesi* and *Eurytemora affinis*, of the San Francisco Estuary", presented at the 18-19 August 2009 Ammonia Summit at the Central Valley Regional Water Quality Control Board.

[4] Werner, I, L Deanovic, M. Stillway, D. Markiewicz 2008. The effects of wastewater treatment effluent associated contaminants on delta smelt. Final Report to the State Water Resources Control Board, p 60 and Werner, I, L

Delta smelt. However, recent studies on ammonia and the POD of the Delta indicate USEPA's criteria may not be adequately protective of some other sensitive resident Delta species. [1,2] Dr. Swee Teh from the U.C. Davis School of Veterinary Medicine reported at the Ammonia Summit on the results of acute toxicity testing with two copepods, *Eurytemora affinis* and *Pseudodiaptomus forbesi.* Both invertebrate species are important forage organisms for larval fish, including Delta Smelt, in the Delta. Ten percent mortality occurred to both invertebrate species at ambient ammonia concentrations present in the river below the SRWTP.

Chronic Ammonia Toxicity – Research shows varied results for chronic toxicity from the Discharger's ammonia. There is currently no method for assessing chronic toxicity to delta smelt. Where no method exists, acute to chronic ratios (ACRs) for other freshwater fish species are often used to predict potential chronic toxicological endpoints. ACRs are calculated by dividing the 96-hour LC_{50} by the lowest chronic NOEC value. The USEPA (1999) has reported ACR ammonia ratios for six species that ranged between 2 and 21[3]. The lowest reported 96-hour LC_{50} for smelt was >0.116 mg/l un-ionized ammonia (Werner *et al*., 2009). For smelt, dividing 0.116 by 21 results in an estimated chronic NOEC for smelt of 0.0055 mg/l un-ionized ammonia.

During a Central Valley Water Board study, "Draft Nutrient Concentrations and Biological Effects in the Sacramento-San Joaquin Delta"[4], none of the upper 95 percent confidence limits of un-ionized ammonia in the Delta exceeded 0.0055 mg/l suggesting that chronic smelt toxicity is unlikely to have occurred. This conclusion is different from that of Werner *et al*. (2008, 2009). Werner *et al*. concluded that chronic smelt toxicity was possible because of the higher pH values measured in summer in their study. According to Werner, repeated excursions above a pH value of 8.0 would indicate the potential for chronic smelt toxicity.

Dr. Swee Teh also used an ACR analysis and concluded that ambient ammonia concentrations downstream of the SRWTP discharge point might be causing chronic toxicity to both *Eurytemora affinis* and *Pseudodiaptomus forbesi* species. Dr. Teh recommended follow up chronic toxicity studies with invertebrate species. Thirty-day full-life cycle tests were conducted with *P. forbesi* to evaluate the possibility of chronic instream ammonia toxicity. Preliminary testing has now been completed and Dr. Teh reported at 6 July 2010 IEP Contaminant Work Team meeting that *P. forbesi* reproduction and survival was negatively effected by ammonia concentrations as low as 0.36 mg N/L. Ammonia concentrations of this magnitude were measured by the Central Valley Water Board staff in 2009 and 2010 between

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Deanovic, M. Stillway, D. Markiewicz 2009. Acute toxicity of ammonia/um and wastewater treatment effluent-associated contaminants on delta smelt—2009. Final Report to the State Water Resources Control Board, p 63.

[1] Johnson, M. L. "Species Sensitivity Distributions and Exposure Concentrations; Placing Recent Results in Context", presented at the 18-19 August 2009 Ammonia Summit at the Central Valley Regional Water Quality Control Board.

[2] Teh, S.J., "Acute Toxicity of Ammonia, Copper, and Pesticides to Key Copepods, *Pseudodiaptomus forbesi* and *Eurytemora affinis*, of the San Francisco Estuary", presented at the 18-19 August 2009 Ammonia Summit at the Central Valley Regional Water Quality Control Board.

[3] The ACR of 21 was from a full life cycle test with fathead minnows (Thurston *et al.*, 1986). The chronic NOEC endpoint was the highest ammonia concentrations not causing any detrimental histopathological effect.

[4] Foe, Chris, "Nutrient Concentrations and Biological Effects in the Sacramento-San Joaquin Delta", May 2010.

the SRWTP and for about 30 miles downstream of the SRWTP[3]. Dr. Teh completed additional experiments and confirmed the *P. forbesi* findings. Dr. Teh concluded *P. forbesi* is more sensitive to total ammonia nitrogen at lower pH and the ionized fraction is more toxic than unionized fraction of ammonia to *P. forbesi.* The Low Observed Effect Concentration (LOEC) of 0.36 mg/L from chronic 31-day study indicated total ammonia at environmentally relevant concentrations of 0.3 to 0.6 mg/L as seen in the Cache Slough regions may pose significant effect on the survival and population of *P. forbesi*. Reproduction performance, i.e., time for female to be gravid and surviving of newborn to the juvenile stages, of P. forbesi is affected by ammonia at concentration ≥ 0.36 mg/L[1].

Proposed 2009 USEPA Ammonia Criteria – USEPA is in the process of updating its ammonia criteria. USEPA released the "Draft 2009 Update Aquatic Life Ambient Water Quality Criteria for Ammonia – Freshwater" in December 2009. These criteria would update the 1999 Ammonia criteria currently used by the Central Valley Water Board to develop ammonia effluent limitations to implement the Basin Plan's narrative toxicity objective. The major change to the criteria is the addition of more stringent ammonia chronic criteria specific to freshwater mussels. The criteria are revised to protect freshwater Unionid mussels. Unionid mussels are more sensitive than larval fish to ammonia. The proposed chronic ammonia critera with freshwater mussels present is about five to ten times lower than the 1999 chronic criteria for juvenile fish. Table K-1 below compares the most stringent 1999 criteria (fish early life stages present) to the proposed 2009 chronic ammonia criteria for freshwater mussels.

TABLE K-1 TEMPERATURE AND PH-DEPENDENT VALUES - AMMONIA CHRONIC CRITERION: USEPA AMMONIA CRITERIA 1999 FISH EARLY LIFE STAGES PRESENT TO PROPOSED 2009

Species	pH @ 7.5	Temperature, °C					
		14	16	18	20	22	24
Fish early life stages present	**1999**	**4.36**	**3.97**	**3.49**	**3.06**	**2.69**	**2.37**
Freshwater mussels	**2009**	**0.933**	**0.82**	**0.721**	**0.634**	**0.577**	**0.49**

The freshwater Unionid mussel *Anadonata* sp. is present in the Sacramento watershed above the City of Sacramento and in the Delta (personal communication, Jeanette Howard)[2]. It is not known whether the mussel is in the lower Sacramento River near the SRWTP. However, *Anadonata* disperses during a larval stage in which it attaches to passing fish. *Anadonata* is present above the SRWTP, therefore, it is likely that *Anadonata* is present in the lower River. If so, then the new draft ammonia criteria for protection of mussels would apply.

A site-specific chronic mussel criterion was calculated for each field sample collected by Central Valley Water Board staff. The USEPA (2009) formula was used to calculate each criterion and then was compared to ambient ammonia levels in the Delta collected during the year long CVRWQB nutrient study. Ambient concentrations never exceeded the criteria. A safety factor was calculated by dividing ambient ammonia concentrations by the estimated site

[1] November 10, 2010 letter from Dr. Swee Teh, Universisity of California, Davis to Dr. Chris Foe, CVRWQCB.
[2] Personal Communications with Dr. Jeanette Howard, March 10, 2010 with Chris Foe, CVWQCB and 17 & 18 March with Kathy Harder, CVWQCB.

specific chronic mussel criteria. The margin of safety for the Sacramento River above the SRWTP (Tower Bridge and at Garcia Bend) was the highest observed in the system. The safety factor decreased to the lowest level at Hood. Many of the calculated monthly safety factor values for Hood were between one and two indicating a very small margin of safety. Values increased downstream of Hood. About 20 miles downstream of Hood, the average safety factor for Rio Vista was about six[1].

The Central Valley Water Board results from the nutrient study are consistent with the conclusions of Dr. Diana Engle of Larry Walker Associates who compared ambient ammonia concentrations collected in the Sacramento River and Delta by the Interagency Ecological Program between 1974 and 2000[2]. Dr. Engle's evaluation had only one exceedance of the chronic 1999 criteria was reported in nearly 12,000 measurements. However the Central Valley Water Board evaluation did not include the ammonia, temperature and pH data for R-3, at Cliff's Marina about 4200 feet downstream of the SWRTP discharge point and outside of the Discharger's requested mixing zone. Analysis of the R-3 data concluded USEPA 1999 acute criteria was never exceeded. The State Water Contractors compared ambient ammonia levels immediately outside the SRWTP mixing zone with the draft 2009 USEPA ammonia criteria. The 2009 criteria were exceeded 21 percent of the time between 2007 and 2008 and 41 percent of the time in 2009[3].

<u>Additive and Synergistic Toxicity</u> – In 2008, Dr. Teh conducted tests on Sacramento River water at Hood, about 8 miles downstream of the SRWTP discharge point. His results showed 95% mortality to *Eurytemora affinis*, a Delta copepod and food for Delta smelt. Further studies[4] completed by Dr. Teh, indicate the Delta copepods, *Pseudodiaptomus forbesi* and *E. affinis* are very sensitive to combined concentrations of ammonia and copper.

Additionally, a study conducted by Dr. Inge Werner[5] evaluated parallel toxicity tests using Sacramento River water seeded with ammonium chloride and another seeded with SRWTP effluent to match the same ammonia concentrations. Dr. Werner's study showed that the test performed with SRWTP effluent was statistically 30-40% more toxic than the test performed with river water seeded with ammonium chloride. This may be an indication that there are additional toxicants present in the SRWTP effluent that are resulting in chronic toxicity to aquatic species.

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[1] Foe, Chris, "Nutrient Concentrations and Biological Effects in the Sacramento-San Joaquin Delta", May 2010.

[2] Engle, D.L., & G. Lau (2010) Does Ammonia Exceed Toxicity Thresholds in the Upper San Francisco Estuary? A comparison of Ambient Data and Toxicity Thresholds for 1974-2010. Interagency Ecological Program (IEP) Annual Workshop, Sacramento, CA.

[3] State Water Contractors, Comments on Aquatic Life and Wildlife Preservation Issues Concerning the Sacramento Regional Wastewater Treatment Plant NPDES Permit Renewal, 1 June 2010.

[4] Teh, S.J., "Acute Toxicity of Ammonia, Copper, and Pesticides to Key Copepods, *Pseudodiaptomus forbesi* and *Eurytemora affinis*, of the San Francisco Estuary", presented at the 18-19 August 2009 Ammonia Summit at the Central Valley Regional Water Quality Control Board.

[5] Werner, I, "Effects of Ammonia/um and Other Wastewater Effluent Associated Contaminants on Delta Smelt", presented at the 18-19 August 2009 Ammonia Summit at the Central Valley Regional Water Quality Control Board.

Inhibition of Diatom Primary Production. – In the Delta, low primary production rates and standing chlorophyll levels may be one factor contributing to the POD including the decline in diatom populations[1]. The causes of low primary production are not understood. Some areas with low primary production are not influenced by the discharger. Dr. Richard Dugdale from the San Francisco State University Romberg Tiburon Center presented evidence that an ammonia concentration greater than 0.056 mg N/l inhibited nitrate uptake by diatoms in Suisun Bay[2]. Ammonia-induced inhibition of nitrate uptake prevents spring algal blooms from developing when conditions are otherwise favorable[3]. High diatom filtration rates by the introduced clam *Corbula* and high turbidity levels are additional factors responsible for reducing diatom production and standing biomass in Suisun Bay. A combination of the above three factors (ammonia inhibition of nitrate uptake, depletion due to filtration by clams, and high turbidity levels due to standing chlorophyll) may contribute to the low diatom abundance now present in the Bay.

The San Francisco Regional Water Quality Control Board is responsible for conducting regulatory activities of water quality in Suisun Bay (part of the Delta system). The Executive Officer from the San Francisco Water Board has informed staff from the Central Valley Water Board that ammonia levels in Suisun Bay may be impairing the aquatic life beneficial uses in Suisun Bay by having a detrimental effect on primary production and phytoplankton species composition[4]. Staff from the San Francisco Regional Board monitored ammonia concentrations and algal species composition in Suisun Bay in the spring of 2010 to determine ammonia concentrations and the response of the diatom community. A written report is expected soon.

Nutrient monitoring by Central Valley Water Board staff have confirmed that the Central Valley watershed is an ammonia source to Suisun Bay[8]. Annual average ammonia concentrations increased 11.5-fold in the Sacramento River downstream of the SRWTP. More than three quarters of this ammonia (NH_3) is nitrified to nitrite (NO_2) and nitrate (NO_3) before the water reaches Chipps Island 40 miles downstream of SRWTP. The channel off Chipps Island is considered here to be the entrance to Suisun Bay. Total dissolved nitrogen (TDN) concentrations (NH_3+NO_2+NO_3) were constant between the SRWTP and Chipps Island. A stable concentration of TDN implies that there are no additional large sources or sinks of nitrogen in the Sacramento River channel between the SRWTP and Suisun Bay. The annual average ammonia concentration at Chipps Island was 0.1 mg N/l in 2009 and 2010[3]. The Dr. Richard Dugdale laboratory reports that ammonia begins to suppress nitrate assimilation in Suisun Bay at about 0.014 mg N/l with a complete shutdown at 0.056 mg-N/l[10].

Recent studies by the Dugdale laboratory at the Romberg Tiburon Center demonstrate that ammonia concentrations are suppressing nitrogen uptake and algal primary production in both

[1] Sommer, T., C. Armor, R. Baxter, L. Brown, M. Chotkowski, S. Culberson, F. Feyrer, M. Gingras, B. Herbold, W. Kimmerer, A. Mueller-Solger, M. Nobriga, and K. Souza. 2007. The collapse of pelagic fishes in the upper San Franisco Estuary. Fisheries 32(6):270-277.

[2] Dugdale, R. f. Wilkerson, V. Hogue, and A. Marchi. 2007. The role of ammonium and nitrate in spring bloom development in San Francisco Bay. Estuarine, Coastal and Shelf Science, 73:17-29

[3] Wilkerson, F. R. Dugdale, V. Hogue, and A. Marchi, 2006. Phytoplankton blooms and nitrogen productivity in San Francisco Bay. Estuaries and Coasts 29(3):401-416.

[4] June 4, 2010 letter from Mr. Bruce Wolfe, Region 2 to Ms. Kathy Harder, CVWQCB.

Suisun Bay and the Delta[1]. The San Francisco Regional Water Quality Control Board is responsible for regulating water quality in Suisun Bay. The Executive Officer from the San Francisco Water Board has informed staff from the Central Valley Water Board that ammonia levels in Suisun Bay may be impairing aquatic life beneficial uses by having a detrimental effect on primary production and algal species composition and request that the Central Valley Regional Board take all reasonable and feasible measures to reduce ammonia loads as soon as possible[2]. Evidence for ammonia impairment of algal primary production in the Delta was reported for the first time at the 6th Biennial Bay-Delta Science Conference by Dr Parker[3]. Dr Parker stated that "*a U-shaped pattern of primary production and chlorophyll was observed …with a maximum in the river above the SRWTP and again to the west in San Pablo Bay, essentially a mirror image of the distribution of ammonia concentrations*". These results are consistent with the earlier observations for Suisun Bay that ammonia concentrations suppress algal primary production and standing chlorophyll levels and extend the findings to the freshwater Delta. Dr. Dugdale's laboratory report that ammonia begins to suppress nitrate assimilation and primary production rates at 0.014 mg-N/l with complete shutdown by 0.056 mg-N/l[4]. Regional Board staff monitored ammonia concentrations monthly at Chipps Island, about 2 miles upstream of Suisun Bay, and at multiple locations in the Delta for a year between March 2009 and February 2010[2]. Ambient ammonia concentrations in 2009 and 2010 would need to be reduced by a factor of 2 to 7 at Chipps Island and by a factor of 1 to 21 in the main channel of the Sacramento River between Rio Vista and Chipps Island to eliminate the suppression of nitrogen uptake and primary production (See Table J-2). For comparison, the proposed ammonia permit limits would reduce the maximum daily concentration 20-fold (45[4] to 2.2 mg N/L) and the average monthly value 13-fold (24[5] to 1.8 mg N/L). These values are comparable to the decreases needed for the Delta and for Suisun Bay to eliminate the ammonia impairment of nitrogen uptake and primary production by the phytoplankton community.

Ammonia concentrations are higher in the Sacramento River downstream of the SRWTP than in Suisun Bay. Two studies have been undertaken to determine the effect of ammonia on phytoplankton primary production in the Sacramento River and Delta. Both studies have found that ambient ammonia concentrations reduce nitrate uptake[6]. An additional complicating factor is that chlorophyll *a* concentrations decrease as the Sacramento River flows toward the Delta. The decrease in chlorophyll appears to commence above the SRWTP. The average annual

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[1] Wilkerson, F. R. Dugdale, V. Hogue, and A. Marchi, 2006. Phytoplankton blooms and nitrogen productivity in San Francisco Bay. Estuaries and Coasts 29(3):401-416.
Dugdale, R. f. Wilkerson, V. Hogue, and A. Marchi. 2007. The role of ammonium and nitrate in spring bloom development in San Francisco Bay. Estuarine, Coastal and Shelf Science, 73:17-29
Machi, A. 2010. Spring 2010 Phytoplankton Blooms in Northern San Francisco Estuary: Influences of Climate and Nutrients. Presented at the 6th Biennial Bay-Delta Science Conference held in Sacramento California on 27-29 September 2010.

[2] June 4, 2010 letter from Mr. Bruce Wolfe to Ms. Kathy Harder

[3] A. Parker, R. Dugdale, F. Wilkerson, A. Marchi, 2010. Biogeochemical Processing of Anthropogenic Ammonium in the Sacramento River and the northern San Francisco Estuary: Consequences for Pelagic Organism Decline Species. Presented at the 6th Biennial Bay-Delta Science Conference held in Sacramento California on 27-29 September 2010

[4] 5-year daily maximum value.

[5] 5-year monthly average value

[6] Parker, A., R. Dugdale, and F. Wilkerson. 2010. Biochemical processing of anthropogenic ammonium in river and estuarine water columns.

decline in pigment between Tower Bridge in the City of Sacramento and Isleton is about 60 percent. The cause of the decline is not known, but has been variously attributed to algal settling, toxicity from an unknown chemical in the SRWTP effluent, or from ammonia. The SRWTP discharge cannot be cause of pigment decline upstream of the discharge point, and may not be contributing to the decline downstream of the discharge point.

Table J-2 SUMMARY OF REPORTED AMMONIA EFFECT CONCENTRATIONS AND THE ASSOCIATED AMMONIA EXCEEDANCE FACTORS FOR VARIOUS LOCATIONS IN THE SACRAMENTO-SAN JOAQUIN RIVER DELTA.

Organism	Location	NH_3 Effect (mg N/L)	Ambient NH_3 (mg N/L)[1/]		Exceedance Factor[2/]		Reference
			Max	Mean	Max	Mean	
Pseudodiaptomus forbesi	Sacramento R @ Hood	Reduce Reproduction and Nauplii survival[3/]	0.71	0.46	2X	1.3X	Dr Swee Teh
Diatoms	Sacramento R @ Chipps Is	Reduces nitrate uptake[4/]	0.16	0.10	11X	7X	Dugdale *et al.*, 2007; Wilkerson *et al.*, 2006
		Shutdown nitrate uptake[5/]	0.16	0.10	3X	2X	
Diatoms	Sacramento R between RioVista & Pt Sacramento	Reduces nitrate uptake[4/]	0.01-0.32	0.08-0.19	1-21X	5X-13X	
		Shutdown nitrate uptake[5/]	0.01-0.32	0.08-0.19	1-6X	1-3X	

[1] The maximum and mean ambient ammonia concentration is the highest monthly and annual average value measured at the site between March 2009 and February 2010 by Regional Board staff (Foe *et al*., 2010)
[2] Calculated by dividing the measured ambient ammonia concentration by the reported effect level
[3] 0.36 mg N/l
[4] 0.015 mg N/l
[5] 0.056 mg N/l

Shift in Algal Communities. - Dugdale *et al* hypothesize that larger algal cells (diatoms) are favored and grow faster in the nitrate-dominated river above the SRWTP while smaller phytoplankton species (flagellates and bluegreen algae) are competitively superior and grow faster at the higher ammonia levels present downstream of the SRWTP[1]. A higher growth rate should cause the smaller sized cells to gradually replace any diatom-dominated community downstream of the SRWTP.

In addition, Dr. Patricia Glibert hypothesizes that a change in ambient nitrogen to phosphorus ratios and in the oxidation state of the nitrogen species can also alter algal species composition[2]. According to Dr. Glibert, ambient nitrogen to phosphorus ratios in the Delta now favors blue-green algae and flagellates.

Dr. Peggy Lehman and T. Brown have documented that the algal community in the Delta has changed from a diatom to a flagellate/blue-green algal dominated community consistent with

[1] Ib.
[2] P. Glibert, 2010. Long-term changes in nutrient loading and stoichiometry and their relationships with change in the food web and dominant pelagic fish species in the San Francisco Estuary, California. Review in Fisheries Science (accepted).

the predictions of Dugdale *et al.* and Glibert[1]. Whether this is the result of changes in nutrient concentrations and/or ratio is not known. Diatoms are assumed to be more nutritious to primary consumers like zooplankton than flagellates and bluegreen algae. Changes in algal food availability and its quality or a "bottom up" effect is one factor hypothesized to contribute to the POD[9]. Follow up studies are needed to determine the ecological effect of the change in nutrient concentrations and ratios on the phytoplankton community and whether nutrient control might cause the community to revert back to a diatom-based system.

Dissolved Oxygen - The Basin Plan includes a water quality objective for dissolved oxygen of not less than 7.0 mg/L at any time for portions of the Delta, including the Sacramento River in the vicinity and downstream of the SRWTP discharge. Oxygen demanding substances, including carbon and nitrogen compounds, present in receiving waters are oxidized by microorganisms (bacteria and algae) resulting in the consumption of oxygen from the water column. If sufficient quantities of oxygen demanding substances are present in the water column, the rate of oxygen consumption may be greater than the reaeration of oxygen from the atmosphere and the dissolved oxygen levels drop in the water column. As the oxygen demanding compounds are oxidized and their concentrations are reduced, the rate of oxygen consumption falls and the reaeration acts to increase the dissolved oxygen levels in the water column. Because the typical response of the dissolved oxygen downstream from a discharge containing oxygen-demanding substances is to first decrease and then increase some distance downstream, the dissolved oxygen plot forms a characteristic "sag" curve.

The SRWTP discharges oxygen demanding substances, including biochemical oxygen demand (BOD) and ammonia. Current SRWTP BOD concentrations average 7.5 mg/L and the average effluent ammonia is 24 mg/L (as Nitrogen). The Discharger evaluated and modeled the dissolved oxygen demand from its discharge and reported the results in the "Low Dissolved Oxygen Prevention Assessment", May 2010. The analysis was based on the Streeter-Phelps Oxygen Sag Curve equation and includes oxygen depletion of carbonaceous oxygen demanding compounds and ammonia present in the water column. Additionally, the decay of organic nitrogen into ammonia is included in an expanded Streeter-Phelps model. The low dissolved oxygen prevention assessment (LDOPA)[2] model calculates daily averaged dissolved oxygen in the Sacramento River from the discharge of the SRWTP at Freeport, to the confluence of the Sacramento and San Joaquin Rivers (the Delta). The model uses river flow rate and temperatures input data developed for the Discharger's SRCSD DYNTOX model (SRCSD 2009) providing a 70-year period of record as a basis for the model simulations. The LDOPA model uses 7.0 mg/L, the Basin Plan water quality objective as the target to be achieved and calculates the maximum Ultimate Oxygen Demand (UOD) that can be

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[1] Lehman, P. 1998. Phytoplankton species composition, size structure, and biomass and their possible effect on copepod food availability in the low salinity zone of the San Francisco Bay/Delta and Suisun Bay. IEP technical report No. 62. August 1998.
Lehman, P. 2000A The influence of climate on phytoplankton community biomass in San Francisco Bay Estuary. Limn and Ocean 45(3):580-590
Lehman, P. 2000B. Phtyoplankton biomass, cell diameter, and species composition in the low salinity zone of northern San Francisco Bay Estuary. Estuaries 23 (2):216-230.
Brown, T. 2010. Phytoplankton community composition: the rise of the flagellates. IEP Newsletter.

[2] More detailed information can be found in "Low Dissolved Oxygen Prevention Assessment", Larry Walker Associates, May 2010

discharged. The UOD is made of the combination of the primary oxygen demand substances in the effluent, BOD and ammonia.

The model was run for both 181 mgd (current design flow) and 218 mgd (previously proposed future flow). The model predicts the bottom of the dissolved oxygen curve is between Rio Vista and Emmaton (about 35 miles downstream of the discharge point) and the beneficial use impacts from the Discharger are felt nearly 40 miles downstream. However, data collected for the Central Valley's Nutrient report showed the lowest dissolved reading at Hood (8 miles downstream) and Isleton (25 miles downstream). The Discharger will need to reduce oxygen demanding constituents in order to comply with the Basin Plan water quality objective. The LDOPA model showed a seasonal difference in the dissolved oxygen assessment because temperature and flow velocity are important factors in the rate of decay of oxygen. The Discharger proposes seasonal limits and the use of UOD in terms of pounds per day as the permit limit. The LDOPA model calculated the maximum UOD before the Basin Plan objective of 7.0 mg/L is exceeded. Based on a design flow of 181 mgd with a 99.9885% compliance (that is, compliance for all but one hour per year) the UOD would be as follows:

		Dry Season UOD (lbs/day)		Wet Season UOD (lbs/day)	
Flow (Q_{eff})	Percent Compliance (%)	AMEL	MDEL	AMEL	MDEL
181 mgd	99.9885	169,000	234,000	275,000	438,000

Ultimate Oxygen Demand = $8.34x[1.5(BOD_5)+4.6(Ammonia)]xQ_{eff}$

In addition to the UOD, BOD limits would be technology based limits for secondary treatment and ammonia limits would be based on the DYNTOX modeled mixing zones for acute and chronic toxicity and are as follows:

		Effluent Limitations		
Parameter	Units	Average Monthly	Average Weekly	Maximum Daily
BOD	mg/L	30	45	60
Ammonia[1]	mg/L as N	37	----	47

[1] Based on acute mixing zone of 60 feet & chronic mixing zone of 350 feet as evaluated with DYNTOX dynamic model

The LDOPA model is based on limited ambient dissolved oxygen sampling conducted by the Discharger. The Discharger's 2009 ambient dissolved data at Hood did not show the dissolved oxygen concentrations less than the water quality objective of 7.0 mg/L 8 miles downstream of the discharge, at Hood. However, the Municipal Water Quality Investigations (MWQI) unit from the Department of Water Resources (DWR), the California Data Exchange Center (CDEC) managed by DWR, the Central Valley Water Board, and the City of Rio Vista have all collected dissolved oxygen data that shows at times, the dissolved oxygen concentration below 7.0 mg/L at various locations on the Sacramento River between the discharge point at Freeport and Rio Vista, 40 miles downstream. Because of this discrepancy

in data, the Discharger expanded its monitoring from April to June 2010 for dissolved oxygen under rigorous quality assurance and quality control (QA/QC). Again none of the Discharger's collected dissolved oxygen concentrations dropped below 7.0 mg/L and compared with the continuous dissolved oxygen monitoring data collected by DWR at Hood, the Discharger's data shows an upward bias in the data, that is, the Discharger's data generally reports higher dissolved oxygen concentrations than data from other sources. At Central Valley Water Board staff's request, DWR checked their data collected at Hood from June 2008 through December 2009, for quality assurance and control and found in many instances the dissolved oxygen concentrations at Hood were below 7.0 mg/L.

The treatment processes or source control are required to reduce Dry Season ammonia and will be in place, therefore, Central Valley Water Board staff believes the Wet Season ammonia should be reduced by the same amount as the Dry Season. The Discharger did not offer compelling arguments to not reducing wet season ammonia limits. Therefore, Discharger's request for seasonal UOD requirements is not included in the permit.

Since conflicting data exist for dissolved oxygen concentrations in the Sacramento River, the Central Valley Water Board concluded that to protect beneficial uses it must be assumed that the River at times, is less than the water quality objective of 7.0 mg/L and the Discharger is currently using all the assimilative capacity in the Sacramento River from Freeport to Rio Vista for oxygen demanding constituents. This results in no assimilative capacity for any other cities and communities to discharge oxygen demanding constituents which is needed for them to grow. In contrast to the Discharger, most of the other cities and communities are implementing Best Practicable Treatment or Control (BPTC) for their own facilities. The following communities have either constructed BPTC processes, will construct BPTC processes, or construct infrastructure to regionalize to BPTC facilities and would be affected by the lack of assimilative capacity for oxygen demanding constituents:

City of Roseville	City of Davis
City of Woodland	Community of El Dorado Hills
City of Placerville	City of Manteca
City of Stockton	City of Lodi
City of Galt	Community of Ironhouse
City of Tracy	City of Lincoln
City of Yuba City	Community of Olivehurst/Marysville
City of Live Oak	City of Auburn
City of Colfax	City of Vacaville
Community of North Auburn	Community of Granite Bay

Nitrosodimethylamines (NDMA) - Nitrosamines, mainly N-nitrosodimethylamine (NDMA), N-nitrosomethylethylamine (NMEA) and N-nitrosodiethylamine (NDEA) are highly mutagenic compounds that are suspected of carcinogenic activity to the human body.[1] NDMA is formed as a disinfection by-product from wastewater containing ammonia and/or nitrogen and chlorination. Historically, NDMA was used to make rocket fuel until contamination was found

[1] Abdrzejewski, P. "N-Nitrosomethlyethylammine (NMEA) and N-Nitrosodiethylamine (NDEA), Two New Potential Disinfection Byproducts; Formation During Water Disinfection with Chlorine", Global NEST Journal, Vol. 7, No 1, pp 17-26, 2005.

in air, soil and water. NDMA is produced currently only a research chemical. Laboratory detection levels for NDMA are greater than the water quality criteria and can range from 0.002 µg/L to 30 µg/L. From June 2005 to July 2008, 15 percent of effluent samples detected NDMA at levels greater than the water criterion with the maximum concentration over 100 times the CTR human health protection water quality objective. The detection levels for sampling effluent are often too high to detect low concentrations of NDMA, therefore, this detection percentage may be underestimated. Similarly, the receiving water showed no detectable concentrations for NDMA, but the detection limits are too high to detect low concentrations. The California Department of Water Resources (DWR) is currently studying NDMA in the Sacramento-San Joaquin Delta. Preliminary data shows NDMA has not been detected at Hood, eight miles downstream of the discharge on the Sacramento River. However, DWR did find the NDMA precursors significantly greater (3-4 times) below the discharge compared with above the discharge[1] point.

Formation of NMEA and NDEA is a result of the reaction of methylethylamine (MEA) or diethylamine (DEA) respectively with chlorine in the presence of ammonia ions[2]. New studies indicate that NMEA and NDEA are also disinfection byproducts from treatment of wastewater and thus need to be monitored in the Monitoring and Reporting Program. Because the laboratory analysis EPA Method 521 identifies all three nitrosoamines, no additional costs are incurred with monitoring for NMEA and NDEA.

<u>Best Practical Treatment and Control</u> – In order to reduce or eliminate ammonia and nitrogen from its effluent, nitrification and denitrification treatment processes are required. According to the "Technical Memorandum: Analysis of Costs and Benefits of Advanced Treatment Alternatives for the Sacramento Regional Wastewater Treatment Plant", May 2010, the capital costs to nitrify and denitrify would be approximately $3.0 million/mgd or for the 181 mgd WWTP a cost of $760 million if a 1.4 maximum average month peaking factor is used.

State Water Resources Control Board Resolution No. 68-16 "Statement of Policy with Respect to Maintaining High Quality of Waters in California" requires:

"Any activity which produces or may produce a waste or increased volume or concentration of waste and which discharges of proposes to discharge to existing high quality waters will be required to meet waste discharge requirements which will result in the best practicable treatment or control of the discharge necessary to assure that (a) a pollution or nuisance will not occur and (b) the highest water quality consistent with maximum benefit to the people of the State will be maintained."

Best Practical Treatment and Control (BPTC) is not defined in Resolution No. 68-16. However, in its "Questions and Answers" for Resolution No. 68-16, BPTC is interpreted as

[1] "Investigation into the sources of nitrosamines and their precursors in the Sacramento-San Joaquin Delta, California", Carol L DiGiorgio, California Department of Water Resources, Municipal Water Quality Investigations Unit. Poster presented from 9-11 August 2009.

[2] Abdrzejewski, P. "N-Nitrosomethlyethylammine (NMEA) and N-Nitrosodiethylamine (NDEA), Two New Potential Disinfection Byproducts; Formation During Water Disinfection with Chlorine", Global NEST Journal, Vol. 7, No 1, pp 17-26, 2005.

"best efforts" In State Water Board Order WQ 2000-07, the Board stated the "one factor to be considered in determining best practicable treatment and control would be the water quality achieved by other similarly situated dischargers and the methods used to achieve water quality". The Discharger argues that they are not similar to other dischargers in that the Sacramento River provides adequate dilution to allow their discharge at treatment levels less than the majority of dischargers that discharge to the Delta directly or indirectly (by the tributary rule). However, as described above, the ammonia discharged by the Discharger is impacting beneficial uses of the Sacramento River, Delta and the Suisun Bay. Therefore, BPTC in the form of nitrification and denitrification is required to assure that a pollution or nuisance will not occur and the highest water quality consistent with maximum benefit to the people of the State will be maintained.