

DISINFECTION ALTERNATIVE NO. 1

SACRAMENTO COUNTY SANITATION DISTRICT SACRAMENTO REGIONAL WASTEWATER TREATMENT PLANT SACRAMENTO COUNTY

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

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

Wastewater contains human disease causing organisms (pathogens). Significant percentages of pathogens are removed through treatment of the wastewater, but for discharges of treated wastewater where there is the potential for human contact, such as SRCSD's discharge to the Sacramento River, a separate disinfection step is needed. How much disinfection is needed depends on the degree and type of potential public exposure that exists. Because SRCSD discharges wastewater at the bottom of the river, direct human contact (typically occurring at the surface of the water body) with undiluted effluent is unlikely due to mixing of the effluent with river water at the water surface; therefore dilution can be considered.

SRCSD worked with Central Valley Water Board staff and Department of Public Health staff to evaluate the illness and infection risk to humans contacting Sacramento River water downstream of the SRCSD discharge. The Discharger engaged the professional services of Dr. Charles Gerba of the University of Arizona to conduct the human health risk assessment. Dr. Gerba's "Estimated Risk of Illness from Swimming in the Sacramento River", 23 February 2010, concluded that the SRWTP discharge did not exceed the USEPA's water quality criteria for contact recreation. The California Department of Public Health (DPH), however, concluded that available data and the risk assessment indicates an unacceptable risk of infection from *Cryptosporidium* and *Giardia*, and has recommended reduction of health risk. The DPH specifically recommended improvements in the SRCSD disinfection system, a statistical minimum of a one log removal of *Cryptosporidium* and *Giardia*, resulting in a 1 in 10,000 risk. SRCSD and the DPH are not in agreement on the interpretation of risk assessment results.

The tentative NPDES permit requires Title 22 (or equivalent) tertiary filtration to ensure adequate disinfection to meet the pathogen removal requirements recommended by DPH (see Section IV.C.3 of the Fact Sheet). Several technologies are available to achieve this, all essentially involving filtration to produce a very low-solids effluent, which is then dosed with a disinfectant (usually chlorine, UV light or ozone/peroxide). The combination of filtration and disinfectant effectively removes virtually all pathogens. This alternative would require construction of new filtration and disinfection facilities and ongoing increased use of chemicals and/or power to provide the higher level of disinfection. The SRCSD estimated the cost for this alternative would be \$1.3 billion.

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, any increased risk of illness and infection from exposure to the wastewater is an impact to the Sacramento River's beneficial use. This alternative produces 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. Central Valley Water Board staff has determined that requirements of CCR Title 22 will be adequate to meet the 1 in 10,000 risk and one log removal recommended by the DPH. Filtration will also reduce heavy metals, total organic carbon, BOD, TSS and phosphorus.

One alternative for disinfection is presented for comment. Table 2, below, compares proposed effluent limitations for BOD, TSS, and total coliform organisms for the disinfection alternative versus the proposed effluent limits contained in the tentative NPDES permit.

Disinfection Alternative 1 – Existing Level of Disinfection. This alternative would require the same level of disinfection requirements as the existing NPDES permit. Chlorine is currently added to the wastewater as a disinfectant. Chlorine is effective at reducing threats from bacteria and enteric viruses, but has little impact on protozoa such as *Giardia* and *Cryptosporidium*. Chlorine disinfection has the disadvantage of producing trihalomethanes and nitrosoamines as byproducts, which are human carcinogens and/or mutagens. If dilution is not allowed by the Central Valley Water Board for human carcinogens, the existing chlorine disinfection will probably have to be discontinued due to failure to meet effluent limits for trihalomethanes.

Dr. Gerba concluded that the risks from the SRWTP discharge do not exceed the 1986 USEPA's Acceptable Risk Level in its Recreational Water Quality Criteria. Further refinement of the pathogen risk study may conclude that there is no increase in risk of infection or illness from the current level of wastewater treatment, thus no change in disinfection-related effluent limitations would be required. Additional studies would be required to determine if the current disinfection facilities are adequate to meet the 1 in 10,000 risk level. At this time the minimum treatment required to reduce *Giardia* and *Cryptosporidium* to the 1 in 10,000 risk is unknown.

This permit alternative results in the following changes to the NPDES Permit and Time Schedule Order:

1. NPDES Permit. Modify section II.G. (in part) of the Findings as shown in underline/strikeout format below:

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 Regional 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.~~

2. NPDES Permit. Modify Table 6 of the Effluent Limitations and Discharge Specifications as shown in underline/strikeout format below:

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	40 <u>30</u>	15 <u>45</u>	20 <u>60</u>	--	--
	lbs/day ¹	45,100 <u>45,286</u>	22,700 <u>67,929</u>	30,200 <u>90,572</u>	--	--
Total Suspended Solids ²	mg/L	40 <u>30</u>	15 <u>45</u>	20 <u>60</u>	--	--
	lbs/day ¹	45,100 <u>45,286</u>	22,700 <u>67,929</u>	30,200 <u>90,572</u>	--	--

- 1 Based on a design average dry weather flow of 181 MGD.
- 2 This Order includes interim effluent limitations for ~~BOD₅~~, ~~TSS~~, and Total Ammonia Nitrogen (section IV.A.2.). Effective immediately, the interim effluent limitations shall apply in lieu of final effluent limitations. The final effluent limitations for ~~BOD₅~~, ~~TSS~~, and Total Ammonia Nitrogen become effective when the Discharger complies with Special Provisions section VI.C.7. or 1 December 2020, whichever is sooner.

3. NPDES Permit. Modify subsection g of section IV.A.1. of the Effluent Limitations and Discharge Specifications as follows:

- g. Total Coliform Organisms¹.** Effluent total coliform organisms shall not exceed:
- i. ~~2.2~~ 23 most probable number (MPN) per 100mL, as a 7-day median;
 - ii. ~~23~~ 240 MPN/100mL, more than once in any 30-day period; and
 - iii. ~~240~~ 500 MPN/100mL, at any time.

4. NPDES Permit. Modify Table 7 of the Effluent Limitations and Discharge Specifications as shown in underline/strikeout format below:

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 Pollutants						
Ammonia Nitrogen, Total (as N)	mg/L	33	35	45	--	--
	lbs/day ¹	49,400	52,920	67,929	--	--

Parameter	Units	Effluent Limitations				
		Average Monthly	Average Weekly	Maximum Daily	Instantaneous Minimum	Instantaneous Maximum

1. Based on a design flow of 181 MGD.
2. This Order includes interim effluent limitations for ~~BOD₅, TSS, and Total Ammonia Nitrogen~~ (section IV.A.2.). Effective immediately, the interim effluent limitations shall apply in lieu of final effluent limitations for ammonia. ~~these constituents~~. The final effluent limitations for ~~BOD₅, TSS, and Total Ammonia Nitrogen~~ become effective when the Discharger complies with Special Provisions section VI.C.7. or 1 December 2020, whichever is sooner.

5. NPDES Permit. Modify section IV.B.2.c. of the Effluent Limitations and Discharge Specifications as shown in underline/strikeout format below:

~~c. Total Coliform Organisms². Effective immediately and ending on 30 November 2020, 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.~~

6. NPDES Permit. Modify section VI.C.6. of the Provisions as shown in underline/strikeout format below:

6. Other Special Provisions – Not Applicable

~~a. Effective 1 December 2020, 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. NPDES Permit. Modify section VI.C.7. (in part) of the Provisions as shown in underline/strikeout format below:

7. Compliance Schedules

~~a. Title 22, or Equivalent, Disinfection Requirements. By 1 December 2020, wastewater discharged to the Sacramento River shall be oxidized, coagulated, filtered, and adequately disinfected pursuant to the Department of Public Health (DPH) reclamation criteria, Title 22 CCR, Division 4, Chapter 3, (Title 22), or equivalent. This Order also requires compliance with the final effluent limitations for BOD₅, total coliform organisms, and TSS by 1 December 2020. Until final compliance, the Discharger shall submit progress reports in accordance with the Monitoring and Reporting Program (Attachment E, section X.D.1).~~

<u>Task</u>	<u>Date Due</u>
i. Submit Method of Compliance Workplan/Schedule	Within 6 months after adoption of this Order
ii. Progress Reports⁴	1 February, annually, after approval of work plan until final compliance
iii. Begin CEQA process for Compliance Project	Within 4 years after Adoption Date of this Order
iv. Begin construction of Compliance Project	Within 7 years after Adoption Date of this Order
<u>v. Full Compliance</u>	1 December 2020

⁴ ~~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.~~

ba. Compliance Schedule for Final Effluent Limitations for ammonia. This Order requires compliance with the final effluent limitations for ammonia by **1 December 2020**. The Discharger shall comply with the following time schedule to ensure compliance with the final effluent limitations:

8. NPDES Permit. Modify Table E-9 of the Monitoring and Reporting Program (Attachment E) as shown in strikeout format below:

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)	1 February, annually, 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)	1 February , annually, until final compliance

9. NPDES Permit. Modify section IV.B.a. of the Fact Sheet (Attachment F) as shown in underline/strikeout format below:

a. BOD₅ and TSS. Federal regulations, 40 CFR Part 133, establish the minimum weekly and monthly average level of effluent quality attainable by secondary

treatment for BOD₅ and TSS. A daily maximum effluent limitation for BOD₅ and TSS is also included in the Order to ensure that the treatment works are not organically overloaded and operate in accordance with design capabilities. ~~However, as described in section IV.C.3.c.xi, 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 BOD₅, 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 BOD₅ and TSS over each calendar month.~~

10. NPDES Permit. Modify section IV.C.1. of the Fact Sheet (Attachment F) as shown in *strikeout* format below:

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.

11. NPDES Permit. Modify section IV.C.2.d.iii.(5) of the Fact Sheet (Attachment F) as shown in underline/strikeout format below:

(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 secondary treatment 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.

12. NPDES Permit. Modify section IV.C.2.d.iv.(5) of the Fact Sheet (Attachment F) as shown in underline/strikeout format below:

(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 secondary treatment 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.

13. NPDES Permit. Replace section IV.C.3.d.xx. of the Fact Sheet (Attachment F) as follows:

xx. Pathogens

- (a) **WQO.** In a letter to the Regional Water Board dated 8 April 1999, DPH indicated it would consider wastewater discharged to water bodies with identified beneficial uses of irrigation or contact recreation and where the wastewater receives dilution of more than 20:1 to be adequately disinfected if the effluent coliform concentration does not exceed 23 MPN/100 mL as a 7-day median and if the effluent coliform concentration

does not exceed 240 MPN/100 mL more than once in any 30 day period. The discharge receives on average at least a dilution of 20:1

(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.

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 *Cryptosporidium* 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 area¹. In addition, there are at least 20 agricultural diversions within 1 mile upstream and 2 miles downstream of the discharge². 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 East Bay Municipal Utility District 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.

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’s¹ 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 beneficial 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

⁴ 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.

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.
- (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.

Considering the conservativeness of the health risk assessment provided by the Discharger, it appears that the current level of disinfection is meeting the DPH recommendation for pathogen removal and is therefore adequate to protect the beneficial uses of the receiving water.

- (c) **WQBELs.** This Order includes effluent limitations for total coliform organisms of 23 MPN/100 mL as a 7-day median and 240 MPN/100 mL, not to be exceeded more than once in a 30-day period, which are consistent with a secondary discharge. These coliform limits are imposed to protect the beneficial uses of the receiving water, including public health through contact recreation and drinking water pathways.
- (d) **Plant Performance and Attainability.** Based on facility performance the Discharger can immediately comply with these effluent limits for total coliform organisms.

14. NPDES Permit. Modify Table F-16 (in part) of the Fact Sheet (Attachment F) as shown in underline/strikeout format below:

Table F-16. Summary of Final Effluent Limitations

Parameter	Units	Effluent Limitations				
		Average Monthly	Average Weekly	Maximum Daily	Instantaneous Minimum	Instantaneous Maximum
Biochemical Oxygen Demand, 5-day @ 20°C	mg/L	40 <u>30</u>	45 <u>45</u>	20 <u>60</u>	--	--
	lbs/day ¹	15,100 <u>45,286</u>	22,700 <u>67,929</u>	30,200 <u>90,572</u>	--	--
	% Removal	85	--	--	--	--
Total Suspended Solids	mg/L	40 <u>30</u>	45 <u>45</u>	20 <u>60</u>	--	--
	lbs/day ¹	15,100 <u>45,286</u>	22,700 <u>67,929</u>	30,200 <u>90,572</u>	--	--
	% Removal	85	--	--	--	--
Total Coliform Organisms ³	MPN/100mL	--	--	--	--	<u>240-500</u>

¹ Based on a design average dry weather flow of 181 MGD.
² Shall not exceed 200 µg/L as an annual average.
³ Effluent total coliform organisms also shall not exceed i.) ~~2-2~~ 23 MPN/100ml, as a 7-day median; and ii.) ~~23~~ 240 MPN/100ml, more than once in any 30-day period.
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 90%, median for any three consecutive bioassays.

15. NPDES Permit. Modify section IV.D.4. (in part) of the Fact Sheet (Attachment F) as shown in underline/strikeout format below:

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 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 species¹.

¹ Comment letter from USFWS to Kathy Harder dated 15 June 2010.

- The Sacramento River and Sacramento-San Joaquin Delta support a trillion dollar economy with \$27 billion economy for agriculture.¹
- The Sacramento River and Sacramento-San Joaquin Delta provide drinking water to 25 million people of the State.²
- 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.³
- 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 discharge⁴. 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 Bay⁵.
- The ammonia from the SRWTP is acutely and chronically toxic to species, including copepods⁶ 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 primary MCL. 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 discharge⁷.~~
- ~~○ Filtration of disinfected SRWTP effluent will result in reduction of total organic carbon, copper, mercury, phosphorus, TSS, BOD₅ and possibly Constituents of Emerging Concern (CECs)⁸.~~
- 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.

¹ http://www.delta.ca.gov/res/docs/Sacto-SanJoaqin_fact.pdf

² Id.

³ Id.

⁴ Memorandum from Mitchell J. Mysliwicz (LWA) to Bob Seyfried, SRCSD "Response to Tetra Tech Comments on the LDOPA", 26 August 2010.

⁵ Letter from Bruce Wolfe, SFRWQCB to Kathy Harder, dated 4 June 2010.

⁶ Swee Teh, Presentation at Contaminants Workshop, July 6, 2010

⁷ Gerba, Charles P., "Estimated Risk of Illness from Swimming in the Sacramento River", 23 February 2010.

⁸ Technical Memorandum: Analysis of Costs and Benefits of Advanced Treatment Alternatives for the Sacramento Regional Wastewater Treatment Plant, LWA, May 2010.

- ~~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.~~
- ~~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 Upgrades⁴

Discharger	Population (July 2008) <small>www.city-data.com</small>	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	61,304	\$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.

⁴ Telephone Survey by Elizabeth Lee, CVWQCB

~~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 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 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.

16. NPDES Permit. Modify section IV.E. of the Fact Sheet (Attachment F) as shown in underline/strikeout format below:

- 1. Compliance Schedules for ammonia and Title 22 (or Equivalent) Requirements.** The permit limitations for ammonia, BOD₅, 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 ~~Title 22 (or equivalent)~~ and ammonia requirements has not been previously required for this discharge. This Order requires the Discharger to meet ~~Title 22 (or equivalent)~~, and ammonia requirements for all flows, which represents 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, ~~BOD₅, 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, ~~BOD₅, 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, ~~BOD₅, 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, and chlorpyrifos, ~~BOD₅, 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, and chlorpyrifos, ~~BOD₅, 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 BOD₅, 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 BOD₅, 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-20).
- 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.XX, above, and are in effect through 1 December 2020 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, ~~BOD₅, 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) 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 to 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 BOD₅, 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.

17. NPDES Permit. Remove section VII.B.4.b. of the Fact Sheet (Attachment F) as shown in underline/strikeout format below:

4. Construction, Operation, and Maintenance Specifications

~~**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 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.~~

18. NPDES Permit. Modify section VII.B.7.a. of the Fact Sheet (Attachment F) as shown in underline/strikeout format below:

7. Compliance Schedules

- a. The Discharger submitted a request, and justification (dated 20 August 2010), for a compliance schedule for BOD₅, 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 a compliance schedule for the new, final WQBELs for ~~BOD₅, TSS, ammonia, and total coliform organisms~~ and requires full compliance by 1 December 2020.