

AMMONIA REMOVAL ALTERNATIVE NO. 2

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

The proposed NPDES permit requires ammonia removal (i.e., full nitrification) (see Section IV.C.3 of the Fact Sheet). As discussed in detail in Attachment K of the proposed NPDES permit, full nitrification is proposed due to concerns with ammonia levels in the Delta that may be adversely affecting aquatic life beneficial uses and based on best practicable treatment or control of the discharge. This alternative would require construction of new nitrification facilities and ongoing increased use of chemicals and/or power to provide ammonia removal. The SRCSD estimated the cost for this alternative is \$800 million.

Ammonia Removal Alternative No. 2. Based on the available receiving water dilution for compliance with acute and chronic aquatic life criteria, the Central Valley Water Board may determine that acute and chronic mixing zones should be granted in establishing effluent limitations for ammonia. However, these effluent limits may not be adequate to ensure compliance with the Basin Plan's dissolved oxygen objective. The Discharger conducted dynamic modeling to evaluate the impacts on dissolved oxygen downstream of the discharge, and submitted a report prepared by Larry Walker Associates titled "Low Dissolved Oxygen Prevention Assessment", dated May 2010 (LDOPA Report). Based on the dynamic modeling the SRCSD determined that if acute and chronic aquatic life dilution is allowed for establishing the WQBELs for ammonia, additional ammonia controls may be necessary to ensure the discharge does not cause a violation of the Basin Plan's water quality objective for dissolved oxygen. The LDOPA Report recommends mass loading effluent limitations for ultimate oxygen demand (UOD), which is the combined oxygen demand caused by ammonia and BOD₅. Therefore, under this alternative, the water quality-based effluent limitations for ammonia have been calculated considering dilution credits for acute and chronic aquatic life criteria. In addition, this alternative includes the UOD mass loading effluent limitations to address dissolved oxygen compliance.

This alternative **MUST** be combined with Dilution alternatives that allow acute and chronic mixing zones.

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

1. NPDES Permit. Modify the final effluent limits for Ammonia in Table 6 of the Limitations and Discharge Specifications and add new effluent limitations for Ultimate Oxygen Demand (UOD), 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						
Ammonia Nitrogen, Total (as N) ²	mg/L	<u>4.8</u> 41	--	<u>2.2</u> 51	--	--
	lbs/day	<u>2720</u>	--	<u>3320</u>	--	--
<u>UOD (1 May–31 Oct)</u> ³	lbs/day	<u>169,000</u>	--	<u>234,000</u>	--	--
<u>UOD (1 Nov–30 Apr)</u> ³	lbs/day	<u>275,000</u>	--	<u>438,000</u>	--	--

² This Order includes interim effluent limitations for BOD_{5T} and 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 BOD_{5T} and 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 Ultimate Oxygen Demand (UOD) = 8.34 * (1.5*BOD₅+4.6*ammonia)*Q_{eff}; BOD₅ in mg/L, ammonia in mg/L, and effluent flow (Q_{eff}) in million gallons per day.

2. NPDES Permit. Remove the Interim Effluent Limits for Ammonia in Table 7 of the 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 Pollutant						
Ammonia Nitrogen, Total (as N)	mg/L	<u>33</u>	<u>35</u>	<u>45</u>	--	--
	lbs/day ¹	<u>49,400</u>	<u>52,920</u>	<u>67,929</u>	--	--

1. Based on a design flow of 181 MGD.

3. NPDES Permit. Add Ammonia and Nitrogen study to Section VI.C.3 of the Limitations and Discharge Specifications, as shown below:

c. Ammonia and Nitrogen Study. The Discharger shall submit a workplan and time schedule for Executive Officer approval for conducting studies of existing and threatened impacts of ammonia and nitrogen on aquatic ecosystems in the Sacramento River, Delta, Suisun Bay and other potentially impacted water bodies within 90 days from adoption of this Order. Studies should be conducted in coordination and conjunction with similar studies that may be required of other NPDES dischargers of ammonia containing ammonia and/or nitrogen into the waterways of concern. Proposed studies shall build upon existing research and be directed at clarifying and quantifying aquatic ecology impact issues as directed by the Executive Officer. The workplan shall be implemented upon approval by the Executive Officer.

<u>Task</u>	<u>Compliance Date</u>
i. Submit Workplan and Time Schedule	90 days from adoption of Permit
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.

4. NPDES Permit. Modify section VI.C.7.b of the Limitations and Discharge Specifications as shown in underline/strikeout format below:

~~b. 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:

<u>Task</u>	<u>Date Due</u>
i. Submit Method of Compliance Workplan/Schedule	Within 6 months after adoption of this Order
ii. Submit and Implement Pollution Prevention Plan (PPP)⁴ for ammonia	Within 1 year after adoption of this Order
iii. Progress Reports²	1 February, annually, after approval of work plan until final compliance
iv. Begin CEQA process for Compliance Project	Within 4 years after Adoption Date of this Order
v. Begin construction of Compliance Project	Within 7 years after Adoption Date of this Order
vi. Full Compliance	1 December 2020

<u>Task</u>	<u>Date Due</u>
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.C.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.	

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

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

Special Provision	Reporting Requirements
Pollution Prevention Plan for mercury (Section VI.C.3.a)	1 December , annually, after approval of workplan
Title 22 Disinfection Requirements (Section VI.C.7.a)	1 December , annually, until final compliance
Compliance Schedules for Final Effluent Limitations for ammonia, compliance with final effluent limitations. (Section VI.C.7.b)	1 June, annually, until final compliance

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

(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 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.

7. NPDES Permit. Modify section IV.C.2.d.iii.(4) of the Fact Sheet (Attachment F) as shown in underline/strikeout format below:

(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

¹ TSD, pg. 33

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.

8. 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 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. This Order requires the discharge meets Title 22 (or equivalent) tertiary filtration and a reduction in ammonia, 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.

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

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 ammonia and cyanide.

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

(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.*” 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.

11. NPDES Permit. Modify section IV.C.2.d.iv.(4) of the Fact Sheet (Attachment F) as shown in underline/strikeout format below:

(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.

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 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. This Order requires the discharge meets Title 22 (or equivalent) tertiary filtration and a reduction in ammonia, 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. Modify section IV.C.2.d.vi. of the Fact Sheet (Attachment F) as shown in underline/strikeout format below for ammonia:

Ammonia – ~~An acute or chronic mixing zone for ammonia does not meet the requirements of the SIP for the allowance of mixing zones. 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 compromise 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. Table F-12, below, shows the WQBELs for ammonia 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 or limits with only chronic dilution allowed. Assimilative capacity is available for ammonia in the receiving water, and, as discussed above, the chronic aquatic life mixing zone meets the requirements of the SIP and Basin Plan and an acute aquatic life mixing zone has not been allowed in this Order. Therefore, the WQBELs for ammonia have been developed considering the allowance of chronic aquatic life dilution.~~

14. NPDES Permit. Add new Table F-12 in the Fact Sheet (Attachment F) as shown below and renumber remaining tables in the Fact Sheet and correct all references to Tables:

Table F-12. WQBELs for Ammonia

	Average Monthly Effluent Limitation	Maximum Daily Effluent Limitation
Dynamic Modeling (acute and chronic dilution)	41 mg/L	51 mg/L
Dynamic Modeling (chronic dilution only)	11 mg/L	13 mg/L
Steady-State Approach	1.8 mg/L	2.2 mg/L
Facility Performance ¹	45 mg/L	

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

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 includes limitations for oxygen-demanding substances that may require the Discharger nitrify a portion of its effluent, therefore, the ammonia will convert to nitrate and the nitrate concentrations will increase. Consequently, the Facility ~~will~~ may 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, to maintain a healthy nitrogen-to-phosphorous ratio in the river, 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.

16. NPDES Permit. Modify sections IV.C.3.d.ii.(c) and (d) of the Fact Sheet as shown in underline/strikeout format below:

~~(c) Dilution Considerations.~~ As discussed in Section IV.C.2.d of the Fact Sheet, an allowance for chronic aquatic life dilution may be granted. However, based on the considerations below and discussed in more detail in Attachment K, 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 Delta².~~
- ~~(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 compared with criteria for salmonids in early 2011³. 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~~

² 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 Francisco Estuary. Fisheries 32(6):270-277.

³ Personal Communication with Lisa Huff USEPA with Kathy Harder, August 2010.

~~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.~~

(dc) WQBELs. ~~The Central Valley Water Board calculates WQBELs in accordance with SIP procedures for non-CTR constituents, and ammonia is a non-CTR constituent. The SIP procedure assumes a 4-day averaging period for calculating the long-term average discharge condition (LTA). However, USEPA recommends modifying the procedure for calculating permit limits for ammonia using a 30-day averaging period for the calculation of the LTA corresponding to the 30-day CCC. Therefore, while the LTAs corresponding to the acute and 4-day chronic criteria were calculated according to SIP procedures, the LTA corresponding to the 30-day CCC was calculated assuming a 30-day averaging period. The lowest LTA representing the acute, 4-day CCC, and 30-day CCC is then selected for deriving the average monthly effluent limitation (AMEL) and the maximum daily effluent limitation (MDEL). The remainder of the WQBEL calculation for ammonia was performed according to the SIP procedures. As discussed in Section IV.C.3.d.vi of the Fact Sheet, acute and chronic aquatic life dilution may be allowed for ammonia, but additional controls are needed to ensure compliance with the Basin Plan's water quality objective for dissolved oxygen. Based on results of the Discharger's dynamic model for compliance with the NAWQC for ammonia at the edge of the acute and chronic aquatic life mixing zone, a MDEL of 51 mg/L (as N), and an AMEL of 41 mg/L (as N) is calculated. This Order contains a final average monthly effluent limitation (AMEL) and maximum daily effluent limitation (MDEL) for ammonia of 4.8 41 mg/L and 2.2 51 mg/L, respectively, based on the NAWQC ammonia criteria for aquatic toxicity with no dilution considering acute and chronic aquatic life dilution credits.~~

Additional effluent controls are necessary to ensure compliance with the Basin Plan's dissolved oxygen objective. The Discharger conducted dynamic modeling to evaluate the impacts on dissolved oxygen downstream of the discharge, and submitted a report prepared by Larry Walker Associates titled "Low Dissolved Oxygen Prevention Assessment", dated May 2010 (LDOPA Report). Based on the dynamic modeling the SRCSD determined that mass loading effluent limitations for ultimate oxygen demand (UOD), which is the combined oxygen demand caused by ammonia and BOD₅, are needed. The LDOPA Report showed that the ultimate oxygen demand was dependent on water temperature, so seasonal UOD limits would be protective of the Basin Plan's dissolved oxygen objective. Therefore, this Order includes seasonal UOD mass loading effluent limitations of 169,000 lbs/day

as an AMEL and 234,000 lbs/day as a MDEL from 1 May through 31 October and 275,000 lbs/day as an AMEL and 438,000 lbs/day as a MDEL from 1 November through 30 April.

(ed) Plant Performance and Attainability. Analysis of the effluent data shows that the MEC of 45 mg/L is greater less than the applicable WQBELs. The Central Valley Water Board concludes, therefore, that immediate compliance with these effluent limitations is feasible. See Table F-20. 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.~~

17. NPDES Permit. Modify section IV.C.3.d.xx.(a) of the Fact Sheet as shown in underline/strikeout format below:

(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 to meet effluent limitations for oxygen-demanding substances, 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.

18. NPDES Permit. Modify section IV.C.4.a. of the Fact Sheet as shown in underline/strikeout format below:

(a) This Order includes WQBELs for copper, ammonia, cyanide, carbon tetrachloride, chlorodibromomethane, dichlorobromomethane, methylene chloride, tetrachloroethylene, pentachlorophenol, bis(2-

ethylhexyl) phthalate, dibenxon(ah)anthracene, 1,2-diphenyl-hydrazine, N-nitrosodimethylamine, aluminum, nitrate, nitrite, manganese, MTBE, mercury, temperature, settleable solids 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 ammonia and 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.

19. NPDES Permit. Modify the effluent limits for Ammonia and Ultimate Oxygen Demand (UOD) in Table F-17 (Summary of Final Effluent Limitations) of the Fact Sheet as shown in underline/strikeout format below:

Parameter	Units	Effluent Limitations				
		Average Monthly	Average Weekly	Maximum Daily	Instantaneous Minimum	Instantaneous Maximum
Conventional Pollutants						
Ammonia Nitrogen, Total (as N)	mg/L	4.8 <u>41</u>	--	2.2 <u>51</u>	--	--
	lbs/day ⁴	2720		3320		
<u>UOD (1 May – 31 Oct)</u> ⁹	lbs/day	<u>169,000</u>	--	<u>234,000</u>	--	--
<u>UOD (1 Nov – 30 Apr)</u> ⁹	lbs/day	<u>275,000</u>	--	<u>438,000</u>	--	--

⁹ Ultimate Oxygen Demand (UOD) = 8.34 * (1.5*BOD₅+4.6*ammonia)*Q_{eff}; BOD₅ in mg/L, ammonia in mg/L, and effluent flow (Q_{eff}) in million gallons per day.

20. NPDES Permit. Modify section IV.D.4 of the Fact Sheet as shown in underline/strikeout format below:

As shown in Table F-19, 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 nitrogen removal (ammonia and nitrate) nitrification, denitrification, and the equivalent of Title 22 filtration with ultraviolet light 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.
- 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.³
- 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.⁴
- 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 discharge⁵. 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 Bay⁶.~~
- ~~○ The ammonia from the SRWTP may be acutely or chronically toxic to species, including copepods⁴ 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 discharge².
- 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)³.
- 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.

- 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.

21. NPDES Permit. Modify section IV.E.1 of the Fact Sheet 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 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~~, 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, 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.** ~~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.A.2, 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.

22. NPDES Permit. Modify section IV.E.2 of the Fact Sheet as shown in underline/strikeout format below:

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 and chlorpyrifos 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.

23. NPDES Permit. Modify section VII.B.7 of the Fact Sheet 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.
- 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: