

## STAFF REPORT

### CITY OF STOCKTON - REGIONAL WASTEWATER CONTROL FACILITY PROPOSED NPDES PERMIT RENEWAL AND TIME SCHEDULE ORDER SAN JOAQUIN COUNTY

Two items are being considered for adoption: (1) issuance of a renewed National Pollutant Discharge Elimination System (NPDES) permit for the City of Stockton – Regional Wastewater Control Facility, and (2) a Time Schedule Order (TSO) with a time schedule requiring full compliance with some final effluent limitations by 1 October 2013.

#### **BACKGROUND**

The City of Stockton (hereinafter Discharger or City) owns and operates the City of Stockton Regional Wastewater Control Facility (Facility), which provides sewerage services to the City of Stockton, the Port of Stockton, and surrounding urbanized San Joaquin County areas. The discharge is currently regulated by Order No. R5-2002-0083, which was adopted on 26 April 2002 and expired on 1 April 2007. Further, Cease and Desist Order No. R5-2002-0084 (CDO) was adopted by the Regional Water Board on 26 April 2002, and establishes a time schedule for the Discharger to comply with ammonia effluent limitations established in Order No. R5-2002-0083. The Orders were petitioned by the Discharger. The State Water Board granted Stay Order WQO 2002-0018 for portions of Order No. R5-2002-0083 and the CDO. The Discharger then filed a Motion for Preliminary Injunction/Order Requiring Stay, which the Superior Court upheld. As a result of the State Water Board Order and the Court Order, the compliance date for the final ammonia effluent limitations was extended to 10 August 2008, and the compliance date for meeting the tertiary treatment requirements was extended to 25 September 2007. The terms and conditions of the current Order have been automatically continued and remain in effect until new Waste Discharge Requirements and NPDES permit are adopted pursuant to this Order. The Facility is permitted for an average dry weather flow of 55.0 million gallons per day (mgd).

The Discharger filed a report of waste discharge and submitted an application for renewal of its Waste Discharge Requirements (WDRs) and NPDES permit on 29 September 2006. A site visit was conducted on 21 April 2006 to observe operations and collect additional data to develop permit limitations and conditions.

#### **FACILITY DESCRIPTION**

The Facility is bifurcated by the San Joaquin River; the main facility (primary and secondary treatment facilities, and sludge processing facilities) is located east of the river and the tertiary treatment facility is located west of the river. At the main facility,

the primary treatment processes consist of screening, grit removal, and primary sedimentation. The secondary treatment processes consist of high rate trickling filters and secondary clarifiers. Sludge is removed from the primary and secondary sedimentation processes to gravity thickeners for preliminary water removal, and then pumped to anaerobic digesters. After digestion, the treated sludge is pumped to a sludge lagoon where anaerobic digestion continues. A dredge is used to pump the concentrated material from the bottom of the lagoon to a belt filter press, and dewatered biosolids are removed by a private contractor off-site for agricultural reuse.

From the main facility, the secondary-treated effluent is piped under the San Joaquin River to the tertiary treatment facility, which consists of unlined facultative oxidation ponds, engineered wetlands, two nitrifying biotowers, dissolved air flotation, mixed-media filters, and chlorination/dechlorination facilities.

## COMMENTS

Written comments on the proposed Order were required to be received by the Regional Water Board by 22 September 2008 in order to receive full consideration. Comments were received by the deadline from:

1. City of Stockton (City or Discharger)
2. Central Valley Clean Water Association (CVCWA)
3. California Sportfishing Protection Alliance (CSPA)
4. South Delta Water Agency
5. Niagra Water
6. California Urban Water Agency (CUWA)
7. San Luis & Delta-Mendota Water Authority (Authority) and Westlands Water District (Westlands)

The significant permitting issues are discussed below and a complete response to comments is provided in the agenda package.

## SIGNIFICANT PERMITTING ISSUES

The significant permitting issues for the proposed Order are the Salinity requirements and ammonia effluent limitations.

- 1. Salinity (EC) Issues.** The discharge contains total dissolved solids (TDS), chloride, sulfate, and electrical conductivity (EC). These are water quality parameters that are indicative of the salinity of the water. Their presence in water can be growth limiting to certain agricultural crops and can affect the taste of water for human consumption. The Basin Plan contains a chemical constituent objective that incorporates State MCLs, contains a narrative objective, and contains numeric water

quality objective for EC. Table 1 below summarizes salinity water quality objectives/criteria and effluent concentration values.

**Table 1. Salinity Water Quality Criteria/Objectives**

Parameter	Agricultural WQ Goal <sup>1</sup>	Bay-Delta Plan	Secondary MCL <sup>2</sup>	Effluent	
				Avg	Max
EC (µmhos/cm)	Varies <sup>3</sup>	700 (1 Apr-31 Jul) 1000 (1 Aug – 31 Mar)	900, 1600, 2200	1205	1518
TDS (mg/L)	Varies	N/A	500, 1000, 1500	668	730
Sulfate (mg/L)	Varies	N/A	250, 500, 600	120	180
Chloride (mg/L)	Varies	N/A	250, 500, 600	178	210

<sup>1</sup> 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)

<sup>2</sup> The secondary MCLs are stated as a recommended level, upper level, and a short-term maximum level.

<sup>3</sup> 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.

The State Water Board’s Bay-Delta Plan establishes water quality objectives at various “compliance points” in the estuary to protect beneficial uses. The Bay-Delta Plan at page 10 states: “The water quality objectives in this plan apply to waters of the San Francisco Bay system and the legal Sacramento-San Joaquin Delta, as specified in the objectives. *Unless otherwise indicated, water quality objectives cited for a general area, such as for the southern Delta, are applicable for all locations in that general area* and compliance locations will be used to determine compliance with the cited objectives.” (Emphasis added) What constitutes “*in that general area*” is not defined in the Bay Delta Plan.

The two nearest Bay Delta Plan compliance points are the San Joaquin River at Brandt Road Bridge, south of the discharge point along the San Joaquin River, and the San Joaquin River at Prisoner’s Point, toward San Francisco Bay from the discharge point. Stockton’s discharge is located between these two compliance points. The San Joaquin River at Brandt Bridge and at the discharge point is largely unchanged. The River flows in a relatively shallow, winding channel, and there are no major diversions or tributaries between Brandt Bridge and Stockton. The Brandt Bridge compliance point is established to protect agricultural irrigation uses, and seasonally varies from 700 to 1000 µmhos/cm. The primary use of river water at both locations is agricultural irrigation. In contrast, the Prisoner’s Point compliance point is located along the Stockton Deep Water Ship Channel where the San Joaquin River has been deepened and straightened. At Prisoner’s Point there is seasonally a significant flow of Sacramento River water moving cross-Delta to the State Water Project and Central Valley Project pumps near Tracy. The Prisoner’s Point compliance point requires the April – May salinity to be maintained at 440 µmhos/cm or less, and is set to protect fish and wildlife beneficial uses. The

water quality objectives prescribed for Brandt Road Bridge are judged to be applicable at the site of the Stockton discharge, as being in the “general area” of the compliance point and as having similar river and beneficial use conditions that would make the Brandt Road objective appropriate for beneficial use protection at the discharge point.

The discharge demonstrates reasonable potential to cause or contribute to an exceedance of the Bay Delta Plan objectives at Brandt Road Bridge. Therefore, the proposed Order contains several mechanisms to control and reduce salinity in the effluent discharge and thus protect the beneficial uses, as follows:

- The proposed Order contains a numeric performance based annual average effluent limitation for EC of 1300  $\mu\text{mhos/cm}$  to protect the receiving water from further salinity degradation.
- The proposed Order contains a provisional requirement that the Discharger must take reasonable steps to obtain lower salinity water supply sources, develop and implement measures to reduce salinity in the discharge, and to participate financially in the development of the Central Valley Salinity Management Plan.
- The proposed Order also provisionally sets a Salinity Reduction Goal of the maximum weighted average EC of the City of Stockton’s water supply (i.e. 273  $\mu\text{mhos/cm}$  in March 2005), plus an increment of 500  $\mu\text{mhos/cm}$ .
- The proposed Order contains a safe guard such that seasonal limits at “a monthly average of 700  $\mu\text{mhos/cm}$  (1 April to 31 August), and 1000  $\mu\text{mhos/cm}$  (1 September to 31 March)” are effective immediately if “the Regional Water Board finds that the Discharger has materially failed to comply with the approved Salinity [reduction] Plan due to circumstances within its control.”

Compliance with the proposed requirements will likely result in a salinity reduction in the effluent discharged to the receiving water, and should ultimately achieve the intermediate goal (i.e. goal of 773  $\mu\text{mhos/cm}$ ).

Part of the City’s salinity problem is a water supply problem. Approximately 40% of the City’s water supply comes from groundwater; the remainder is treated surface water. The City intends to obtain a new surface water supply source to augment its current water supply system and minimize the use of groundwater. Another portion of the salt in the City’s discharge is from industrial discharges, which is approximately 37% of the overall annual load. To help reduce salinity loads, the Discharger plans to develop an industrial outreach program to encourage industrial users to reduce TDS levels in the influent. The Discharger also plans to evaluate the benefits of a potential residential water softener ban.

- 2. Ammonia Issues.** The proposed Order contains a maximum daily effluent limitation (MDEL) of 5 mg/L and an average monthly effluent limitation (AMEL) of 2 mg/L. These effluent limitations were carried forward from previous Order No. R5-2002-0083 and are based on USEPA's *National Ambient Water Quality Criteria for the Protection of Freshwater Aquatic Life, for total ammonia* (NAWQC). The NAWQC recommends acute standards (1-hour average; criteria maximum concentration) based on pH, and chronic standards (30-day average, criteria continuous concentration) based on pH and temperature. It also recommends a maximum four-day average concentration of 2.5 times the criteria continuous concentration. USEPA found that as pH increased, both the acute and chronic toxicity of ammonia increased. Salmonids were more sensitive to acute toxicity effects than other species. While the acute toxicity of ammonia was not influenced by temperature, it was found that invertebrates and young fish experienced increasing chronic toxicity effects with increasing temperature. The beneficial uses of the San Joaquin River downstream of the discharge include migration of salmonids, and spawning, reproduction, and/or early development of fish species. Thus, because the presence of salmonids and early fish life stages in San Joaquin River within the vicinity of the discharge is well-documented, the recommended criteria for waters where salmonids and early life stages are present were used.

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

In development of the proposed Order, fifteen years of effluent and receiving water monitoring data (September 1992 through December 2007) were evaluated to determine if the existing effluent limitations are adequately protective of the beneficial uses. An acute ammonia criterion was calculated for each receiving water pH value using the NAWQC acute criterion equation based on salmonids present. A chronic criterion was calculated for each paired receiving water 30-day average temperature and pH using the NAWQC chronic criterion equation based on early life stages present. The resulting 1,238 total ammonia criteria were compared to receiving water ammonia concentrations to determine if the receiving water

exceeded either the acute or chronic criteria. Table 2 shows five instances when the receiving water exceeded the ammonia criteria.

**Table 2. Summary of Receiving Water Compliance with NAWQC for Ammonia**

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

As indicated in Table 2 above, at times the chronic criterion was exceeded in the receiving water. However, these exceedances occurred during periods of high effluent ammonia concentrations, as much as five times the MDEL in the proposed Order<sup>1</sup>. Effluent concentrations in compliance with the proposed effluent limitations would have not caused exceedances of the ammonia criteria. Based on this evaluation, the ammonia effluent limitations at a MDEL of 5 mg/L and an AMEL of 2 mg/L are fully protective of the beneficial uses.

Comments were received from interested parties in regards to the ammonia effluent limits as follows:

- CSPA contends that the proposed Order should also contain a 4-day average effluent limit for ammonia to be fully protective of the beneficial uses.

As recommended by USEPA, the 4-day average chronic ammonia concentration shall not exceed 2.5 times the value of the 30-day chronic criterion, which is 2.13 mg/L. The resulting 4-day average chronic criterion is therefore 5.3 mg/L. Considering the MDEL at 5 mg/L is less than the 4-day average chronic criterion, the 4-day average chronic criterion will not be exceeded if the Discharger is in compliance with the proposed Order. Thus, a 4-day average effluent limitation is not necessary.

- The Delta Mendota Water Authority and Westlands Water District contends that the proposed Order must be based upon recent scientific information, in particular, the “2007 Annual Technical Report on implementation and Monitoring of the San Joaquin River Agreement and the Vernalis Adaptive Management

<sup>1</sup> The compliance date for meeting the final effluent limitations for ammonia was 10 August 2008.

Plan” and recent findings by Dr. Richard Dugdale, a researcher at San Francisco State University.

The cited “2007 Annual Technical Report on Implementation and Monitoring of the San Joaquin River Agreement and the Vernalis Adaptive Management Plan” documents an incident where, in May 2007, 116 acoustic transmitters that had been implanted in juvenile Chinook salmon were found near the City’s discharge, indicating that the fish had died at this location. It is unknown if the cause of death was due to aquatic toxicity or predation. The report does not support a defensible conclusion that the Facility’s discharge caused, or is likely to cause toxicity in, or impairment of, the receiving water. Instead, the report concludes that “The cause of the high mortality remains unknown” (p. 55 of the report). The more recent scientific findings by Dr. Richard Dugdale demonstrated that ammonia can inhibit growth of *marine* diatoms at ammonia concentrations in the receiving water much lower than ammonia concentrations that impact fish species (i.e. criteria recommended by the NAWQC). However, new studies are ongoing to evaluate the effect of ammonia on the inhibition of growth of *freshwater* diatoms in the Delta, as well as, studies to evaluate the sensitivity of delta smelt to ammonia toxicity. At this time there is no new information to base the development of water quality-based effluent limitations for ammonia.

Regional Water Board staff is supportive of the efforts to address the pelagic organism decline in the Sacramento-San Joaquin Delta, including the work of Dr. Richard Dugdale and researchers from Natural Resource Scientists, Inc. However, the study results are preliminary, and other studies are ongoing. When new defensible, scientific information is developed, Regional Water Board staff will incorporate this information into our permits, or reopen them as appropriate. Thus, provisions were added to the proposed Order so that the permit may be reopened to incorporate new information and, if necessary, to modify the ammonia effluent limitations if new information is developed.

## **MAJOR PERMIT CHANGES OR ADDITIONS**

The following is a summary of the major changes and additions to the NPDES Permit since the previous Order.

- New or more stringent effluent limitations for aluminum, bis (2-ethylhexyl) phthalate, cyanide, chlorodibromomethane, dichlorobromomethane, manganese, molybdenum, nitrate plus nitrite, chronic whole effluent toxicity, carbonaceous biochemical oxygen demand (CBOD<sub>5</sub>), and total suspended solids (TSS)
- Salinity Requirements
- Groundwater Limits

- 1. New Effluent Limitations.** The proposed Order contains new water quality-based effluent limitations for aluminum, bis (2-ethylhexyl) phthalate, cyanide, chlorodibromomethane, dichlorobromomethane, electrical conductivity (EC), manganese, molybdenum, nitrate plus nitrite, and chronic whole effluent toxicity. The proposed Order also contains more stringent effluent limitations for CBOD<sub>5</sub>, and TSS. Based on the performance of the Facility, the Discharger may not be capable of immediately complying with the effluent limitations for aluminum, chlorodibromomethane, dichlorobromomethane, bis (2-ethylhexyl) phthalate, and cyanide. Time schedules for compliance with these effluent limitations may not be allowed in the permit, therefore, the time schedules are included in the proposed Time Schedule Order. The compliance time schedules require compliance with the final effluent limitations by 1 October 2013.
- 2. Salinity Requirements.** The proposed Order includes new salinity requirements, as discussed in detail above. The new requirements are outlined on page 4 (see bullets).
- 3. Groundwater Limits.** The proposed Order contains new numeric groundwater limits for fecal Coliform Organisms, and Nitrate plus Nitrite, which are effective upon the characterization of background groundwater quality. To comply, the Discharger cannot cause the groundwater within the influence of the Facility to exceed the greater of 1) the new groundwater limits or 2) the natural background groundwater quality. The proposed Order contains an associated provision that requires the Discharger to characterize the natural background groundwater quality.

## CHANGES TO PROPOSED ORDERS

The tentative NPDES permit has been modified based on comments received to provide clarification and/or correct minor factual errors. In addition to these corrections and clarifications, five changes have been made to the proposed Order that require some explanation. These changes are discussed in detail below. All changes are incorporated into the agenda copies of the Orders. Underline/Strikeout versions will be made available to the Discharger and interested persons on the Regional Water Board's website.

**Chronic Whole Effluent Toxicity.** In WQO 2008-0008, the State Water Board concluded that NPDES permits must include appropriate chronic toxicity effluent limitations when chronic whole effluent toxicity tests indicate the discharge has reasonable potential to cause or contribute to an exceedance of the Basin Plan's narrative toxicity objective. Based on this Order, and comments received, a chronic whole effluent toxicity narrative effluent limitation and compliance determination language were added to the proposed Order.

**New Reopener Provisions.** Three new reopeners have been added to the proposed Order based on comments received on the tentative Order.

Central Valley Drinking Water Policy. The Regional Water Board is currently working with stakeholders to develop a Drinking Water Policy for the Central Valley. Based on the current schedule, the Basin Plan may be proposed to be amended in 2009 or 2010 to incorporate water quality objectives for the protection of drinking water supplies. This reopener was added to allow the Regional Water Board to reopen the permit to include appropriate effluent limitations, as necessary, to require compliance with these objectives

Ammonia Studies. The Regional Water Board contracted with researchers at the University of California, Davis Aquatic Toxicology Laboratory to initiate studies to evaluate the potential effects of ammonia on delta smelt. Based on comments received on the tentative Order, this reopener was added to allow the Regional Water Board to reopen the permit to add or modify ammonia limitations, or add requirements, based on defensible scientific findings

Regional Monitoring Program. The State and Regional Water Boards are committed to creation of a coordinated Regional Monitoring Program to address receiving water monitoring in the Delta for all Water Board regulatory and research programs. Therefore, the reopener was added to allow the Regional Water Board to reopen the permit to make appropriate adjustments in permit-specific monitoring to coordinate with the Regional Monitoring Program.

**Special Provision Wastewater Spill Notification Requirement.** The Regional Water Board is dedicated to protecting the Beneficial Uses of the Delta and the San Joaquin River. The Delta is heavily used as a municipal, industrial and agricultural water supply. California Urban Water Agencies requested that the City immediately notify downstream drinking water agencies of any spills that reach the Delta. Regional Water Board staff agrees, and therefore, a special provision was added to the proposed Order that requires the Discharger to immediately notify specified drinking water agencies about any spill that reaches the Delta.