

STAFF REPORT
CITY OF VACAVILLE
EASTERLY WASTEWATER TREATMENT PLANT
SOLANO COUNTY

Consideration of a NPDES Permit renewal and Time Schedule Order for the City of Vacaville Easterly Wastewater Treatment Plant.

BACKGROUND

The City of Vacaville (Discharger or City) owns and operates the Easterly Wastewater Treatment Plant (WWTP), a publicly owned treatment works, which provides sewerage service to the City of Vacaville and the unincorporated community of Elmira. The treatment system consists of head works (screw pumps, bar screens, grit chamber), primary clarifiers, activated sludge reactors, secondary clarifiers, a chlorine contact chamber, dechlorination, sludge thickeners, sludge digesters, sludge drying beds/lagoons and a stabilization pond. The plant nitrifies but does not denitrify the wastewater.

The City is currently operating under Order No. 5-01-044, adopted by the Regional Water Board on 15 March 2001. Secondary effluent is discharged to Old Alamo Creek, an ephemeral stream that flows approximately 3.7 miles to New Alamo Creek, which flows approximately 2.7 miles to Ulatis Creek (within the Delta's legal boundary). About 5.5 miles downstream from the confluence of New Alamo Creek and Ulatis Creek is Cache Slough. The abandoned Vallejo Pump Station is located in Cache Slough, which was previously used by the City of Vallejo as its potable water supply until 1990. The City is currently permitted to discharge an average dry weather flow (ADWF) of 15 mgd and recently completed construction of a 15 mgd secondary WWTP expansion project with funding from the State Revolving Fund Loan Program. The City submitted a Report of Waste Discharge in September 2005 to renew its NPDES permit. The City has not requested capacity beyond the recently constructed 15 mgd.

After adoption of Order No. 5-01-044, the City appealed the permit to the State Water Board. On 3 October 2002, the State Water Board adopted Order WQO 2002-0015, remanding the permit back to the Regional Water Board. WQO 2002-0015 concluded the following:

1. The Regional Water Board properly interpreted its Basin Plan and properly assigned uses to Old Alamo Creek. However, the Order also concluded that COLD and MUN do not exist for Old Alamo Creek and probably cannot be feasibly attained in the future. Therefore, the Order directed the Regional Water Board to expeditiously initiate basin plan amendments to consider dedesignating these uses for Old Alamo Creek.

2. The Order required the Regional Water Board to stay the effluent limit for copper, the interim effluent limit for chloroform, the receiving water limit for temperature, the receiving limit for ammonia and the groundwater limit for EC.
3. Although the Order concluded that the Regional Water Board properly included tertiary treatment requirements, the Order required the Regional Water Board stay the compliance schedule for coliform, turbidity, and suspended solids until the Regional Water Board acted on the remand.
4. The Order required the Regional Water Board stay for 3 years, the compliance schedules for the DO effluent limit, DO receiving water limit, BOD effluent limit and effluent limits for dichlorobromomethane, chlorodibromomethane, and chloroform.

The City subsequently filed a lawsuit in November 2002 with the Contra Costa County Superior Court against both the Regional Water Board and the State Water Board over the 2001 NPDES permit. The issues of the lawsuit surrounded the beneficial use designations, tertiary treatment requirements, and the prohibition of blending (by-pass of secondary treatment) during wet weather flows. The lawsuit by the City is finally set to be heard in March 2008 by the Contra Costa County Superior Court.

In September 2003, the Regional Water Board adopted resolution No. R5-2003-0129 staying the requirement prohibiting by-pass of secondary treatment of wet weather flows until the Contra Costa County Superior Court reviews the City's petition.

In April 2005, the Regional Water Board adopted a Basin Plan amendment designating Old Alamo Creek for MUN, COLD and SPAWN, effective August 2006. The City is currently developing information for site-specific objectives for New Alamo Creek and Ulatis Creek. Regional Water Board staff plan to submit their analyses of the use attainability of New Alamo Creek and Ulatis Creek to the State Water Board by September 2008.

SEASONAL TERTIARY REQUIREMENTS

The proposed tentative NPDES permit for the City of Vacaville Easterly Wastewater Treatment Plant requires seasonal tertiary treatment requirements, based on a health risk assessment study conducted by the City and an October 2002, recommendation from the California Department of Public Health (CDPH). According to CDPH, secondary treated wastewater provides an acceptable level of disinfection from November through April, because the beneficial uses of contact and non-contact recreation (REC-1 and REC-2) and agricultural water supply (AGR) are not expected during these months. Due to possible concerns from interested persons with this permitting approach, two alternative options were provided for public review and comment. The two options include year-round Title 22 (or equivalent) tertiary requirements or a seasonal requirement similar to that proposed in the tentative Order, but with the requirement to operate the tertiary filters up to the design capacity year-

round. These options are available for consideration by the Regional Water Board at the 24/25 April 2008 Regional Water Board meeting.

ASSIMILATIVE CAPACITY / DILUTION AND MIXING ZONES

The City completed an effluent dilution analysis, prepared by Flow Science to better assess the fate and dilution of the facility's effluent in its receiving waters. The analysis evaluated the fate and dilution of the effluent under a range of seasonal conditions. Based on results of the dilution dye study, and protective of all scenarios, the minimum dilution available at the confluence of Old Alamo and New Alamo Creeks is 1.1 to 1.0. Therefore, a dilution credit of 1.1 was used in this order when establishing effluent limitations for the protection of MUN at New Alamo Creek (MUN is not applicable in Old Alamo Creek). The dilution credit is based on a worst-case dilution during low flow periods in New Alamo Creek and may not be appropriate for long-term human health criteria. Therefore, the proposed Order requires the Discharger to conduct a dilution study to evaluate the available dilution in New Alamo Creek, based on the harmonic mean flow in New Alamo Creek.

Due to periods of no flow in Old Alamo Creek upstream of the discharge, no dilution has been allowed for setting effluent limitations for protection of beneficial uses applicable to Old Alamo Creek (i.e. AGR, PRO, IND, REC-1, REC-2, WARM, WILD and NAV).

SALINITY

The average effluent EC was 984 $\mu\text{mhos/cm}$ and the maximum reported was 1320 $\mu\text{mhos/cm}$, based on effluent data collected from January 2004 – July 2007. The data indicated that the effluent EC concentration has been increasing. The effluent from the WWTP exceeds the Agriculture Goal of 700 $\mu\text{mhos/cm}$ EC. Additionally, the Basin Plan contains site-specific salinity objectives at Cache Slough for chloride when the Vallejo Pumping Station is in use. The chloride limit is 250 mg/L. The WWTP meets this requirement. The Vallejo Pumping Station was abandoned in 1990 and is not in use. Vallejo now uses higher quality water from the North Bay Aqueduct under an agreement with the City of Vacaville that includes discontinued use of the Cache Slough Pump Station. This limit may no longer be appropriate, however, the limit was included in the recent December 2006 Bay-Delta Plan update.

The City completed a Salinity Source Control Study Phase I Report and a Salinity Source Control Study Final Effectiveness Assessment Report, as required by Order No. 5-01-044, to evaluate the salinity of the discharge. The City uses three sources of municipal drinking water; the North Bay Aqueduct, Lake Berryessa, and groundwater. The weighted average EC of the municipal source water since 2001 is 402 $\mu\text{mhos/cm}$. The City's salinity reports show that the greatest contributor of salt is residential use, followed by industry and commercial facilities. The City estimates that approximately 6000 pounds/day of salt is discharged to the WWTP from residential water softeners.

To reduce salinity, the City has examined and implemented the following:

- 1) Public education - Public education actions included information sheets and surveys distributed to residents, meetings with water softener vendors & dentists, and presentations to community groups and high school students. After 3 years there is no statistically significant change in the salinity from residential wastewater.
- 2) Local Ordinance development - Local ordinance development evaluated restricting residential use of water softeners. AB 334 amends state law on water softeners and restricts local agencies from developing ordinances to eliminate water softeners without a salinity limit in its NPDES permit. The City cannot take action on a local ordinance until the Regional Water Board adopts a salt limit.
- 3) Alternative Water Source - The City plans to decrease use of groundwater and increase use of Delta water for source water. Eventually, salinity would decrease. No formal actions have been taken toward this goal.
- 4) Source identification and Control Studies. The major discharging industries are pharmaceutical, California Medical Facility for inmates, and California State Prison. All of these industries conducted source control and process analyses to reduce salts. Additional reduction from industries is not expected.

The proposed Order requires the City to continue implementation of its salinity source control plan and perform a study to develop a site-specific numeric objective for salinity to protect local crops that are irrigated with the receiving water. An interim EC limit of 1320 $\mu\text{mhos/cm}$ (as a monthly average) is included in the proposed Order based on facility performance, to hold effluent salinity at current levels until a site-specific numeric objective can be developed. Furthermore, the proposed Order requires the Discharger to provide annual reports demonstrating reasonable progress in the reduction of salinity in its discharge to Old Alamo Creek and sets an annual average salinity goal of 864 $\mu\text{mhos/cm}$ as electrical conductivity is a reasonable intermediate goal for the term of the Order. The goal is based on the weighted average electrical conductivity of the City of Vacaville's water supply (i.e. 364 $\mu\text{mhos/cm}$ in 2006), plus an increment of 500 $\mu\text{mhos/cm}$ for typical consumptive use.

ANTIDegradation ANALYSIS

The proposed Order does not allow for an increase in flow or mass of pollutants to the receiving water. Therefore, a complete antidegradation analysis is not necessary. The Order requires compliance with applicable federal technology-based standards and with water quality-based effluent limits (WQBELs) where the discharge could have the reasonable potential to cause or contribute to an exceedance of water quality standards. The proposed Order requires Title 22 tertiary treatment or equivalent, which is a high level of treatment that is considered best practicable treatment or control (BPTC) for most constituents in the wastewater and will result in attaining water quality standards applicable to the discharge. The permitted surface water and groundwater discharges are consistent with the antidegradation provisions of 40 CFR 131.12 and

State Water Board Resolution 68-16. Compliance with the requirements of the proposed Order will result in the use of BPTC of the discharge. The impact on existing water quality will be insignificant.

GROUNDWATER

The Discharger utilizes a lined aerated lagoon for storage of stabilized solids from the anaerobic digesters and a lined filtrate storage pond for storage of all the water removed from the biosolids by the belt presses. The Facility's impact to groundwater quality was one of the issues associated with the previous Order and the State Water Board's subsequent water quality Order No. 2002-0015. As part of its order, the State Water Board stated that "...without more information on well location and some explanations of the changes in nitrate-N, TDS, and pH concentrations..." it was "...unable to draw meaningful conclusions from the monitoring data." As a result of the uncertainty, the State Water Board remanded the issue back to the Regional Water Board for further clarification and to give the Discharger the opportunity to respond. The Discharger in response to this directive, hired the services of Luhdorff & Scalmanini to conduct a shallow groundwater quality investigation. Based on the results of the investigation, submitted as part of the Report of Waste Discharge, it appears that groundwater was minimally impacted due to the facility's operation and that operational changes, like decommissioning of old storage ponds and the lining of any new storage ponds, have resulted in a steady decline in impact. However, the groundwater is also influenced by Old Alamo Creek where the discharge is located. An August 2005 shallow groundwater evaluation by Luhdorff and Scalmanini concluded Old Alamo Creek influences groundwater quality. Groundwater monitoring wells #3 and #5 show nitrate concentrations above the primary MCL of 10 mg/l since 2002. The report indicates the rising nitrate concentrations in monitoring well #3 are the result of temporary mobilization of soil nitrate from nearby construction excavation work and most recent data shows a decrease in nitrate concentration. The nitrate concentrations may also be the result of nitrifying the wastewater and increasing nitrate concentration in the effluent. Regardless, the nitrate concentrations are above both water quality objectives and background groundwater monitoring wells. Therefore, the City must immediately and definitely determine if the nitrate in the groundwater is the result its actions or inactions. BPTC will be required if the increased groundwater nitrate concentrations are found to be due to the City.

FINAL EFFLUENT LIMITATIONS

Parameter	Units	Effluent Limitations				
		Average Monthly	Average Weekly	Maximum Daily	Instantaneous Minimum	Instantaneous Maximum
BOD 5-day 20°C 1 May – 31 October	mg/L	10	15	20	--	--
	lbs/day ¹	1252	1878	2504	--	--
Total Suspended Solids 1 May – 31 October	mg/L	10	15	20	--	--
	lbs/day ¹	1252	1878	2504	--	--
BOD 5-day 20°C 1 November – 30 April	mg/L	20	25	30	--	--
	lbs/day ¹	2504	3129	3755	--	--
Total Suspended Solids 1 November – 30 April	mg/L	30	45	50	--	--
	lbs/day ¹	3755	5633	6259	--	--
Turbidity ⁴ 1 May – 31 October	NTU	--	--	2	--	10
Total Coliform 1 May – 31 October	MPN/100mL	--	2.2 ⁵	23 ⁶	--	240
Total Coliform 1 November – 30 April	MPN/100mL	23 ⁷	--	--	--	240
Settleable Solids	ml/L	0.1	--	0.2	--	--
pH	std units	--	--	--	6.5	8.5
Ammonia (as N) (total recoverable)	mg/L	1.3	--	3.2	--	--
	lbs/day ¹	163	--	400	--	--
Cyanide (total recoverable)	µg/L	4.1	--	8.9	--	--
Chlorodibromomethane	µg/L	0.41	--	0.86	--	--
Total Trihalomethanes ³	µg/L	--	--	122	--	--
Dichlorobromomethane	µg/L	0.63	--	0.99	--	--
Nitrate (as N) (total recoverable)	mg/L	17	--	--	--	--
Acute Toxicity ⁸	% Survival					

1. Based upon a design treatment capacity of 15 mgd (ADWF).
2. Non Detect
3. Total Trihalomethanes include chlorodibromomethane, bromoform, dichlorobromomethane and chloroform.
4. Effluent turbidity shall not exceed 2 NTU, as a daily average; 5 NTU, more than 5% of the time within a 24-hour period, and 10 NTU at any time. No turbidity effluent limits from 1 November – 30 April.
5. Expressed as a 7-day median.
6. Not to be exceeded more than one time in any 30-day period.
7. Expressed as a 30-day median.
8. 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.

SITE-SPECIFIC OBJECTIVES and CASE-BY-CASE EXCEPTION TO CHLORODIBROMOMETHANE AND DICHLOROBROMOMETHANE REQUIREMENTS

Surveys to determine if the municipal and domestic supply beneficial use (MUN) exists or is attainable in New Alamo Creek and Ulatis Creek have been conducted. The

Regional Water Board is reviewing data to determine if some limits may be unnecessary for the protection of human health. If the Regional Water Board adopts a Basin Plan amendment that removes or redefines the MUN beneficial use for the lower segments of New Alamo Creek and Ulatis Creek and/or adopts site-specific objectives for one or more human health constituents some limitations may be modified or removed.

In addition to site specific objectives, the City applied for a case-by-case exception from the CTR for dichlorobromomethane and chlorodibromomethane that the Regional Water Board's Basin Planning Unit supports and submitted to the State Water Board on 1 June 2007. The State Water Board is reviewing the request. The City cannot meet the MUN - CTR Human Health, water and organism limits of 0.63 µg/L and 0.41 µg/L with an MEC of 43 µg/L and 14 µg/L, respectively. The request is in addition to the City's request for site specific requirements for New Alamo and Ulatis Creeks.

STUDY REQUIREMENTS

Electrical Conductivity (EC) and pH Study. The proposed Order requires the Discharger to complete and submit a report on the results of a site-specific investigation of appropriate EC and pH levels to protect the beneficial use of agricultural supply for the most salt sensitive crops in areas irrigated with Old Alamo Creek, New Alamo Creek, and Ulatis Creek waters in the vicinity of the discharge under reasonable worst-case conditions.

Groundwater Monitoring Work Plan/ Water Quality Characterization and BPTC. Due to groundwater degradation concerns, the proposed Order requires the Discharger to evaluate its groundwater monitoring network to ensure there are one or more background monitoring wells and a sufficient number of designated monitoring wells downgradient of every treatment, storage, and disposal unit that does or may release waste constituents to groundwater. The Discharger, after 2 years of monitoring, shall characterize natural background quality of monitored constituents in a technical report. If the groundwater monitoring results show that the discharge of waste is threatening to cause or has caused groundwater to contain waste constituents in concentrations statistically greater than background water quality, the Discharger shall submit a BPTC Evaluation Work Plan that sets forth a scope and schedule for a systematic and comprehensive technical evaluation of each component of the facilities' waste management system to determine BPTC for each the waste constituents of concern.

Effluent and Receiving Water Characterization Study. An effluent and receiving water monitoring study is required to ensure adequate information is available for the next permit renewal. During the third year of the permit term, the Discharger shall conduct monthly monitoring of the effluent at EFF-001 and of the receiving water.

COMMENTS

Written comments on the proposed Orders were required to be received by the Regional Water Board by 17 March 2008 in order to receive full consideration. Comments were received by the deadline from the Discharger and the Central Valley Clean Water Association (CVCWA)

The major issues discussed in the public comments are summarized below. A complete response to comments is provided in the agenda package.

Total Trihalomethanes Effluent Limitations.

The Discharger contends the Tentative Order incorrectly uses the maximum effluent concentration from the WWTP to determine reasonable potential. Because THM compounds are volatile and thus attenuated through the Old Alamo Creek channel, reasonable potential should be determined for the terminus of Old Alamo Creek, immediately prior to its confluence with New Alamo Creek. When data from this location are evaluated against the total THM criterion, Primary Maximum Contaminant Level (MCL), there is no reasonable potential. The approach proposed for determining reasonable potential is not inconsistent with state or federal regulations

Regional Water Board staff disagree. Although the Total THMs water quality objective is a USEPA primary MCL, Total THMs include bromoform, dichlorobromomethane, chloroform, and chlorodibromomethane, all of which are CTR constituents. The state's *Policy for Implementation of Toxics Standards for Inland Surface Waters, Enclosed Bays, and Estuaries of California* ("SIP") requires reasonable potential analysis (RPA) procedures for California Toxics Rule (CTR) and National Toxics Rule (NTR) constituents and must be followed for these constituents regardless of whether the CTR or NTR criteria are the most stringent criteria used for the protection of beneficial uses. The RPA using the SIP shows reasonable potential for total THMs, therefore, water quality-based effluent limitations (WQBELs) are required. A dilution credit has been applied in the WQBELs calculation to account for the fact that the MUN beneficial use does not apply in Old Alamo Creek.

Groundwater Limitations.

The Tentative Order fails to provide proper justification for the imposition of all the groundwater limitations. The Regional Water Board is required to support decisions with specific findings and must relate evidentiary findings to the ultimate order. . In particular, the Regional Water Board must "set forth findings to bridge the analytic gap between the raw evidence and ultimate decision or order."

Moreover, the Tentative Order would apply the groundwater limits in the shallow groundwater. The Discharger submits that the beneficial uses, which the limits are intended to protect, do not actually occur in the shallow groundwater. In this regard,

consideration must be given to the appropriate and reasonable point of compliance and any mixing zone.

The Discharger contents at the very least, the groundwater limitations should not apply until such time that the City has the opportunity to collect additional data, characterize the natural background, determine the most appropriate groundwater limits, and demonstrate that the lowering of groundwater is consistent with Resolution 68-16.

The Basin Plan designates all groundwaters, including the shallow groundwater in the vicinity of the Facility, to have the beneficial of MUN, AGR, IND and PRO. Regional Water Board staff have clarified this in the Findings and Fact Sheet of the proposed Order. The groundwater limitations are protective of these beneficial uses and information is provided in the Fact Sheet referencing the appropriate limits for the beneficial uses. The Discharger was required to collect additional data, and characterize the natural background in the previous Order No. 5-01-044. Unfortunately, the Discharger nor its consultant recognized the questionable location for the background monitoring well thus requiring additional analyses be conducted as a requirement of the proposed Order.

The groundwater limitations are either the numeric limitations in the Order or the background water quality, whichever is greater. Since the natural background water quality has not been characterized, compliance with the groundwater limitations can not be determined until an adequate background groundwater monitoring well is established. Therefore, the proposed permit has been modified by making the groundwater limitations (Section V.B.2.) effective within 42 months of adoption of the Order or upon submission of the Groundwater Quality Characterization Study, whichever is sooner.

Effluent Diazinon and Chlorpyrifos Monitoring.

There is no reasonable potential for bromoform and no effluent limitation for bromoform. Therefore, it should be removed from the monitoring requirements. Based on comments provided above, total THMs also should be removed. Similarly, neither diazinon nor chlorpyrifos have ever been detected in the WWTP effluent. Therefore, the requirement to monitor these constituents quarterly also should be removed.

Regional Water Board staff disagree that bromoform and Total THMs should be monitored. The proposed permit includes an effluent limitation for total THMs, which includes bromoform. In order to determine compliance with the THM effluent limitations, bromoform must be monitored. Staff agree that quarterly monitoring for Diazinon and Chlorpyrifos is excessive. The proposed permit already requires monitoring of these constituents in preparation of the next permit renewal, which is adequate considering these constituents have never been detected in the effluent.

CHANGES TO TENTATIVE ORDER

The tentative NPDES permit has been modified in a few areas based on comments received to provide clarification and/or correct minor factual errors. In addition, the following more significant changes have been made based on comments received:

1. Reduced monitoring for acute toxicity, chronic toxicity from weekly and monthly to monthly and quarterly as in the previous permit.
2. Reduced monitoring for effluent BOD, TSS, and total coliform organisms from 1/day to 5 days/week, which is consistent with the previous permit.
3. Total coliform monitoring for groundwater has been changed to fecal coliform.
4. Receiving water monitoring for fecal coliform has been removed, compliance to be determined at end of pipe for total coliform.
5. Diazinon and Chloropyrifos monitoring has been changed from annually to one year of quarterly monitoring.
6. Aluminum has been eliminated from influent monitoring.
7. A dilution study to determine the human health dilution credit has been included in the permit.
8. Changed effective date of new groundwater limitations from being effective immediately to being effective after submission of Groundwater Quality Characterization Study, which will provide natural background water quality.
9. Typographical errors and clarifying language have been corrected or added to the permit.