STAFF REPORT
CONSIDERATION OF NPDES PERMIT RENEWAL
FOR

CITY OF DAVIS
WASTEWATER TREATMENT PLANT
YOLO COUNTY

A renewed NPDES Permit for the City of Davis Wastewater Treatment Plant is being considered for Regional Water Quality Control Board adoption.

BACKGROUND

The City of Davis (Discharger) owns and operates an equivalent-to-secondary wastewater treatment plant (WWTP) with a design capacity of 7.5 million gallons per day. After treatment, the disinfected equivalent-to-secondary effluent is discharged into two different receiving waters, the Willow Slough Bypass and the Conaway Ranch Toe Drain, which converge into the Yolo Bypass immediately downstream of both discharge locations. The existing discharge is regulated by Waste Discharge Requirements Order No. 5-01-067.

FACILITY DESCRIPTION

The existing WWTP consists of headworks, primary sedimentation, aeration ponds, oxidation ponds, a Lemna (an aquatic plant) pond, an overland flow system, disinfection and dechlorination, wetlands, anaerobic digesters, and a sludge lagoon. The treatment train varies and the Discharger alternates discharge to the two receiving waters. Effluent discharged to the Conaway Ranch Toe Drain passes through wetlands; effluent discharged to the Willow Slough Bypass does not. Sludge is dewatered in an unlined sludge lagoon and land applied into the onsite overland flow system.

The proposed NPDES permit renewal requires the Discharger to upgrade the WWTP to provide tertiary treatment and nitrification/denitrification, and prohibits the current land application of biosolids to the overland flow system. The proposed maximum permitted flow rate and discharge locations will remain the same as in the existing NPDES permit.

PERMIT ISSUES

The following is a summary of the major issues regarding the proposed NPDES Permit. It only provides general background. Further detail is included in the Regional Water Board staff Response to Comments.

1. <u>Compliance Schedule for Tertiary Treatment:</u> The WWTP is not a standard secondary treatment system, and upgrade of the equivalent-to-secondary treatment system is more complicated. A pilot study and treatability study completed in February 2007 indicates that first the WWTP must be upgraded to a conventional secondary treatment system. Then a selenium study on the secondary effluent must be conducted to properly design the tertiary treatment process. The Discharger has projected that it can upgrade the WWTP to tertiary

by 2015. The proposed five-year time schedule for the completion of tertiary treatment is the longest time schedule allowed to be placed in an NPDES permit. The Discharger anticipates that, upon the end of the proposed 5-year compliance schedule, additional time will be needed to complete construction of the tertiary WWTP.

2. Tertiary Treatment Requirement: The proposed permit requires the discharge be oxidized, coagulated, filtered, and adequately disinfected pursuant to the California Department of Health Services (DHS) reclamation criteria, Title 22 California Code of Regulations, Division 4, Chapter 3, (Title 22) or equivalent.

   The following California Water Code (CWC) section 13241 factors were considered as part of the permit development to require tertiary (or equivalent) level treatment.

   a. *Past, present, and probable future beneficial uses of water:*
   The designated beneficial uses of the Yolo Bypass include water contact recreation. The City of Woodland's *December 2000 - Recreation, Land Use, and Dilution Study of the Tule Canal and Toe Drain* (Study) indicates that the Yolo Bypass has been used for water contact recreation, including fishing (with human consumption of fish) and swimming. Additionally, the Willow Slough Bypass and Conaway Ranch Toe Drain are used for duck hunting, and the wetlands at the WWTP are open to the public and used as an educational facility for schoolchildren.

   The designated beneficial uses of the Yolo Bypass also include agricultural irrigation supply. The Study indicates that crops grown in the area with the potential to be irrigated with Yolo Bypass waters include food crops that require irrigation water be treated to a tertiary level to protect public health. The State of California Department of Water Resources 1997 Yolo County Land Use Survey shows tomatoes and either melons, squash, or cucumbers grown in the Yolo Bypass within the vicinity of the two existing discharges.

   b. *Environmental characteristics of the hydrographic unit under consideration, including the quality of water available thereto:*
   The Willow Slough Bypass and Conaway Ranch Toe Drain receiving water flows do not provide a 20:1 dilution of the effluent. The water in the Yolo Bypass includes tertiary-treated water from the City of Woodland WWTP. The upgrade to tertiary by the City of Davis WWTP will further improve the environmental characteristics of the hydrographic unit (including the quality of water available).

c. *Water quality conditions that could reasonably be achieved through the coordinated control of all factors that affect water quality in the area:*
As stated above, the City of Woodland currently discharges tertiary treated effluent to the Yolo Bypass. To protect public health, the California Department of Health Services recommends that discharges to receiving streams with contact recreation and less than 20:1 dilution be oxidized, coagulated, filtered and adequately disinfected to provide a median total coliform organisms concentration of 2.2 MPN/100 mL at some point in the treatment process.

d. *Economic considerations:*
The Discharger estimates the cost to upgrade the WWTP to tertiary or equivalent to be $140 million dollars. Much of this cost is for upgrades necessary to comply with the mandatory California Toxics Rule (CTR) limitations.

Effective the summer of 2007, the City of Davis (City) has a monthly user charge of $39.00, which covers the existing operation and management of the WWTP and preliminary design and planning for WWTP upgrades. The Wastewater User Charge Survey Report, prepared by the State Board shows the City of Davis' monthly user charge was $35.63 in fiscal year 2006-2007, (higher than the State average of $30.86) and the connection fee is $1276 (lower than the State average of $3547). However prior to fiscal year 2006-2007, the City's monthly user charges were lower than the State average. The City's monthly user charges were $25.38 during fiscal year 2005-2006 (State average was $28.09), $25.38 during fiscal year 2004-2005 (State average was $26.08), $22.46 during fiscal year 2003-2004 (State average was $24.03), and $9.29 during fiscal year 1996-1997 (State average was $18.83).

e. *The need for developing housing within the region:*
The Discharger is not requesting the WWTP be permitted to discharge an increased flow, which indicates the City does not anticipate needing additional treatment plant capacity to accommodate housing development within the next five years. However, any housing development may be facilitated by improved water quality, which protects the contact recreation uses of the receiving water. Any growth in the area will place greater demand on the available resources and will increase the potential for activities, such as contact recreation, that needs an improved surface water quality.

f. *The need to develop and use recycled water:*
Title 22 contains reclamation criteria for the reuse of wastewater, and requires recycled water be disinfected and treated to a tertiary level when used to irrigate food crops where the recycled water may come into contact with the edible portion of the crop. Tertiary treatment will allow for the continued reuse of the undiluted wastewater for food crop irrigation and contact recreation activities, which is otherwise unsafe according to recommendations from the DHS. These crops require irrigation water be treated to a tertiary level to protect public health.

3. Selenium Limitation: The proposed permit contains interim and final effluent limitations for selenium. Since selenium is a CTR constituent, the proposed permit requires the Discharger to comply with the final selenium effluent limitation by 18 May 2010. As part of the WWTP upgrade, the Discharger may need to remove the existing overland flow system. The overland flow system successfully removes selenium from the wastewater; however, it also contributes other pollutants into the wastewater. Therefore, the proposed removal of the existing overland flow system will improve the effluent quality for most constituents, but is likely to increase the concentration of effluent selenium. Achieving compliance with the CTR effluent selenium limitations may require a change in the City's water supply.

4. Salinity Limitations: Monitoring data indicates that electrical conductivity (EC), total dissolved solids (TDS), chloride, sodium, and boron have reasonable potential to exceed water quality screening values for protection of agricultural beneficial uses.

   The proposed permit includes a performance-based interim effluent limitation for EC and requires the Discharger to conduct and submit site-specific salinity studies on EC, boron, sodium, and chloride to determine appropriate levels to protect beneficial uses. Effluent limitations for TDS are not proposed because TDS concentrations are directly related to the EC levels in the wastewater. Additionally, the Discharger is required to develop and implement a Salinity Minimization Plan to minimize salinity in the water supply and wastewater treatment plant influent. The Discharger provided information indicating that compliance with future salinity effluent limitations will require implementation of long-term changes in the City's sources of water supply.

   The proposed permit (1) states that the water quality to be achieved is the level that is necessary to protect agricultural beneficial uses and requires the Discharger to identify the EC level that meets this objective, (2) explains that a final water-quality based effluent limitation is not being incorporated into the permit because further site-specific receiving water quality information is needed to address the appropriate level of protection of agricultural beneficial uses, and (3) includes a statement that "[i]t is the intent of the Regional Water Board to include a final EC effluent limitation in a subsequent permit renewal or amendment, based on the results of approved site-specific studies."

5. Dioxins and congeners: 1,2,3,4,6,7,8-HpCDD is a congener of chlorinated dibenzodioxins that exhibits toxic effects similar to those of 2,3,7,8-TCDD. USEPA toxic equivalency factors express the relative toxicities of the congeners compared to 2,3,7,8-TCDD. The effluent contained 1,2,3,4,6,7,8-HpCDD at concentrations exceeding its criterion, as determined using toxic equivalency factors. Therefore, the proposed permit includes a final effluent limitation for dioxin and congeners.

6. Biosolids Disposal: The Discharger currently land applies biosolids to the existing overland flow system and annually discs the plants that grow in that area back into the system itself. Since there is no removal of plants from the overland flow system, constituents from the sludge application may build up in the soil and percolate to groundwater. The proposed permit requires the Discharger to cease this practice within one year and to investigate and implement alternatives for biosolids disposal.

7. Hardness: Proposed effluent limitations for metal-dependent CTR constituents were based on the lowest reported hardness in the receiving stream. This is different from other NPDES permits, which apply lowest hardness during critical low flow periods. Additionally, during permit development, the use of a combination of effluent and receiving stream hardness has been analyzed for metal-dependent CTR constituents, based on studies that demonstrate this alternate method is protective of beneficial uses. Due to the timing of the tentative permit process, the use of the lowest hardness value during critical low flows and/or the alternative use of effluent hardness are not implemented in the proposed permit.

   There are three options for determining hardness-dependent metals criteria for the proposed permit:

   a. Retain the currently proposed effluent limitations based on the lowest reported receiving stream hardness of 56 mg/L for the Willow Slough Bypass and 74 mg/L for the Conaway Ranch Toe Drain. This is inconsistent with the approach used in recently adopted NPDES permits, and is overly protective of the receiving water during low flow conditions.

   b. Modify the proposed effluent limitations using the lowest reported hardness that occurs in the receiving stream during low flow conditions (179 mg/L for the Willow Slough Bypass, 138 mg/L for the Conaway Ranch Toe Drain). This would result in no "reasonable potential", and therefore no effluent limitations for copper for Discharge 001 or for silver for Discharge 002. It would also increase the copper effluent limitation value for Discharge 002. This is consistent with the approach used in recently adopted NPDES permits.

   c. Modify the effluent limitations using the lowest reported hardness of the effluent (270 mg/L for Discharge 001 and 320 mg/L for Discharge 002) for some constituents and the combination of the effluent and receiving stream hardness for other constituents (179 mg/L for the Willow Slough Bypass, 138 mg/L for the Conaway Ranch Toe Drain). This would result in no "reasonable potential", and therefore no effluent limitations, for copper for Discharge 001, or for silver for Discharge 002, and would increase the copper effluent limitation value for Discharge 002. Recent studies submitted by dischargers indicate that, if the metals in the effluent are non-toxic at the hardness of the effluent, the metals will not reach toxic concentrations in the receiving water, even if the hardness of the receiving water is lower than the hardness of the effluent. The submitted studies have been reviewed; however, implementation of effluent hardness for development of effluent limitations in NPDES permits has not been initiated.

8. Mass Limitations: Mass limitations for oxygen-demanding substances, bioaccumulative substances, and constituents with an associated 303(d) listing or total maximum daily load, are included in the proposed permit. The proposed permit includes mass limitations for 1) biochemical oxygen demand, total suspended solids, and ammonia since these are oxygen-demanding substances, and 2) dioxins, mercury, and selenium since these are bioaccumulative constituents. Mass limitations for copper and cyanide have been removed from the proposed permit for consistency with other adopted NPDES permits, as the water

quality impacts of these constituents in the Yolo Bypass and downstream waters are based upon the concentration of the constituents, not mass loading.

9. Technical Correction to Ammonia Limitations: A calculation error was identified in the proposed seasonal ammonia limitations included in the tentative permit. Correction of the error results in more stringent proposed final average monthly ammonia limitations from 1 November to 29 February for Discharge 001, less stringent proposed final average monthly ammonia limitations from 1 March to 31 October for Discharge 001, and less stringent proposed final average monthly ammonia limitations for Discharge 002.

SUMMARY

The proposed NPDES Permit Renewal authorizes a major discharge. It requires the Discharger to upgrade the City of Davis WWTP to provide tertiary treatment and nitrification/denitrification, and prohibits the current land application of biosolids to the overland flow system.

The proposed permit contains a significant number of new and more stringent effluent limitations. Compliance schedules are proposed to provide time for the Discharger to (1) upgrade the WWTP to provide tertiary (or equivalent) treatment and nitrification/ denitrification, (2) cease discharge of biosolids to the overland flow system, and (3) meet new final effluent limitations for aluminum, ammonia, copper, cyanide, dioxin and congeners, iron, manganese, selenium, and silver. Interim limitations are included for aluminum, ammonia, copper, cyanide, dioxin and congeners, electrical conductivity, iron, manganese, selenium, and silver. The Discharger may not be able to comply with the proposed compliance schedules due to the need for long-term WWTP upgrades and pollutant source control measures.

RECOMMENDATION

Adopt the proposed NPDES Permit.