CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
CENTRAL VALLEY REGION

ORDER NO. R5-2003-0003 AMENDMENT NO. 1

NPDES NO. CA0077895

WASTE DISCHARGE REQUIREMENTS FOR UNIVERSITY OF CALIFORNIA, DAVIS CAMPUS WASTEWATER TREATMENT PLANT YOLO AND SOLANO COUNTIES

The California Regional Water Quality Control Board, Central Valley Region, (hereafter Regional Board) finds that:

BACKGROUND

1. The University of California (hereafter Discharger) submitted a Report of Waste Discharge, dated 29 March 2002, and applied for a permit renewal to discharge waste under the National Pollutant Discharge Elimination System (NPDES) from the Davis Campus Wastewater Treatment Plant. Supplemental information to complete filing of the application was submitted on 16 August 2002, 30 August 2002, and 9 September 2002.

2. The Discharger owns and operates a wastewater collection, treatment, and disposal system, and provides sewerage service to University of California's Davis Campus. The treatment plant is in Section 21, T8N, R2E, MDB&M, as shown on Attachment A, a part of this Order. Treated municipal wastewater is discharged to South Fork Putah Creek (001), a water of the United States at the point, latitude 38˚, 31', 04" and longitude 121˚, 45', 25". The Discharger is proposing to also discharge treated municipal wastewater to the Arboretum Waterway (North Branch Putah Creek) (002), a water of the United States, at the point latitude 38°, 31´, 56" and longitude 121°, 45', 25".

3. The treatment system consists of a bar screen (located at the old WWTP), communitor, fine screen, oxidation ditch, secondary clarifiers, gravity filtration, and ultraviolet light disinfection. The oxidation basin is operated to nitrify and denitrify, reducing both the ammonia and nitrate concentrations in the wastewater. Sludge is stabilized in lined basins and dewatered by sludge drying beds lined with asphalt. Currently, sludge is disposed off-site at a landfill. Additionally, there is a 2.0 million gallon emergency pond located at the wastewater treatment plant site. All flows diverted to this pond are returned to the headworks. The Report of Waste Discharge describes the discharge as follows:

Monthly Average Dry Weather Flow:	1.525 million gallons per day (mgd)
Daily Peak Wet Weather Flow:	2.119 mgd
Design Flow (dry weather):	2.7 mgd
Average Temperature:	76°F Summer; 66°F Winter

Constituent	mg/l	lb/day
BOD[1]	1.2	15
Total Suspended Solids	1.2	15

[1] 5-day, 20°C biochemical oxygen demand

4. The Discharger began operating its new tertiary wastewater treatment plant in March 2000. The barscreens at the old plant are still used as part of the treatment processes. From the old treatment plant the wastewater is pumped to the new treatment plant. The old treatment plant used sludge drying facilities located near the University's Primate Center. These drying beds are no longer used, although some sludge remains in the beds. There are indications that groundwater may have been degraded with nitrates from the drying beds. The groundwater under the abandoned sludge drying beds at the Primate Center must be investigated for any groundwater degradation. Provision No. 7 requires the Discharger to complete a hydrogeologic evaluation of the groundwater at the Primate Center.

5. Putah Creek originally flowed through the City of Davis where the University is located. To prevent flooding, the City created South Fork Putah Creek and damming what is now known as the North Branch Putah Creek (arboretum). The North Branch Putah Creek is a water of the United States and is located on the campus and used as storm water retention basin and recreational impoundment. During dry weather, the arboretum water becomes stagnant and fills with algae. The Discharger proposes to treat the arboretum water at the new wastewater treatment plant to reduce the nutrients and other pollutants that currently accumulate in the arboretum. The arboretum water would be pumped to the new plant for treatment when wastewater flows are low. The arboretum water would be recycled back to the arboretum. Since domestic sewage is treated at the same time, the commingled waste stream must be regulated as reclaimed water in accordance with California Code of Regulations, Title 22. Before reclamation can begin, additional information and analyses must be completed including submittal and approval of a Title 22 Report.

   Engineering analyses on the ability of the wastewater treatment plant to treat the arboretum water, to meet water quality objectives, and not impact the treatment capability of the wastewater plant must be completed. A Plan of Operation detailing the quality of flow, operation hours, operation days, emergency procedures, maintenance, staffing, etc. must be submitted. Provision Nos. 8 and 9 require the Discharger to complete studies and reports before treating and discharging reclaimed water to the arboretum. The discharge of reclaimed water from the North Branch Putah Creek to the South Fork of Putah Creek may constitute a wastewater discharge and may require an NPDES permit. A decision on the requirement of an NPDES permit other than a storm water discharge permit will be made at a later date.

6. The U.S. Environmental Protection Agency (EPA) and the Regional Board have classified this discharge as a major discharge.

7. The Regional Board adopted a *Water Quality Control Plan*, *Fourth Edition, for the Sacramento and San Joaquin River Basins* (hereafter Basin Plan). The Basin Plan designates beneficial uses, establishes water quality objectives, and contains implementation programs and policies to achieve water quality objectives for all waters of the Basin. These requirements implement the Basin Plan.

8. USEPA adopted the *National Toxics Rule* (NTR) on 5 February 1993 and the *California Toxics Rule* (CTR) on 18 May 2000. These Rules contain water quality standards applicable to this discharge. The State Water Resources Control Board adopted the *Policy for Implementation of Toxics Standards for Inland Surface Waters (SIP), Enclosed Bays, and Estuaries of California* (known as the State Implementation Plan) which contains guidance on implementation of the *National Toxics Rule* and the *California Toxics Rule.*

BENEFICIAL USES OF THE RECEIVING STREAM

9. The beneficial uses of Putah Creek downstream of the discharge as identified in Table II-1 of the Basin Plan are municipal and domestic supply, agricultural irrigation, agricultural stock watering, body contact water recreation, canoeing and rafting, other non-body contact water recreation, warm freshwater aquatic habitat, potential cold freshwater aquatic habitat, warm spawning habitat and wildlife habitat.

10. In 1995, 1997 and 1998, University of California, Davis students under the direction of Dr. Peter Moyle observed juvenile and adult salmon in the South Fork Putah Creek. Some salmon were observed spawning in December and January 1997/1998. Therefore, the potential beneficial use of cold water aquatic habitat has been confirmed to exist in Putah Creek.

EFFLUENT LIMITATIONS AND REASONABLE POTENTIAL

11. Federal regulations require effluent limitations for all pollutants that are or may be discharged at a level that will cause or have the reasonable potential to cause, or contribute to an in-stream excursion above a narrative or numerical water quality standard. This Order contains provisions that:

    a. require the Discharger to conduct a study to provide information as to whether the levels of NTR and CTR constituents, EPA Priority Pollutants, and total chlorine residual, ammonia, nitrate + nitrite, aluminum, iron and electrical conductivity in the discharge have the reasonable potential to cause or contribute to an in-stream excursion above a water quality standard, including Basin Plan numeric and narrative objectives and NTR and CTR criteria;

    b. if the discharge has a reasonable potential to cause or contribute to an in-stream excursion above a water quality standard, require the Discharger to submit information to calculate effluent limitations for those constituents; and

    c. allow the Regional Board to reopen this Order and include effluent limitations for those constituents.

On 10 September 2001, the Executive Officer issued a letter, in conformance with State Water Code, Section 13267, requiring the Discharger to prepare a technical report assessing water quality. This Order is intended to be consistent with the requirements of the technical report in requiring sampling for NTR, CTR, and additional constituents to determine the full water quality impacts of the discharge. The technical report requirements are intended to be more detailed, listing specific constituents, detection levels, and acceptable time frames and shall take precedence in resolving any conflicts.

12. Federal regulations require effluent limitations for all pollutants that are or may be discharged at a level that will cause or have the reasonable potential to cause, or contribute to an in-stream excursion above a narrative or numerical water quality standard. Based on information submitted as part of the application, in studies, and as directed by monitoring and reporting programs the Regional Board finds that the discharge does have a reasonable potential to cause or contribute to an in-stream excursion above a water quality objective for total chlorine residual, ammonia, nitrate + nitrite, aluminum, copper, cyanide, iron, lead and electrical conductivity. Effluent limitations for these constituents are included in this Order. Additionally, the SIP requires the inclusion of effluent limits for dichloromethane and dioxin/furans because upstream in-stream sampling has shown that water quality standards have been exceeded for these constituents.

13. Section 13263.6(a), California Water Code, requires that "the regional board shall prescribe effluent limitations as part of the waste discharge requirements of a POTW for all substances that the most recent toxic chemical release data reported to the state emergency response commission pursuant to Section 313 of the Emergency Planning and Community Right to Know Act of 1986 (42 U.S.C. Sec. 11023) (EPCRKA) indicate as discharged into the POTW, for which the state board or the regional board has established numeric water quality objectives, and has determined that the discharge is or may be discharged at a level which will cause, have the reasonable potential to cause, or contribute to, an excursion above any numeric water quality objective".

    As detailed elsewhere in this Permit, available effluent quality data indicate that effluent concentrations of total chlorine residual, ammonia, nitrate + nitrite, aluminum, lead, dioxin/furans, copper, cyanide, dichloromethane, iron and electrical conductivity do have reasonable potential to cause or contribute to an excursion above narrative water quality objectives are included in this permit pursuant to CWC Section 13263.6(a).

14. The Basin Plan prohibits the discharge of toxic constituents in toxic concentrations. **Aluminum** can be toxic to aquatic organisms. Based on information included in analytical laboratory reports submitted by the Discharger, the discharge contained concentrations of aluminum as high as 87 µg/l, which is the U.S. EPA National Recommended Ambient Water Quality Criteria for protection of freshwater aquatic life. The Ambient Water Quality Criteria for the Protection of Freshwater Aquatic Life for aluminum is 87 µg/l for the 4-day average and 750 µg/l for the 1-hour average. The discharge has a reasonable potential to cause violation of the Basin Plan prohibition against the discharge of toxic constituents for aluminum. Additionally, the analytical results from a sample collected on 6 March 2002 from the South Fork Putah Creek upstream of the wastewater treatment plant discharge detected aluminum at 526 µg/l. Therefore, there is no assimilative capacity for aluminum in the receiving stream. Order No. 97-236, included a limit for aluminum

that was required to be met by November 2000. Although the limit has not been exceeded, there remains reasonable potential to exceed the limit. This effluent limitation, based on the Basin Plan narrative toxicity objective has been included in this permit.

15. Untreated domestic wastewater contains **ammonia**. Nitrification is a biological process that converts ammonia to nitrate. Inadequate or incomplete nitrification may result in the discharge of ammonia to the receiving stream. Ammonia is known to cause toxicity to aquatic organisms in surface waters. U.S. EPA has developed Drinking Water Standards for protection of human health for nitrate and Ambient Water Quality Criteria for ammonia. The Discharger currently nitrifies and denitrifies its effluent and discharges low concentrations of ammonia. Because ammonia is in all domestic wastewater failure to operate the wastewater treatment plant in nitrification mode would present a reasonable potential to cause or contribute to an in-stream excursion above the Basin Plan prohibition against the discharge of toxic constituents in toxic concentrations. The Effluent limitations for ammonia are included in this Order to assure the treatment process adequately nitrifies the waste stream to protect the beneficial uses of the receiving stream and to prevent aquatic toxicity. Denitrification is a process that converts nitrate to nitrogen gas, which is then released to the atmosphere. Wastewater treatment plants commonly use nitrification and denitrification processes to remove ammonia from the waste stream. Inadequate or incomplete nitrification or denitrification may result in the discharge of ammonia or nitrate to the receiving stream. U.S. EPA has developed Primary Maximum Contaminant Levels (MCLs) for the protection of human health for nitrate plus nitrite of 10 mg/*l*, and pH- and temperature-dependent Ambient Water Quality Criteria for ammonia. Recent toxicity studies have indicated a possibility that nitrate is toxic to aquatic organisms. The conversion of ammonia to nitrates presents a reasonable potential for the discharge to exceed the Primary Maximum Contaminant Level for nitrate. Nitrate concentrations in the effluent are as high as 42 mg/l. Therefore, this permit includes an effluent limitation for nitrate plus nitrite.

16. The Basin Plan prohibits the discharge of toxic materials in toxic concentrations. The Discharger has used **chlorine** for cleaning the filters, and can be used for odor control and filamentous organism control of the waste stream. Chlorine can cause toxicity to aquatic organisms. U.S. EPA recommends, in its Ambient Water Quality Criteria for the Protection of Fresh Water Aquatic Life, that chlorine concentrations not exceed 0.019 mg/*l* as a 1-hour average and 0.011 mg/*l* as a 4-day average. The use of chlorine presents a reasonable potential that it could be discharged in toxic concentrations. An Effluent Limitation for chlorine has been included in this Order to protect the receiving stream aquatic life beneficial uses. The effluent limitation has been established at the ambient water quality criteria for chlorine since, absent the discharge, the South Fork of Putah Creek may not flow during some periods of the year.

17. Based on information included in analytical laboratory reports submitted by the Discharger, **dichloromethane** in the discharge has a reasonable potential to cause or contribute to an in-stream excursion above the CTR water quality standard. The receiving stream, South Fork Putah Creek, upstream of the wastewater treatment discharge, showed a dichloromethane concentration of 35 µg/l on 11 February 2002. The CTR standard for dichloromethane for consumption of water and aquatic organisms is 4.7 µg/l. Therefore, the receiving stream has no assimilative capacity for dichloromethane. The SIP Section 1.3, requires an Effluent Limitation be established when the

concentrations of a pollutant in the receiving stream exceed a CTR standard. The highest effluent concentration was an estimated value of 0.6 µg/l, below detection level. Effluent limitations for dichloromethane are included in this Order and are based on the SIP and the CTR.

18. Based on information submitted as part of the application, in studies, and in monitoring reports, the discharge has a reasonable potential to cause or contribute to an in-stream excursion above the CTR Standards for **dioxins and furans** or their congeners, TCDD equivalents. The receiving stream, South Putah Creek upstream of the wastewater discharge showed a concentration of 1,2,3,4,6,7,8- HpCDD was 12.6 pg/l and OCDD was 55.9 pg/l in the 30 July 2002 sampling for the receiving stream. These congeners have assigned Toxic Equivalency Factors relative to toxicity of 2,3,7,8-TCDD. The CTR receiving water limit for dioxin (2,3,7,8-TCDD) is 0.000000014 µg/l (or 0.014 pg/l) where drinking water is not a designated beneficial use. The SIP requires the inclusion of effluent limitations where the stream sampling has exceeded the water quality standard. The stream sampling which exceed the CTR water quality standard presents a reasonable potential for continued exceedance of the standard and an effluent limitation for dioxin and furans is included in this Order. Since the discharge has not been shown to exceed the Effluent Limitation, a compliance time schedule is not included in this Order.

19. Based on analytical results of effluent samples collected by the Discharger, the discharge has a reasonable potential to cause or contribute to an in-stream excursion above the CTR standards for **copper**; therefore, effluent limitations for copper are included in the Order. Effluent results showing copper concentrations ranging from 29.3 – 4.2 µg/l were submitted by the Discharger. Copper toxicity is hardness dependent and the worst-case hardness for Discharger's effluent is 110 µg/*l*. Based on this hardness, the CTR standards are 9.7 µg/l as a 4-day average and 15 µg/l as a 1-hour average. The Ambient Water Quality Criteria for metals are presented in dissolved concentrations. Lacking site-specific conversion factors, U.S. EPA recommends conversion factors to translate dissolved concentrations to total concentrations. The conversion factors for copper in freshwater are 0.960 for both the acute and the chronic criteria. Order No. 97-236, included a limit for copper that was required to be met by November 2000. This limit was 13 µg/l for the 4-day average, 20 µg/l for the 1-hour average and both limits have been exceeded since November 2000. Copper effluent limitations are included in the Cease and Desist Order. The new limit is based on hardness. The effluent limitations for copper are presented in total recoverable concentrations, and are based on the CTR.

20. **Electrical Conductivity (EC)** is a method of measuring salinity in water. High salinity can impact the beneficial uses of receiving waters. The UCD Wastewater Treatment Plant (Facility) discharges to the South Fork of Putah Creek, which is a low flow/ ephemeral stream, with beneficial uses that include both municipal and domestic supply and irrigated agricultural supply. Based on information included in analytical laboratory reports submitted by the Discharger, EC in the discharge has a reasonable potential to cause or contribute to an in-stream excursion above a level necessary to protect drinking and irrigation water.

    The annual average for EC in the Discharger's wastewater treatment plant effluent is 1050 µhmos/cm. At times, the wastewater in the South Fork of Putah Creek may be undiluted or relatively undiluted. The EC of the receiving stream, without the wastewater discharge, is

approximately 522 µmhos/cm, which is fully protective of both municipal and irrigated agricultural uses.

The Basin Plan states, on Page III-3.00, Chemical Constituents, that "Waters shall not contain constituents in concentrations that adversely affect beneficial uses." The Basin Plan's "Policy for Application of Water Quality Objectives" provides that in implementing narrative water quality objectives, the Regional Board will consider numerical criteria and guidelines developed by other agencies and organizations. This application of the Basin Plan is consistent with Federal Regulations, 40CFR 122.44(d).

Municipal and domestic water supply is a beneficial use of Putah Creek. The Basin Plan requires that discharges not contain concentrations of chemical constituents in excess of the maximum contaminant levels (MCLs) specified in Title 22. The drinking water standards developed by the California Department of Health Services establish a secondary MCL for electrical conductivity at 900 µhmos/cm with an upper limit of 1,600 µhmos/cm and a short term maximum of 2,200 µhmos/cm. The discharge has reasonable potential to exceed the secondary MCL for electrical conductivity.

It is appropriate for the Regional Board to rely on technical documents for implementation of the narrative water quality objective. For EC, a publication (*Ayers R.S. and D.W. Westcott, Water Quality for Agriculture, Food and Agriculture Organization of the United Nations – Irrigation and Drainage Paper No. 29, Rev. 1, Rome (1985))* concluded that levels above 700 µhmos/cm will reduce crop yield for sensitive plants. The *University of California, Davis Campus, Agricultural Extension Service*, published a paper, dated 7 January 1974, stating that there will not be problems to crops associated with salt if the EC remains below 750 µhmos/cm. In reviewing *Irrigation Water Salinity and Crop Production, Stephen R. Grattan, University of California, Agriculture and Natural Resources, Publication 8066, Table 2,* the estimated crop yields for beans, carrots, eggplant and strawberries were shown to be 100% when EC levels were 700 µhmos/cm and decreased to 90% when the irrigation water EC rose to between 900 µhmos/cm and 1,700 µhmos/cm, depending on the individual crop. The discharge has the reasonable potential to cause or contribute to an exceedence of the Agricultural Water Quality Goal of 700 µhmos/cm for electrical conductivity.

Numerically the secondary MCL of 900 µhmos/cm and the agricultural goal of 700 µhmos/cm for EC are relatively close. The current municipal water supply averages 600 µhmos/cm for campus domestic water. However, some wells on campus show EC concentration of 500 µhmos/cm. The Discharger may be able to lower the EC concentration in its water supplies with use of wells with lower EC or new deeper groundwater wells. The Discharger may also have the ability to reduce salt loads through an effective pretreatment program, such as controlling cooling tower blowdown and groundwater cleanup discharges.

On 30 January 2003, at the Regional Board meeting, the University offered their expertise to develop site-specific objectives for electrical conductivity that fully protect the beneficial uses of Putah Creek. Section 13267 of the California Water Code allows the Regional Board to request technical information from dischargers to assist in the development of waste discharge

requirements. Under the direction of the Regional Board members, staff issued a letter requesting technical information on site-specific objectives for Putah Creek for electrical conductivity from the University. A time schedule is included in the request for technical information. After review of the technical information, the Regional Board may reopen this Order to include an EC limit for protecting the beneficial use of agriculture irrigation.

The limit for EC at the secondary MCL at 900 µhmos/cm is required to protect the beneficial uses of municipal and domestic water supply. The results of the 13267 study for site-specific objectives of electrical conductivity for agriculture may determine the need for a more stringent EC limit.

21. Based on information submitted as part of the application, in studies, and in monitoring reports, the discharge has a reasonable potential to cause or contribute to an in-stream excursion above the CTR Standard for **lead**. Lead is a heavy metal and was detected in the effluent as high as 7.42 µg/l in June 2002. Lead toxicity is hardness dependent. The CTR limit for lead is 2.8 µg/l for the 4-day chronic limit and 72 µg/*l* for the acute limit at the worst-case scenario of 110 mg/l hardness. The effluent limit for lead, included in this Order, is presented in total concentration, and is based on the CTR. A time schedule to allow the Discharger to come into compliance with the effluent limitation is included in this Order.

    Section 2.1 of the SIP provides that: "*Based on an existing discharger's request and demonstration that it is infeasible for the discharger to achieve immediate compliance with a CTR criterion, or with an effluent limitation based on a CTR criterion, the RWQCB may establish a compliance schedule in an NPDES permit*." Section 2.1, further states that compliance schedules may be included in NPDES permits provided that the following justification has been submitted: …"*(a) documentation that diligent efforts have been made to quantify pollutant levels in the discharge and the sources of the pollutant in the waste stream; (b) documentation of source control measures and/or pollution minimization measures efforts currently underway or completed; (c) a proposal for additional or future source control measures, pollutant minimization actions, or waste treatment (i.e., facility upgrades); and (d) a demonstration that the proposed schedule is as short as practicable."* This Order requires the Discharger to provide this information. The new water quality based effluent limitations for lead become effective on **1 April 2003** if a compliance schedule justification is not completed and submitted by the Discharger to the Regional Board. Otherwise, final water quality based effluent limitations for lead become effective **30 December 2007**.

22. Based on information included in analytical laboratory reports submitted by the Discharger, **cyanide** in the discharge has a reasonable potential to cause or contribute to an in-stream excursion above the CTR water quality standard. Cyanide was detected in an effluent sample collected 10 June 2002 at a concentration of 19 µg/l. The CTR recommended continuous concentration (maximum four-day average concentration) is 5.2 µg/l and the recommended maximum concentration (maximum one-hour average concentration) is 22 µg/l. Effluent limitations for cyanide are included in this Order and are based on the CTR for the protection of freshwater aquatic life. Additionally, the analytical results on June 2002 from the South Putah Creek upstream of the wastewater discharge detected cyanide at concentration of 6.7 µg/l.

Therefore, there is no assimilative capacity for cyanide in the receiving stream. Order No. 97-236, included a limit for cyanide that was required to be met by November 2000. This limit was 5.2 µg/l for the 4-day average, 22 µg/l for the 1-hour average, 700 µg/l as a 30-day average and the 4-day limit has been exceeded. Cyanide effluent limitations are included in this Order.

23. Based on information included in analytical laboratory reports submitted by the Discharger, **iron** in the discharge has a reasonable potential to cause or contribute to an in-stream excursion above a level necessary to protect drinking water. Iron was detected in an effluent sample collected 10 June 2002 at a concentration of 445 mg/l. U.S. EPA and California developed Drinking Water Secondary MCL's for iron and is 300 mg/l. Additionally, the analytical results in 6 March 2002 for South Putah Creek detected iron at 988 mg/l. Therefore, there is no assimilative capacity for iron in the receiving stream. Effluent limitations for iron are included in this Order and are based on protection of the municipal and domestic beneficial use of the receiving stream.

24. This Order and the Basin Plan prohibit the discharge of constituents that contain biostimulating substances which promote aquatic growth in concentrations that cause nuisance or adversely affect beneficial uses. **Phosphorus** is the most limiting constituent for aquatic plant growth in most water bodies. Phosphorus may contribute to excessive growth of algae and may exacerbate eutrophication. Increased algae limits the beneficial uses of South Fork Putah Creek. Based on information submitted as part of the application, the discharge may have a reasonable potential to cause or contribute to an in-stream excursion above the Basin Plan narrative prohibition against the discharge of biostimulating constituents. Phosphorus was detected in an effluent sample collected 16 January 2002 at a concentration of 5.4 µg/l. Additionally, the analytical results in 6 March 2002 for South Fork Putah Creek detected phosphorus at 0.14 µg/l. Effluent limitations for phosphorus as a biostimulating constituent have not been established. There is no effluent limit, however the concentration of phosphorus needs to be monitored in the effluent and is included in the Monitoring and Reporting Program. If a water quality standard for phosphorus is adopted, this permit may be reopened and an effluent limitation added.

25. Order No. 97-236 includes limits for **bis(2-ethylhexyl)phalate**, **hexachlorobutaiene** and **hexachloroethane**. Monitoring for these constituents since the operation of the new treatment facilities shows these constituents in concentrations below the water quality criteria. Elimination of these limits are consistent with the Federal Regulations for antibacksliding (40 CFR122.44(2)(i).

26. A substantial number of constituents including **volatiles**, **semi-volatiles**, **inorganics**, **pesticides** and **PCB's** were not analyzed at or below the criterion concentration by commercial laboratories. Therefore, reasonable potential cannot be determined for 1,1-dichloroethene, 1,1,2,2-tetrachloroethane, 1,2-dichloroethane, acrylonitrile, carbon tetrachloride, dibromochloromethane, hexachlorobenzene, hexachlorobutadiene, 1,2-benzathracene, 1,2-diphenylhydrazine, 2-chlorophenol, 2,4-dichlorophenol, 2,4-dinitrotoluene, 2,4,6-trichlorophenol, 2,6-dinitrotoluene, 3,3-dichlorobenzidine, benzidine, benzo(k)fluoranthene, bis(2-chloroethyl)ether, indeno(1,2,3-c,d)pyrene, n-nitrosodimethylamine, n-nitrosodi-n-propylamine, cadmium, silver, 4,4-DDD, 4,4-DDE, 4,4-DDT, aldrin, chlordane, heptachlor, heptachlor epoxide, PCB-1016, PCB-1221, PCB-1232, PCB-1242, PCB-1248, PCB-1254, PCB-1260, toxaphene, atrazine, carbofuran, DBCP,

diquat, ethylene dibromide, diazinon, chlorpyrifos, at this time. The Reporting and Monitoring Program requires the Discharger to continue monitoring for priority pollutants and other constituents twice a year in accordance with the SIP, Sections 2.3 and 2.4.

27. The beneficial uses of South Fork of Putah Creek include contact recreation uses and irrigation. To protect these beneficial uses, the Regional Board finds that the wastewater must be disinfected and adequately treated to prevent disease. The principal infectious agents (pathogens) that may be present in raw sewage may be classified into three broad groups: bacteria, parasites, and viruses. Tertiary treatment, consisting of chemical coagulation, sedimentation, and filtration, has been found to remove approximately 99.5% of viruses. Filtration is an effective means of reducing viruses and parasites from the waste stream. The wastewater must be treated to tertiary standards (filtered) to protect contact recreational and food crop irrigation uses.

    The California Department of Health Services (DHS) has developed reclamation criteria, California Code of Regulations, Title 22, Division 4, Chapter 3 (Title 22), for the reuse of wastewater. Title 22 requires that for spray irrigation of food crops, parks, playgrounds, school yards, and other areas of similar public access, wastewater be adequately disinfected, oxidized, coagulated, clarified, and filtered, and that the effluent total coliform levels not exceed 2.2 MPN/100 m*l* as a 7-day median. Title 22 is not directly applicable to surface waters; however, the Regional Board finds that it is appropriate to apply DHS's reclamation criteria because the South Fork of Putah Creek is used for irrigation of agricultural land and for contact recreation purposes. The stringent disinfection criteria of Title 22 are appropriate since the undiluted effluent may be used for contact recreation. Coliform organisms are intended as an indicator of the effectiveness of the entire treatment train and the effectiveness of removing other pathogens. The method of treatment is not prescribed by this Order; however, wastewater must be treated to a level equivalent to that recommended by DHS.

    In addition to coliform testing, a turbidity effluent limitation has been included as a second indicator of the effectiveness of the treatment process and to assure compliance with the required level of treatment. The tertiary treatment process, or equivalent, is also capable of reliably meeting a turbidity limitation of 2 nephelometric turbidity units (NTU) as a daily average. Failure of the filtration system such that virus removal is impaired would normally result in increased particles in the effluent, which result in higher effluent turbidity. Turbidity has a major advantage for monitoring filter performance, allowing immediate detection of filter failure and rapid corrective action. Coliform testing, by comparison, is not conducted continuously and requires several hours, to days, to identify high coliform concentrations.

    The application of tertiary treatment processes results in the ability to achieve lower levels for BOD and TSS year round; the 30-day average BOD and TSS limitations are 10 mg/*l*, which is technically based on the capability of a tertiary system. Review of the flow in the stream compared to the flow of the effluent indicates a less than 20:1 ratio even during wet weather. Therefore no allowance will be given for higher BOD or TSS limits during wet weather.

    The treatment system currently treats wastewater to a tertiary level when discharging to surface waters. The discharge limitations in the current permit establish coliform limits at 2.2 MPN/100 ml as a monthly median. The recommendation from DHS for the level of coliform produced by a

tertiary wastewater system is 2.2 MPN/100 ml as a 7-day median and is included in this Order. A review of the self-monitoring reports submitted by the Discharger indicates 2.2 MPN/100 ml as a 7-day median can be met with the current treatment facilities. Therefore, a schedule for compliance with the tertiary treatment requirement is not included as a Provision in this Order.

GROUNDWATER

28. The beneficial uses of the underlying ground water, as identified in the Basin Plan, are municipal and domestic, industrial service, industrial process, and agricultural supply.

29. Basin Plan water quality objectives to protect the beneficial uses of groundwater include numeric objectives and narrative objectives, including objectives for chemical constituents, toxicity of groundwater, and taste and odor. The toxicity objective requires that groundwater be maintained free of toxic substances in concentrations that produce detrimental physiological responses in humans, plants, or animals. The chemical constituent objective states groundwater shall not contain chemical constituents in concentrations that adversely affect any beneficial use or that exceed the maximum contaminant levels (MCLs) in Title 22, CCR. The Basin Plan requires the application of the most stringent objective necessary as necessary to ensure that groundwaters do not contain chemical constituents, toxic substances, radionuclides, or taste and odor producing substances in concentrations that adversely affect domestic drinking water supply, agricultural supply, or any other beneficial use.

30. State Water Resources Control Board (SWRCB) Resolution No. 68-16 (hereafter Resolution 68-16) requires the Regional Board in regulating discharge of waste to maintain high quality waters of the State until it is demonstrated that any change in quality will be consistent with maximum benefit to the people of the State, will not unreasonably affect beneficial uses, and will not result in water quality less than that described in the Regional Board's policies (e.g., quality that exceeds water quality objectives). Resolution 68-16 requires that the discharge be regulated to meet best practicable treatment or control to assure that pollution or nuisance will not occur and the highest water quality consistent with the maximum benefit to the people of the State be maintained.

31. Domestic wastewater contains constituents such as total dissolved solids (TDS), specific conductivity, pathogens, nitrates, organics, metals and oxygen demanding substances (BOD). The discharge of solids to land, with disposal to lined solid stabilization basins and lined sludge drying beds, and remaining sludge in at the Primate Center sludge beds may result in an increase in the concentration of these constituents in groundwater. Typically, wastewater treatment plants mechanically dewater solids with offsite disposal as the best practicable treatment. The increase in the concentration of these constituents in groundwater must be consistent with Resolution 68-16. Any increase in pollutant concentrations in groundwater must be shown to be necessary to allow wastewater utility service necessary to accommodate housing and economic expansion in the area and must be consistent with maximum benefit to the people of the state of California. Some degradation of groundwater by the Discharger is consistent with Resolution 68-16 provided that:

    a. the degradation is limited in extent;

b. the degradation, after effective source control and treatment, is limited to waste constituents typically encountered in municipal wastewater as specified in the groundwater limitations in this Order;

c. the Discharger minimizes the degradation by fully implementing, regularly maintaining, and optimally operating best practicable treatment and control (BPTC) measures; and

d. the degradation does not result in water quality less than that prescribed in the Basin Plan.

32. Groundwater monitoring results for the Primate Center wastewater facilities (abandoned facilities), submitted as part of the Report of Waste Discharge, show that nitrates and electrical conductivity may have degraded groundwater quality when compared to background. Continued monitoring of the groundwater must be conducted to determine if the discharge has caused an increase in constituent concentrations, when compared to background. The monitoring must, at a minimum, require a complete assessment of groundwater impacts including the vertical and lateral extent of degradation, an assessment of all wastewater-related constituents which may have migrated to groundwater, an analysis of whether additional or different methods of treatment or control of the discharge are necessary to provide best practicable treatment or control to comply with Resolution No. 68-16. Economic analysis is only one of many factors considered in determining best practicable treatment. If monitoring indicates that the discharge has incrementally increased constituent concentrations in groundwater above background, this permit may be reopened and modified. Until groundwater monitoring is sufficient, this Order contains Groundwater Limitations that allow groundwater quality to be degraded for certain constituents when compared to background groundwater quality, but not to exceed water quality objectives. If groundwater quality has been degraded by the discharge, the incremental change in pollutant concentration (when compared with background) may not be increased. If groundwater quality has been or may be degraded by the discharge, this Order may be reopened and specific numeric limitations established consistent with Resolution 68-16 and the Basin Plan.

33. The new wastewater facilities include solids stabilization basins (SSBs) and sludge drying beds. The basins have been lined with three feet of native clay and the sludge drying beds are lined with asphalt. Monitoring wells are installed to monitor the groundwater. Continued monitoring of the groundwater is required as described in the Monitoring and Reporting Program.

34. The discharge authorized herein and the treatment and storage facilities associated with the discharge of treated municipal wastewater, except for discharges of residual sludge and solid waste, are exempt from the requirements of Title 27, California Code of Regulations (CCR), section 20005 et seq. (hereafter Title 27). The exemption, pursuant to Title 27 CCR section 20090(a), is based on the following:

a. The waste consists primarily of domestic sewage and treated effluent;

b. The waste discharge requirements are consistent with water quality objectives; and

c. The treatment and storage facilities described herein are associated with a municipal wastewater treatment plant.

35. This Order requires the Discharger to continue groundwater monitoring and includes a regular schedule of groundwater monitoring in the attached Monitoring and Reporting Program. The groundwater monitoring reports are necessary to evaluate impacts to waters of the state to assure protection of beneficial uses and compliance with Regional Board plans and policies, including Resolution 68-16. Evidence in the record includes effluent monitoring data that indicates the presence of constituents that may degrade groundwater and surface water.

36. Section 13267 of the California Water Code states, in part, "*(a) A regional board, in establishing…waste discharge requirements… may investigate the quality of any waters of the state within its region"* and *"(b) (1) In conducting an investigation…, the regional board may require that any person who… discharges… waste…that could affect the quality of waters within its region shall furnish, under penalty of perjury, technical or monitoring program reports which the regional board requires.*" The attached Monitoring and Reporting Program is issued pursuant to California Water Code Section 13267. The monitoring and reporting program to monitor groundwater required by this Order and the attached Monitoring and Reporting Program are necessary to assure compliance with these waste discharge requirements. The Discharger operates the facility that discharges waste subject to this Order.

WATER RECLAMATION REQUIREMENTS

37. The Discharger has proposed to discharge treated wastewater for recreational impoundment. The proposed site is Lake Spafford, the arboretum that collects storm water for the campus. The California Department of Health Services The DHS has established statewide reclamation criteria in Chapter 3, Division 4, Title 22, California Code of Regulations (CCR), Section 60301, et seq. (Hereafter Title 22) for the use of reclaimed water. The DHS has also established Guidelines for Use of Reclaimed Water. These requirements implement the reclamation criteria in Title 22. The use of the tertiary, disinfected wastewater must meet the requirements of California Code of Regulations, Title 22, Standards for Reclamation. On 6 January 1977, the State Water Resources Control Board (State Board) adopted Resolution No. 77-1, which resolved to encourage water reclamation projects. In 1996, the State Board and the DHS set forth principles, procedures, and agreements to which the agencies committed themselves, relative to the use of reclaimed water in California, in a document titled *Memorandum of Agreement Between the Department of Health Services and The State Water Resources Control Board On The Use of Reclaimed Water* (MOA). This Order is consistent with the MOA.

SLUDGE PONDS SPECIFICATIONS

38. The Discharger utilizes ponds for the treatment and storage of sludge. Land Discharge Specifications have been included in this permit. Nuisance conditions from ponds are typically found when strong odors occur when the dissolved oxygen concentration is allowed to drop below 1.0 mg/*l*. This permit requires the dissolved oxygen concentration be maintained above 1.0 mg/*l* in the upper one-foot of water in the pond.

39. Ponds levees can fail, typically, a lack of maintenance or overtopping due to wave action. This permit requires a minimum pond freeboard be maintained to prevent overtopping.

GENERAL

40. The permitted discharge is consistent with the antidegradation provisions of 40 CFR 131.12 and State Water Resources Control Board Resolution 68-16. Compliance with these requirements will result in the use of best practicable treatment or control of the discharge. The impact on existing water quality will be insignificant.

41. Effluent limitations, and toxic and pretreatment effluent standards established pursuant to Sections 301 (Effluent Limitations), 302 (Water Quality Related Effluent Limitations), 304 (Information and Guidelines), and 307 (Toxic and Pretreatment Effluent Standards) of the Clean Water Act (CWA) and amendments thereto are applicable to the discharge.

42. The discharge is presently governed by Waste Discharge Requirements Order No. 97-236, adopted by the Regional Board on 24 October 1997.

43. The action to adopt an NPDES permit is exempt from the provisions of Chapter 3 of the California Environmental Quality Act (CEQA) (Public Resources Code Section 21000, et seq.), requiring preparation of an environmental impact report or negative declaration in accordance with Section 13389 of the California Water Code.

44. The Regional Board has considered the information in the attached Information Sheet in developing the Findings of this Order. The attached Information Sheet is part of this Order.

45. The Regional Board has notified the Discharger and interested agencies and persons of its intent to prescribe waste discharge requirements for this discharge and has provided them with an opportunity for a public hearing and an opportunity to submit their written views and recommendations.

46. The Regional Board, in a public meeting, heard and considered all comments pertaining to the discharge.

47. This Order shall serve as an NPDES permit pursuant to Section 402 of the CWA, and amendments thereto, and shall take effect 50 days following permit adoption (effective 28 March 2003), provided EPA has no objections.

IT IS HEREBY ORDERED that Order No. 97-236 is rescinded and the University of California and, its agents, successors and assigns, in order to meet the provisions contained in Division 7 of the California Water Code and regulations adopted thereunder, and the provisions of the Clean Water Act and regulations and guidelines adopted thereunder, shall comply with the following:

A. Discharge Prohibitions:

1. Discharge of wastewater at a location or in a manner different from that described in the Findings is prohibited.

2. The by-pass or overflow of wastes is prohibited, except as allowed by Standard Provision A.13. [See attached "Standard Provisions and Reporting Requirements for Waste Discharge Requirements (NPDES)"].

3. Neither the discharge nor its treatment shall create a nuisance as defined in Section 13050 of the California Water Code.

B. Effluent Limitations:

1. Effluent discharge to South Fork Putah Creek (001) and North Fork Putah Creek (002)shall not exceed the following limits:

Constituents	Units	Monthly Average	Weekly Average	7-Day Median	Daily Average	Daily Maximum
BOD[1]	mg/l	10[2]	15[2]	---	---	25[2]
	lb/day[3]	225	338	---	---	560
Total Suspended	mg/l	10[2]	15[2]	---	---	25[2]
Solids	lb/day[3]	225	338	---	---	560
Total Coliform Organisms	MPN/100ml	---	---	2.2	---	23
Settleable Solids	ml/l	---	---	---	---	0.1
Turbidity	NTU	---	---	---	2	5*

* The turbidity shall not exceed 5 NTU more than 5 percent of the time within a 24-hour period. At no time shall the turbidity exceed 10 NTU.

Constituents	Units	Monthly Average	4-Day Average	Daily Maximum	1-Hour Average
Total Residual	mg/*l*	---	0.01	---	0.02
Chlorine	lbs/day[3]	----	0.225	---	0.45
Ammonia	mg/*l*	Attachment B	---	---	Attachment C
(as N)	lbs/day[4]	---	---	---	---
Nitrate + Nitrite	mg/*l*	10	---	---	---
(as N)	lbs/day[3]	225	---	---	---
Aluminum	µg/*l*	---	87	---	750
	lbs/day[3]	---	1.9	---	16.8
Cyanide	µg/*l*	---	5.2	---	22
	lbs/day[3]	---	0.113	---	0.5
Copper	µg/*l*		Attachment D	---	---
	lbs/day[3]		---	---	---
Dichloromethane	µg/*l*	4.7	---	---	---
	lbs/day[3]	0.1	---	---	---
Dioxin/Furans	pg/*l*	0.014	---	---	---

Constituents	Units	Monthly Average	4-Day Average	Daily Maximum	1-Hour Average
	lbs/day[3]	0	---	---	---
Iron	µg/*l*	300	---	---	---
	lbs/day[3]	6.8	---	---	---
Electrical Conductivity	µmhos/cm	900		2,200	

[1] 5-day, 20°C biochemical oxygen demand
[2] To be ascertained by a 24-hour composite
[3] Based upon a design treatment capacity of 2.7 mgd (*x* mg/*l* x 8.345 x 2.7 mgd = *y* lbs/day)
[4] The mass limit (lb/day) for ammonia shall be equal to the concentration limit (from Attachments) multiplied by the design flow of 2.7 mgd and the unit conversion factor of 8.345 (see footnote 1 for equation).

In addition to the limitations above, the effluent discharge to South Fork Putah Creek (001) and North Fork Putah Creek (002) shall not exceed the following limitations (from **30 December 2007** forward):

Constituents	Units	Average Monthly	Average 4-Day	Average Daily	Average 1-Hour
Lead	µg/*l*		Attachment E -	---	---
	lbs/day[1]		---	---	---

[1] Based upon a design treatment capacity of 2.7 mgd (*x* mg/*l* x 8.345 x 2.7 mgd = *y* lbs/day)

2. Wastewater shall be oxidized, coagulated and filtered, or equivalent tertiary treatment provided.

3. The arithmetic mean of 20°C BOD (5-day) and total suspended solids in effluent samples collected over a monthly period shall not exceed 15 percent of the arithmetic mean of the values for influent samples collected at approximately the same times during the same period (85 percent removal).

4. The discharge shall not have a pH less than 6.5 nor greater than 8.5.

5. The average dry weather discharge flow shall not exceed 2.7 million gallons per day.

6. Survival of aquatic organisms in 96-hour bioassays of undiluted waste shall be no less than:

   Minimum for any one bioassay - - - - - - - - - 70%
   Median for any three or more consecutive bioassays - - - - 90%

C. Water Reclamation Requirements

1. Disinfected tertiary treated wastewater for unrestricted use shall be continuously sampled for turbidity using a continuous turbidity meter and recorder at a point prior to filtration and again following filtration. Turbidity measurements shall be based on a reading and recording of the turbidity strip charts or computer records at four-hour intervals at least once per day. Compliance with the daily average operating turbidity shall be determined by averaging the results of all four-hour turbidity samples read during the day. The results of the daily average turbidity determinations shall be reported monthly to the Board, except non-

compliance shall be reported immediately. The turbidity of the filter effluent shall not exceed 2 NTU as a daily average, nor 5 NTU more than 5 percent of the time within a 24-hour period. At no time shall the turbidity exceed 10 NTU. Reclaimed water in excess of the turbidity limits shall not enter the reclamation distribution system. An automated distribution system bypass shall be installed.

2. Neither the treatment nor the use of reclaimed water shall cause a pollution or nuisance as defined by Section 13050 of the CWC.

3. The use of reclaimed water shall not cause degradation of groundwater or any water supply.

4. Reclaimed water shall be managed in conformance with the regulations contained in Title 22, Division 4, Chapter 3, CCR.

5. All reclamation equipment, pumps, piping, valves, and outlets shall be appropriately marked to differentiate them from potable facilities. In accordance with Health and Safety Code Section 116815 all reclamation distribution system piping installed after 1 June 1993 shall be purple.

6. Perimeter warning signs indicating that reclaimed water is in use shall be posted as prescribed in the User's Reclamation Plan that is subject to approval by the Board and the Department of Health Services.

7. Reclaimed water shall not be allowed to escape from the authorized use areas by airborne spray or by surface flow except in minor amounts such as that associated with good irrigation practices.

8. There shall be at least a ten-foot horizontal and one foot vertical separation at crossings between all pipelines transporting reclaimed water and those transporting domestic supply, with the domestic supply above the reclaimed water pipeline, unless approved by the Department.

9. There shall be no cross-connection between potable water supply and piping containing reclaimed water. Supplementing reclaimed water with potable water shall not be allowed except through an air-gap separation, or if approved by the Department, a reduced pressure principle backflow device.

10. Areas with reclaimed water shall be managed to prevent ponding and conditions conducive to the proliferation of mosquitoes and other disease vectors, and to avoid creation of a public nuisance or health hazard. The following practices shall be implemented, at a minimum:

    a. Ditches receiving irrigation runoff, not serving as wildlife habitat, shall be maintained free of emergent, marginal, and floating vegetation.

b. Low-pressure and unpressurized pipelines and ditches accessible to mosquitoes shall not be used to store recycled water. Ponds shall be managed to prevent breeding of mosquitoes. In particular,

c. An erosion control program should assure that small coves and irregularities are not created around the perimeter of the water surface.

d. Dead algae, vegetation, and debris shall not accumulate on the water surface.

11. The reclaimed water piping system shall not include any hose bibs, except at the treatment plant, on hose bibs with appropriate signage.

12. Disinfection of tertiary treated wastewater shall be accomplished by a ultraviolet light when combined with filtration has been demonstrated to inactivate and/or remove 99.999 percent of the plaque-forming units of F-specific bacteriophage MS2, or polio virus in the wastewater.

13. The coagulation system shall be used whenever the plant is producing tertiary treated wastewater for unrestricted use. For the purpose of maintenance and repair of the system, the Discharger is allowed to have the coagulation system off-line for short periods of time (up to 30 minutes for each occurrence), when the turbidity of the influent to the tertiary treatment plant is less than 5 NTU.

D. Sludge Disposal:

1. Collected screenings, sludges, and other solids removed from liquid wastes shall be disposed of in a manner approved by the Executive Officer, and consistent with *Consolidated Regulations for Treatment, Storage, Processing, or Disposal of Solid Waste,* as set forth in Title 27, CCR, Division 2, Subdivision 1, Section 20005, et seq.

2. Any proposed change in sludge use or disposal practice from a previously approved practice shall be reported to the Executive Officer and EPA Regional Administrator at least **90 days** in advance of the change.

3. Use and disposal of sewage sludge shall comply with existing Federal and State laws and regulations, including permitting requirements and technical standards included in 40 CFR 503.

   If the State Water Resources Control Board and the Regional Water Quality Control Boards are given the authority to implement regulations contained in 40 CFR 503, this Order may be reopened to incorporate appropriate time schedules and technical standards. The Discharger must comply with the standards and time schedules contained in 40 CFR 503 whether or not they have been incorporated into this Order.

4. The Discharger is encouraged to comply with the "Manual of Good Practice for Agricultural Land Application of Biosolids" developed by the California Water Environment Association.

5. By 30 June 2003, the Discharger shall submit a sludge disposal plan describing the annual volume of sludge generated by the plant and specifying the disposal practices.

E. Receiving Water Limitations:

Receiving Water Limitations are based upon water quality objectives contained in the Basin Plan. As such, they are a required part of this permit.

The discharge shall not cause the following in the receiving water:

1. Concentrations of dissolved oxygen to fall below 7.0 mg/l. The monthly median of the mean daily dissolved oxygen concentration shall not fall below 85 percent of saturation in the main water mass, and the 95th percentile concentration shall not fall below 75 percent of saturation.

2. Oils, greases, waxes, or other materials to form a visible film or coating on the water surface or on the stream bottom.

3. Oils, greases, waxes, floating material (liquids, solids, foams, and scums) or suspended material to create a nuisance or adversely affect beneficial uses.

4. Esthetically undesirable discoloration.

5. Fungi, slimes, or other objectionable growths.

6. The turbidity to increase as follows:

   a. More than 1 Nephelometric Turbidity Units (NTUs) as a monthly average where natural turbidity is between 0 and 5 NTUs.

   b. More than 20 percent where natural turbidity is between 5 and 50 NTUs.

   c. More than 10 NTUs where natural turbidity is between 50 and 100 NTUs.

   d. More than 10 percent where natural turbidity is greater than 100 NTUs.

7. The ambient pH to fall below 6.5, exceed 8.5, or the 30-day average to change by more than 0.5 units.

8. The ambient temperature to increase more than 5°F.

9. Deposition of material that causes nuisance or adversely affects beneficial uses.

10. Radionuclides to be present in concentrations that exceed maximum contaminant levels specified in the California Code of Regulations, Title 22; that harm human, plant, animal or aquatic life; or that result in the accumulation of radionuclides in the food web to an extent that presents a hazard to human, plant, animal, or aquatic life.

11. Aquatic communities and populations, including vertebrate, invertebrate, and plant species, to be degraded.

12. Toxic pollutants to be present in the water column, sediments, or biota in concentrations that adversely affect beneficial uses; that produce detrimental response in human, plant, animal, or aquatic life; or that bioaccumulate in aquatic resources at levels which are harmful to human health.

13. Violation of any applicable water quality standard for receiving waters adopted by the Regional Board or the State Water Resources Control Board pursuant to the CWA and regulations adopted thereunder.

14. Taste or odor-producing substances to impart undesirable tastes or odors to fish flesh or other edible products of aquatic origin or to cause nuisance or adversely affect beneficial uses.

15. The fecal coliform concentration in any 30-day period to exceed a geometric mean of 200 MPN/100 ml or cause more than 10 percent of total samples to exceed 400 MPN/100 ml.

F. Discharge Specifications (Solids Stabilization Basins):

1. Objectionable odors originating at this facility shall not be perceivable beyond the limits of the wastewater treatment and disposal areas.

2. As a means of discerning compliance with Discharge Specification No.1 the dissolved oxygen content in the upper zone (1 foot) of wastewater in ponds shall not be less than 1.0 mg/l.

3. Ponds shall not have a pH less than 6.5 or greater than 9.0.

4. Ponds shall be managed to prevent breeding of mosquitoes. In particular,

    a. An erosion control program should assure that small coves and irregularities are not created around the perimeter of the water surface.

    b. Dead algae, vegetation, and debris shall not accumulate on the water surface.

5. Public contact with wastewater shall be precluded through such means as fences, signs, and other acceptable alternatives.

6. Freeboard shall never be less than two feet (measured vertically to the lowest point of overflow) for all ponds.

G. Groundwater Limitations:

Release of waste constituents from any storage, treatment, or disposal component associated with the Waste Water Treatment Plant shall not, in combination with other sources cause the following in groundwater:

1. Adversely impact beneficial uses or exceed water quality objectives.

2. Any constituent concentration, when compared with background, shall not be incrementally increased beyond the current concentration.

H. Provisions:

1. The treatment facilities shall be designed, constructed, operated, and maintained to prevent inundation or washout due to floods with a 100-year return frequency.

2. The Discharger shall not allow pollutant-free wastewater to be discharged into the collection, treatment, and disposal system in amounts that significantly diminish the system's capability to comply with this Order. Pollutant-free wastewater means rainfall, groundwater, cooling waters, and condensates that are essentially free of pollutants.

3. There are indications that the discharge may contain constituents that have a reasonable potential to cause or contribute to an exceedance of water quality objectives. The constituents are specifically listed in a technical report requirement issued by the Executive Officer on 10 September 2001 and include NTR, CTR and additional constituents, which could exceed Basin Plan numeric or narrative water quality objectives. The Discharger shall comply with the following time schedule in conducting a study of these constituents potential effect in surface waters:

Task	Compliance Date
Submit Study Report	**1 March 2003**
Submit Study Report for dioxins	**1 March 2004**

This Order is intended to be consistent with the requirements of the 10 September 2001 technical report. The technical report requirements shall take precedence in resolving any conflicts. The Discharger shall submit to the Regional Board on or before each compliance due date, the specified document or a written report detailing compliance or noncompliance with the specific date and task. If noncompliance is reported, the Discharger shall state the reasons for noncompliance and include an estimate of the date when the Discharger will be in compliance. The Discharger shall notify the Regional Board by letter when it returns to compliance with the time schedule.

If after review of the study results it is determined that the discharge has reasonable potential to cause or contribute to an exceedance of a water quality objective this Order will be reopened and effluent limitations added for the subject constituents.

4. By **31 March 2003** the Discharger shall complete and submit a compliance schedule justification for lead. The compliance schedule justification shall include all items specified by the SIP Section 2.1, Paragraph 3 (items (a) through (d)). The new water quality based effluent limitations for lead become effective on **1 April 2003** if a compliance schedule justification meeting the requirements of Section 2.1 of the SIP is not completed and submitted by the Discharger. Otherwise the new final water quality based effluent limitations for lead required by this Order shall become effective on **30 December 2007**. As this schedule is greater than one year, the Discharger shall submit semi-annual progress reports on **15 January** and **15 July** each year until the Discharger achieves compliance with the final water quality based effluent limitations for lead.

5. The discharge contains constituents that have a reasonable potential to cause or contribute to an exceedance of water quality objectives as identified in this permit. The Discharger shall comply with the following time schedule detailing what steps have been implemented towards achieving compliance with waste discharge requirements. These steps must include construction progress, evaluate the effectiveness of the implemented measures and assess whether additional measures are necessary to meet the time schedule to comply with meeting the Effluent Limitations for lead:

Task	Compliance Date
Submit Workplan and Time Schedule	**30 June 2003**
Begin Study	**30 September 2003**
Complete Study	**30 September 2005**
Submit Study Report	**1 January 2006**
Comply with Effluent Limitations	**30 December 2007**

The Discharger shall submit to the Regional Board on or before each compliance due date, the specified document or a written report detailing compliance or noncompliance with the specific date and task. If noncompliance is reported, the Discharger shall state the reasons for noncompliance and include an estimate of the date when the Discharger will be in compliance. The Discharger shall notify the Regional Board by letter when it returns to compliance with the time schedule.

If after review of the study results it is determined that the discharge has reasonable potential to cause or contribute to an exceedance of a water quality objective this Order will be reopened and effluent limitations added for the subject constituents.

6. This permit, and the Monitoring and Reporting Program which is a part of this permit, requires that certain parameters be monitored on a continuous basis. The wastewater

treatment plant is not staffed on a full time basis. Permit violations or system upsets can go undetected during this period. The Discharger is required to establish an electronic system for operator notification for continuous recording devise alarms. For existing continuous monitoring systems, the electronic notification system shall be installed within six months of adoption of this permit. For systems installed following permit adoption, the notification system shall be installed simultaneously.

7. The Discharger shall conduct the chronic toxicity testing specified in the Monitoring and Reporting Program. If the testing indicates that the discharge causes, has the reasonable potential to cause, or contributes to an in-stream excursion above the water quality objective for toxicity, the Discharger initiate a Toxicity Identification Evaluation (TIE) to identify the causes of toxicity. Upon completion of the TIE, the Discharger shall submit a workplan to conduct a Toxicity Reduction Evaluation (TRE) and, after Regional Board evaluation, conduct the TRE. This Order will be reopened and a chronic toxicity limitation included and/or a limitation for the specific toxicant identified in the TRE included. Additionally, if a chronic toxicity water quality objective is adopted by the State Water Resources Control Board, this Order may be reopened and a limitation based on that objective included.

8. **Hydrogeologic Evaluation and Groundwater Monitoring Tasks**. **Within 18-months of the adoption of this Order**, the Discharger shall complete a hydrogeologic investigation within the Primate Center affected by past discharges of the WWTF to land.

   The technical report documenting the hydrogeologic investigation shall describe the underlying geology, existing wells (active and otherwise), local well construction practices and standards, well restrictions, hydrogeology and assess all impacts of the wastewater discharge on water quality. The groundwater quality must be monitored at least quarterly for a minimum of four quarters for U.S. EPA priority pollutants, nutrients, coliform organisms, pH, TDS and EC. The technical report must present, for each monitoring event, determinations for the direction and gradient of groundwater flow.

   The groundwater monitoring network shall include one or more background monitoring wells and sufficient number of designated monitoring wells to evaluate performance of BPTC measures and determine if the discharge has degraded groundwater. These include monitoring wells immediately downgradient of every treatment, storage, and disposal unit that does or may release waste constituents to groundwater with the exception of wastewater reclamation areas to which the Discharger applies effluent. The need for monitoring wells at reclamation areas will be determined on a case-by-case basis by Regional Board staff. All wells shall comply with appropriate standards as described in *California Well Standards Bulletin 74-90* (June 1991) and *Water Well Standards: State of California Bulletin 94-81* (December 1981), and any more stringent standards adopted by the Discharger or county pursuant to CWC section 13801.

   The existing well network will be evaluated, and the proposed network should include existing monitoring wells where they will serve to measure compliance or provide other relevant information (e.g., depth to groundwater). The Discharger shall install approved

monitoring wells, properly destroy ineffective wells, and commence groundwater monitoring in accordance with this Order's Monitoring and Reporting Program. After the first sampling event, the Discharger shall report on its sampling protocol as specified in this Order's Monitoring and Reporting Program (MRP).

After one year of monitoring, the Discharger shall characterize natural background quality of monitored constituents in a technical report. If the monitoring shows that any constituent concentrations are increased above background water quality, the Discharger shall submit a technical report describing the evaluation's results and critiquing each evaluated component with respect to BPTC and minimizing the discharge's impact on groundwater quality. In no case shall the discharge be allowed to exceed a water quality objective. Where treatment system deficiencies are documented, the technical report shall provide recommendations for necessary modifications (e.g., new or revised salinity source control measures, WWTF component upgrade and retrofit) to achieve BPTC and identify the source of funding and proposed schedule for modifications for achieving full compliance prior to expiration of this Order. This Order may be reopened and additional groundwater limitations added.

9. The Discharge must submit a report for approval by the Regional Board staff evaluating the ability of the wastewater treatment plant to treat arboretum waters to meet water quality objectives without jeopardizing the treatment of existing wastewater. The report, due by 30 September 2005 must detail the treatment system capability of the system and the hydraulic and constituent by constituent impacts of the proposed project.

10. The Discharger must submit and have approval by the Department of Health Services and the Regional Board staff a Title 22 Engineering Report prior to discharging treated effluent into Lake Spafford by 30 September 2005.

11. The Discharger shall report to the Regional Board any toxic chemical release data it reports to the State Emergency Response Commission within 15 days of reporting the data to the Commission pursuant to section 313 of the "Emergency Planning and Community Right to Know Act of 1986.

12. The Discharger shall comply with all the items of the "Standard Provisions and Reporting Requirements for Waste Discharge Requirements (NPDES)", dated 1 March 1991, which are part of this Order. This attachment and its individual paragraphs are referred to as "Standard Provisions."

13. The Discharger shall comply with Monitoring and Reporting Program No. R5-2003-003, which is part of this Order, and any revisions thereto as ordered by the Executive Officer.

When requested by USEPA, the Discharger shall complete and submit Discharge Monitoring Reports. The submittal date shall be no later than the submittal date specified in the Monitoring and Reporting Program for Discharger Self Monitoring Reports.

14. This Order expires on **1 January 2008** and the Discharger must file a Report of Waste Discharge in accordance with Title 23, CCR, not later than 180 days in advance of such date in application for renewal of waste discharge requirements if it wishes to continue the discharge.

15. The Discharger shall implement the necessary legal authorities, programs, and controls to ensure that the following incompatible wastes are not introduced to the treatment system, where incompatible wastes are:

    a. Wastes which create a fire or explosion hazard in the treatment works;

    b. Wastes which will cause corrosive structural damage to treatment works, but in no case wastes with a pH lower than 5.0, unless the works is specially designed to accommodate such wastes;

    c. Solid or viscous wastes in amounts which cause obstruction to flow in sewers, or which cause other interference with proper operation or treatment works;

    d. Any waste, including oxygen demanding pollutants (BOD, etc.), released in such volume or strength as to cause inhibition or disruption in the treatment works, and subsequent treatment process upset and loss of treatment efficiency;

16. Heat in amounts that inhibit or disrupt biological activity in the treatment works, or that raise influent temperatures above 40°C (104°F), unless the Regional Board approves alternate temperature limits;

    a. Petroleum oil, nonbiodegradable cutting oil, or products of mineral oil origin in amounts that will cause interference or pass through;

    b. Pollutants which result in the presence of toxic gases, vapors, or fumes within the treatment works in a quantity that may cause acute worker health and safety problems; and

    c. Any trucked or hauled pollutants, except at points predesignated by the Discharger.

17. The Discharger shall implement the legal authorities, programs, and controls necessary to ensure that indirect discharges do not introduce pollutants into the sewerage system that, either alone or in conjunction with a discharge or discharges from other sources:

    a. Flow through the system to the receiving water in quantities or concentrations that cause a violation of this Order, or

    b. Inhibit or disrupt treatment processes, treatment system operations, or sludge processes, use, or disposal and either cause a violation of this Order or prevent

sludge use or disposal in accordance with this Order.

18. Prior to making any change in the discharge point, place of use, or purpose of use of the wastewater, the Discharger shall obtain approval of, or clearance from the State Water Resources Control Board (Division of Water Rights).

19. In the event of any change in control or ownership of land or waste discharge facilities presently owned or controlled by the Discharger, the Discharger shall notify the succeeding owner or operator of the existence of this Order by letter, a copy of which shall be immediately forwarded to this office.

    To assume operation under this Order, the succeeding owner or operator must apply in writing to the Executive Officer requesting transfer of the Order. The request must contain the requesting entity's full legal name, the State of incorporation if a corporation, address and telephone number of the persons responsible for contact with the Regional Board and a statement. The statement shall comply with the signatory paragraph of Standard Provision D.6 and state that the new owner or operator assumes full responsibility for compliance with this Order. Failure to submit the request shall be considered a discharge without requirements, a violation of the California Water Code. Transfer shall be approved or disapproved in writing by the Executive Officer.

I, THOMAS R. PINKOS, Executive Officer, do hereby certify the foregoing is a full, true, and correct copy of an Order adopted by the California Regional Water Quality Control Board, Central Valley Region, on 18 March 2004.

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THOMAS R. PINKOS, Executive Officer

CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
CENTRAL VALLEY REGION

MONITORING AND REPORTING PROGRAM NO. R5-2003-0003
Amendment No. 1
NPDES NO. CA0077895
UNIVERSITY OF CALIFORNIA, DAVIS CAMPUS
WASTEWATER TREATMENT PLANT
YOLO AND SOLANO COUNTIES

This Monitoring and Reporting Program is issued pursuant to Water Code Sections 13383 and 13267. The Discharger shall not implement any changes to this Program unless and until the Regional Board or Executive Officer issues a revised Monitoring and Reporting Program. Specific sample station locations shall be established under direction of the Regional Board's staff, and a description of the stations shall be attached to this Order.

INFLUENT MONITORING

Samples shall be collected at approximately the same time as effluent samples and should be representative of the influent. All influent monitoring results shall be submitted monthly except Priority Pollutants, which are to be submitted quarterly. Influent monitoring shall include at least the following:

Constituent	Units	Sample Type	Sampling Frequency
Flow	Mgd	Meter	Continuous
Hardness	mg/l	Grab	Monthly
Electrical Conductivity (EC) at 25 ºC	μmhos/cm	Grab	Daily
pH	--	Grab	Daily
BOD [1]	mg/l, lbs/day	24 hr. Composite [2]	3Xs/wk
Total Suspended Solids (TSS)	mg/l, lbs/day	24 hr. Composite [2]	3Xs/wk
Ammonia	mg N/l	Grab	3Xs/wk
Priority Pollutants	μg/l	As Appropriate [2]	Twice a Year

[1] ***5-day, 20º C biochemical oxygen demand (BOD)***
[2] Volatile samples shall be grab samples, the remainder shall be 24-hour flow proportional composite samples

EFFLUENT MONITORING (001 and 002)

1. Effluent samples shall be collected downstream from the last connection through which wastes can be admitted into any outfall. Effluent samples should be representative of the total volume and quality of the discharge. Date and time of collection of samples shall be recorded and reported.

Effluent monitoring results shall be submitted monthly. Effluent monitoring at 001 and 002 shall include at least the following:

Constituents	Units	Type of Sample	Sampling Frequency*
Flow	mgd	Meter	Continuous
Chlorine Residual[8]	mg/l, lbs/day	Grab	Footnote 12
Turbidity	NTU	Meter	Continuous
pH[12]	--	Grab	Daily
Temperature	°F or °C	Grab [1]	Daily
Electrical Conductivity (EC) at 25 °C	µmhos/cm	Grab [1]	Daily
Total Coliform Organisms	MPN/l00 ml	Grab [1]	5Xs/wk
Ammonia [2,6,8]	mg N/l, lbs/day	Grab [1]	3Xs/wk
BOD [3,4]	mg/l, lbs/day	24 hr. Composite [4, 11]	3Xs/wk
Total Suspended Solids (TSS) [4]	mg/l, lbs/day	24 hr. Composite [4,11]	3Xs/wk
Settleable Solids (SS)	ml/l	Grab [1]	Daily
Oil and Grease	mg/l, lbs/day	Grab [1]	Monthly
Total Dissolved Solids (TDS)	mg/l	Grab [1]	Monthly
Hardness	mg/l	Grab [1]	Monthly
Aluminum[6,8]	µg/l, lbs/day	24 hr. Composite	Monthly
Dichloromethane[6]	µg/l, lbs/day	Grab [1]	Quarterly
Dioxin/Furans	µg/l	Grab	Twice/year
Copper[6,8]	µg/l, lbs/day	24 hr. Composite	Monthly
Cyanide[6,8]	µg/l, lbs/day	Grab [1]	Monthly
Nitrate+Nitrite, as N	mg/l	Grab [1]	Monthly
Iron[6]	µg/l, lbs/day	24 hr. Composite	Monthly
Lead[6]	µg/l, lbs/day	24 hr. Composite	Monthly
Phosphorus	µg/l, lbs/day	Grab [1]	Quarterly
Acute Bioassay [5]	% Survival	Grab [1]	Quarterly
Chronic Bioassay	% Survival	Grab [1]	Quarterly
Priority Pollutants [6,7, 8, 9, 10,11]	µg/l, lbs/day	As Appropriate [1,10,11]	Twice/year

1 Grab samples shall not be collected at the same time each day.
2 pH and temperature data shall be collected on the same date and at the same time as the ammonia sample.
3 5-day, 20 °C biochemical oxygen demand (BOD)
4 The BOD and TSS samples shall be flow proportional composite samples.
5 Acute Bioassays shall be conducted in accordance with EPA/821-R-02-012, or later amendment, with Board staff approval, using rainbow trout, *Oncorhynchus mykiss*, as the test species. Temperature and pH shall be recorded at the time of bioassay collection.
6 Hardness, pH, and temperature data shall be collected at the same time and on the same date. Metals to be reported in total recoverable.
7 All peaks are to be reported, along with any explanation provided by the laboratory.
8 If any single sample exceeds the 4-Day Average Effluent Limit, the Discharger shall conduct additional sampling for 4 consecutive days for those constituents that exceeded the 4-Day Average.
9 Priority Pollutants is defined as U.S. EPA Priority Pollutants and consists of the constituents listed in the most recent National Toxics Rule and California Toxics Rule and constituents identified in the 13267 letter dated 9/10/01
10 Volatile samples shall be grab samples; the remainder shall be 24-hour composite samples.
11 Composite samples shall be flow proportional.
12 Chlorine residual and pH shall be monitored every 15 minutes one hour prior to use at the wastewater treatment plant and 2 hours after the end of use.
* At specified frequency or when discharged.

2. The Discharger shall calculate and record daily effluent limits for ammonia, and quarterly effluent limits for ammonia and copper as described below and in Order B.1 (Effluent Limitations) of Waste Discharge Requirements Order No. (attached). The ammonia effluent limits shall be reported in

mg N/l and lbs/day and copper limits shall be reported in µg/l and lbs/day. Ammonia and copper limit calculations shall be included with the monthly effluent monitoring results.

Constituent	Units	1-Hour Average	4-Day Average	30-Day Average	Recording Frequency*
Ammonia	mg N/l	Attachment B	--	Attachment C	3Xs/wk
	lbs/day	[1]	--	[1]	3Xs/wk
Copper	µg/l	Attachment D	Attachment D	--	Monthly [2]
	lbs/day	[1]	[1]	--	Monthly [2]

[1] Using the value, in mg/l, determined from Attachment B, C, or D (as appropriate), calculate the lbs per day using the formula: *x* mg/l x 8.345 x 2.7 mgd = *y* lbs/day.
[2] Effluent limits must be calculated for any copper samples.
* At specified frequency or when discharged.

RECEIVING WATER MONITORING

1. All receiving water samples shall be grab samples. Receiving water monitoring stations are located as follows:

Point of Discharge	Station	Description
South Fork Putah Creek (001)	R-1	30 feet upstream from the point of discharge
	R-2	200 feet downstream from the point of discharge

2. All receiving water monitoring results, log notations, and notes shall be reported monthly.

3. All receiving water samples shall be grab samples. Date and time of sample collection shall be recorded and reported. Receiving water monitoring shall include at least the following:

Constituents	Units	Sampling Stations	Frequency
Dissolved Oxygen (DO)	mg/l	R-l, R-2	Weekly
pH	--	R-l, R-2	Weekly
Temperature	°F and °C	R-l, R-2	Weekly
Electrical Conductivity (EC) at 25 °C	µmhos/cm	R-l, R-2	Weekly
Turbidity	NTU	R-l, R-2	Weekly
Hardness	Mg/l	R-l, R-2	Weekly
Fecal Coliform Organisms	MPN/100ml	R-l, R-2	Quarterly
Radionuclides	PCi/l	R-l, R-2	Annually

4. In conducting the receiving water sampling, a separate log shall be kept of the receiving water conditions. Attention shall be given to the presence or absence of:

    a. Floating or suspended matter
    b. Discoloration
    c. Bottom deposits
    d. Aquatic life
    e. Visible films, sheens, or coatings
    f. Fungi, slimes, or objectionable growths
    g. Potential nuisance conditions
    h. Flow Direction
    i. Upstream Conditions

5. Notes on receiving water conditions shall be summarized in the monitoring report.

THREE SPECIES CHRONIC TOXICITY MONITORING

Chronic toxicity monitoring shall be conducted to determine whether the effluent is contributing toxicity to South Fork Putah Creek. The testing shall be conducted as specified in U.S. EPA 821-R-02-013. Chronic toxicity samples shall be collected from the effluent of the UCD Wastewater Treatment Plant. Grab samples shall be representative of the volume and quality of the discharge. Time of collection of samples shall be recorded. The effluent tests must be conducted with concurrent reference toxicant tests. Monthly laboratory reference toxicant tests may be substituted upon approval. Both the reference toxicant and effluent tests must meet all test acceptability criteria as specified in the chronic manual. If the test acceptability criteria are not achieved, then the Discharger must re-sample and re-test within 14 days.

Chronic toxicity monitoring results are to be submitted quarterly. Chronic toxicity monitoring shall include the following:

Species: *Pimephales promelas* (larval stage), *Ceriodaphnia dubia*, and *Selenastrum capricornutum*

Frequency: Once per quarter, four quarters per year
Dilution Series:

		Controls	
	Dilutions (%)	Creek Water	Lab Water
% WWTP Effluent[1]	100	0	0
% Dilution Water*	100	100	0
% Lab Water	100	0	100

* Dilution water shall be taken individually from Putah Creek upstream of discharge point 001. When stream flow is absent, the analyses may be conducted with undiluted effluent. The dilution series may be altered upon written approval of Board staff. Dilution water chronic testing maybe eliminated after two years by staff if no toxicity is found.

[1] Effluent to be collected after disinfection.

GROUNDWATER MONITORING

1. Groundwater grab samples shall be collected from all groundwater monitoring wells. Prior to sampling, the wells should be pumped until the temperature, specific conductivity, and pH have stabilized to ensure representative samples.

2. The following shall constitute the groundwater monitoring program:

Constituents	Units	Sampling Frequency
Depth to Groundwater	1/100th foot	Monthly
Groundwater Elevation	1/100th foot	Monthly
pH	--	Monthly
Electrical Conductivity (EC) at 25 °C	μmhos/cm	Monthly
Nitrates	mg/l	Quarterly
Total Coliform Organisms	MPN/100ml	Quarterly
Heavy Metals (Title 22)	mg/l	Annually
Volatile Organics (U.S. EPA 601)	μg/l	Annually
Semi-Volatile Organics (U.S. EPA 602)	μg/l	Annually
Oxygenate Compounds (U.S. EPA 8260)	μg/l	Annually

3. Groundwater monitoring results for the constituents above shall be submitted monthly and includes a site map showing the location of the wells and the direction and gradient of ground water flow.

4. A groundwater report shall be submitted annually, which contains a brief written description of any groundwater investigation and sampling work completed for the year, a site map showing the location of all monitoring wells, and tables showing all groundwater monitoring data collected since the wells were installed, including groundwater depth and elevation data, pH, EC, and all other monitored constituents.

BIOSOLIDS MONITORING

1. A composite sample of biosolids shall be collected hourly during the hours of biosolids wasting over a 24-hour period and in accordance with U.S. EPA's POTW Biosolids Sampling and Analysis Guidance Document, August 1989, (or most recent edition) and tested for the following constituents:

Constituent	Units	Sample Type	Frequency
Quantity	Dry Tons	--------	Daily
Solids Content	% percentage	--------	Daily
Disposal Location	--------	--------	Daily
Cadmium	mg/kg	Composite	Twice-Annually
Copper	mg/kg	Composite	Twice-Annually

Constituent	Units	Sample Type	Frequency
Total chromium	mg/kg	Composite	Twice-Annually
Lead	mg/kg	Composite	Twice-Annually
Mercury	mg/kg	Composite	Twice-Annually
Nickel	mg/kg	Composite	Twice-Annually
Selenium	mg/kg	Composite	Twice-Annually
Silver	mg/kg	Composite	Twice-Annually
Zinc	mg/kg	Composite	Twice-Annually
PCB's	mg/kg	Composite	Twice-Annually
Oil and Grease	mg/kg	Composite	Twice-Annually
Nitrogen[1]	mg/kg (dry)	Composite	Twice-Annually
Ammonia	mg/kg (dry)	Composite	Twice-Annually
Nitrate	mg/kg (dry)	Composite	Twice-Annually
Total Kjeldahl Nitrogen	mg/kg (dry)	Composite	Twice-Annually
pH[1]	pH units	Composite	Twice-Annually
Fecal Coliform[1]	MPN/gram dry wt.	Composite	Twice-Annually

[1] Samples for nitrogen, pH and fecal coliforms shall be collected from dry biosolids.

2. Sampling records shall be retained for a minimum of five years. A log shall be kept of the quantity of biosolids generated and of the handling and disposal activities. The frequency of entries is discretionary; however, the log should be complete enough to serve as a basis for part of the annual report.

3. Discharger shall submit annually:

   a. The biosolids composite sample results.

   b. Annual production of biosolids in dry tons and percent solids.

   c. A schematic diagram showing biosolids handling facilities and a solids flow diagram.

   d. Depth of application and drying time for biosolids drying beds.

   e. A description of disposal methods, including the following information related to the disposal methods used at the facility. If more than one method is used, include the percentage of annual biosolids production disposed by each method.

4. Within 90 days of the effective date of this Order, the Discharger shall submit characterization of biosolids quality, including percent solids and quantitative results of chemical analysis for the priority pollutants listed in 40 CFR 122 Appendix D, Tables II and III (excluding total phenols). All biosolids samples shall be a composite of a minimum of twelve (12) discrete samples taken at equal time intervals over 24 hours. Suggested methods for analysis of biosolids are provided in U.S. EPA publications titled "Test Methods for Evaluating Solid Waste: Physical/Chemical Methods" and "Test Methods for Organic Chemical Analysis of Municipal and Industrial Wastewater". Recommended analytical holding times for biosolids samples should reflect those specified in 40 CFR 136.6.3(e). Other guidance is available in EPA's POTW Biosolids Sampling and Analysis Guidance Document, August 1989 (or most recent edition).

5. Solids stabilization basin monitoring shall include at least the following:

Constituent	Units	Sampling Frequency
Freeboard	Feet	Monthly
Odors	Observation	Monthly
Quantity of Sludge discharged	Tons	Daily
Quantity of Sludge Removed	Tons	Daily
Levee Condition	Observation	Monthly
Dissolved Oxygen	mg/l	Monthly
pH	pH units	Monthly

WATER SUPPLY MONITORING

A sampling station shall be established where a representative sample of the municipal water supply can be obtained. Water supply monitoring results shall be submitted four times per year. Water supply monitoring shall include at least the following:

Constituents	Units	Sampling Frequency
Total Dissolved Solids (TDS)	mg/l	Quarterly
Electrical Conductivity (EC) at 25°C *	μmhos/cm	Quarterly
Selenium	mg/l	Quarterly
Chromium VI	µg/l	Quarterly

* If the source water is from more than one well, the constituents shall be reported as a weighted average and include copies of supporting calculations.

REPORTING

1. Monitoring results shall be submitted to the Regional Board by the **1st day of the second month following sample collection**. Quarterly and annual monitoring results shall be submitted by the **1st day of the second month following each calendar quarter (May, August, November, and February) and year (February)**, respectively.

2. All constituents for all sections of the Monitoring and Reporting Program, that are monitored monthly (or several times per month), shall be submitted in one monthly report. All constituents for all sections of the Monitoring and Reporting Program, that are monitored quarterly, shall be submitted with the appropriate monthly report. All constituents monitored annually, and all sections of the Monitoring and Reporting Program with annual reporting requirements, shall be submitted in one annual report.

3. In reporting the monitoring data, the Discharger shall arrange the data in tabular form so that the time and date of sample collection, the constituents, and the concentrations are readily discernible. The data shall be summarized to illustrate clearly whether the discharge complies with waste discharge requirements. The highest daily maximum for the month, monthly and weekly averages,

and medians, and removal efficiencies (%) for BOD and Suspended Solids, should be determined and recorded.

4. If the Discharger monitors any pollutant at the locations designated herein more frequently than is required by this Order, the results of such monitoring shall be included in the calculation and reporting of the values required in the discharge monitoring report form. Such increased frequency shall be indicated on the discharge monitoring report form.

5. By **30 January of each year**, the Discharger shall submit a written report to the Executive Officer containing the following:

   a. The names, certificate grades, and general responsibilities of all persons employed at the Davis Wastewater Treatment Plant (Standard Provision A.5).

   b. The names and telephone numbers of persons to contact regarding the plant for emergency and routine situations.

   c. A statement certifying when the flow meter and other monitoring instruments and devices were last calibrated, including identification of who performed the calibration (Standard Provision C.6).

   d. A statement certifying whether the current operation and maintenance manual, and contingency plan, reflect the wastewater treatment plant as currently constructed and operated, and the dates when these documents were last revised and last reviewed for adequacy.

The Discharger may also be requested to submit an annual report to the Board with both tabular and graphical summaries of the monitoring data obtained during the previous year. Any such request shall be made in writing. The report shall discuss the compliance record. If violations have occurred, the report shall also discuss the corrective actions taken and planned to bring the discharge into full compliance with the waste discharge requirements.

All reports submitted in response to this Order shall comply with the signatory requirements of Standard Provision D.6.

The Discharger shall implement the above monitoring program on the first day of the month following effective date of this Order.

Ordered by: _____
THOMAS R. PINKOS, Executive Officer

18 March 2004
(Date)

Temperature- and pH-Dependent Effluent Limits for Ammonia
Criterion Continuous Concentration, Maximum Average Monthly Concentration

Ammonia Concentration Limitation (mg N/*l*)										
	Temperature, ºC (ºF)									
pH	**0** (32)	**14** (57)	**16** (61)	**18** (64)	**20** (68)	**22** (72)	**24** (75)	**26** (79)	**28** (82)	**30** (86)
6.5	6.67	6.67	6.06	5.33	4.68	4.12	3.62	3.18	2.80	2.46
6.6	6.57	6.57	5.97	5.25	4.61	4.05	3.56	3.13	2.75	2.42
6.7	6.44	6.44	5.86	5.15	4.52	3.98	3.50	3.07	2.70	2.37
6.8	6.29	6.29	5.72	5.03	4.42	3.89	3.42	3.00	2.64	2.32
6.9	6.12	6.12	5.56	4.89	4.30	3.78	3.32	2.92	2.57	2.25
7.0	5.91	5.91	5.37	4.72	4.15	3.65	3.21	2.82	2.48	2.18
7.1	5.67	5.67	5.15	4.53	3.98	3.50	3.08	2.70	2.38	2.09
7.2	5.39	5.39	4.90	4.31	3.78	3.33	2.92	2.57	2.26	1.99
7.3	5.08	5.08	4.61	4.06	3.57	3.13	2.76	2.42	2.13	1.87
7.4	4.73	4.73	4.30	3.78	3.32	2.92	2.57	2.26	1.98	1.74
7.5	4.36	4.36	3.97	3.49	3.06	2.69	2.37	2.08	1.83	1.61
7.6	3.98	3.98	3.61	3.18	2.79	2.45	2.16	1.90	1.67	1.47
7.7	3.58	3.58	3.25	2.86	2.51	2.21	1.94	1.71	1.50	1.32
7.8	3.18	3.18	2.89	2.54	2.23	1.96	1.73	1.52	1.33	1.17
7.9	2.80	2.80	2.54	2.24	1.96	1.73	1.52	1.33	1.17	1.03
8.0	2.43	2.43	2.21	1.94	1.71	1.50	1.32	1.16	1.02	0.897
8.1	2.10	2.10	1.91	1.68	1.47	1.29	1.14	1.00	0.879	0.773
8.2	1.79	1.79	1.63	1.43	1.26	1.11	0.973	0.855	0.752	0.661
8.3	1.52	1.52	1.39	1.22	1.07	0.941	0.827	0.727	0.639	0.562
8.4	1.29	1.29	1.17	1.03	0.906	0.796	0.700	0.615	0.541	0.475
8.5	1.09	1.09	0.990	0.870	0.765	0.672	0.591	0.520	0.457	0.401
8.6	0.920	0.920	0.836	0.735	0.646	0.568	0.499	0.439	0.386	0.339
8.7	0.778	0.778	0.707	0.622	0.547	0.480	0.422	0.371	0.326	0.287
8.8	0.661	0.661	0.601	0.528	0.464	0.408	0.359	0.315	0.277	0.244
8.9	0.565	0.565	0.513	0.451	0.397	0.349	0.306	0.269	0.237	0.208
9.0	0.486	0.486	0.442	0.389	0.342	0.300	0.264	0.232	0.204	0.179

$$CCC = \left(\frac{0.0577}{1+10^{7.688-pH}} + \frac{2.487}{1+10^{pH-7.688}} \right) x\ MIN\left(2.85, 1.45 \cdot 10^{0.028(25-T)}\right)$$

Where: CCC = criteria continuous concentration
T = temperature in degrees Celsius (ºC)

pH-Dependent Effluent Limits for Ammonia
Criterion Maximum Concentration, Maximum 1-hour Average

pH	Ammonia Concentration Limit (mg N/*l*)
6.5	**32.6**
6.6	**31.3**
6.7	**29.8**
6.8	**28.0**
6.9	**26.2**
7.0	**24.1**
7.1	**21.9**
7.2	**19.7**
7.3	**17.5**
7.4	**15.3**
7.5	**13.3**
7.6	**11.4**
7.7	**9.64**
7.8	**8.11**
7.9	**6.77**
8.0	**5.62**
8.1	**4.64**
8.2	**3.83**
8.3	**3.15**
8.4	**2.59**
8.5	**2.14**
8.6	**1.77**
8.7	**1.47**
8.8	**1.23**
8.9	**1.04**
9.0	**0.885**

$$CMC_{salmonids\ \ present} = \left(\frac{0.275}{1+10^{7.204-pH}} + \frac{39.0}{1+10^{pH-7.204}} \right)$$

Where: CMC = criteria maximum concentration

Hardness-Dependent Effluent Limits for Copper
(expressed as total recoverable metal)

Hardness (mg/*l* as $CaCO_3$)	CCC 4-Day Ave. (µg/*l*)	*CMC* 1-Hour Ave. (µg/*l*)	Hardness (mg/*l* as $CaCO_3$)	CCC 4-Day Ave. (µg/*l*)	*CMC* 1-Hour Ave. (µg/*l*)
<25	*Calc.*	*Calc.*	180	15	24
25	2.9	3.8	190	16	26
30	3.3	4.5	200	17	27
35	3.8	5.2	210	18	28
40	4.3	5.9	220	18	29
45	4.7	6.6	230	19	31
50	5.2	7.3	240	20	32
55	5.6	8.0	250	20	33
60	6.0	8.7	260	21	34
65	6.5	9.3	270	22	36
70	6.9	10	280	22	37
75	7.3	11	290	23	38
80	7.7	11	300	24	39
85	8.1	12	310	25	41
90	8.5	13	320	25	42
95	8.9	13	330	26	43
100	9.3	14	340	27	44
110	10	15	350	27	46
120	11	17	360	28	47
130	12	18	370	29	48
140	12	19	380	29	49
150	13	21	390	30	50
160	14	22	400	30	52
170	15	23	>400	30	52

$$CCC = e^{\{0.8545[\ln(hardness)]-1.702\}}$$

$$CMC = e^{\{0.9422[\ln(hardness)]-1.700\}}$$

Hardness-Dependent Effluent Limitations for Lead

(expressed as total recoverable metal)

LEAD

Hardness (mg/*l* as $CaCO_3$)	CCC 4-Day Ave. (µg/*l*)	*CMC* 1-Hour Ave. (µg/*l*)	Hardness (mg/*l* as $CaCO_3$)	CCC 4-Day Ave. (µg/*l*)	*CMC* 1-Hour Ave. (µg/*l*)
<25	*Calculate*	*Calculate*	180	6.7	170
25	0.54	25	190	7.2	180
30	0.69	30	200	7.7	200
35	0.84	34	210	8.2	210
40	0.99	38	220	8.7	220
45	1.2	43	230	9.2	240
50	1.3	47	240	9.7	250
55	1.5	52	250	10	260
60	1.7	57	260	11	280
65	1.8	61	270	11	290
70	2.0	66	280	12	300
75	2.2	71	290	12	320
80	2.4	76	300	13	330
85	2.6	82	310	13	340
90	2.8	92	320	14	360
95	3.0	25	330	15	370
100	3.2	30	340	15	390
110	3.6	34	350	16	400
120	4.0	100	360	16	420
130	4.4	110	370	17	430
140	4.9	130	380	17	450
150	5.3	140	390	18	460
160	5.8	150	400	19	480
170	6.3	160	>400	*Calculate*	*Calculate*

$$CCC = e^{\{1.273[\ln(hardness)]-4.705\}}$$

$$CMC = e^{\{1.273[\ln(hardness)]-1.460\}}$$

Where: CCC = criteria continuous concentration
CMC = criteria maximum concentration

FACT SHEET

ORDER NO. R5-2003-0003, Amendment No. 1
UNIVERSITY OF CALIFORNIA, DAVIS
MAIN WASTEWATER TREATMENT PLANT
YOLO AND SOLANO COUNTIES
NPDES NO. CA0077895

SCOPE OF PERMIT

This renewed Order regulates the discharge of up to 2.7 million gallons per day (mgd), design average dry weather flow (ADWF), of effluent from the University of California, Davis, Main Wastewater Treatment Plant (WWTP). This Order includes effluent, sludge, and surface water limitations, monitoring and reporting requirements, additional study requirements, and reopener provisions for effluent constituents.

BACKGROUND INFORMATION

The Discharger owns and operates a wastewater collection, treatment, and disposal system, and provides sewerage service to University of California's Davis Campus. The treatment plant is in Section 21, T8N, R2E, MDB&M, as shown on Attachment A, a part of this Order. Treated municipal wastewater is discharged to South Fork Putah Creek, a water of the United States at the point, latitude 38°, 31′, 04″ and longitude 121°, 45′, 25″. The Discharger is proposing to also discharge treated municipal wastewater to the Arboretum Waterway (North Branch Putah Creek), a water of the United States, at the point latitude 38°, 31′, 56″ north and longitude 121°, 45′, 25″ west.

The treatment system consists of a bar screen (located at the old WWTP), communitor, fine screen, oxidation ditch, secondary clarifiers, gravity filtration, and ultraviolet light disinfection. The oxidation basin is operated to nitrify and denitrify, reducing both the ammonia and nitrate concentrations in the wastewater. Sludge is stabilized in basins and dewatered by sludge drying beds. Sludge is disposed off-site at a landfill. Additionally, there is a 2.0 million gallon bypass pond located at the wastewater treatment plant site.

The Discharger began operating its new tertiary wastewater treatment plant in March 2000. The barscreens at the old plant are still used as part of the treatment processes. From the old treatment plant the wastewater is pumped to the new treatment plant. The old treatment plant used sludge drying facilities located near the University's Primate Center. These drying beds are no longer used. The groundwater under the abandoned sludge drying beds at the Primate Center must be investigated for any groundwater degradation.

Putah Creek originally flowed through the City of Davis where the University is located. To prevent flooding, the City created South Fork Putah Creek and damming what is now known as the North Branch Putah Creek (arboretum). The North Branch Putah Creek is a water of the United States and is located on the campus and used as storm water retention basin and recreational impoundment. During dry weather, the arboretum water becomes stagnant and fills with algae. The Discharger proposes to treat the arboretum water at the new wastewater treatment plant to reduce the nutrients and other pollutants that currently accumulate in the arboretum. The arboretum water would be pumped to the new plant for treatment when wastewater flows are low. The arboretum water would be recycled back

to the arboretum. Since domestic sewage is treated at the same time, the commingled waste stream must be regulated as reclaimed water in accordance with California Code of Regulations, Title 22. Before reclamation can begin, additional information and analyses must be completed including submittal and approval of a Title 22 Report.

Engineering analyses on the ability of the wastewater treatment plant to treat the arboretum water, to meet water quality objectives, and not impact the treatment capability of the wastewater plant must be completed. A Plan of Operation detailing the quality of flow, operation hours, operation days, emergency procedures, maintenance, staffing, etc. must be submitted. Provision Nos. 8 and 9 require the Discharger to complete studies and reports before treating and discharging reclaimed water to the arboretum. The discharge of reclaimed water from the North Branch Putah Creek to the South Fork of Putah Creek may constitute a wastewater discharge and may require an NPDES permit. A decision on the requirement of an NPDES permit other than a storm water discharge permit will be made at a later date.

RECEIVING WATER BENEFICIAL USES

The beneficial uses of Putah Creek downstream of the discharge as identified in Table II-1 of the Basin Plan are municipal and domestic supply, agricultural irrigation, agricultural stock watering, body contact water recreation, canoeing and rafting, other non-body contact water recreation, warm freshwater aquatic habitat, potential cold freshwater aquatic habitat, warm spawning habitat and wildlife habitat.

In 1995, 1997 and 1998, University of California, Davis students under the direction of Dr. Peter Moyle observed juvenile and adult salmon in the South Fork Putah Creek. Some salmon were observed spawning in December and January 1997/1998. Therefore, the potential beneficial use of cold water aquatic habitat has been confirmed to exist in Putah Creek.

EFFLUENT LIMITATIONS FOR SURFACE WATER DISCHARGE

All mass limitations in the permit were calculated by multiplying the concentration limitation by the design flow and the appropriate unit conversion factors.

Flow—The WWTP was designed to provide a tertiary level of treatment for up to its design flow of 2.7 mgd. The effluent flow limit is therefore set at 2.7 mgd.

Total Coliform Organisms— The beneficial uses of South Fork of Putah Creek and Nork Fork Putah Creek include contact recreation uses and irrigation. To protect these beneficial uses, the Regional Board finds that the wastewater must be disinfected and adequately treated to prevent disease. The principal infectious agents (pathogens) that may be present in raw sewage may be classified into three broad groups: bacteria, parasites, and viruses. Tertiary treatment, consisting of chemical coagulation, sedimentation, and filtration, has been found to remove approximately 99.5% of viruses. Filtration is an effective means of reducing viruses and parasites from the waste stream. The wastewater must be

treated to tertiary standards (filtered) to protect contact recreational and food crop irrigation uses.

The California Department of Health Services (DHS) has developed reclamation criteria, California Code of Regulations, Title 22, Division 4, Chapter 3 (Title 22), for the reuse of wastewater. Title 22 requires that for spray irrigation of food crops, parks, playgrounds, school yards, and other areas of similar public access, wastewater be adequately disinfected, oxidized, coagulated, clarified, and filtered, and that the effluent total coliform levels not exceed 2.2 MPN/100 m*l* as a 7-day median. Title 22 is not directly applicable to surface waters; however, the Regional Board finds that it is appropriate to apply DHS's reclamation criteria because the South Fork of Putah Creek is used for irrigation of agricultural land and for contact recreation purposes. The stringent disinfection criteria of Title 22 are appropriate since the undiluted effluent may be used for contact recreation. Coliform organisms are intended as an indicator of the effectiveness of the entire treatment train and the effectiveness of removing other pathogens. The method of treatment is not prescribed by this Order; however, wastewater must be treated to a level equivalent to that recommended by DHS.

In addition to coliform testing, a turbidity effluent limitation has been included as a second indicator of the effectiveness of the treatment process and to assure compliance with the required level of treatment. The tertiary treatment process, or equivalent, is also capable of reliably meeting a turbidity limitation of 2 nephelometric turbidity units (NTU) as a daily average. Failure of the filtration system such that virus removal is impaired would normally result in increased particles in the effluent, which result in higher effluent turbidity. Turbidity has a major advantage for monitoring filter performance, allowing immediate detection of filter failure and rapid corrective action. Coliform testing, by comparison, is not conducted continuously and requires several hours, to days, to identify high coliform concentrations.

The application of tertiary treatment processes results in the ability to achieve lower levels for BOD and TSS year round; the 30-day average BOD and TSS limitations are 10 mg/*l*, which is technically based on the capability of a tertiary system.

The treatment system currently treats wastewater to a tertiary level when discharging to surface waters. The discharge limitations in the current permit establish coliform limits at 2.2 MPN/100 ml as a monthly median. The recommendation from DHS for the level of coliform produced by a tertiary wastewater system is 2.2 MPN/100 ml as a 7-day median. A review of the self monitoring reports submitted by the Discharger indicates 2.2 MPN/100 ml as a 7-day median can be met with the current treatment facilities.

Turbidity— In addition to coliform testing, a turbidity effluent limitation has been included as a second indicator of the effectiveness of the treatment process and to assure compliance with the required level of treatment. The tertiary treatment process, or equivalent, is also capable of reliably meeting a reduced turbidity limitation of 2 NTU as a daily average, 5 NTU at least 95 percent of the time within a day, and 10 NTU at all times. Failure of the filtration system, such that virus removal is impaired, would normally result in increased particles in the effluent and higher effluent turbidity. Turbidity monitoring has a major advantage over coliform monitoring for evaluating filter performance, allowing immediate detection of filter failure and rapid corrective action. Coliform

testing, by comparison, is not conducted continuously and requires several hours to days to identify high coliform concentrations.

BOD and TSS—40 Code of Federal Regulations (CFR), Section 133.102 contains regulations describing the minimum level of effluent quality—for biochemical oxygen demand (BOD) and total suspended solids (TSS)—attainable by secondary treatment.

The WWTP is required to comply with effluent limitations appropriate for treatment systems providing tertiary or equivalent treatment. Effluent limitations for both BOD and TSS have been established at 10 mg/*l*, as a 30-day average, which is technically based on the capability of a tertiary system. In addition, 40 CFR 133.102, in describing the minimum level of effluent quality attainable by secondary treatment, states that the 30-day average percent removal shall not be less than 85 percent. If 85 percent removal of BOD and TSS must be achieved by a secondary treatment plant, it must also be achieved by a tertiary (*i.e*., treatment beyond secondary level) treatment plant. Review of the flow in the stream compared to the flow of the effluent indicates a less than 20:1 ratio even during wet weather. Therefore no allowance will be given for higher BOD or TSS limits during wet weather.

Total Residual Chlorine—The discharger has used chlorine in the past to clean the filters at its WWTP. For dechlorination, the Discharger uses sulfur dioxide, which combines with chlorine, to render it relatively unreactive and thus remove it from the waste stream. Inadequate dechlorination may result in discharge of chlorine to the receiving stream. For chlorine, U.S. EPA has developed Ambient Water Quality Criteria for the Protection of Freshwater Aquatic Life. The recommended maximum one-hour average concentration for chlorine is 0.019 mg/*l* and the recommended maximum four-day average concentration is 0.011 mg/*l*. Effluent limitations for chlorine, based on these criteria, are included in Order No. R5-2003-003.

Ammonia, Nitrite, and Nitrate— Untreated domestic wastewater contains ammonia. Nitrification is a biological process that converts ammonia to nitrite and nitrite to nitrate, and denitrification is a process that converts nitrate to nitrogen gas, which is then released to the atmosphere. Inadequate or incomplete nitrification or denitrification may result in the discharge of ammonia, nitrite, or nitrate to the receiving stream in unacceptable concentrations.

In water, un-ionized ammonia (NH_3) exists in equilibrium with the ammonium ion (NH_4^+). The toxicity of aqueous ammonia solutions to aquatic organisms is primarily attributable to the un-ionized ammonia form, with the ammonium ion being relatively less toxic. The relative concentrations of these two forms are pH and temperature-dependent. Total ammonia refers to the sum of these two forms in aqueous solutions.

The Basin Plan includes a water quality objective that "[a]ll water shall be maintained free of toxic substances in concentrations that produce detrimental physiological responses in human, plant, animal, or aquatic life". U.S. EPA's Ambient Water Quality Criteria for the Protection of Freshwater Aquatic Life, for total ammonia, recommends acute (1-hour average) standards based on pH and chronic (30-day average) standards based on pH and temperature. It also recommends a maximum four-day average concentration. U.S. EPA 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. However, 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. Because the receiving stream has a beneficial use of cold freshwater habitat and because salmonids do inhabit Putah Creek, the recommended criteria for waters where salmonids are present were used.

U.S. EPA has presented the acute ammonia criteria in three ways: as equations, in a table, and in graphs that relate pH to ammonia concentrations. Attachment B shows the equation and table used for the 30-day average concentration criteria recommended for waters where fish early life stages are present. Attachment C shows the equation and table used for the 1-hour average concentration criteria recommended for waters where salmonid fish are present. A 30-day period is a reasonable representation of a calendar month; so, to conform to 40 CFR §122.45, the 30-day average criteria are set equal to average monthly limitations in Order No. R5-2003-003.

For waters designated as having the beneficial use of municipal and domestic supply (MUN), the Basin Plan includes a water quality objective that water "shall not contain concentrations of chemical constituents in excess of the maximum contaminant levels (MCLs) specified in the following provisions of Title 22 of the California Code of Regulations…: Tables 64431-A (Inorganic Chemicals)…". U.S. EPA has developed a primary MCL and an MCL goal of 1,000 µg/*l* for nitrite (as nitrogen). The primary MCL listed in Title 22 of the California Code of Regulations (CCR), Table 64431-A, is also 1,000 µg/*l* for nitrite as nitrogen. For nitrate plus nitrite, U.S. EPA has developed Drinking Water Standards (10,000 µg/*l* as Primary Maximum Contaminant Level) and Ambient Water Quality Criteria for protection of human health (10,000 µg/*l* for non-cancer health effects). Title 22 CCR, Table 64431-A, also includes a primary MCL of 10,000 µg/*l* for the sum of nitrate and nitrite, measured as nitrogen. Recent toxicity studies have indicated a possibility that nitrate is toxic to aquatic organisms.

The conversion of ammonia to nitrites and the conversion of nitrites to nitrates present a reasonable potential for the discharge to exceed the primary maximum contaminant levels for nitrite and the sum of nitrite and nitrate. Therefore, Order No. R5-2003-003 includes limitations for nitrite and the sum of nitrite and nitrate.

Aluminum - Based on information included in analytical laboratory reports submitted by the Discharger, the discharge contained concentrations of aluminum as high as 87 µg/l, which is the U.S. EPA National Recommended Ambient Water Quality Criteria for protection of freshwater aquatic life. The Ambient Water Quality Criteria for the Protection of Freshwater Aquatic Life for aluminum is 87 µg/l for the 4-day average and 750 µg/l for the 1-hour average. The discharge has a reasonable potential to cause violation of the Basin Plan prohibition against the discharge of toxic constituents for aluminum. Additionally, the analytical results from a sample collected on 6 March 2002 from the South Fork Putah Creek upstream of the wastewater treatment plant discharge detected aluminum at 526 µg/l. Therefore, there is no assimilative capacity for aluminum in the receiving stream.

Arsenic **-** Arsenic is considered to be a "known human carcinogen". Because Putah Creek has a designated municipal beneficial use, drinking water MCLs are applicable to the discharge. The current drinking water MCL for arsenic of 50 µg/*l* was developed in the 1940s. On 22 January 2001, U.S. EPA adopted a new federal MCL for arsenic of 10µg/*l*. On 22 May 2001, U.S. EPA revised the new standard by delaying its effective date until 22 February 2002 in order to conduct reviews of the scientific and economic analyses on which the new MCL was based. On 19 July 2001, U.S. EPA proposed a range of MCL options for arsenic—3 µg/*l*, 5 µg/*l*, 10 µg/*l*, and 20 µg/*l*—and requested additional comment on the technical basis for the original 22 January 2001 rule.

The Discharger submitted laboratory results showing arsenic concentrations between 0.87 – 5.76 µg/*l*. Based on statistical analysis, the discharge does not have a reasonable potential to cause or contribute to an in stream excursion above a level necessary to protect drinking water. This permit does not have a limit for arsenic at the current MCL of 10 µg/*l*. The Order may be reopened and the arsenic limit may be added based on amendment of the MCL or other scientific finding or additional monitoring data.

Copper **-** Based on analytical results of effluent samples collected by the Discharger, the discharge has a reasonable potential to cause or contribute to an in-stream excursion above the CTR standards for copper; therefore, effluent limitations for copper are included in the Order. Effluent results showing copper concentrations ranging from 29.3 – 4.2 µg/l were submitted by the Discharger. Copper toxicity is hardness dependent and the worst-case hardness for Discharger's effluent is 110 µg/*l*. Based on this hardness, the CTR standards are 9.7 µg/l for 4 days and 15 µg/l for 1 hour. The Ambient Water Quality Criteria for metals are presented in dissolved concentrations. Lacking site-specific data, the U.S. EPA recommends conversion factors to translate dissolved concentrations to total concentrations. The conversion factors for copper in freshwater are 0.960 for both the acute and the chronic criteria.

Cyanide **-** Based on information included in analytical laboratory reports submitted by the Discharger, cyanide in the discharge has a reasonable potential to cause or contribute to an in-stream excursion above the CTR water quality standard. Cyanide was detected in an effluent sample collected 10 June 2002 at a concentration of 19 µg/l. The CTR recommended continuous concentration (maximum four-day average concentration) is 5.2 µg/l and the recommended maximum concentration (maximum one-hour average concentration) is 22 µg/l. Effluent limitations for cyanide are included in this Order and are based on the CTR for the protection of freshwater aquatic life. Additionally, the analytical results collected on June 2002 from the South Putah Creek upstream of the wastewater discharge detected cyanide at 6.7 µg/l. Therefore, there is no assimilative capacity for cyanide in the receiving stream.

Dichloromethane **-** Based on information included in analytical laboratory reports submitted by the Discharger, dichloromethane in the discharge has a reasonable potential to cause or contribute to an in-stream excursion above the CTR water quality standard. The receiving stream upstream of the wastewater discharge, showed a dichloromethane concentration of 35 µg/l on 11 February 2002. The CTR for consumption of water and aquatic organisms is 4.7 µg/l. The SIP Section 1.3, requires an Effluent Limitation be established when the concentrations of a pollutant in the receiving stream exceed a CTR standard. Therefore, the receiving stream has no assimilative capacity for

dichloromethane. The highest effluent concentration was an estimated value of 0.6 µg/l, below detection level.

Dioxin/Furans - Based on information submitted as part of the application, in studies, and in monitoring reports, the discharge has a reasonable potential to cause or contribute to an in-stream excursion above the CTR Standards for dioxins and furans or their congeners, TCDD equivalents. The receiving stream, South Putah Creek upstream of the wastewater discharge showed a concentration of 1,2,3,4,6,7,8- HpCDD was 12.6 pg/l and OCDD was 55.9 pg/l in the 30 July 2002 sampling for the receiving stream. These congeners have assigned Toxic Equivalency Factors relative to toxicity of 2,3,7,8-TCDD. The CTR receiving water limit for dioxin (2,3,7,8-TCDD) is 0.000000014 µg/l (or 0.014 pg/l) where drinking water is not a designated beneficial use. The SIP requires the inclusion of effluent limitations where the stream sampling has exceeded the water quality standard.

Electrical Conductivity (EC) is a method of measuring salinity in water. High salinity can impact the beneficial uses of receiving waters. The UCD Wastewater Treatment Plant (Facility) discharges to the South Fork of Putah Creek, which is a low flow/ ephemeral stream, with beneficial uses that include both municipal and domestic supply and irrigated agricultural supply. Based on information included in analytical laboratory reports submitted by the Discharger, EC in the discharge has a reasonable potential to cause or contribute to an in-stream excursion above a level necessary to protect drinking and irrigation water.

The annual average for EC in the Discharger's wastewater treatment plant effluent is 1050 µhmos/cm. At times, the wastewater in the South Fork of Putah Creek may be undiluted or relatively undiluted. The EC of the receiving stream, without the wastewater discharge, is approximately 522 µmhos/cm, which is fully protective of both municipal and irrigated agricultural uses.

The Basin Plan states, on Page III-3.00, Chemical Constituents, that "Waters shall not contain constituents in concentrations that adversely affect beneficial uses." The Basin Plan's "Policy for Application of Water Quality Objectives" provides that in implementing narrative water quality objectives, the Regional Board will consider numerical criteria and guidelines developed by other agencies and organizations. This application of the Basin Plan is consistent with Federal Regulations, 40CFR 122.44(d).

Municipal and domestic water supply is a beneficial use of Putah Creek. The Basin Plan requires that discharges not contain concentrations of chemical constituents in excess of the maximum contaminant levels (MCLs) specified in Title 22. The drinking water standards developed by the California Department of Health Services establish a secondary MCL for electrical conductivity at 900 µhmos/cm with an upper limit of 1,600 µhmos/cm and a short term maximum of 2,200 µhmos/cm. The discharge has reasonable potential to exceed the secondary MCL for electrical conductivity.

It is appropriate for the Regional Board to rely on technical documents for implementation of the narrative water quality objective. For EC, a publication (*Ayers R.S. and D.W. Westcott, Water Quality for Agriculture, Food and Agriculture Organization of the United Nations – Irrigation and Drainage*

Paper No. 29, Rev. 1, Rome (1985)) concluded that levels above 700 µhmos/cm will reduce crop yield for sensitive plants. The *University of California, Davis Campus, Agricultural Extension Service*, published a paper, dated 7 January 1974, stating that there will not be problems to crops associated with salt if the EC remains below 750 µhmos/cm. In reviewing *Irrigation Water Salinity and Crop Production, Stephen R. Grattan, University of California, Agriculture and Natural Resources, Publication 8066, Table 2,* the estimated crop yields for beans, carrots, eggplant and strawberries were shown to be 100% when EC levels were 700 µhmos/cm and decreased to 90% when the irrigation water EC rose to between 900 µhmos/cm and 1,700 µhmos/cm, depending on the individual crop. The discharge has the reasonable potential to cause or contribute to an exceedence of the Agricultural Water Quality Goal of 700 µhmos/cm for electrical conductivity.

Numerically the secondary MCL of 900 µhmos/cm and the agricultural goal of 700 µhmos/cm for EC are relatively close. The current municipal water supply averages 600 µhmos/cm for campus domestic water. However, some wells on campus show EC concentration of 500 µhmos/cm. The Discharger may be able to lower the EC concentration in its water supplies with use of wells with lower EC or new deeper groundwater wells. The Discharger may also have the ability to reduce salt loads through an effective pretreatment program, such as controlling cooling tower blowdown and groundwater cleanup discharges.

On 30 January 2003, at the Regional Board meeting, the University offered their expertise to develop site-specific objectives for electrical conductivity that fully protect the beneficial uses of Putah Creek. Section 13267 of the California Water Code allows the Regional Board to request technical information from dischargers to assist in the development of waste discharge requirements. Under the direction of the Regional Board members, staff issued a letter requesting technical information on site-specific objectives for Putah Creek for electrical conductivity from the University. A time schedule is included in the request for technical information. After review of the technical information, the Regional Board may reopen this Order to include an EC limit for protecting the beneficial use of agriculture irrigation.

The limit for EC at the secondary MCL at 900 µhmos/cm is required to protect the beneficial uses of municipal and domestic water supply. The results of the 13267 study for site-specific objectives of electrical conductivity for agriculture may determine the need for a more stringent EC limit.

Iron **-** Based on information included in analytical laboratory reports submitted by the Discharger, iron in the discharge has a reasonable potential to cause or contribute to an in-stream excursion above a level necessary to protect drinking water. Iron was detected in an effluent sample collected 10 June 2002 at a concentration of 445 mg/l. U.S. EPA and California developed Drinking Water Secondary MCL's for iron and is 300 mg/l. Additionally, the analytical results on 6 March 2002 from the South Putah Creek upstream of the wastewater discharge detected iron at a concentration of 988 mg/l. Therefore, there is no assimilative capacity for iron in the receiving stream.

Lead - Based on information submitted as part of the application, in studies, and in monitoring reports, the discharge has a reasonable potential to cause or contribute to an in-stream excursion above the CTR Standard for lead. Lead is a heavy metal and was detected in the effluent as high as 7.42 µg/l in June 2002. Lead toxicity is hardness dependent. The CTR for lead is 2.8 µg/l for the 4-day chronic limit and 72 µg/*l* for the acute limit at the worst-case scenario of 110 mg/l hardness.

pH - The Basin Plan includes a water quality objective for surface waters (except for Goose Lake) that the "…pH shall not be depressed below 6.5 nor raised above 8.5." No reliable dilution is available in the receiving stream, so the Order includes effluent limitations for pH at the Basin Plan objective values.

Phosphorus - Phosphorus is the most limiting constituent for aquatic plant growth in most water bodies. Phosphorus may contribute to excessive growth of algae and may exacerbate eutrophication. Increased algae limits the beneficial uses of South Fork Putah Creek. Based on information submitted as part of the application, the discharge may have a reasonable potential to cause or contribute to an in-stream excursion above the Basin Plan narrative prohibition against the discharge of biostimulating constituents. Phosphorus was detected in an effluent sample collected 16 January 2002 at a concentration of 5.4 µg/l. Additionally, the analytical results in 6 March 2002 for South Fork Putah Creek detected phosphorus at 0.14 µg/l. Effluent limitations for phosphorus as a biostimulating constituent have not been established. There is no effluent limit, however the concentration of phosphorus needs to be monitored in the effluent and is included in the Monitoring and Reporting Program.

Total Chromium – A total chromium limit was included in the tentative permit send out in October 2002 because sampling data indicated the maximum observable concentration was 50 mg/l. Additional review of that sample data shows the concentration was less than 50 mg/l, and there was no reasonable potential to exceed an MCL. Therefore, the limit for total chromium was removed from the permit.

Non-Detected Constituents - A substantial number of constituents including volatiles, semi-volatiles, inorganics, pesticides and PCB's were not analyzed at or below the criterion concentration by commercial laboratories. Therefore, reasonable potential cannot be determined for 1,1-dichloroethene, 1,1,2,2-tetrachloroethane, 1,2-dichloroethane, acrylonitrile, carbon tetrachloride, dibromochloromethane, hexachlorobenzene, hexachlorobutadiene, 1,2-benzathracene, 1,2-diphenylhydrazine, 2-chlorophenol, 2,4-dichlorophenol, 2,4-dinitrotoluene, 2,4,6-trichlorophenol, 2,6-dinitrotoluene, 3,3-dichlorobenzidine, benzidine, benzo(k)fluoranthene, bis(2-chloroethyl)ether, indeno(1,2,3-c,d)pyrene, n-nitrosodimethylamine, n-nitrosodi-n-propylamine, cadmium, silver, 4,4-DDD, 4,4-DDE, 4,4-DDT,aldrin, chlordane, heptachlor, heptachlor epoxide, PCB-1016, PCB-1221, PCB-1232, PCB-1242, PCB-1248, PCB-1254, PCB-1260, toxaphene, atrizine, carbofuran, DBCP, diquat, ethylene dibromide, dioxin, diazinon, chlorpyrifos, those constituents at this time. The Reporting and Monitoring Program requires the Discharger to continue monitoring for priority pollutants and other constituents twice a year in accordance with the SIP, Section 2.3 and 2.4.

Toxicity - The Basin Plan states that "[a]ll waters shall be maintained free of toxic substances in concentrations that produce detrimental physiological responses in human, plant, animal, or aquatic life. This objective applies regardless of whether the toxicity is caused by a single substance or the interactive effect of multiple substances." The Basin Plan requires that "[a]s a minimum, compliance with this objective…shall be evaluated with a 96-hour bioassay." Order No. R5-2003-003 requires both acute and chronic toxicity monitoring to evaluate compliance with this water quality objective.

The low-flow nature of Putah Creek means that the designated beneficial uses must be protected, but that no credit for receiving water dilution is available. The use of a dilution series to evaluate compliance with the narrative toxicity objective contained in the Basin Plan is, therefore, inappropriate.

The Basin Plan further states that "…effluent limits based upon acute biotoxicity tests of effluents will be prescribed…". Effluent limitations for acute toxicity have been included in the Order.

The Discharger's effluent has shown some toxicity in the chronic toxicity testing of Ceriodaphnia dubia survival and reproduction. In September 2001, the survival of Ceriodaphnia dubia was 40%. In September 2000, January 2001, September 2001 and October 2002, Ceriodaphnia dubia reproduction was less than the laboratory control.

General Effluent Limitation Information -

Selected 40 CFR §122.2 definitions:

Average monthly discharge limitation means the highest allowable average of "daily discharges" over a calendar month, calculated as the sum of all "daily discharges" measured during a calendar month divided by the number of "daily discharges" measured during that month.

Average weekly discharge limitation means the highest allowable average of "daily discharges" over a calendar week, calculated as the sum of all "daily discharges" measured during a calendar week divided by the number of "daily discharges" measured during that week.

Continuous discharge means a "discharge" which occurs without interruption throughout the operating hours of the facility, except for infrequent shutdowns for maintenance, process changes, or other similar activities.

Daily discharge means the "discharge of a pollutant" measured during a calendar day or any 24-hour period that reasonable represents a calendar day for purposes of sampling. For pollutants with limitations expressed in units of mass, the "daily discharge" is calculated as the total mass of the pollutant discharged over the day. For pollutants with limitations expressed in other units of measurement, the "daily discharge" is calculated as the average measurement of the pollutant over the day.

Maximum daily discharge limitation means the highest allowable "daily discharge".'

The SIP contains similar definitions. These definitions were used in the development of Order No. R5-2003-003. Alternate limitation period terms were used in the permit for the sake of clarity. Alternates are shown in the following table:

Term Used in Permit	SIP/40 CFR 122.2 Term
Monthly average	Average monthly discharge limitation. 30-day averages may have been converted to monthly averages to conform with 40 CFR §122.45 (see below)
1-Day average	Average daily discharge limitation. Since the daily discharge for limitations expressed in concentrations is defined as the average measurement of the pollutant over the day, the term '1-Day Average' was used in the Order.

40 CFR §122.45 states that:

(1) "In the case of POTWs, permit effluent limitations…shall be calculated based on design flow."

(2) "For continuous discharges all permit effluent limitations…shall unless impracticable be stated as…[a]verage weekly and average monthly discharge limitations for POTWs."

(3) "All pollutants limited in permits shall have limitations…expressed in terms of mass except…[f]or pH, temperature, radiation, or other pollutants which cannot appropriately be expressed by mass…Pollutants limited in terms of mass additionally may be limited in terms of other units of measurement, and the permit shall require the permittee to comply with both limitations."

U.S. EPA recommends a maximum daily limitation rather than an average weekly limitation for water quality based permitting.

RECEIVING WATER LIMITATIONS AND MONITORING

Fecal coliform—Putah Creek has been designated as having the beneficial use of contact recreation (REC-1). For water bodies designated as having REC-1 as a beneficial use, the Basin Plan includes a water quality objective limiting the "…fecal coliform concentration based on a minimum of not less than five samples for any 30-day period…" to a maximum geometric mean of 200 MPN/100 ml. The objective also states that "…[no] more than ten percent of the total number of samples taken during any 30-day period [shall] exceed 400/100 ml." This objective is included in the Order as a receiving water limitation.

Dissolved Oxygen—The University of California has documented the presence of salmonids in Putah Creek.

For water bodies designated as having COLD as a beneficial use, the Basin Plan includes a water quality objective of maintaining a minimum of 7.0 mg/*l* of dissolved oxygen. Since the beneficial use of COLD does apply to Putah Creek, a receiving water limitation of 7.0 mg/l for dissolved oxygen was included in the Order.

For surface water bodies outside of the Delta, the Basin Plan includes the water quality objective that "…the monthly median of the mean daily dissolved oxygen (DO) concentration shall not fall below 85 percent of saturation in the main water mass, and the 95 percentile concentration shall not fall below 75 percent of saturation." This objective was included as a receiving water limitation in the Order.

pH - For all surface water bodies in the Sacramento River and San Joaquin River basins, the Basin Plan includes water quality objectives stating that "[t]he pH shall not be depressed below 6.5 nor raised above 8.5. Changes in normal ambient pH levels shall not exceed 0.5 in fresh waters with designated COLD or WARM beneficial uses." Putah Creek has the beneficial uses of both COLD and WARM (warm freshwater habitat); therefore, the Order includes receiving water limitations for both pH range and pH change.

The Basin Plan allows an appropriate averaging period for pH change in the receiving stream. Since there is no technical information available that indicates that aquatic organisms are adversely affected by shifts in pH within the 6.5 to 8.5 range, an averaging period is considered appropriate and a monthly averaging period for determining compliance with the 0.5 receiving water pH limitation is included in the Order.

Temperature - Putah Creek has the beneficial uses of both COLD and WARM. The Basin Plan includes the objective that "[a]t no time or place shall the temperature of COLD or WARM intrastate waters be increased more than 5ºF above natural receiving water temperature." The Order includes a receiving water limitation based on this objective.

Turbidity - The Basin Plan includes the following objective: "Increases in turbidity attributable to controllable water quality factors shall not exceed the following limits:

- Where natural turbidity is between 0 and 5 Nephelometric Turbidity Units (NTUs), increases shall not exceed 1 NTU.
- Where natural turbidity is between 5 and 10 NTUs, increases shall not exceed 20 percent.
- Where natural turbidity is between 50 and 100 NTUs, increases shall not exceed 10 NTU.
- Where natural turbidity is greater than 100 NTUs, increases shall not exceed 10 percent."

The Basin Plan allows an appropriate averaging period for turbidity increases in the receiving stream. The turbidity objective in the Basin Plan is based on antidegradation and not on protection of aquatic life. The effluent limitations in the permit are the best practicable treatment levels available from a tertiary treatment system. An averaging period for low turbidity levels will not result in degradation of beneficial uses of the receiving stream. Therefore, when the discharged wastewater has been treated to a tertiary level, an averaging period of one month may be used in determining compliance with the 0 to 5 NTU background turbidity increase limitation.

Ammonia and Chlorine - U.S. EPA has developed Ambient Water Quality Criteria for the Protection of Freshwater Aquatic Life for ammonia and for chlorine. The Order contains effluent limitations for ammonia and for chlorine equal to the Ambient Water Quality Criteria. Compliance with the effluent limitations for ammonia and for chlorine means that the discharge cannot cause an exceedance of the criteria in the receiving stream; in other words, the limitations are fully protective of water quality. Therefore, no receiving water ammonia or chlorine limitations are included in the Order.