CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
CENTRAL VALLEY REGION

ORDER NO.R5-2003-0031
NPDES NO. CA0077950

WASTE DISCHARGE REQUIREMENTS FOR CITY OF WOODLAND WATER POLLUTION CONTROL FACILITY YOLO COUNTY

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

1. The City of Woodland (hereafter Discharger) submitted a Report of Waste Discharge, dated 30 July 2002, and applied for a permit renewal to discharge waste under the National Pollutant Discharge Elimination System (NPDES) from the City's Wastewater Treatment Plant. Supplemental information to complete filing of the application was submitted on 20 September 2002.

2. The Discharger owns and operates a wastewater collection, treatment, and disposal system, and provides sewerage service to domestic, commercial, and industrial users of the City of Woodland. The treatment plant is in Section 2, T9N, R2E, and Section 35, T10N, R2E, MDB&M, as shown on Attachment A, a part of this Order. Treated municipal wastewater is discharged to Tule Canal, a water of the United States, and a tributary to the Yolo Bypass at the point, latitude 38°, 40', 51'' and longitude 121°, 38', 38''.

3. The treatment system consists of three activated sludge oxidation ditches, three secondary clarifiers, and chlorination/dechlorination. Approximately 315 arces of ponds are used for the treatment of sludge and storage of excess wastewater during periods of peak flow. The Report of Waste Discharge and the supplemental information describe the wastewater discharge as follows:

Parameter - Constituent	Maximum Daily	Average Daily	Unit
Flow Rate	12.8	6.03	million gallons per day (mgd)
		7.8 (Design)	mgd
Temperature	81.0 (Summer) 46.9 (Winter)	74.5 (Summer) 62.1 (Winter)	°F
BOD[1]	27.0	3.4	mg/l
Total Suspended Solid	65.0	5.4	mg/l
Total Coliform Organisms	170	3.6	MPN /100 mL
Ammonia (as N)	1.25	0.13	mg/l

Chlorine Residual (Total)	0.85	0.0015	mg/l
Oil and Grease	12.2	1.13	mg/l
Total Dissolved Solids (TDS)	3,700	914	mg/l
Electrical Conductivity	2,700	1,578	µmhos/cm
Bis(2-ethylhexyl)phthalate	8.0	--	µg/l
Gamma-BHC (Lindane)	0.06	--	µg/l
Delta-BHC	0.05	--	µg/l
Mercury	0.058	0.005	µg/l
Dibromochloromethane	37.5	21.9	µg/l
Aluminum	30.0	25.0	µg/l
Boron	2,540	--	µg/l
Iron	1,300	--	µg/l
Fluoride	400	340	µg/l

[1] 5-day, 20°C biochemical oxygen demand
-- not available

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

5. 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.

6. The United States Environmental Protection Agency (U.S.EPA) 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, Enclosed Bays, and Estuaries of California* (known as the State Implementation Plan or SIP) that contains guidance on implementation of the NTR and the CTR.

7. The Report of Waste Discharge contains information showing that flows within the receiving stream, Tule Canal, were too low to measure during the months of July, August, September, and October. The data submitted in the Report of Waste Discharge indicates, as was determined in past NPDES permits, Tule Canal is ephemeral. In addition, the State Water Resources Control Board, in precedential decision, Order WQO 2002-0015, states that the use of the harmonic mean to determine flow rates is inappropriate for ephemeral streams where there is no consistent background dilution. The impact of considering a receiving stream to be ephemeral is that all limitations are "end of pipe" without any benefit

of dilution.

8. The beneficial uses of Tule Canal, within the Yolo Bypass, downstream of the discharge, as identified in Table II-1 of the Basin Plan are agricultural irrigation, agricultural stock watering, water contact recreation, non-contact water recreation, warm freshwater aquatic habitat, potential cold freshwater aquatic habitat, warm fish migration habitat, cold fish migration habitat, warm spawning habitat, and wildlife habitat.

9. Federal regulations require effluent limitations for all pollutants that are or may be discharged at a level that will cause or have a 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 has a reasonable potential to cause or contribute to an in-stream excursion above a water quality standard for the following constituents:

a) **Bis(2-ethylhexyl)phthalate**:

An Effluent Limitation for bis(2-ethylhexyl)phthalate is included in existing Waste Discharge Requirements, Order No. R5-1998-0021-R01, in accordance with the NTR. A time schedule for compliance with the Effluent Limitation was included in Cease and Desist Order No. 98-022, with full compliance required by 30 December 2002. The CTR, Section 131.38 (e)(6), and the SIP, Section 2.1, allow a maximum compliance schedule for CTR and NTR constituents. The Discharger has exhausted a five-year compliance time schedule allowed under the SIP for bis(2-ethylhexyl)phthalate. During the compliance time period, the Discharger did not develop and implement industrial pretreatment limitations to control bis(2-ethylhexyl)phthalate. The Discharger has not implemented treatment systems for bis(2-ethylhexyl)phthalate. The Discharger has not implemented other effective source control measures for bis(2-ethylhexyl)phthalate. The Discharger has not achieved compliance with the Effluent Limitation for bis(2-ethylhexyl)phthalate. The 1998-2002 Effluent Monitoring Data report provided by the Discharger indicates that bis(2-ethylhexyl)phthalate was detected in three samples at concentrations of 4.0 µg/l (25 February 1998), 8.0 µg/l (15 April 1999), and 6.8 µg/l (16 November 1999). Using the average flow of 7.8 mgd and a maximum detected concentration of 8.0 µg/l, the approximate maximum mass of bis(2-ethylhexyl)phthalate discharged daily is 0.52 lbs/day. The U.S. EPA NTR human health criterion is 5.9 µg/l (30-day average) for waters that are not sources of drinking water. Detected concentrations of bis(2-ethylhexyl)phthalate exceeded the NTR human health criterion. Additionally, dilution within Tule Canal is not sufficient for bis(2-ethylhexyl)phthalate to meet water quality standards. The SIP allows human health-based limitations to be established using dilution in the receiving stream, specifically, harmonic mean flow rates. However, harmonic mean flow rates are not appropriate for ephemeral or low flow streams. Harmonic mean flow rates are calculated as the reciprocal of the

arithmetic mean of the reciprocals of the individual daily flows. Therefore, if there are individual daily flows of zero, the mathematical equation is undefined. The State Water Resources Control Board confirms that harmonic mean flow rates are inappropriate for ephemeral streams in precedential decision, Order WQO 2002-0015. Therefore, the discharge from the City of Woodland Wastewater Treatment Plant has a reasonable potential to cause or contribute to an exceedance of the NTR criterion. Therefore, an Effluent Limitation for bis (2-ethylhexyl) phthalate is included in this Order and is based on the NTR human health criterion.

b) **Organochlorine Pesticides**:

The Basin Plan includes a water quality objective for pesticides on page III-6.0, which states: "No individual pesticide or combination of pesticides shall be present in concentrations that adversely affect beneficial uses" and that " Total identifiable persistent chlorinated hydrocarbon pesticides shall not be present in the water column at concentrations detectable within the accuracy of analytical methods approved by the Environmental Protection Agency or the Executive Officer". An Effluent Limitation for organochlorine pesticides is included in existing Waste Discharge Requirements, Order No. R5-1998-0021-R01, in accordance with the Basin Plan objective. A time schedule for compliance with the Effluent Limitation was included in Cease and Desist Order No. 98-022, with full compliance required by 30 December 2002.

The Report of Waste Discharge and the 1998-2002 Effluent Monitoring Data report indicate that delta-BHC and gamma-BHC (Lindane) were detected in the effluent. Delta-BHC was detected in the effluent at a maximum concentration of 0.05 µg/l. Gamma BHC (Lindane) was detected in 18 of 57 effluent samples and the detected concentrations ranged from 0.02 µg/l to 0.06 µg/l. For gamma BHC (Lindane), U.S. EPA established CTR criteria for waters that are not sources of drinking water of 0.063 µg/l (30-day average) and the maximum concentration (one-hour average) to protect freshwater aquatic life is 0.95 µg/l. The Basin Plan objective is more restrictive than the CTR water quality standard for organochlorine pesticides. The CTR states that CTR standards apply unless the State's criteria are more restrictive, 133.38 (c).

The presence of delta-BHC and gamma-BHC (Lindane) in the effluent indicates a reasonable potential for the organochlorine pesticides to cause an exceedance of the Basin Plan objectives. Based on these considerations, this Order includes an Effluent Limitation for organochlorine pesticides based on the Basin Plan objective.

c) **Mercury**:

An Effluent Limitation for mercury is included in existing Waste Discharge Requirements, Order No. R5-1998-0021-R01, in accordance with the Basin Plan narrative toxicity objective. A time schedule for compliance with the Effluent

Limitation was included in Cease and Desist Order No. 98-022, with full compliance required by 30 December 2002. The CTR, Section 131.38 (e)(6), and the SIP, Section 2.1, allow a maximum compliance schedule for CTR and NTR constituents. The Discharger has exhausted a five-year compliance time schedule, although existing Effluent Limitations were not based of the CTR. The CTR human health criterion for waters that are not sources of drinking water but from which aquatic organisms may be consumed is 0.051 µg/l as a 30-day average. In 40 CFR Part 131, U.S. EPA acknowledges that human health criteria may not be protective of some aquatic or endangered species. In the CTR, U.S.EPA reserved the mercury criteria for fresh water and aquatic life and may adopt new criteria at a later date.

Mercury was detected in almost all of the samples collected from the effluent. As reported in the 1998-2002 Effluent Mercury Report, mercury was detected at a maximum concentration of 0.058 µg/l on 11 May 2000. Using the average daily flow of 6.03 mgd and a maximum detected mercury concentration of 0.058 µg/l, the approximate mass of mercury discharged daily is 0.0029 lbs/day. Wastewater from the treatment plant is discharged to Tule Canal, within the Yolo Bypass, which then flows to the Sacramento-San Joaquin Delta. The Sacramento-San Joaquin Delta has been listed as an impaired water pursuant to Section 303(d) of the Clean Water Act because of mercury. Because the Sacramento-San Joaquin Delta has been listed as an impaired water body for mercury, the discharge must not cause or contribute to increased mercury levels. The SIP, Section 1.3, requires the establishment of an effluent limitation when the detected concentration exceeds an applicable criterion or objective. The maximum detected concentration of mercury exceeds the CTR human health criterion. In addition, dilution within Tule Canal is not sufficient for mercury to meet water quality standards. Based on these considerations, this Order contains an average monthly concentration-based Effluent Limitation of 0.051 µg/l for mercury based on the CTR criterion. This Order also contains a mercury interim performance-based mass Effluent Limitation of 1.06 lbs/twelve months for the effluent discharge to Tule Canal. This limitation is based on maintaining the mercury loading at the current level until a total maximum daily load (TMDL) can be established and EPA develops mercury standards that are protective of human health. The mass limitation is derived using the maximum observed effluent mercury concentration and the reported average daily flow rate of 6.03 mgd. If U.S. EPA develops new water quality standards for mercury, this permit may be reopened and the Effluent Limitation adjusted. In accordance with Federal Regulations, 40 CFR 122.44(2)(i)(B)(1), the adoption of less stringent effluent limitations for mercury is not considered backsliding since U.S. EPA promulgated the CTR. The CTR based limitation replaces the limitation which was based on the Basin Plan narrative toxicity utilizing U.S. EPA's ambient water quality criteria for the protection of freshwater aquatic life.

d) **Dibromochloromethane**:

As reported in the Report of Waste Discharge, dibromochloromethane was detected in the effluent at a maximum concentration of 37.5 µg/l. U.S.EPA CTR human health criterion for dibromochloromethane is 34.0 µg/l (for waters that are not sources of drinking water but from which aquatic organisms may be consumed) as a 30-day average.

The detected concentration of dibromochloromethane exceeds the CTR criterion. Therefore, the discharge has a reasonable potential to cause or contribute to an exceedance of the CTR criterion. Dibromochloromethane is a trihalomethane, which pose a serious cancer risk. The Discharger uses chlorine to disinfect its wastewater. Effluent Limitations for dibromochloromethane based on the CTR criterion are included in this Order. A time schedule has been included in this Order for compliance with the dibromochloromethane limitation.

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 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 dibromochloromethane become effective on **13 May 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 dibromochloromethane become effective on **30 March 2008**.

e) **<u>Beryllium</u>**:

The Agricultural Water Quality Goal for beryllium is 100 µg/l. U.S. EPA established Ambient Water Quality criteria to protect the freshwater aquatic life and the information for the lowest observed effect concentration (LOEC) for acute and chronic toxicity are 130 µg/l and 5.3 µg/l, respectively. The existing permit contains Effluent Limitations for beryllium based on the Basin Plan narrative toxicity objective utilizing the Ambient Criteria. Beryllium had been detected in the effluent at a concentration of 95 µg/l. Beryllium is used in a variety of industrial processes, including electroplating, metal finishing and concrete manufacturing. Beryllium concentrations can be controlled through an effective industrial pretreatment program. Even though effluent samplings

over the past five years indicated that beryllium was not detected in the effluent, nothing in the character of the wastewater influent or the treatment capability of the wastewater treatment plant has changed which would either remove or treat for beryllium. Therefore, effluent limitations as contained in the existing permit are continued in this Order based on the protection of the Basin Plan narrative toxicity objective. A compliance time schedule for beryllium has not been included in this Order since sampling results show the discharge has consistently met the Effluent Limitation.

f) **Aluminum**:

The Basin Plan prohibits the discharge of toxic constituents in toxic concentrations. The 1998-2002 Effluent Monitoring Data report indicates that aluminum was detected in each of four effluent samples collected by the Discharger. Using the methodology in the U.S. EPA's Technical Support Document (TSD) for Water Quality-Based Toxics Control, the reasonable potential multiplying factor, from footnote 1 of Table 1 above, is 4.7 based on the four samples collected in the effluent. The projected maximum effluent concentration (MEC) of aluminum is calculated at 141 µg/l. U.S. EPA established Ambient Water Quality criteria for the protection of freshwater aquatic life of 87 µg/l (four-day average) and 750 µg/l (one-hour average). Therefore, the discharge from the City of Woodland Wastewater Treatment Plant causes or has a reasonable potential to cause an exceedance of the Basin Plan narrative toxicity objective. This Order includes Effluent Limitations for aluminum based on the narrative toxicity objective.

g) **Ammonia**:

Untreated domestic wastewater contains ammonia. Nitrification is a biological process that converts ammonia to nitrate, and denitrification is a process that converts nitrate to nitrogen gas, which is then released to the atmosphere. Wastewater treatment plants commonly use nitrification processes to remove ammonia from the waste stream. 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 Ambient Water Quality Criteria for the protection of freshwater aquatic life. The discharge from the City of Woodland Wastewater Treatment Plant has 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. 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.

h) **Iron**:

The Basin Plan prohibits the discharge of toxic constituents in toxic concentrations. Using a reasonable potential analysis, the projected MEC of iron in the effluent is 5,460 µg/l. The Agricultural Water Quality Goal for iron is 5,000 µg/l. U.S. EPA has developed the Ambient Water Quality Criterion for the protection of freshwater aquatic life for iron of 1,000 µg/l as an instantaneous maximum concentration.

The projected MEC of iron exceeds ambient water quality criteria and the agricultural goal. Therefore, the discharge from the City of Woodland Wastewater Treatment Plant has a reasonable potential to cause or contribute to an exceedance of the Basin Plan narrative toxicity objective and degrade the agricultural beneficial use. An Effluent Limitation for iron is included in this Order.

i) **Fluoride:**

Using a reasonable potential analysis, the projected MEC of fluoride is 1,680 µg/l. The Agricultural Water Quality Goal for fluoride is 1,000 µg/l. The projected MEC of fluoride exceeds the Agricultural Water Quality Goal. Agricultural irrigation is designated as a beneficial use of Tule Canal, within the Yolo Bypass. Undiluted wastewater effluent can be withdrawn from Tule Canal for agricultural irrigation. Therefore, to protect the agricultural beneficial use, an Effluent Limitation for fluoride is included in this Order as a six-month average based on an approximate crop season.

j) **Oil and Grease:**

The Basin Plan includes a water quality objective for oil and grease in surface waters, which states: "Waters shall not contain oils, greases, waxes, or other materials in concentrations that cause nuisance, result in a visible film or coating on the surface of the water or on objects in the water, or otherwise adversely affect beneficial uses". Oil and grease is mainly from food industries, which are currently regulated under the pretreatment program. The existing permit includes monthly average and daily maximum Effluent Limitations of 10 mg/l and 15 mg/l, respectively. The Report of Waste Discharge indicates that the maximum detected concentration of oil and grease in the effluent exceeded the monthly average Effluent Limitation. Therefore, oil and grease has violated and presents a reasonable potential to cause an exceedance of permit limitations. Effluent Limitations for oil and grease as contained in the existing permit are continued in this Order. Compliance time schedules are not included in Cease and Desist Order since the discharge currently meets the concentration-based Effluent Limitation and the mass-based Effluent Limitation can be met through the current implementation of the industrial pretreatment program, specifically requiring grease traps and good house keeping.

k) **Total Chlorine Residual:**

The Basin Plan prohibits the discharge of toxic materials in toxic concentrations. Chlorine is commonly used as a disinfection agent in the treatment of wastewater. Proper disinfection ensures destruction of pathogens prior to discharge to the surface waters. The City of Woodland uses chlorine for disinfection of the wastewater at the treatment plant. Because chlorine poses a threat to human health and is especially harmful to organisms living in water, a dechlorination process is necessary for the removal of chlorine. For dechlorination, the Discharger uses sulfur dioxide, which combines with chlorine, to render it relatively unreactive and thus removes it from the waste stream. Inadequate dechlorination may result in the discharge of chlorine to the receiving stream and cause toxicity to aquatic life. The Basin Plan prohibits the discharge of toxic substances in toxic concentrations.

U.S. EPA has developed Ambient Water Quality Criteria for the protection of freshwater aquatic life. The recommended maximum one-hour average and four-day average concentrations for chlorine are 0.02 mg/l and 0.01 mg/l, respectively. The Report of Waste Discharge indicates that chlorine was detected at a maximum concentration of 0.85 mg/l, which is almost 85 times greater than the Ambient Water Quality criterion for four-day average condition. Effluent Limitations for chlorine are included in this Order and are based on the Basin Plan narrative toxicity objective.

l) **Boron:**

The 1998-2002 Effluent Monitoring Data report indicates that boron was detected in the effluent at a concentration of 2,540 µg/l. The Agricultural Water Quality Goal for boron is 700 µg/l. Boron in excessive concentrations can cause damage to plant life. The detected concentration of boron exceeds the Agricultural Water Quality Goal. The Basin Plan, on page III-3.00, states that: "Waters shall not contain chemical constituents in concentrations that adversely affect beneficial uses." Agricultural irrigation is designated as a beneficial use of Tule Canal, within the Yolo Bypass. Undiluted wastewater effluent can be withdrawn from Tule Canal for agricultural irrigation. Therefore, to protect the agricultural beneficial use, an Effluent Limitation for boron is included in this Order at 700 µg/l as a six-month average based on an approximate crop season.

m) **Electrical Conductivity**:

The City of Woodland discharges treated wastewater to Tule Canal, within the Yolo Bypass. The Basin Plan, Table II-1, designates Irrigated Agriculture as a beneficial use of the Yolo Bypass. Water Rights have been issued by the State Water Resources Control Board to divert water from Tule Canal downstream of the City's discharge for irrigation purposes. The City conducted a study, *Recreation, Land Use, and Dilution*

Study of the Tule Canal and Toe Drain dated December 2000, of receiving water uses, confirming that water from Tule Canal is used for crop irrigation.

The City's Report of Waste Discharge states that of 1,450 effluent samples for electrical conductivity (EC), the maximum concentration was 2,700 µmhos/cm and the average discharge concentration was 1,578 µmhos/cm. Table 17, Section 11, of the City's Report of Waste Discharge shows that the wastewater discharge regularly causes significant increases in the EC concentration (µmhos/cm) within the receiving stream, Tule Canal, as follows:

Month	Upstream EC	Downstream EC	Effluent Discharge
May	740	940	1597
June	720	930	1592
July	710	1000	1598
August	660	770	1524
September	470	890	1607
October	610	1000	1575
November	630	870	1437

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, 40 CFR 122.44(d).

For EC, *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),* reports levels above 700 µmhos/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 µmhos/cm.

Tule Canal, absent the City of Woodland wastewater, is generally acceptable for irrigation based on EC values. The City's wastewater discharge increases concentrations of EC within Tule Canal to unacceptable concentrations adversely affecting the agricultural beneficial use. The wastewater discharge not only presents a reasonable potential, but actually causes, violation of the Chemical Constituent Water Quality Objective in the Basin Plan. The available literature regarding safe levels of EC for irrigated agriculture were considered in requiring that an Effluent Limitation for EC is necessary to protect the beneficial use of the receiving stream in accordance with the Basin Plan and Federal Regulations. Therefore, this Order includes an Effluent

Limitation of 700 µmhos/cm for electrical conductivity based on the Agricultural beneficial use. The Effluent Limitation has been established as a six-month average based on an approximate crop season.

10. As stated in the above Findings, the U.S. EPA adopted the NTR and the CTR, which contain water quality standards applicable to this discharge and the SIP contains guidance on implementation of the NTR and CTR. The SIP, Section 2.2.1, requires that if a compliance schedule is granted for a CTR or NTR constituent, the Regional Board shall establish interim requirements and dates for their achievement in the NPDES permit. The interim limitations must: be based on current treatment plant performance or existing permit limitations, whichever is more stringent; include interim compliance dates separated by no more than one year, and; be included in the Provisions. The interim limitations in this Order are based on the current treatment plant performance. In developing the interim limitation, where there are ten sampling data points or more, sampling and laboratory variability is accounted for by establishing interim limits that are based on normally distributed data where 99.9% of the data points will lie within 3.3 standard deviations of the mean (*Basic Statistical Methods for Engineers and Scientists, Kennedy and Neville, Harper and Row*). Therefore, the interim limitations in this Order are established as the mean plus 3.3 standard deviations of the available data. Where actual sampling shows an exceedance of the proposed 3.3-standard deviation interim limit, the maximum detected concentration has been established as the interim limitation. When there are less than ten sampling data points available, the *Technical Support Document for Water Quality Based Toxics Control* ((EPA/505/2-90-001)TSD) recommends a coefficient of variation of 0.6 be utilized as representative of wastewater effluent sampling. The TSD recognizes that a minimum of ten data points is necessary to conduct a valid statistical analysis. The multipliers contained in Table 5-2 of the TSD are used to determine a maximum daily limitation based on a long-term average objective. In this case, the long-term average objective is to maintain, at a minimum, the current plant performance level. Therefore, when there are less than ten sampling points for a constituent, interim limitations are based on 3.11 times the maximum observed sampling point to obtain the daily maximum interim limitation (TSD, Table 5-2). The Regional Board finds that the Discharger can undertake source control and treatment plant measures to maintain compliance with the interim limitations included in this Order. Interim limitations are established when compliance with NTR- and CTR-based Effluent Limitations cannot be achieved by the existing discharge. Discharge of constituents in concentrations in excess of the final Effluent Limitations, but in compliance with the interim Effluent Limitations, can significantly degrade water quality and adversely affect the beneficial uses of the receiving stream on a long-term basis. For example, U.S. EPA states in the Ambient Water Quality Criteria for the Protection of Freshwater Aquatic Life for copper, that it will take an unstressed system approximately three years to recover from a pollutant in which exposure to copper exceeds the recommended criterion. The interim limitations, however, establish an enforceable ceiling concentration until compliance with the Effluent Limitation can be achieved.

11. The Basin Plan states, on page II-1.00, "Protection and enhancement of existing and potential beneficial uses are primary goals of water quality planning" and "…disposal of wastewaters is [not] a prohibited use of waters of the State; it is merely a use which cannot be satisfied to the detriment of beneficial uses." The existing and potential beneficial uses that currently apply to surface waters of the basins are presented in Figure II-1 and Table II-1 of the Basin Plan. The designated beneficial uses of Tule Canal, within the Yolo Bypass, include water contact recreation. The *December 2000 - Recreation, Land Use, and Dilution Study of Tule Canal and Toe Drain (Study)* conducted by the Discharger indicates that the receiving water has been used for water contact recreation and irrigation purposes. The Basin Plan definition for water contact recreation includes "uses of water for recreational activities involving body contact with water, where ingestion of water is reasonably potential. These uses include, but not limited to, swimming, wading, water-skiing, skin and scuba diving, surfing, white water activities, fishing or use of natural hot springs". The Discharger completed a survey in December 2000 of recreational and irrigation practices along the receiving water, Tule Canal. The Discharger's survey found that: eleven of the 212 people surveyed stated that they swim in Tule Canal; 24 % of respondents consume fish caught in Tule Canal several times a month; and that, between 4% and 5% of the crops grown with water from the receiving stream were food crops that require the water be treated to a tertiary level to protect the public health. The survey also found that the wastewater remained relatively undiluted in the principal recreational and food crop irrigation areas.

The beneficial uses of Tule Canal and the Yolo Bypass 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. Filtration also reduces solids in the effluent and allows for more effective disinfection. 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, schoolyards, 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 ml 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 Tule Canal 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 the irrigation of food crops.

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 two 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 than the secondary standards currently prescribed; the 30-day average BOD and TSS limitations have been revised to 10 mg/l, which is technically based on the capability of a tertiary system.

The establishment of tertiary limitations has not been previously required for this discharge; therefore, a schedule for compliance with the tertiary treatment requirement is included as a Provision in this Order.

12. This Order contains Effluent Limitations and a tertiary level of treatment, or equivalent, necessary to protect the beneficial uses of the receiving water. In accordance with California Water Code, Section 13241, the Regional Board has considered the followings:

As stated in the above Findings, the past, present, and probable future beneficial uses of the receiving stream include agricultural irrigation, agricultural stock watering, water contact recreation, non-contact water recreation, warm freshwater aquatic habitat, potential cold freshwater aquatic habitat, warm fish migration habitat, cold fish migration habitat, warm spawning habitat, and wildlife habitat.

The environmental characteristics of the hydrographic unit including the quality of water available will be improved by the requirement to provide tertiary treatment for this wastewater discharge. Tertiary treatment will allow for the continued reuse of the undiluted wastewater for food crop irrigation and contact recreation activities which is otherwise unsafe according to recommendations from the DHS.

Fishable, swimable, and agricultural irrigation water quality conditions can be reasonably

achieved through the coordinated control of all factors, which affect water quality in the area.

The cost of providing tertiary treatment would be $10 million. In assessing the actual cost of compliance, the cost of $10 million is based on a 10.4 mgd flow rate, not the currently authorized 7.8 mgd. The Discharger is proposing to expand the capacity of the wastewater treatment plant, not to improve water quality, but to accommodate growth in the community at a cost of $16 million. The cost appears accurate based on recent conversations with staff at the State Board, Division of Financial Assistance, who stated that the cost to add tertiary treatment to an existing secondary WWTP was approximately $1 million/1 mgd. The cost of compliance without expansion is approximately $7.8 million. The Discharger's current monthly domestic sewer user fee is $18.15. The California average monthly domestic sewer user fee is $20.46. The loss of recreational and irrigation beneficial uses within downstream waters, without the tertiary treatment requirement, would require prohibiting the irrigation of food crops and prohibiting public access for contact recreational purposes, resulting in a detrimental economic impact. The cost associated with the alternative loss of beneficial uses or illness among those that would utilize the receiving water was not assessed. In addition to pathogen removal to protect irrigation and recreation, tertiary treatment may also aid in meeting discharge limitations for other pollutants, such as heavy metals, reducing the need for advanced treatment, therefore reducing costs.

The need to develop housing in the area will be facilitated by improved water quality, which protects the contact recreation and irrigation uses of the receiving water. The Discharger's, December 2000, Recreation, Land Use and Dilution study confirms the existing beneficial uses of contact recreation and irrigation. The study also describes proposed recreational uses of the receiving water for wildlife refuges and bicycle trails. Growth in the area places greater demand on the available resources and will increase the potential for activities, such as contact recreation, that needs an improved surface water quality. DHS recommends that, in order to protect the public health, undiluted wastewater effluent must be treated to a tertiary level, for contact recreational and food crop irrigation uses. Without tertiary treatment, the downstream waters could not be safely utilized for contact recreation or the irrigation of food crops. It is the Regional Board's policy, (Basin Plan, page IV-15.00, Policy 2) to encourage the reuse of wastewater. The Regional Board requires Dischargers to evaluate how reuse or land disposal of wastewater can be optimized. The need to develop and use recycled water is facilitated by providing a tertiary level of wastewater treatment, which will allow for a greater variety of uses in accordance with California Code of Regulations, Title 22.

13. The beneficial uses of the underlying ground water are municipal and domestic, industrial service, industrial process and agricultural supply.

14. 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.

15. 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.

16. Domestic wastewater contains constituents such as total dissolved solids (TDS), specific conductivity, pathogens, nitrates, organics, metals and oxygen demanding substances (BOD). The discharge to land, with disposal by percolation, may result in an increase in the concentration of these constituents in groundwater. 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, treatment, and control 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.

17. 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.

18. 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.

19. 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.

20. 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.

21. The permitted discharge is consistent with the antidegradation provisions of 40 CFR 131.12 and State Water Resources Control Board Resolution 68-16. The discharge allows wastewater utility service necessary to accommodate housing and economic expansion in the area, and is considered to be a benefit to the people of the State. Compliance with these requirements will result in the use of best practicable treatment or control of the discharge. The Discharger has not conducted a best practicable treatment analysis for control of the discharge. The Discharger has used the pond system for the disposal of wastewater and treatment of sludge for a long period of time. The treatment of sludge using ponds may not be considered the best practicable long-term treatment since it may cause pollutants from the sludge to percolate to the groundwater. The Discharger owns and operates a mechanical wastewater treatment plant. To evaluate protection of the beneficial uses of the groundwater, the Discharger should analyze whether sludge from the treatment plant should be dewatered and transported off-site for disposal, possibly at a local landfill.

22. The current average dry weather wastewater flow of the treatment plant is approximately 7.8 million gallons per day (mgd). The City has proposed to expand the capacity to 10.4 mgd to accommodate growth within the community. The proposed plant expansion includes the expansion of the chlorine contact chamber and installation of an additional screw lift pump, a mechanical bar screen, an aerated grit chamber, an additional oxidation ditch, a secondary clarifier, and a flow meter for the emergency overflow from the chlorine contact chambers. Construction of the plant expansion is tentatively scheduled to begin in the spring of 2003 and be completed in the spring of 2004. The Discharger must complete the required California Environmental Quality Act (CEQA) documentation and water quality assessments and a Report of Waste Discharge (RWD) must be filed detailing how the expanded facility will comply with Waste Discharge Requirements. Based on the RWD, this Order may be reopened and the flow rate increased.

23. The Basin Plan states that "*All 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 "as a minimum, compliance with this objective…shall be evaluated with a 96-hour bioassay." Order No. R5-2003-0031 requires both acute and chronic toxicity monitoring to evaluate compliance with this water quality objective. The Basin Plan also states: "…effluent limits based upon acute biotoxicity tests of effluents will be prescribed…" Effluent limitations for acute toxicity are included in the Order.

The Report of Waste Discharge indicates that the percent survival of fathead minnow from the chronic toxicity test was 87.5 % in December 1998. The percent survival for ceriodaphnia were 0 % (September 2000) and 10 % (June 2001). The toxicity tests conducted up to date have been used 100 % effluent from the wastewater treatment plant. With a low available dilution and very low percent survival of *Ceriodaphnia* and fathead minnow, it is concluded that discharges from the treatment plant have caused adverse effects on aquatic organisms.

24. 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.

25. The Discharger accepts wastes from industries located throughout the community. The Federal Clean Water Act, Section 307(b), and Federal Regulations, 40 CFR Part 403, require publicly owned treatment works to develop an acceptable industrial pretreatment program. A pretreatment program is required to prevent the introduction of pollutants which will interfere with treatment plant operations or sludge disposal and prevent pass through of pollutants that exceed water quality objectives, standards or permit limitations. Federal Regulations, 40 CFR 403.8, requires the Discharger develop and submit for approval by the Regional Board an acceptable industrial pretreatment program within one-year of adoption of this Order.

26. The discharge is presently governed by Waste Discharge Requirements Order No. R5-1998-0021-R01, amended by the Regional Board on 11 March 2002.

27. The Regional Board has considered the information in the attached Information Sheet in Attachments A, B, C, and D and the Information Sheet are part of this Order.

28. 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.

29. 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.

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

31. 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, provided EPA has no objections.

IT IS HEREBY ORDERED that Order No. R5-1998-0021-R01 is rescinded and the City of Woodland, 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 Findings is prohibited.

2. The by-pass or overflow of wastes to surface waters 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 shall not exceed the following limits:

Constituents	Units	Monthly Average	Weekly Average	Monthly Median	Instantaneous Maximum	Daily Maximum
BOD[1]	mg/l	30[2]	45[2]	--	--	90[2]
	lbs/day[3]	1951	2,927	--	--	5,853

Constituents	Units	Monthly Average	Weekly Average	Monthly Median	Instantaneous Maximum	Daily Maximum
Total Suspended Solids (TSS)	mg/l	30[2]	45[2]	--	--	90[2]
	lbs/day[3]	1951	2,927	--	--	5,853
Total Coliform	MPN/100 ml	--	--	23	--	500
Settleable Solids	ml/l	0.1	--	--	--	0.2
Mercury	µg/l	0.051	--	--	--	--
	lbs/12 months[4]	--	--	--	--	--
Bis(2-ethylhexyl)phthalate	µg/l	5.9	--	--	--	11.8
	lbs/day[3]	0.38	--	--	--	0.77
Oil and Grease	mg/l	10	--	--	--	15
	lbs/day[3]	650	--	--	--	976
Iron	µg/l	--	--	--	1,000	--
	lbs/day[3]	--	--	--	65	--

[1] 5-day, 20°C biochemical oxygen demand (BOD)
[2] To be ascertained by a 24-hour composite
[3] Based upon a design treatment capacity of 7.8 mgd
[4] The mass-based Effluent Limitation is 1.06 lbs/12 months calculated using the maximum detected effluent concentration of 0.058 µg/l and the average daily flow of 6.03 mgd.

Constituents	Units	Monthly Average	Four-day Average	Six-month Average	One-hour Average	Daily Maximum
Beryllium	µg/l	4.3	5.3	--	130	8.7
	lbs/day[1]	0.28	0.35	--	8.5	0.57
Organochlorine Pesticides	µg/l	--	--	--	--	ND[2]
Dibromochloromethane[3]	µg/l	34	--	--	--	68
	lbs/day[1]	2.2	--	--	--	4.4
Aluminum	µg/l	43	87	--	750	87
	lbs/day[1]	2.8	5.7	--	49	5.7
Ammonia	µg/l	Attach. B	Attach. C	--	Attach. D	--
	lbs/day[4]	--	--	--	--	--
Fluoride	µg/l	--	--	1,000	--	--
	lbs/day[1]	--	--	65	--	--
Chlorine Residual	mg/l	--	0.01	--	0.02	--
	lbs/day[1]	--	0.65	--	1.3	--

Constituents	Units	Monthly Average	Four-day Average	Six-month Average	One-hour Average	Daily Maximum
Electrical Conductivity	µmhos/cm	--	--	700	--	--
Boron	µg/l	--	--	700	--	--
	lbs/day[1]	--	--	46	--	--

[1] Based upon a design treatment capacity of 7.8 mgd.
[2] ND (non-detectable), the non-detectable limitation applies to each individual pesticide at any detection level. No individual pesticide may be present in the discharge at detectable concentrations. The Discharger shall use EPA standard analytical techniques that have the lowest possible detectable level for organochlorine pesticides with a maximum acceptable detection level of 0.05 µg/l.
[3] See Provision No. 6 of this Order for the effective compliance date for dibromochloromethane.
[4] The mass limit shall be calculated based on the concentration limitations (from Attachments) and the design flow of 7.8 mgd.

2. Effluent shall not exceed the following interim priority pollutant limits:

Constituents	Average Daily Limitation	
	Concentration (µg/l)	Mass (lbs/day[1])
Dibromochloromethane[2]	117	7.6

[1] Based upon a design treatment capacity of 7.8 mgd.
[2] See Provision No. 6 of this Order for the effective compliance date for dibromochloromethane.

3. Effluent shall not exceed the following limits (after **30 April 2005**):

Constituents	Units	Monthly Average	Weekly Average	7-day Median	Daily Average	Daily Maximum	Instantaneous Maximum
BOD[1]	mg/l	10[2]	15[2]	--	--	20[2]	--
	lb/day[3]	650	976	--	--	1,301	--
Total Suspended Solids	mg/l	10[2]	15[2]	--	--	20[2]	--
	lb/day[3]	650	976		--	1,301	--
Total Coliform	MPN/100ml	--	--	2.2	--	--	23
Turbidity	NTU	--	--	--	2.0	5.0[4]	--

[1] 5-day, 20°C biochemical oxygen demand (BOD)
[2] To be ascertained by a 24-hour composite
[3] Based upon a design treatment capacity of 7.8 mgd
[4] 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.

4. The effluent mass mercury loading to Tule Canal, within the Yolo Bypass shall not exceed 1.06 pounds as a twelve months average.

   a. In calculating for compliance, the Discharger shall count all non-detect results at one half of the method detection limit and shall apply the monthly average flow from the discharge. If compliance with the effluent limit is not attained due to the non-detect contribution, the Discharger shall improve and implement available analytical capabilities and compliance will be evaluated with consideration of the detection limits.

   b. Twelve month mass loadings shall be calculated for each calendar month. For monthly measures, calculate monthly loadings using average monthly flow and the average of all mercury analyses conducted that month. The Discharger shall submit a cumulative total of mass loadings for the previous twelve months with each self-monitoring report. Compliance will be determined based on monitoring results from the previous twelve calendar months.

5. Wastewater shall be oxidized, coagulated and filtered, or equivalent treatment provided by **30 April 2005.**

6. 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).

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

8. The average daily dry weather effluent flow shall not exceed 7.8 mgd.

9. 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. 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.

4. 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.

5. 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.

D. 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) 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.

E. Groundwater Limitations:

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

1. Beneficial uses to be adversely impacted or water quality objectives to be exceeded.

2. Any constituent concentration, when compared with background, to be incrementally increased beyond the current concentration.

F. Pond Disposal Limitations:

1. Objectionable odors originating at this facility shall not be perceivable beyond the limits of the disposal areas or property owned by the Discharger.

2. As a means of discerning compliance with Pond Disposal Limitation 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. Public contact with wastewater shall be precluded through such means as fences, signs, and other acceptable alternatives.

5. Ponds shall be managed to prevent breeding of mosquitos. 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) Weeds shall be minimized.

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

6. Pond freeboard shall never be less than two feet (measured vertically to the lowest point of overflow).

G. 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. Mercury criteria are promulgated by U.S. EPA to establish fish tissue values and conversion of fish tissue values to water criteria, this order shall be reopened to modify the receiving water limitation, effluent limitation, and monitoring program.

4. 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.

5. 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 that could exceed Basin Plan numeric or narrative water quality objectives. The Discharger shall comply with the following time schedule in conducting a study of the potential effect(s) of these constituents in surface waters:

Task	Compliance Date
Submit Study Report for Dioxins	**30 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.

On or before each compliance date, the Discharger shall submit to the Regional Board 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 may be reopened and effluent limitations added for the subject constituents.

6. **Dibromochloromethane Compliance Schedule**: By **1 November 2003** the Discharger shall complete and submit a compliance schedule justification for dibromochloromethane. The compliance schedule justification shall include all items specified by the SIP Section 2.1, Paragraph 3 (items (a) through (d)). Implementation of the new water quality based effluent limitations for dibromochloromethane become effective on **1 November 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 dibromochloromethane required by this Order shall become effective on **30 March 2008.** 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 dibromochloromethane.

7. The Discharger shall comply with the following time schedule to assure compliance with tertiary treatment requirement Effluent Limitation:

Task	Compliance Date	Report of Compliance Due
Submit Annual Status Report		**1 February, annually**
Submit Workplan/Time Schedule		**1 November 2003**
Full Compliance	**30 April 2005**	

The Discharger shall submit to the Regional Board on or before each compliance report due date, the specified document or, if appropriate, a written report detailing compliance or noncompliance with the specific schedule date and task. If noncompliance is being reported, the reasons for such noncompliance shall be stated, plus 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.

8. The interim limitations in this Order are based on the current treatment plant performance and established at the maximum observed concentration. Interim limitation has been established since compliance with NTR and CTR based Effluent Limitation cannot be achieved by the existing discharge. The Interim Limitations establish enforceable mass and concentration ceilings until compliance with the Effluent Limitation can be achieved, which is required by **30 March 2008**.

9. **Hydrogeologic Evaluation and Groundwater Monitoring Tasks**. **Within 18-months of the adoption of this Order**, the Discharger shall complete a hydrogeologic investigation within the area affected and potentially affected by the WWTF and its discharge(s) 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.

10. The Discharger shall use the best practicable treatment or control technique currently available to limit mineralization to no more than a reasonable increment.

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.R5-2003-0031, which is part of this Order, and any revisions thereto as ordered by the Executive Officer.

    When requested by U.S.EPA, 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 **30 March 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. **Within one year of adoption of this Order** the Discharger shall submit for Regional Board approval an Industrial Pretreatment Program, as more completely set forth in 40 CFR 403, the legal authorities, programs, and controls necessary to ensure that industrial discharges do not introduce pollutants into the sewerage system that, either alone or in conjunction 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.

The Discharger shall enforce the Pretreatment Standards promulgated under Sections 307(b), 307(c) and 307(d) of the Clean Water Act. The Discharger shall perform the pretreatment functions required by 40 CFR Part 403 including but not limited to:

a. Adopting the legal authority required by 40 CFR 403.8(f)(1);

b. Enforcing the Pretreatment Standards of 40 CFR 403.5 and 403.6;

c. Implementing procedures to ensure compliance as required by 40 CFR 403.8(f)(2); and

d. Providing funding and personnel for implementation and enforcement of the pretreatment program as required by 40 CFR 403.8(f)(3).

The Discharger shall implement its approved pretreatment program and the program shall be an enforceable condition of this permit. If the Discharger fails to perform the pretreatment functions, the Regional Water Quality Control Board (RWQCB), the State Water Resources Control Board (SWRCB) or the U.S. Environmental Protection Agency (U.S. EPA) may take enforcement actions against the Discharger as authorized by the Clean Water Act. The Discharger shall implement, as more completely set forth in 40 CFR 403.5, the necessary legal authorities, programs, and controls to ensure that incompatible wastes are not introduced to the treatment system.

16. The Discharger shall implement, as more completely set forth in 40 CFR 403.5, 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;

e. 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;

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

g. 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

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

17. The Discharger shall implement, as more completely set forth in 40 CFR 403.5, 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 13 March 2003.

_____

THOMAS R. PINKOS, Executive Officer

CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
CENTRAL VALLEY REGION

MONITORING AND REPORTING PROGRAM NO.R5-2003-0031

NPDES NO. CA0077950

FOR
CITY OF WOODLAND
WATER POLLUTION CONTROL FACILITY
YOLO COUNTY

This Monitoring and Reporting Program is issued pursuant to California Water Code Sections 13383 and 13267. The Discharger shall not implement any changes to this Monitoring and Reporting 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.

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 nay 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."* This Monitoring and Reporting Program to monitor groundwater required by Order No. R5-2003-0031 are necessary to assure compliance with Order No. R5-2003-0031. The Discharger operates the facility that discharges waste subject to Order No. R5-2003-0031.

INFLUENT MONITORING

Samples shall be collected at approximately the same time as effluent samples and should be representative of the influent for the period sampled. Influent monitoring shall include at least the following:

Constituents	Units	Type of Sample	Sampling Frequency
20°C BOD_5	mg/l, lbs/day	24-hr. Composite	Weekly
Total Suspended Solids	mg/l, lbs/day	24-hr. Composite	Weekly
Flow	mgd	Meter	Continuous

EFFLUENT MONITORING

Effluent samples shall be collected downstream from the last connection through which wastes can be admitted into the outfall. Effluent samples should be representative of the volume and

quality of the discharge. Samples collected from the outlet structure of ponds will be considered adequately composited. Time of collection of samples shall be recorded. Effluent monitoring shall include at least the following:

Constituents	Units	Type of Sample	Sampling Frequency
20°C BOD_5	mg/l, lbs/day	24-hr. Composite[1]	3 times weekly
Total Suspended Solids (TSS)	mg/l, lbs/day	24-hr. Composite[1]	3 times weekly
Settleable Solids	ml/l	24-hr. Composite[1]	3 times weekly
Total Dissolved Solids (TDS)	mg/l, lbs/day	24-hr. Composite[1]	monthly
Electrical Conductivity @25°C	µmhos/cm	Grab	3 times weekly
pH	Number	Meter	3 times weekly
Acute Toxicity[2,3]	% Survival	Grab	Every other month
Total Coliform Organisms	MPN/l00 ml	Grab	3 times weekly
Chlorine Residual	mg/l, lbs/day	Meter	Continuous[4]
Flow	mgd	Meter	Continuous
Temperature	°F	Grab	3 times weekly
Ammonia[5,6,7]	mg/l, lbs/day	Grab	3 times weekly
Turbidity	NTU	Meter	Continuous
Bis(2-ethylhexyl)phthalate	µg/l, lbs/day	Grab	monthly
Organochlorine Pesticides	µg/l, lbs/day	Grab	monthly
Mercury	µg/l, lbs/day	Grab	monthly
Beryllium	µg/l, lbs/day	Grab	monthly
Dibromochloromethane	µg/l, lbs/day	Grab	monthly
Aluminum	µg/l, lbs/day	Grab	monthly
Boron	µg/l, lbs/day	Grab	Once every six months
Iron	µg/l, lbs/day	Grab	monthly
Fluoride	µg/l, lbs/day	Grab	Once every six months
Oil and Grease	mg/l, lbs/day	Grab	monthly
Nitrate	µg/l, lbs/day	Grab	monthly

Constituents	Units	Type of Sample	Sampling Frequency
Phosphate	µg/l, lbs/day	Grab	monthly
Priority Pollutants[8]	mg/l, lbs/day	Grab	Quarterly

[1] The BOD and TSS samples shall be flow proportional composite samples.
[2] The acute bioassays samples shall be analyzed using EPA/600/4-90/027F, Fourth Edition, or later amendment with Regional Board staff approval. Temperature and pH shall be recorded at the time of bioassay sample collection. Test species shall be fathead minnows (Pimephales promelas), with no pH adjustment unless approved by the Executive Officer.
[3] Concurrent with ammonia sampling.
[4] The continuous chlorine residual monitoring system, or functional equivalent, shall be operational no later than the completion of the plant expansion. Until that time, grab samples shall be collected and analyzed daily.
[5] Concurrent with biotoxicity monitoring.
[6] Report as both total and un-ionized ammonia.
[7] Temperature and pH shall be recorded at the time of ammonia sample collection.
[8] Temperature, pH, and hardness data shall be collected at the same time and on the same date as the Priority Pollutant samples.

If the discharge is intermittent rather than continuous, then on the first day of each such intermittent discharge, the Discharger shall monitor and record data for all of the constituents listed above, after which the frequencies of analysis given in the schedule shall apply for the duration of each such intermittent discharge. In no event shall the Discharger be required to monitor and record data more often than twice the frequencies listed in the schedule.

RECEIVING WATER MONITORING

All receiving water samples shall be grab samples. Receiving water monitoring shall include at least the following:

Station	Description
R-l	800 feet upstream from the point of discharge
R-2	1800 feet downstream from the point of discharge

Constituents	Units	Station	Sampling Frequency
Dissolved Oxygen	mg/l	R-l, R-2	Weekly
pH	Number	R-l, R-2	Weekly
Turbidity	NTU	R-l, R-2	Monthly

Constituents	Units	Station	Sampling Frequency
Temperature	°F (°C)	R-l, R-2	Weekly
Electrical Conductivity @25°C	µmhos/cm	R-1, R-2	Weekly
Total Coliform Organisms	MPN/100 ml	R-1, R-2	Monthly
Ammonia*	mg/l	R-1, R-2	Quarterly
Radionuclides	PCi/l	R-1, R-2	Annually

* Temperature and pH shall be determined at the time of sample collection for the calculation of unionized ammonia.

In conducting the receiving water sampling, a log shall be kept of the receiving water conditions throughout the reach bounded by Stations R-l and R-2. 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

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 the receiving water. The testing shall be conducted as specified in EPA 600/4-91/002. Chronic toxicity samples shall be collected at the discharge of the wastewater treatment plan prior to its entering Tule Canal. Twenty-four hour composite samples shall be representative of the volume and quality of the discharge. Time of collection samples shall be recorded. Dilution and control waters shall be obtained immediately upstream of the discharge from an area unaffected by the discharge in the receiving waters. Standard dilution water can be used if the receiving water source exhibits toxicity and is approved by the Executive Officer. The sensitivity of the test organisms to a reference toxicant shall be determined concurrently with each bioassay and reported with the test results. Both the reference toxicant and effluent test 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 shall include the following:

Species: *Oncorhynchus Mykiss (Rainbow trout), Ceriodaphnia dubia, and Selenastrum capricornutum*

Frequency: *Six times per year*
Dilution Series:

	Dilutions (%)					Controls	
	100	75	50	25	12.5	Creek Water	Lab Water
% WWTP Effluent	100	75	50	25	12.5	0	0
% Dilution Water*	0	25	50	75	87.5	100	0
% Lab Water	0	0	0	0	0	0	100

* Dilution water shall be receiving water from Tule Canal taken upstream from the discharge point. The dilution series may be altered upon approval of Regional Board staff.

SLUDGE MONITORING

A composite sample of sludge shall be collected annually in accordance with EPA's POTW Sludge Sampling and Analysis Guidance Document, August 1989, and tested for the following metals:

Cadmium	Copper	Nickel	Molybdenum
Chromium	Lead	Zinc	Mercury
Beryllium	Selenium	Silver	Gamma-BHC (Lindane)
Delta-BHC			

Sampling records shall be retained for a minimum of five years. A log shall be kept of sludge quantities generated and of 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.

1. **Within 90 days of the effective date of this Order**, and **annually by 30 January** thereafter, the Discharger shall submit:

   a. Annual sludge production in dry tons and percent solids.

   b. A schematic diagram showing sludge handling facilities and a solids flow diagram.

   c. Depth of application and drying time for sludge drying beds.

   d. 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 sludge production disposed by each method.

Within 90 days of the effective date of this Order, the Discharger shall submit characterization of sludge quality, including sludge 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 sludge 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 sludge are provided in 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 sludge samples should reflect those specified in 40 CFR 136.6.3(e). Other guidance is available in EPA's POTW Sludge Sampling and Analysis Guidance Document, August 1989.

WATER SUPPLY MONITORING

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

Constituents	Units	Sampling Frequency
Electrical Conductivity[1] @ 25°C	µmhos/cm	Annually
Total Dissolved Solids	mg/l	Annually

[1] If the water supply is from more than one source, the EC shall be reported as a weighted average and include copies of supporting calculations.

GROUNDWATER MONITORING

Prior to construction, plans and specifications for ground water monitoring wells shall be submitted to Regional Board staff for review and approval. Wells shall comply with requirements of the Department of Water Resources.

Constituents	Units	Sampling Frequency
Depth to Groundwater	feet	Monthly
Elevation[1]	feet/100	Monthly
Specific Conductivity	µmhos/cm	Monthly
Nitrate (as N)	mg/l	Quarterly
Total Coliform Organisms	MPN/100 ml	Quarterly

[1] The elevation shall be used to calculate the gradient and direction of groundwater flow which shall be reported with the monitoring report.

POND MONITORING

Wastewater ponds shall be monitored for at least the followings:

Constituents	Units	Sampling Frequency
Freeboard	Feet	monthly
Specific Conductivity	µmhos/cm	monthly
Color	observation	monthly
Odors	observation	monthly
Levee Condition	observation	monthly

REPORTING

Monitoring results shall be submitted to the Regional Board by the **first day** of the second month following sample collection. Quarterly and annual monitoring results shall be submitted by the **first day of the second month following each calendar quarter, semi-annual period, and year**, respectively.

In reporting the monitoring data, the Discharger shall arrange the data in tabular form so that the date, the constituents, and the concentrations are readily discernible. The data shall be summarized in such a manner 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.

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.

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 WWTP (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 Regional 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

13 March 2003
(Date)

INFORMATION SHEET

ORDER NO. R5-2003-0031
NPDES NO. CA0077950
CITY OF WOODLAND
WATER POLLUTION CONTROL FACILITY
YOLO COUNTY

BACKGROUND INFORMATION

The City of Woodland (Discharger) owns and operates a wastewater collection, treatment, and disposal system, and provides sewerage service to domestic, commercial, and industrial users of the City of Woodland. The treatment system consists of three activated sludge oxidation ditches, three secondary clarifiers, and a chlorination/dechlorination process. Approximately 315 arces of ponds are used for sludge treatment and/or disposal or treatment of excess wastewater during periods of peak flow. The current design average dry weather flow capacity of the wastewater treatment plan is 7.8 million gallons per day (mgd). The Discharger is currently developing to expand the treatment plant's capacity to 10.4 mgd. The construction for the plant expansion is tentatively scheduled to begin in the spring of 2003 and completed in the spring of 2004. However, information required in accordance to the California Environmental Quality Act (CEQA) and water quality assessments and a Report of Waste Discharge (RWD) were not filed detailing how the expanded facility will comply with Waste Discharge Requirements.

BENEFICIAL USES OF THE RECEIVING WATER

The Basin Plan states, on page II-1.00, "Protection and enhancement of existing and potential beneficial uses are primary goals of water quality planning" and "…disposal of wastewaters is [not] a prohibited use of waters of the State; it is merely a use which cannot be satisfied to the detriment of beneficial uses." The existing and potential beneficial uses that currently apply to surface waters of the basins are presented in Figure II-1 and Table II-1 of the Basin Plan. The beneficial uses of Tule Canal, within the Yolo Bypass, downstream of the discharge, as identified in Table II-1 of the Basin Plan are agricultural irrigation, agricultural stock watering, water contact recreation, non-contact water recreation, warm freshwater aquatic habitat, potential cold freshwater aquatic habitat, warm fish migration habitat, cold fish migration habitat, warm spawning habitat, and wildlife habitat.

The designated beneficial uses of Tule Canal, within the Yolo Bypass, include water contact recreation. The December 2000 - Recreation, Land Use, and Dilution Study of the Tule Canal and Toe Drain (Study) provided by the Discharger indicates that the receiving water has been used for water contact recreation and irrigation purposes. The Basin Plan definition for water contact recreation includes "uses of water for recreational activities involving body contact with water, where ingestion of water is reasonably potential. These uses include, but not limited to, swimming, wading, water-skiing, skin and scuba diving, surfing, white water activities, fishing or use of natural hot springs". The Discharger completed a survey in December 2000 of recreational and irrigation practices along the receiving water, Tule Canal. The Discharger's survey found that: eleven of the 212 people surveyed stated that they swim in Tule Canal; 24 % of respondents consume fish caught in Tule Canal several times a month; and that, between 4% and 5% of the crops grown with water from the receiving stream were food crops that require the

water be treated to a tertiary level to protect the public health. The survey also found that the wastewater remained relatively undiluted in the principal recreational and food crop irrigation areas.

DILUTION CONSIDERATIONS

The Discharger requested, in the Report of Waste Discharge, that dilution be allowed within the Tule Canal when calculating Effluent Limitations for individual constituents. The Discharger specifically requested that harmonic mean flow rates be used in determining human health based Effluent Limitations. In the past, the Discharger and Regional Board staff had agreed that Tule Canal was ephemeral. The impact of considering a receiving stream to be ephemeral is that all limitations are "end of pipe" without any benefit of dilution.

Flows within the receiving stream, Tule Canal, were too low to measure during the months of July, August, September and October. For the months of July, August, September and October, the Discharger estimated receiving water flow rates using "chemical dilution" values, specifically electrical conductivity (EC). The EC, within Tule Canal, upstream of the discharge is considerably lower than the EC of the discharge. Since EC is conservative, any available dilution could be calculated knowing the EC at an upstream point, at the discharge and at a combined downstream point. If dilution is available, the combined EC downstream of the discharge would be lower than the discharge EC and higher than upstream EC. This was not always the case, the Discharger reports for EC that "R-2 was nearly always higher than R-1". This indicates that, at times, EC values at the downstream sampling point were lower than at the upstream point, the opposite case of high EC wastewater being diluted by lower EC receiving stream flows. This would indicate that the high EC wastewater discharge was not diluted with lower EC receiving water and there is no hydraulic dilution in the receiving stream. This section of the Report of Waste Discharge also states that water is driven upstream within Tule Canal by tidal influences. With the EC analysis and the possibility of tidal influences pushing the flow backwards, the receiving stream does not appear to have dilution available year round and the ephemeral nature of the receiving stream was instead confirmed.

Harmonic mean flow rates are calculated as the reciprocal of the arithmetic mean of the reciprocals of the individual daily flows. Therefore, if there are individual daily flows of zero, the mathematical equation is undefined. Confirming that harmonic mean flow rates are inappropriate for ephemeral streams, the State Water Resources Control Board, in a precedential decision, Order WQO 2002-0015, regarding Vacaville's Easterly Wastewater Treatment Plant, states, "The Toxics Policy requires the permit writer to use the receiving water's harmonic mean flow. The Toxics Policy includes an equation to calculate the harmonic mean flow; however, the equation cannot be used when a discharge is made to receiving waters without consistent background dilution."

The Discharger's Report of Water Discharge confirms that Tule Canal is an ephemeral stream without reliable hydraulic dilution. Without dilution in the receiving stream, Effluent Limitations have been established as "end of pipe" limits.

REASONABLE POTENTIAL ANALYSIS FOR EFFLUENT LIMITATIONS– CTR CONSTITUENTS

The Code of Federal Regulations, 40 CFR 122.44 (d)(1)(iii), states: "…a discharge causes, has a reasonable potential to cause, or contribute to an in-stream excursion above allowable ambient concentration of a State numeric criteria within a State water quality standard for an individual pollutant, the permit must contain effluent limits for that pollutant."

All mass-based Effluent Limitations are calculated using the following equation:

$$X \frac{\mu g}{l} \times 10^{-6} \frac{g}{\mu g} \times 3.79 \frac{l}{gal} \times Flow \frac{gals}{day} \times 0.0022 \frac{lbs}{g} = Y \frac{lbs}{day} \qquad (*)$$

where

X = Concentration-based Effluent Limitation
Y = Mass-based Effluent Limitation

Bis(2-ethylhexyl)phthalate

Bis(2-ethylhexyl)phthalate is a colorless oily liquid that is extensively used as a plasticizer in a wide variety of industrial, domestic, and medical products. It is an environmental contaminant and has been detected in groundwater, surface water, drinking water, air, soil, plants, fish, and animals.

Bis(2-ethylhexyl)phthalate is in polyvinyl chloride plastic products like toys, vinyl upholstery, shower curtains, adhesives, and coatings. Bis(2-ethylhexyl)phthalate is also used in inks, pesticides, cosmetics, and vacuum pump oil. Bis(2-ethylhexyl)phthalate is insoluble in water, miscible with mineral oil and hexane, and soluble in most organic solvents. It is easily dissolved in body fluids such as saliva and plasma. Bis(2-ethylhexyl)phthalate is a combustible liquid; it may burn, but does not readily ignite. It produces poisonous gas in a fire. When heated to decomposition, it emits acrid smoke.

The Department of Health and Human Services has determined that bis(2-ethylhexyl)phthalate may reasonably be anticipated to be a carcinogen. Repeated exposure to bis(2-ethylhexyl)phthalate may affect kidneys and livers, and may cause numbness and tingling in the arms and legs.

An Effluent Limitation for bis(2-ethylhexyl)phthalate is included in existing Waste Discharge Requirements, Order No. R5-1998-0021-R01, in accordance with the NTR. A time schedule for compliance with the Effluent Limitation was included in Cease and Desist Order No. 98-022, with full compliance required by 30 December 2002. The CTR, Section 131.38 (e)(6), and the SIP, Section 2.1, allow a maximum compliance schedule for CTR and NTR constituents. The Discharger has exhausted a five-year compliance time schedule allowed under the SIP for

bis(2-ethylhexyl)phthalate. During the compliance time period, the Discharger did not develop and implement industrial pretreatment limitations to control bis(2-ethylhexyl)phthalate. The Discharger has not implemented treatment systems for bis(2-ethylhexyl)phthalate. The Discharger has not implemented other effective source control measures for bis(2-ethylhexyl)phthalate. The 1998-2002 Effluent Monitoring Data report provided by the Discharger indicates that bis(2-ethylhexyl)phthalate was detected in three samples at concentrations of 4.0 µg/l (25 February 1998), 8.0 µg/l (15 April 1999), and 6.8 µg/l (16 November 1999). Using the average flow of 7.8 mgd and a maximum detected concentration of 8.0 µg/l, the approximate mass of bis(2-ethylhexyl)phthalate discharged daily is 0.52 lbs/day. U.S. EPA NTR human health criterion is 5.9 µg/l (30-day average) for waters that are not sources of drinking water. Detected concentrations of bis(2-ethylhexyl)phthalate exceeded the NTR human health criterion. Additionally, dilution within Tule Canal is not sufficient for bis(2-ethylhexyl)phthalate to meet water quality standards. The SIP allows human health-based limitations to be established using dilution in the receiving stream, specifically, harmonic mean flow rates. However, harmonic mean flow rates are not appropriate for ephemeral or low flow streams. Harmonic mean flow rates are calculated as the reciprocal of the arithmetic mean of the reciprocals of the individual daily flows. Therefore, if there are individual daily flows of zero, the mathematical equation is undefined. The State Water Resources Control Board confirms that harmonic mean flow rates are inappropriate for ephemeral stream in precedential decision, Order WQO 2002-0015. Therefore, the discharge has a reasonable potential to cause or contribute to an exceedance of the NTR criterion. Based on these considerations, this Order contains an average monthly concentration-based Effluent Limitation of 5.9 µg/l for bis(2-ethylhexyl)phthalate based on the NTR human health criterion.

The State Board adopted the SIP on 2 March 2000 and amended it on 26 April 2000. The SIP includes methodology for establishing effluent limitations for priority toxic pollutants included in the NTR and CTR. The SIP includes the following equation for calculating the maximum daily effluent limitation (MDEL) when the applicable criteria are for the protection of human health:

$$MDEL_{hh} = ECA * \left(\frac{MDEL}{AMEL} \right)_{multiplier}$$

where

ECA = Effluent concentration allowance
ECA = Average monthly effluent limitation (for the protection of human health)
AMEL = Average monthly effluent limitation
$MDEL_{hh}$ = Maximum daily effluent limitation (for the protection of human health)

Using the equation above, the maximum daily concentration-based Effluent Limitation for bis(2-ethylhexyl)phthalate is calculated at 11.8 µg/l.

In addition, this Order contains average monthly and maximum daily mass-based Effluent Limitations of 0.38 lbs/day and 0.77 lbs/day, calculated using the equation (*) above.

Organochlorine Pesticides

The Basin Plan includes a water quality objective for pesticides on page III-6.0, which states: "No individual pesticide or combination of pesticides shall be present in concentrations that adversely affect beneficial uses" and that " Total identifiable persistent chlorinated hydrocarbon pesticides shall not be present in the water column at concentrations detectable within the accuracy of analytical methods approved by the Environmental Protection Agency or the Executive Officer". An Effluent Limitation for organochlorine pesticides is included in existing Waste Discharge Requirements, Order No. R5-1998-0021-R01, in accordance with the Basin Plan objective. A time schedule for compliance with the Effluent Limitation was included in the Cease and Desist Order No. 98-022, with full compliance required by 30 December 2002.

The Report of Waste Discharge and the 1998-2002 Effluent Monitoring Data report indicate that delta-BHC and gamma-BHC (Lindane) were detected in the effluent. Delta-BHC was detected in the effluent at a maximum concentration of 0.05 μg/l. Gamma-BHC (Lindane) was detected in 18 of 57 effluent samples ranging from 0.02 μg/l to 0.06 μg/l. The CTR gamma-BHC human health criterion for waters that are not sources of drinking water but from which aquatic organisms can be consumed is 0.063 μg/l as a 30-day average. The CTR gamma-BHC freshwater aquatic life criterion is 0.95 μg/l as a maximum concentration (one-hour average).

The Basin Plan Objective is more restrictive than the CTR water quality standard for organochlorine pesticides. The CTR states that CTR standards apply unless the State's criteria are more restrictive. The presence of delta-BHC and gamma-BHC (Lindane) in the effluent indicates that the discharge from the wastewater treatment plant has a reasonable potential to cause or contribute to an exceedance of Basin Plan objectives. Based on these considerations, this Order includes an Effluent Limitation for organochlorine pesticides based on the Basin Plan objective.

Mercury

Mercury is a neurotoxin, meaning it affects the nervous system**.** The three most common forms of mercury are elemental, inorganic, and methylmercury. Mercury combines with other elements, such as chlorine, sulfur, or oxygen, to form inorganic mercury compounds or "salts," which are usually white powders or crystals. Mercury also combines with carbon to make organic mercury compounds. The most common form of mercury is methylmercury. Methylmercury is produced mainly by microscopic organisms in the water and soil. More mercury in the environment can increase the amounts of methylmercury that these small organisms make. The three forms of mercury can all produce adverse health effects at sufficiently high doses. U.S.EPA has determined that mercuric chloride and methylmercury are possible human carcinogens. Methylmercury and metallic mercury vapors are more harmful than other forms, because more mercury in these forms reaches the brain. Exposure to high levels of metallic, inorganic, or organic mercury can permanently damage the brain, kidneys, and developing fetus. Effects on brain functioning may result in irritability, shyness, tremors, changes in vision or hearing, and memory problems. Short-term exposure to high levels of metallic mercury vapors may cause effects including lung damage, nausea, vomiting, diarrhea,

increases in blood pressure or heart rate, skin rashes, and eye irritation. U.S. EPA has determined that eating mercury-contaminated fish is the primary route of exposure to mercury for most people.

An Effluent Limitation for mercury is included in existing Waste Discharge Requirements, Order No. R5-1998-0021-R01, in accordance with the Basin Plan narrative toxicity objective. A time schedule for compliance with the Effluent Limitation was included in Cease and Desist Order No. 98-022, with full compliance required by 30 December 2002. The CTR, Section 131.38 (e)(6), and the SIP, Section 2.1, allow a maximum compliance schedule for CTR and NTR constituents. The Discharger has exhausted a five-year compliance time schedule, although existing Effluent Limitations were not based of the CTR.

The U.S. EPA aquatic life Ambient Water Quality Criteria are 0.77 µg/l as a four-day average and 1.4 µg/l as a one-hour average. The CTR human health criterion for waters that are not sources of drinking water but from which the aquatic organisms may be consumed is 0.051 µg/l as a 30-day average. In 40 CFR Part 131, U.S. EPA acknowledges that human health criteria may not be protective of some aquatic or endangered species. In the CTR, U.S.EPA reserved the mercury criteria for fresh water and aquatic life and may adopt new criteria at a later date.

Mercury was detected in almost all of the effluent samples. As reported in the 1998-2002 Effluent Mercury Report, mercury was detected at a maximum concentration of 0.058 µg/l on 11 May 2000. Using the average daily flow rate of 6.03 mgd and a maximum detected mercury concentration of 0.058 µg/l, the approximate mass of mercury discharged daily is 0.0029 lbs/day. Wastewater from the treatment plant is discharged to Tule Canal, within the Yolo Bypass, and then tributary to the Sacramento-San Joaquin Delta, which has been listed as an impaired water pursuant to Section 303(d) of the Clean Water Act because of mercury. Because the Sacramento-San Joaquin Delta has been listed as an impaired water body for mercury, the discharge must not cause or contribute to increase mercury levels. The SIP, Section 1.3, requires the establishment of an effluent limitation when the detected concentration exceeds an applicable criterion or objective. The maximum detected concentration of mercury exceeds the CTR human health criterion. In addition, dilution within Tule Canal is not sufficient for mercury to meet water quality standard. Based on these considerations, this Order contains an average monthly concentration-based Effluent Limitation of 0.051 µg/l for mercury based on the CTR human health criterion. In accordance with Federal Regulations, 40 CFR 122.44(2)(i)(B)(1), the adoption of less stringent effluent limitations for mercury is not considered backsliding since U.S. EPA promulgated the CTR. The CTR based limitation replaces the limitation which was based on the Basin Plan narrative toxicity utilizing U.S. EPA's ambient water quality criteria for the protection of freshwater aquatic life. This Order also contains a mercury interim performance-based mass Effluent Limitation of 1.06 lbs/twelve months for the effluent discharge to Tule Canal. This limitation is based on maintaining the mercury loading at the current level until a total maximum daily load (TMDL) can be established and EPA develops mercury standards that are protective of human health. The mass limitation is derived using the maximum observed effluent mercury concentration of 0.058 µg/l and the reported average daily flow rate of 6.03 mgd. If U.S. EPA develops new water quality standards for mercury, this

permit may be reopened and the Effluent Limitation adjusted. The mass-based Effluent Limitation for mercury is demonstrated as follows:

6.03 million gallons per day = 6,030,000 gallons per day

$$0.058\frac{\mu g}{l}\times 10^{-6}\ \frac{g}{\mu g}\times 3.79\frac{l}{gal}\times 6{,}030{,}000\frac{gals}{day}\times 0.0022\frac{lbs}{g}\times\frac{365 days}{12 months}=1.06\frac{lbs}{12 months}$$

Dibromochloromethane

Dibromochloromethane is one of the chemicals in the trihalomethane (THM) group that are formed along with other disinfection by products when chlorine or other disinfectants used to control microbial contaminants in wastewater react with naturally occurring organic and inorganic matter in water. The THM group includes chloroform, bromodichloromethane, dibromochloromethane, and bromoform. Dibromochloromethane poses the most serious cancer risk in the THM group. THM levels tend to increase with pH, temperature, time, and the level of "precursors" present. Precursors are organic material that reacts with chlorine to form THM. The City of Woodland uses chlorine to disinfect its wastewater.

As reported in the Report of Waste Discharge, dibromochloromethane was detected in the effluent at a maximum concentration of 37.5 µg/l. U.S.EPA established a CTR human health criterion of 34 µg/l (for waters that are not sources of drinking water but from which aquatic organisms may be consumed) as a 30-day average.

The maximum detected concentration of dibromochloromethane exceeds the CTR criterion. Therefore, this Order contains an average monthly concentration-based Effluent Limitation of 34 µg/l for dibromochloromethane based on the CTR human health criterion.

The State Board adopted the SIP on 2 March 2000 and amended it on 26 April 2000. The SIP includes methodology for establishing effluent limitations for priority toxic pollutants included in the NTR and CTR. The SIP includes the following equation for calculating the maximum daily effluent limitation when the applicable criteria are for the protection of human health:

$$MDEL_{hh} = ECA * \left(\frac{MDEL}{AMEL}\right)_{multiplier}$$

where

ECA = Effluent concentration allowance
AMEL = Average monthly effluent limitation
AMEL = ECA (for the protection of human health)
$MDEL_{hh}$ = Maximum daily effluent limitation (for the protection of human health)

Using the equation above, the maximum daily concentration-based Effluent Limitation for dibromochloromethane is calculated at 68 µg/l.

In addition, this Order contains an average monthly and maximum daily mass-based Effluent Limitations of 2.2 lbs/day and 4.4 lbs/day, calculated using the equation (*) above.

Cyanide

Cyanide most commonly occurs as hydrogen cyanide and its salts-sodium and potassium cyanide. Cyanides are both man-made and naturally occurring substances. They are found in several plant species as cyanogenic glycosides and are produced by certain bacteria, fungi, and algae. Cyanides are released to the environment from industrial sources and car emissions. The 1998-2002 Effluent Monitoring Data report indicates that cyanide was detected in each of five effluent samples. The detected concentrations of cyanide ranged from 4.0 µg/l to 5.0 µg/l. U.S.EPA established the CTR criterion of 220,000 µg/l (for waters that are not sources of drinking water but from which aquatic organisms may be consumed) to protect human health based on a 30-day average. U.S. EPA also established CTR criteria for the protection of freshwater aquatic life. The continuous concentration (four-day average) and the maximum concentration (one-hour average) criteria for cyanide are 5.2 µg/l and 22 µg/l, respectively.

Detected concentrations of cyanide do not exceed CTR criteria. Therefore, no effluent limitation for cyanide is included in this Order.

Copper

The 1998-2002 Effluent Monitoring Data report and the Report of Waste Discharge indicate that copper was detected in five of eight effluent samples. Detected concentrations of copper are summarized in the table below. U.S. EPA developed hardness-dependent CTR criteria for the protection of freshwater aquatic life. The CTR criteria for copper are presented in dissolved concentrations. U.S. EPA recommended conversion factors to translate dissolved concentrations to total concentrations. The conversion factor for copper in fresh water is 0.960 for both acute and chronic criteria. The continuous concentration (four-day average) and the maximum concentration (one-hour average) criteria for copper are presented in total concentrations. These criteria are presented as follows:

Sampling Dates	Reported Concentrations of Copper (µg/l) (Total)	Hardness (mg/l as CaCO3)	CCC (µg/l) (Total)	CMC (µg/l) (Total)
7/13/01	0.005	--	11.7*	17.9*
1/31/02	5.5	--	11.7*	17.9*
2/6/02	5.5	400	30.5	51.7
4/10/02	7.3	430	32.4	55.3
5/13/02	4.8	--	11.7*	17.9*
--	10.7	--	11.7*	17.9*

$$CCC = e^{\{0.8545[\ln(hardness)]-1.702\}}$$
$$CMC = e^{\{0.9422[\ln(hardness)]-1.700\}}$$

where

CCC = criteria continuous concentration (four-day average)
CMC = criteria maximum concentration (one-hour average)
-- = not available
* = calculated using the hardness of 130 mg/l (of CaCO3) of receiving stream at the critical low flow as reported in the Report of Waste Discharge

U.S.EPA CTR human health criterion is 1,300 µg/l (for the consumption of water and aquatic organisms) as a 30-day average. The Agricultural Water Quality Goal for copper is 200 µg/l.

The maximum detected concentration of copper does not exceed any water quality criteria. Therefore, no effluent limitation for copper is included in this Order.

Selenium

Exposure to high doses of selenium can be toxic. The most frequently reported symptoms of selenosis (chronic selenium toxicity) are hair and nail brittleness and loss. Other symptoms may include gastrointestinal disturbances, skin rashes, a garlic breath odor, fatigue, irritability, and nervous system abnormalities.

The 1998-2002 Effluent Monitoring Data report indicates that selenium was detected in each of five effluent samples. Detected concentrations of selenium ranged from 2.0 µg/l to 4.0 µg/l. The Agricultural Water Quality Goal for selenium is 20 µg/l. U.S. EPA established CTR criteria for the protection of freshwater aquatic life for selenium. The continuous concentration (four-day average) and the maximum concentration (one-hour average) criteria for selenium are 5.0 µg/l and 20 µg/l, respectively.

The maximum detected concentration of selenium does not exceed any water quality criteria. Therefore, no effluent limitation for selenium is included in this Order.

Nickel

The 1998-2002 Effluent Monitoring Data report indicates that nickel was detected in four of eight effluent samples. Detected concentrations of nickel are summarized in the table below. U.S. EPA developed hardness-dependent CTR criteria for the protection of freshwater aquatic life. U.S.EPA recommended conversion factors to translate dissolved concentrations to total concentrations. The conversion factors for nickel in freshwater are 0.998 and 0.997 for acute and chronic criteria, respectively. The continuous concentration (four-day average) and the maximum concentration (one-hour average) criteria for nickel are presented in total concentrations. These criteria are presented as follows:

Sampling Dates	Reported Concentrations of Nickel (µg/l) (Total)	Hardness (mg/l as CaCO3)	CCC (µg/l) (Total)	CMC (µg/l) (Total)
1/31/02	2.2	--	65*	586*
2/6/02	2.2	400	169	1,516
4/10/02	4.3	430	179	1,612
5/13/02	3.9	--	65*	586*

$$CCC = e^{\{0.846[\ln(hardness)]+0.0584\}} \qquad CMC = e^{\{0.846[\ln(hardness)]+2.255\}}$$

where

CCC = criteria continuous concentration (four-day average)
CMC = criteria maximum concentration (one-hour average)
-- = not available
* = calculated using the hardness of 130 mg/l (of CaCO3) of receiving stream at the critical low flow as reported in the Report of Waste Discharge

U.S.EPA CTR human health criterion for nickel is 4,600 µg/l (for waters that are not sources of drinking water but from which aquatic organisms may be consumed) as a 30-day average. The Agricultural Water Quality Goal for nickel is 200 µg/l.

Detected concentrations of nickel do not exceed water quality criteria for waters that are not sources of drinking water. Therefore, no effluent limitation for nickel is included in this Order.

Zinc

The 1998-2002 Effluent Monitoring Data report indicates that zinc was detected in each of eight effluent samples. Detected concentrations of zinc are summarized in the table below. The Report of Waste Discharge indicates that zinc was detected in the effluent at a maximum concentration of 95.7 µg/l. U.S. EPA developed hardness-dependent CTR criteria for the protection of freshwater aquatic life. U.S.EPA recommended conversion factors to translate dissolved concentrations to total concentrations. The conversion factors for zinc in freshwater are 0.978 and 0.986 for acute and chronic criteria, respectively. The continuous concentration (four-day average) and the maximum concentration (one-hour average) criteria for zinc are presented in total concentrations. These criteria are presented as follows:

Sampling Dates	Reported Concentrations of Zinc (µg/l) (Total)	Hardness (mg/l as CaCO3)	CCC (µg/l) (Total)	CMC (µg/l) (Total)
2/16/00	33.0	--	150*	150*
4/13/00	37.0	--	150*	150*

7/13/01	44.0	--	150*	150*
10/22/01	38.0	--	150*	150*
1/31/02	33.0	--	150*	150*
2/6/02	33.0	400	388	388
4/10/02	38.0	430	412	412
5/13/02	32.0	--	150*	150*
--	95.7	--	150*	150*

$$CCC = e^{\{0.8473[\ln(hardness)]+0.884\}} \qquad CMC = e^{\{0.8473[\ln(hardness)]+0.884\}}$$

where

CCC = criteria continuous concentration (four-day average)
CMC = criteria maximum concentration (one-hour average)
-- = not available
* = calculated using the hardness of 130 mg/l (of CaCO3) of receiving stream at critical low flow reported in the Report of Waste Discharge

U.S. EPA established Ambient Water Quality criteria for the protection of human health and welfare for zinc. The non-cancer health effects criterion for waters that are not sources of drinking water, but from which aquatic organisms may be consumed is 69,000 µg/l. The Agricultural Water Quality Goal for zinc is 2,000 µg/l.

Detected concentrations of zinc are below water quality criteria. Therefore, no effluent limitation for zinc is included in this Order.

Bromodichloromethane

Bromodichloromethane is a colorless, nonflammable liquid. Most bromodichloromethane is formed as a by-product when chlorine is added to the wastewater to kill bacteria. The Department of Health and Human Services (DHHS) has determined that bromodichloromethane is reasonably anticipated to be a human carcinogen. U.S.EPA CTR human health criterion is 46 µg/l (30-day average) for waters that are not sources of drinking water but from which aquatic organisms may be consumed.

As reported in the Report of Waste Discharge, bromodichloromethane was detected in the effluent at a maximum concentration of 30.4 µg/l. The maximum detected concentration of bromodichloromethane is below the CTR human health criterion. Therefore, no effluent limitation for bromodichloromethane is included in this Order.

Lead

The 1998-2002 Effluent Monitoring Data report indicates that lead was detected in the effluent at a maximum concentration of 0.35 µg/l. Detected concentrations of lead are summarized in the table below. The Agricultural Water Quality Goal for lead is 5,000 µg/l. U.S. EPA developed hardness-dependent CTR criteria for the protection of freshwater aquatic life for lead. U.S.EPA recommended conversion factors (CF) to translate dissolved concentrations to total concentrations. The conversion factors based on the hardness for chronic and acute condition in freshwater are calculated using the following equations:

$$CF_C = \left(1.46203 - \left\{\left[\ln(hardness)\right] \times 0.145712\right\}\right)$$

$$CF_A = \left(1.46203 - \left\{\left[\ln(hardness)\right] \times 0.145712\right\}\right)$$

where

CF_C = conversion factor for chronic criteria
CF_A = conversion factor for acute criteria

The continuous concentration (four-day average) and the maximum concentration (one-hour average) criteria for lead are presented in total concentrations. These criteria are presented as follows:

Sampling Dates	Reported Concentrations of Lead (µg/l) (Total)	Hardness (mg/l as CaCO3)	CCC (µg/l) (Total)	CMC (µg/l) (Total)
1/31/02	0.28	--	4.4*	114*
2/6/02	0.35	400	18.6	477
4/10/02	0.28	430	20.4	523
5/13/02	0.18	--	4.4*	114*

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

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

where

CCC = criteria continuous concentration (four-day average)
CMC = criteria maximum concentration (one-hour average)
-- = not available
* = calculated using the hardness of 130 mg/l (of CaCO3) of receiving stream at the critical low flow as reported in the Report of Waste Discharge

Detected concentrations of lead are below all water quality criteria. Therefore, no effluent limitation for lead is included in this Order.

Methylene Chloride

Methylene chloride is a colorless liquid with a mild, sweet odor. Another name for it is dichloromethane. Methylene chloride does not occur naturally in the environment. Methylene chloride is used as an industrial solvent and as a paint stripper. It may also be found in some aerosol and pesticide products and is used in the manufacture of photographic film.

The Report of Waste Discharge indicates that methylene chloride was detected in the effluent at a maximum concentration of 6.2 µg/l. The CTR human health criterion is 1,600 µg/l (30-day average) for waters that are not sources of drinking water.

The maximum detected concentration of methylene chloride does not exceed the CTR criterion. Therefore, no effluent limitation for methylene chloride is included in this Order.

Arsenic

Arsenic is a toxic substance that is known to cause adverse human health effects. Exposure to arsenic at high levels poses serious health effects as it is a known human carcinogen. Studies have shown that prolonged arsenic exposure significantly increases the risk of contracting various forms of cancer. In addition, it has been reported to affect the vascular system in humans and has been associated with the development of diabetes.

Arsenic can combine with other elements to form inorganic and organic arsenicals. In the environment, arsenic combines readily with many elements to form inorganic compounds: with hydrogen to form arsine, an extremely poisonous gas; with oxygen to form a pentoxide and the above-mentioned trioxide (As_2O_3 or As_4O_6), a deadly poison also called arsenic (III) oxide, arsenious oxide, white arsenic, or, simply, arsenic; with the halogens; and with sulfur. Arsenic in animals and plants combines with carbon and hydrogen to form organic arsenic compounds. Organic arsenic compounds are less toxic than inorganic arsenic compounds. While food contains both inorganic and organic arsenicals, primarily inorganic forms are present in water. Exposure to high levels of some organic arsenic compounds may cause similar effects as inorganic arsenic.

The 1998-2002 Effluent Monitoring Data report indicates that arsenic was detected in each of four effluent samples. Detected concentrations of arsenic ranged from 0.9 µg/l to 1.2 µg/l.

U.S.EPA CTR freshwater aquatic life criteria are 150 µg/l (four-day average) and 340 µg/l (one-hour average). The Agricultural Water Quality Goal for arsenic is 100 µg/l. State Board adopted the Resolution No. 88-63 entitled "Source of Drinking Water*",* which states: "…All surface and ground waters of the State are considered to be suitable, or potentially suitable, for municipal or domestic water supply and should be so designated by the Regional Boards…".

Therefore, detected concentrations of arsenic are compared to all water quality criteria to determine if arsenic causes or has a reasonable potential to cause an exceedance of a water quality criterion or objective. On 31 October 2001, U.S. EPA adopted a new drinking water standard for arsenic. The new Primary Maximum Contaminant Level (MCL) for arsenic is 10 µg/l.

The maximum detected concentration of arsenic does not exceed any water quality criteria. Therefore, no effluent limitation for arsenic is included in this Order.

Antimony

The 1998-2002 Effluent Monitoring Data report indicates that antimony was detected in each of four samples. Detected concentrations of antimony ranged from 0.3 µg/l to 0.4 µg/l. U.S. EPA CTR human health criterion is 4,300 µg/l (30-day average) for waters that are not sources of drinking water but from which aquatic organisms may be consumed. U.S.EPA established Ambient Water Quality criteria to protect freshwater aquatic life and the information for the lowest observed effect concentration (LOEC) for acute, chronic, and other conditions are 9,000 µg/l, 1,600 µg/l, and 610 µg/l, respectively.

Detected concentrations of antimony are below water quality criteria for waters that are not sources of drinking water. Therefore, no effluent limitation for antimony is included in this Order.

Bromoform

The Report of Waste Discharge indicates that bromoform was detected in the effluent at a maximum concentration of 8.5 µg/l. The U.S.EPA CTR human health criterion is 360 µg/l (30-average) for waters that are not sources of drinking water but from which aquatic organisms may be consumed. U.S. EPA also included the Ambient Water Quality criterion to protect freshwater aquatic life and the toxicity information for the lowest observed effect concentration (LOEC) for acute condition is 11,000 µg/l.

The maximum detected concentration of bromoform does not exceed any water quality criteria. Therefore, no effluent limitation for bromoform is included in this Order.

Cadmium

The 1998-2002 Effluent Monitoring Data report indicates that cadmium was detected in four of eight effluent samples. Detected concentrations of cadmium are summarized in the table below. The Agricultural Water Quality Goal for cadmium is 10 µg/l. U.S. EPA developed hardness-dependent CTR criteria for the protection of the freshwater aquatic life for cadmium. U.S.EPA recommended conversion factors (CF) to translate dissolved concentrations to total concentrations. The conversion factors based on the hardness for cadmium in freshwater are calculated using the following equations:

$$CF_C = (1.101672 - \{[\ln(hardness)] \times 0.041838\})$$
$$CF_A = (1.136672 - \{[\ln(hardness)] \times 0.041838\})$$

where

CF_C = conversion factor for chronic criteria
CF_A = conversion factor for acute criteria

The continuous concentration (four-day average) and the maximum concentration (one-hour average) criteria for cadmium are presented in total concentrations. These criteria are presented in the following table:

Sampling Dates	Reported Concentrations of Cadmium (µg/l) (Total)	Hardness (mg/l as CaCO3)	CCC (µg/l) (Total)	CMC (µg/l) (Total)
1/31/02	0.09	--	3.03*	6.07*
2/6/02	0.1	400	7.31	21.6
4/10/02	0.1	430	7.74	23.4
5/13/02	0.06	--	3.03*	6.07*

$$CCC = e^{\{0.7852[\ln(hardness)] - 2.715\}}$$
$$CMC = e^{\{1.128[\ln(hardness)] - 3.6867\}}$$

where

CCC = criteria continuous concentration (four-day average)
CMC = criteria maximum concentration (one-hour average)
-- = not available
* = calculated using the hardness of 130 mg/l (of CaCO3) of receiving stream at the critical low flow as reported in the Report of Waste Discharge

Detected concentrations of cadmium are below water quality criteria for waters that are not source of drinking water. Therefore, no effluent limitation for cadmium is included in this Order.

Chromium (III)

Chromium is a naturally occurring element found in rocks, animals, plants, soil, and in volcanic dust and gases. Total chromium measures the combined levels of trivalent chromium (chromium III) and hexavalent chromium (chromium VI). Chromium (III) occurs naturally in the environment and is an essential nutrient. Chromium (VI) is generally produced by industrial processes, such as chrome plating, dyes and pigments, leather tanning, and wood preserving. There is evidence to suggest that chromium (VI) may be converted to chromium (III) in the human body; particularly in the acidic environment of the digestive system. In addition, chromium (III) is the most stable form. Therefore, total chromium in the effluent is likely to be in the chromium (III) form. Based on these considerations, water quality standards for chromium (III) are used to evaluate whether detected concentrations of chromium (III) in the discharge from the WWTP cause or contribute to an exceedance of a water quality standard.

The 1998-2002 Effluent Monitoring Data report provides monitoring results for chromium (total) and chromium (VI). Detected concentrations of chromium (III) are calculated by taking the difference of chromium (VI) concentration from the chromium (total) concentration. Detected concentrations of chromium (III) are presented in the following table:

Sampling Dates	Unit	Chromium (total)	Chromium (VI)	Chromium (III)
1/31/02	µg/l	2.3	1.1	1.2
2/6/02	µg/l	2.3	0.9	1.4
4/10/02	µg/l	2.1	1.1	1.0
5/13/02	µg/l	1.4	1.0	0.4

U.S. EPA developed hardness-dependent CTR criteria for the protection of freshwater aquatic life for chromium. U.S.EPA recommended conversion factors to translate dissolved concentrations to total concentrations. Conversion factors for chromium (III) in freshwater are 0.316 and 0.860 for acute and chronic criteria, respectively. Continuous concentration (four-day average) and the maximum concentration (one-hour average) criteria for chromium are presented in total concentrations. These criteria are presented as follows:

Sampling Dates	Detected Concentrations of Chromium (III) (µg/l)	Hardness (mg/l as CaCO3)	CCC (µg/l)	CMC (µg/l)
1/31/02	1.2	--	257*	2,153*
2/13/02	1.4	400	644	5,405
4/10/02	1.0	430	684	5,734
5/13/02	0.3	--	257*	2,153*

$$CCC = e\{0.819[\ln(hardness)]+1.561\} \qquad CMC = e\{0.819[\ln(hardness)]+3.688\}$$

where

CCC = criteria continuous concentration (four-day average)
CMC = criteria maximum concentration (one-hour average)
-- = not available
* = calculated using the hardness of 130 mg/l (of CaCO3) of receiving stream at the critical low flow as reported in the Report of Waste Discharge

Detected concentrations of chromium (III) do not exceed CTR freshwater aquatic life criteria. Therefore, no effluent limitation for chromium (III) is included in this order.

REASONABLE POTENTIAL ANALYSIS FOR EFFLUENT LIMITATIONS – NON-CTR CONSTITUENTS

Sampling activities were conducted by the Discharger on 13 April 2000 and January through May of 2002. Reported results are used to perform the reasonable potential analysis for constituents that are not included in the CTR. The analysis assists to determine whether the discharge may: (1) cause, (2) have a reasonable to cause, (3) or contribute to an exceedance of any water quality criteria or objectives. The reasonable analysis is included in the U.S.EPA Technical Support Document for Water Quality-Based Toxics Control. All available sampling results for non-CTR constituents are summarized in the Table 1 below:

Table 1. Detectable Results and Projected Maximum Effluent Concentrations (µg/l)

Constituents	4/13/00	1/31/02	2/6/02	3/12/02	4/10/02	5/13/02	Projected MEC[1]
Aluminum	--	20	30	--	20	30	141
Barium	--	150	150	--	180	150	846
Boron	2,540	--	--	--	--	--	33,528
Nitrate	--	8,400	9,400	16,000	19,000	7,800	79,800
Calcium	64,940	--	--	--	--	--	857,508
Chloride	--	260,000	160,000	240,000	200,000	220,000	1,092,000
Fluoride (total)	--	400	400	400	300	200	1,680
Iron	20	1,300	<50	<50	<50	--	5,460
Magnesium	61,800	--	--	--	--	--	815,760
Manganese	--	1.2	1.3	3.6	1.7	--	16.9
Phosphate (P, total)	--	2,000	2,200	3,800	2,400	2,800	15,960
Potassium	10,000	--	--	--	--	--	132,000
Sodium	170,000	--	--	--	--	--	2,244,000
Sulfate	--	64,000	94,000	69,000	69,000	79,000	394,800
Sulfite	--	8,100	6,700	<500	560	2,500	34,020
Xylenes	--	<0.5	<0.5	<0.5	<0.5	<0.5	6.8[2]
Chloroform	--	6.5	7.6	13	12	16	67.2
PeCDF	--	--	--	--	1.41E-6	--	1.86E-5

Table 2. Controlling Water Quality Criteria for Tule Canal, within the Yolo Bypass

Constituents	Controlling Water Quality Criteria for the Surface Water
Aluminum	Basin Plan narrative toxicity objective
Barium	No criteria for waters that are not sources of drinking water
Boron	Agricultural Water Quality Goal
Nitrate	No criteria for waters that are not sources of drinking water
Calcium	No water quality criteria available
Chloride	Agricultural Water Quality Goal
Fluoride (total)	Agricultural Water Quality Goal
Iron	Basin Plan narrative toxicity objective
Magnesium	No water quality criteria available
Manganese	Ambient Water Quality Criteria for the protection of human health and welfare (non-cancer health effects criterion)
Phosphate (P)	No criteria for waters that are not sources of drinking water
Potassium	No criteria for waters that are not sources of drinking water
Sodium	No criteria for waters that are not sources of drinking water
Sulfate	No criteria for waters that are not sources of drinking water
Sulfite	No water quality criteria available
Xylenes	No criteria for waters that are not sources of drinking water
Chloroform	Ambient Water Quality Criteria for the protection of human health and welfare
PeCDF	No water quality criteria available

[1] The projected MEC (maximum effluent concentration) is determined by multiplying the maximum detected concentration with a reasonable potential multiplying factor that accounts for statistical variation. The multiplying factor (for 99% confidence level and 99% probability basis) is dependent on the coefficient of variation (CV) and number of reported effluent results. For less than 10 effluent data, CV is estimated to equal 0.6. The multiplying factors are 13.2 (for one sample), 4.7 (for four samples), 4.2 (for five samples), and 3.8 (for six samples).

-- No sampling result available.

[2] The projected MEC is estimated by multiplying the maximum concentration of 1.78 µg/l provided in the Report of Waste Discharge and the multiplying factor of 3.8 (for six samples).

The Code of Federal Regulations, 40 CFR 122.44 (d)(1)(iii), states: "…a discharge causes, has a reasonable potential to cause, or contribute to an in-stream excursion above allowable ambient concentration of State numeric criteria within a State water quality standard for an individual pollutant, the permit must contain effluent limits for that pollutant."

All mass-based Effluent Limitations are calculated using the following equation:

$$X\frac{\mu g}{l}\times 10^{-6}\,\frac{g}{\mu g}\times 3.79\frac{l}{gal}\times Flow\frac{gals}{day}\times 0.0022\frac{lbs}{g}=Y\frac{lbs}{day} \qquad (*)$$

where

X = Concentration-based Effluent Limitation
Y = Mass-based Effluent Limitation

Beryllium

Pure beryllium is a hard, grayish metal. In nature, beryllium can be found in compounds in mineral rocks, coal, soil, and volcanic dust. Beryllium compounds are commercially mined, and the beryllium purified for use in electrical parts, machine parts, ceramics, aircraft parts, nuclear weapons, and mirrors. Beryllium compounds have no particular smell. Beryllium and its compounds have high acute toxicity to aquatic life. The Department of Health and Human Services (DHHS) has determined that beryllium and certain beryllium compounds may reasonably be anticipated to be carcinogens.

Short-term exposure to beryllium compounds can lead to inflammation or reddening and swelling of the lungs, a condition known as Acute Beryllium Disease. Long-term exposure to beryllium or beryllium oxide at much lower levels has been reported to cause Chronic Beryllium Disease, with shortness of breath, scarring of the lungs, and berylliosis. Both Acute and Chronic Beryllium Disease can be fatal, depending on the severity of the exposure. In addition, a skin allergy has been shown to develop when soluble beryllium compounds come in contact with the skin of sensitized individuals.

The Basin Plan prohibits the discharge of toxic constituents in toxic concentrations. The Agricultural Water Quality Goal criterion for beryllium is 100 µg/l. U.S. EPA established the Ambient Water Quality criteria to protect the freshwater aquatic life and the information for the lowest observed effect concentration (LOEC) for acute and chronic toxicity are 130 µg/l and 5.3 µg/l, respectively. Even though beryllium is a CTR constituent, no CTR criteria for beryllium have yet been established. Therefore, the reasonable potential analysis for non-CTR constituents is applied for beryllium to determine whether beryllium causes or has a reasonable potential to cause an exceedance of water quality criteria.

The existing permit contains Effluent Limitations for beryllium based on the Basin Plan narrative toxicity objective utilizing the Ambient Criteria. Beryllium had been detected in the effluent at a concentration of 95 µg/l. The detected concentration of beryllium is approximately 18 times greater than the LOEC for chronic toxicity. Even though effluent sampling results over the past five years indicated that beryllium were not detected in the effluent, nothing in the character of the wastewater influent or the treatment capability of the wastewater treatment plant has changed which would either remove or treat for beryllium. Therefore, the discharge from the wastewater treatment plant has a reasonable potential to cause an exceedance of the Basin Plan narrative toxicity objective and Ambient Water Quality criteria. Therefore, effluent limitations as contained in the existing permit are continued in this Order based on the protection of the Basin Plan narrative toxicity objective. Based on these considerations, effluent limitations for beryllium as contained in the existing permit are continued this Order based on the protection of the Basin Plan narrative toxicity objective.

The U.S. EPA Technical Support Document for Water Quality-based Toxics Control recommends converting acute (one-hour average) and chronic (four-day average) aquatic life criteria to maximum daily and average monthly effluent limitations. Conversions are demonstrated in the following equations:

$$LTA_{ac} = WLA_{ac} \times \exp\left(0.5\sigma^2 - z\sigma\right)$$
$$LTA_c = WLA_c \times \exp\left(0.5\sigma_4{}^2 - z\sigma_4\right)$$
$$LTA = \min\left(LTA_C, LTA_{ac}\right)$$
$$AMEL = LTA \times \exp\left(z\sigma_n - 0.5\sigma_n{}^2\right)$$
$$MDEL = LTA \times \exp\left(z\sigma - 0.5\sigma^2\right)$$

where

LTA_{ac} = Acute long-term average wasteload in chronic units
LTA_c = Chronic long-term average wasteload
WLA_{ac} = Acute wasteload allocation in chronic toxic units
LTA = Long-term average
σ = Standard deviation
AMEL = Average monthly effluent limitation
MDEL = Maximum daily effluent limitation

Using above equations, maximum daily and average monthly concentration-based Effluent Limitations for beryllium are calculated at 8.7 µg/l and 4.3 µg/l.

In addition, this Order contains four-day average, one-hour average, maximum daily, and average monthly mass-based Effluent Limitations of 0.35 lbs/day, 8.5 lbs/day, 0.57 lbs/day, and 0.28 lbs/day, respectively. Mass-based Effluent Limitations are calculated using the equation (*) above.

Aluminum

Aluminum occurs naturally and makes up about 8% of the surface of the earth. When aluminum enters the environment, it can dissolve in lakes, streams, and rivers depending on the quality of the water.

Studies have shown that infants and adults who received large doses of aluminum developed bone diseases, which suggests that aluminum may cause skeletal problems. Some sensitive people develop skin rashes from using aluminum chlorohydrate deodorants.

The 1998-2002 Effluent Monitoring Data report indicates that aluminum was detected in each of four effluent samples collected by the Discharger. Using the methodology in the U.S. EPA's Technical Support Document (TSD) for Water Quality-Based Toxics Control, the reasonable potential multiplying factor, from footnote 1 of Table 1 above, is 4.7 based on the four samples

collected in the effluent. The projected maximum effluent concentration (MEC) of aluminum is calculated at 141 µg/l. The Basin Plan prohibits the discharge of toxic constituents in toxic concentrations. The Agricultural Water Quality Goal criterion for aluminum is 5,000 µg/l. U.S. EPA established Ambient Water Quality criteria for the protection of freshwater aquatic life of 87 µg/l (four-day average) and 750 µg/l (one-hour average). The projected MEC of aluminum exceeds the Basin Plan narrative toxicity objective and the Ambient Water Quality freshwater aquatic life criterion (four-day average). Therefore, this Order includes concentration-based Effluent Limitations for aluminum based on the Basin Plan narrative toxicity objective.

The U.S. EPA Technical Support Document for Water Quality-based Toxics Control recommends converting acute (one-hour average) and chronic (four-day average) aquatic life criteria to maximum daily and average monthly effluent limitations. Conversions are demonstrated in the following equations:

$$LTA_{ac} = WLA_{ac} \times \exp\left(0.5\sigma^2 - z\sigma\right)$$
$$LTA_c = WLA_c \times \exp\left(0.5\sigma_4{}^2 - z\sigma_4\right)$$
$$LTA = \min\left(LTA_C, LTA_{ac}\right)$$
$$AMEL = LTA \times \exp\left(z\sigma_n - 0.5\sigma_n{}^2\right)$$
$$MDEL = LTA \times \exp\left(z\sigma - 0.5\sigma^2\right)$$

where

LTA_{ac} = Acute long-term average wasteload in chronic units
LTA_c = Chronic long-term average wasteload
WLA_{ac} = Acute wasteload allocation in chronic toxic units
LTA = Long-term average
σ = Standard deviation
AMEL = Average monthly effluent limitation
MDEL = Maximum daily effluent limitation

Using above equations, maximum daily and average monthly concentration-based Effluent Limitations for aluminum are calculated at 87 µg/l and 43 µg/l.

In addition, this Order contains four-day average, one-hour average, maximum daily, and average monthly mass-based Effluent Limitations of 5.7 lbs/day, 49.0 lbs/day, 5.7 lbs/day, and 2.8 lbs/day, respectively. Mass-based Effluent Limitations are calculated using the equation (*) above.

Boron

In addition to the mineral elements N, P, K, S, Ca, and Mg, defined as macronutrients, plants require other mineral elements, which are generally described as micronutrients; due to the relatively small amounts required. Boron is one of the most important of the essential

micronutrients for crops. Because of its high potency, even in small quantities, boron was regarded as a "poisonous element". Of all micronutrients, boron has the narrowest range between deficiency and toxicity.

The 1998-2002 Effluent Monitoring Data report indicates that boron was detected in the effluent at a concentration of 2,540 µg/l. Using the reasonable potential analysis, the projected MEC of boron is 33,528 µg/l. The Agricultural Water Quality Goal for boron is 700 µg/l. The detected concentration and the projected MEC of boron exceed the Agricultural Water Quality Goal. Agricultural irrigation is designated as a beneficial use of the receiving stream. Undiluted wastewater effluent can be withdrawn from Tule Canal for agricultural irrigation. Therefore, to protect the agricultural beneficial use, this Order includes a six-month average concentration-based Effluent Limitation of 700 µg/l for boron. The Effluent Limitation has been established as a six-month average based on an approximate crop season. In addition, this Order contains a six-month average mass-based Effluent Limitation of 46 lbs/day, calculated using the average flow of 7.8 mgd and the concentration-based Effluent Limitation of 700 µg/l. The calculation for average monthly mass-based Effluent Limitation is demonstrated as follows:

7.8 million gallons per day = 7,800,000 gallons per day

$$700\frac{\mu g}{l}\times 10^{-6}\ \frac{g}{\mu g}\times 3.79\frac{l}{gal}\times 7{,}800{,}000\frac{gals}{day}\times 0.0022\frac{lbs}{g}=46\frac{lbs}{day}$$

Ammonia

Untreated domestic wastewater contains ammonia. Nitrification is a biological process that converts ammonia to nitrate, and denitrification is a process that converts nitrate to nitrogen gas, which is then released to the atmosphere. Wastewater treatment plants commonly use nitrification process to remove ammonia from the waste stream. Inadequate or incomplete nitrification may result in the discharge of ammonia to the receiving stream.

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. Total ammonia refers to the sum of these two forms in aqueous solutions. Analytical methods are used to directly determine the total ammonia concentration, which is then used to calculate the un-ionized ammonia (toxic) concentration in water.

U.S. EPA's Ambient Water Quality criteria for the protection of freshwater aquatic life include the acute (one-hour average) standard based on pH and chronic (30-day average) standard based on pH and temperature. U.S. EPA found that as pH increased, both the acute and chronic toxicity of ammonia increased. Salmonids are more sensitive to acute toxicity effects than other species. However, while the acute toxicity of ammonia as not influenced by the temperature, it has been found that inverterbrates and young fish experienced increasing chronic toxicity effects with increasing temperature. 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. Because warm and potential cold freshwater aquatic habitat are designated as beneficial uses of Tule Canal,

within the Yolo Bypass, criteria for waters based on the present of the salmonids fish and fish early life stages are used. Attachments B and C show the equation and table used for the 30-day and four-day average concentration criteria recommended for waters where fish early life stages are present. Attachment D shows the equation and table used for the one-hour average concentration criteria recommended for waters where salmonid fish are present.

The discharge from the City of Woodland Wastewater Treatment Plant has 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. Therefore, this Order includes 30-day average, four-day average, and one-hour average concentration-based Effluent Limitations for ammonia based on the Basin Plan narrative toxicity objective. In addition, this Order includes mass-based Effluent Limitations calculated using the equation (*).

Iron

Iron is an abundant element in the earth's crust. It is believed to be the major component of the earth's core. Iron is rarely found uncombined in nature except in meteorites, but iron ores and minerals are abundant and widely distributed. Several studies have shown that high iron content in the body linked to cancer and heart disease. Iron can be poisonous and if high dose of iron is taken over a long period, it could result in liver and heart damage, diabetes, and skin changes.

Using the reasonable potential analysis, the projected MEC of iron in the effluent is 5,460 µg/l. The Basin Plan prohibits the discharge of toxic constituents in toxic concentrations. The Agricultural Water Quality Goal for iron is 5,000 µg/l. U.S. EPA has developed the Ambient Water Quality criterion for the protection of freshwater aquatic life of 1,000 µg/l as an instantaneous maximum concentration.

The projected MEC of iron exceeds ambient water quality criteria and the agricultural goal. Therefore, the discharge from the City of Woodland Wastewater Treatment Plant has a reasonable potential to cause or contribute to an exceedance of the Basin Plan narrative toxicity objective and degrade the agricultural beneficial use. Based on these considerations, this Order includes an instantaneous maximum concentration-based Effluent Limitation of 1,000 µg/l for iron. In addition, this Order contains a mass-based Effluent Limitation of 65 lbs/day, calculated using the equation (*).

Fluoride

Using a reasonable potential analysis, the projected MEC of fluoride is 1,680 µg/l. The Agricultural Water Quality Goal for fluoride is 1,000 µg/l.

The projected MEC of fluoride exceeds the Agricultural Water Quality Goal. Agricultural irrigation is designated as a beneficial use of the receiving stream. Undiluted wastewater effluent can be withdrawn from Tule Canal for agricultural irrigation. Therefore, to protect the agricultural beneficial use, this Order includes a six-month average concentration-based Effluent Limitation of 1,000 µg/l for fluoride. In addition, this Order contains a six-month average mass-

based Effluent Limitation of 65 lbs/day, calculated using the average flow of 7.8 mgd and the Agricultural Water Quality Goal of 1,000 µg/l. The Effluent Limitation has been established as a six-month average based on an approximate crop season. The calculation for mass-based Effluent Limitation is demonstrated as follows:

7.8 million gallons per day = 7,800,000 gallons per day

$$1{,}000\frac{\mu g}{l}\times 10^{-6}\ \frac{g}{\mu g}\times 3.79\frac{l}{gal}\times 7{,}800{,}000\frac{gals}{day}\times 0.0022\frac{lbs}{g}=65\frac{lbs}{day}$$

Phosphate

Phosphates enter the water system from household detergents and from fertilizers. Phosphates and nitrates are important nutrients for algae. An excess of these compounds may cause the rapid growth of algae. The algae population becomes an extreme and algae dies. Decomposition occurs using much oxygen and other aquatic organisms also die and decompose. This condition is known as eutrophication and the ecological balance has been destroyed.

Using the reasonable potential analysis, the projected MEC of phosphate is 15,960 µg/l. The Basin Plan on page III-3.0, states: "Water shall not contain biostimulatory substances which promote aquatic growths in concentrations that cause nuisance or adversely affect beneficial uses". The detected concentration of phosphate in the effluent indicates that the discharge from the wastewater treatment plant 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. Since no water quality criteria for waters that are not sources of drinking water have been established for phosphate, this Order does not include effluent limitations for phosphate. However, to protect aquatic organisms, concentrations of phosphate need to be monitored in the effluent. This Order includes monitoring requirements in the Monitoring and Reporting Program, a part of the permit. Water quality criteria for nutrients are currently in the development stage. Once they are developed, effluent limitations may be included if nutrient concentrations show that they cause or have a reasonable potential to cause an exceedance of new water quality standards.

Manganese

Using the reasonable potential analysis, the projected MEC of manganese is 16.9 µg/l. The Agricultural Water Quality Goal for manganese is 200 µg/l. U.S. EPA established Ambient Water Quality criteria for the protection of human health and welfare for manganese. The non-cancer health effects criterion for waters that are not sources of drinking water, but from which aquatic organisms may be consumed is 100 µg/l.

The projected MEC of manganese does not exceed water quality criteria. Therefore, no effluent limitation for manganese is included in this Order.

Nitrate

Untreated domestic wastewater contains ammonia. Nitrification is a biological process that converts ammonia to nitrate, and denitrification is a process that converts nitrate to nitrogen gas, which is then released to the atmosphere. Wastewater treatment plants commonly use nitrification process to remove ammonia from the waste stream. Inadequate or incomplete nitrification may result in the discharge of ammonia to the receiving stream. Nitrate is one of the important nutrients for algae. An excess nitrate may cause the rapid growth of algae. The algae population becomes an extreme and algae dies. Decomposition occurs using much oxygen and other aquatic organisms also die and decompose. This condition is known as eutrophication and the ecological balance has been destroyed.

As reported in the Report of Waste Discharge, nitrate was detected in the effluent at a maximum concentration of 19,000 µg/l. Using the reasonable potential analysis, the projected MEC of nitrate is 79,800 µg/l. The Basin Plan on page III-3.0, states: "Water shall not contain biostimulatory substances which promote aquatic growths in concentrations that cause nuisance or adversely affect beneficial uses". The elevated concentration of nitrate in the effluent indicates that the discharge from the wastewater treatment plant 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. Since no water quality criteria for waters that are not sources of drinking water have been established for nitrate, this Order does not include effluent limitations for nitrate. However, to protect aquatic organisms, concentrations of nitrate need to be monitored in the effluent. This Order includes monitoring requirements in the Monitoring and Reporting Program, a part of the permit. Water quality criteria for nutrients are currently in the development stage. Once they are developed, effluent limitations may be included if the nutrient concentrations show that they cause or have a reasonable potential to cause or contribute to an exceedance of new water quality standards.

Chloroform

The 1998-2002 Effluent Monitoring Data report indicates that chloroform was detected in each of five samples collected from the effluent. Detected concentrations of chloroform ranged from 6.5 µg/l to 16.0 µg/l. Chloroform is included in the CTR. However, no CTR criteria for chloroform have yet been established. Therefore, the reasonable potential analysis for non-CTR constituents is applied to chloroform to determine whether chloroform causes or has a reasonable potential to cause an exceedance of a water quality criterion or objective. Using a reasonable potential analysis, the projected MEC of chloroform is 67.2 µg/l.

The current U.S.EPA National Recommended Ambient Water Quality criteria for the protection of human and welfare based on a one-in-a-million cancer risk estimate is 470 µg/l (for waters that are not sources of drinking water, but from which aquatic organisms may be consumed). The projected MEC of chloroform does not exceed the Ambient Water criterion for waters that are not sources of drinking water. Therefore, no effluent limitation for chloroform is included in this Order.

Oil and Grease

The Basin Plan includes a water quality objective for oil and grease in surface waters, which states: "Waters shall not contain oils, greases, waxes, or other materials in concentrations that cause nuisance, result in a visible film or coating on the surface of the water or on objects in the water, or otherwise adversely affect beneficial uses". Oil and grease is mainly from food industries, which are currently regulated under the pretreatment program. The existing permit includes monthly average and daily maximum Effluent Limitations of 10 mg/l and 15 mg/l, respectively. The Report of Waste Discharge indicates that the maximum detected concentration of oil and grease in the effluent was 12.2 mg/l, which exceeded the monthly average Effluent Limitation. Therefore, oil and grease has violated and presents a reasonable potential to cause or contribute to an exceedance of permit limitations. Monthly average and daily maximum concentration-based Effluent Limitations as contained in the existing permit are continued in this Order. In addition, this Order contains monthly average and daily maximum mass-based Effluent Limitations of 650 lbs/day and 976 lbs/day, calculated using the average flow of 7.8 mgd and the concentration-based Effluent Limitations. Calculations for mass-based Effluent Limitations are demonstrated as follows:

7.8 million gallons per day = 7,800,000 gallons per day

- Monthly average mass-based Effluent Limitation:

$$10\frac{mg}{l}\times 10^{-3}\ \frac{g}{mg}\times 3.79\frac{l}{gal}\times 7{,}800{,}000\frac{gals}{day}\times 0.0022\frac{lbs}{g}=650\frac{lbs}{day}$$

- Daily maximum mass-based Effluent Limitation:

$$15\frac{mg}{l}\times 10^{-3}\ \frac{g}{mg}\times 3.79\frac{l}{gal}\times 7{,}800{,}000\frac{gals}{day}\times 0.0022\frac{lbs}{g}=976\frac{lbs}{day}$$

Total Coliform Organisms

Total coliform bacteria is a group of bacteria that includes fecal coliforms and other non-fecal bacteria. Escherichia coli (E.coli) is a specific kind of fecal coliform that is found in human and other mammal waste. Some of the health risks associated with fecal-contaminated water are gastroenteritis, ear infections, typhoid fever, dysentery, and hepatitis. The presence of coliform suggests contamination of the water supply that may include such harmful microorganisms giardia and cryptosporidium as well as others. The existing permit includes effluent total coliform organisms limitations of 23 MPN/100 m*l* and 500 MPN/100 m*l* as the monthly median and daily maximum concentrations, respectively. These effluent limitations are continued in this Order. Based on a review the effluent monitoring results, the Discharger currently meets effluent limitations; therefore, no time schedule for compliance is included in this Order. 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, schoolyards, 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 Tule Canal 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 the irrigation of food crops. 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. Therefore, from **30 April 2005** forward, Effluent Limitations based on the tertiary treatment standards are included in this Order to protect the beneficial uses of nonrestricted contact recreation and irrigation in Tule Canal, within the Yolo Bypass.

BOD and TSS

Biochemical oxygen demand (BOD) is a measure of the amount of oxygen that bacteria will consume while decomposing the organic matter under aerobic condition. BOD measurements are used as a measure of the organic strength of waste in water.

Total suspended solids (TSS) are solids in water that can be trapped by a filter. Total suspended solid is a parameter use to measure water quality as a concentration of mineral and organic sediment. TSS can include a wide variety of material, such as silt, decaying plant and animal matter, industrial wastes, and sewage. High concentrations of suspended solids can cause many problems for stream health and aquatic life.

High TSS can block light from reaching submerged vegetation. As the amount of light passing through the water is reduced, photosynthesis slows down. Reduced rates of photosynthesis cause less dissolved oxygen to be released into the water by plans. If light is completely blocked from bottom dwelling plants, the plants will stop producing oxygen and will die. As the plants are decomposed, bacteria will use up even more oxygen from the water. Low dissolved oxygen can lead to fish kills. High TSS can also cause an increase in surface water temperature, because the suspended particles absorb heat from sunlight. This can cause dissolved oxygen levels to fall even further (because warmer waters can hold less DO), and can harm aquatic life in many other ways.

40 Code of Federal Regulations (CFR), Section 133.102 contains regulations describing the minimum level of effluent quality for BOD and TSS based on the secondary treatment standards. These standards continued to be applied in the Order No. R5-2003-0031.

From **30 April 2005** forward, the Discharger shall be required to comply with effluent limitations established based on the tertiary treatment or equivalent treatment standards. Effluent limitations for BOD and TSS have been established at 10 mg/l, 15 mg/l, and 20 mg/l as a 30-day average, weekly average, and daily maximum based on the capability of the tertiary treatment system.

Settleable Solids

For inland surface waters, the Basin Plan states that "[w]ater shall not contain substances in concentrations that result in the deposition of material that causes nuisance or adversely affects beneficial uses." Order No. R5-2003-0031 contains average monthly and average daily effluent limitations for settleable solids.

Total Chlorine Residual

Chlorine is commonly used as a disinfection agent in the treatment of the wastewater. Proper disinfection ensures destruction of pathogens prior to discharge to the surface waters. The City of Woodland uses chlorine for disinfection of the wastewater at the treatment plant. Chlorine combines with natural organic matter to form potent, cancer causing compounds known as trihalomethane. Because chlorine poses a threat to human health and especially harmful to organisms living in water, a dechlorination process is necessary for the removal of chlorine. For dechlorination, the Discharger uses sulfur dioxide, which combines with chlorine, to render it relatively unreactive and thus removes it from the waste stream. Inadequate dechlorination may result in the discharge of chlorine to the receiving stream and cause toxicity to aquatic life.

The Basin Plan prohibits the discharge of toxic materials in toxic concentrations. U.S. EPA has developed Ambient Water Quality criteria for the protection of freshwater aquatic life. The recommended maximum one-hour average and four-day average concentrations for chlorine are 0.02 mg/l and 0.01 mg/l, respectively. The Report of Waste Discharge indicates that chlorine was detected at a maximum concentration of 0.85 mg/l, which is almost 85 times greater than the Ambient Water Quality criterion for four-day average condition. Therefore, the discharge from the wastewater treatment plant has a reasonable potential to cause or contribute to an exceedance of the Basin Plan narrative toxicity objective and the Ambient Water Quality criterion. Based on these considerations, this Order includes a maximum one-hour average Effluent Limitation of 0.02 mg/l and four-day average Effluent Limitation of 0.01 mg/l for chlorine. In addition, this Order contains mass-based Effluent Limitations of 1.3 lbs/day (one-hour average) and 0.65 lbs/day (four-day average), calculated based on the average flow of 7.8 mgd. Calculations for mass-based Effluent Limitations are demonstrated as follows:

7.8 million gallons per day = 7,800,000 gallons per day

- One-hour average mass-based Effluent Limitation:

$$0.02\frac{mg}{l}\times 10^{-3}\ \frac{g}{mg}\times 3.79\frac{l}{gal}\times 7{,}800{,}000\frac{gals}{day}\times 0.0022\frac{lbs}{g}=1.3\frac{lbs}{day}$$

- Four-day average mass-based Effluent Limitation:

$$0.01\frac{mg}{l}\times 10^{-3}\ \frac{g}{mg}\times 3.79\frac{l}{gal}\times 7{,}800{,}000\frac{gals}{day}\times 0.0022\frac{lbs}{g}=0.65\frac{lbs}{day}$$

Electrical Conductivity, Total Dissolved Solids, and Chloride

- Electrical Conductivity (EC):

EC measures the ability of the water sample to carry an electrical current, a property which is proportional to the concentration of ions in solution. Domestic and industrial uses of water, result in an increase in the mineral content of the wastewater. The salinity of the wastewater is determined by measuring the electrical conductivity (EC). When salts dissolve in water, ions are formed and the solution will conduct electricity. The electrical conductivity increases with salinity because of the increasing presence of ions (usually sodium and chlorine ions).

The City of Woodland discharges treated wastewater to Tule Canal, within the Yolo Bypass. The Basin Plan, Table II-1, designates Irrigated Agriculture as a beneficial use of the Yolo Bypass. Water Rights have been issued by the State Water Resources Control Board to divert water from Tule Canal downstream of the City's discharge for irrigation purposes. The City conducted a study, *Recreation, Land Use, and Dilution Study of the Tule Canal and Toe Drain* dated December 2000, of receiving water uses, confirming that water from Tule Canal is used for crop irrigation.

The City's Report of Waste Discharge states that of 1,450 effluent samples for electrical conductivity (EC), the maximum concentration was 2,700 µmhos/cm and the average discharge concentration was 1,578 µmhos/cm. Table 17, Section 11, of the City's Report of Waste Discharge shows that the wastewater discharge regularly causes significant increases in the EC concentration (µmhos/cm) within the receiving stream, Tule Canal, as follows:

Month	Upstream EC	Downstream EC	Effluent Discharge
May	740	940	1597
June	720	930	1592
July	710	1000	1598
August	660	770	1524
September	470	890	1607
October	610	1000	1575
November	630	870	1437

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, 40 CFR 122.44(d).

For EC, *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),* levels above 700 µmhos/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 μmhos/cm.

Tule Canal, absent the City of Woodland wastewater, is generally acceptable for irrigation based on EC values. The City's wastewater discharge increases concentrations of EC within Tule Canal to unacceptable concentrations adversely affecting the agricultural beneficial use. The wastewater discharge not only presents a reasonable potential, but actually causes, violation of the Chemical Constituent Water Quality Objective in the Basin Plan. The available literature regarding safe levels of EC for irrigated agriculture were considered in requiring that an Effluent Limitation for EC is necessary to protect the beneficial use of the receiving stream in accordance with the Basin Plan and Federal Regulations.

Therefore, this Order includes an Effluent Limitation of 700 μmhos/cm based on the Agricultural beneficial use. The Effluent Limitation for EC has been established as a six-month average based on an approximate crop season.

- Total Dissolved Solids (TDS):

Total dissolved solids are materials that can be dissolved in water. These materials can include carbonate, bicarbonate, chloride, sulfate, phosphate, nitrate, calcium, magnesium, sodium, organic ions, and other ions. A certain level of these ions in water is necessary for aquatic life. If TDS concentrations are too high or too low, the growth of many aquatic organisms can be limited, and death may occur. High concentrations of TDS may also reduce water clarity, contribute to a decrease in photosynthesis, combine with toxic compounds and heavy metals, and lead to an increase in water temperature.

By measuring the electrical conductivity of a water sample, the presence of TDS in the sample can be determined. The more amounts of TDS in the wastewater, the greater the level of electrical conductivity. The Report of Waste Discharge reveals that the maximum concentration of TDS in the effluent is 3,700 mg/l. The current Agricultural Water Quality Goal for TDS is 450 mg/l. The maximum detected concentration of TDS in the effluent is approximately eight times greater than the Agricultural Water Quality Goal. High concentrations of TDS can be a problem for water used for irrigation. However, effluent limitation for TDS is not included in this Order because the direct relationship between EC and TDS and that an Effluent Limitation for EC is included in this Order. Advantages of selecting EC over TDS are the time- and cost-effective with which measurements can be made.

- Chloride:

Using a reasonable potential analysis, the projected MEC of chloride is 1,092 mg/l. The Agricultural Water Quality Goal for chloride is 106 mg/l. U.S. EPA established Water Quality criteria for the protection of freshwater aquatic life. Criteria for four-day average and one-hour average conditions are 230 mg/l and 860 mg/l.

Sodium chloride consists of sodium ions (Na+) and chloride ions (Cl-) held together in a crystal. In water, sodium chloride breaks apart into an aqueous solution of sodium and chloride ions. This solution will conduct an electric current. Because dissolved ions in water increase conductivity, the measures of chloride ion and EC are related. Effectively control the level of EC will result in less amount of chloride in the effluent. Since an Effluent Limitation for EC is established in this Order, no effluent limitation for chloride is included in this Order.

Flow

The design average dry weather flow capacity of the wastewater treatment plan is 7.8 mgd. Therefore, the influent flow limit is established at 7.8 mgd.

pH

For all surface water bodies in the Sacramento River and San Joaquin River basins, the Basin Plan includes a water quality objective for pH in surface waters, which states " *The 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 water with designated COLD and WARM beneficial uses*." At times, Tule Canal provides insignificant dilution for the effluent discharged from the wastewater treatment plant. The effluent limitation for pH in this Order will be based on the water quality objective described in the Basin Plan.

Toxicity

The Report of Waste Discharge indicates that the percent survival for fathead minnow from the chronic toxicity test in December 1998 was 87.5 %. Survivals for *ceriodaphnia* were 0 % (September 2000) and 10 % (June 2001). The toxicity tests conducted up to date have been used 100 % of the effluent discharged from the wastewater treatment plant. With a low available dilution and very low percent survival of *ceriodaphnia* and fathead minnow, it is concluded that discharges from the treatment plant have caused adverse effects on aquatic organisms. The Basin Plan states that "All 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 "as a minimum, compliance with this objective…shall be evaluated with a 96-hour bioassay." Order No. R5-2003-0031 requires both acute and chronic toxicity monitoring to evaluate compliance with this water quality objective. The Basin Plan also states: "…effluent limits based upon acute biotoxicity tests of effluents will be prescribed…". Effluent limitations for acute toxicity are included in the Order.

RECEIVING WATER LIMITATIONS AND MONITORING

Dissolved Oxygen

Cold freshwater fish have been observed to be present in Tule Canal, downstream of the discharge from the City of Woodland Wastewater Treatment Plant. Potential cold freshwater aquatic habitat is designated as a beneficial use of Tule Canal, within the Yolo Bypass. For water bodies designated as having cold freshwater aquatic habitat as a beneficial use, the Basin Plan includes a water quality objective of maintaining a minimum of 7.0 mg/*l* of dissolved oxygen. The current permit includes a limitation of 5.0 mg/l for dissolved oxygen. Since cold freshwater fish have been confirmed to be present in the receiving water and as required in the Basin Plan for the protection of cold freshwater aquatic habitat beneficial use, this Order contains a new receiving water limitation of 7.0 mg/*l* for dissolved oxygen.

For surface water bodies outside of the Delta, the Basin Plan requires 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 is 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 a water quality objective for pH in surface waters, which states: " The 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 water with designated COLD and WARM beneficial uses." Both warm and potential cold freshwater aquatic habitat are designated as beneficial uses of Tule Canal, within the Yolo Bypass; therefore, this Order includes receiving water limitations for pH based on the water quality objective described in the Basin Plan.

Temperature

The Basin Plan includes the following objective: "At no time or place shall the temperature of COLD or WARM intrastate waters be increased more than 5ºF above natural receiving water temperature." Since warm and potential cold freshwater aquatic habitat have been designated as beneficial uses of Tule Canal, within the Yolo Bypass; therefore, this Order includes receiving water limitations for temperature based on the water quality objective described in the Basin Plan.

Turbidity

The Basin Plan states that: "Waters shall be free of changes in turbidity that cause nuisance or adversely effect beneficial uses. 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."

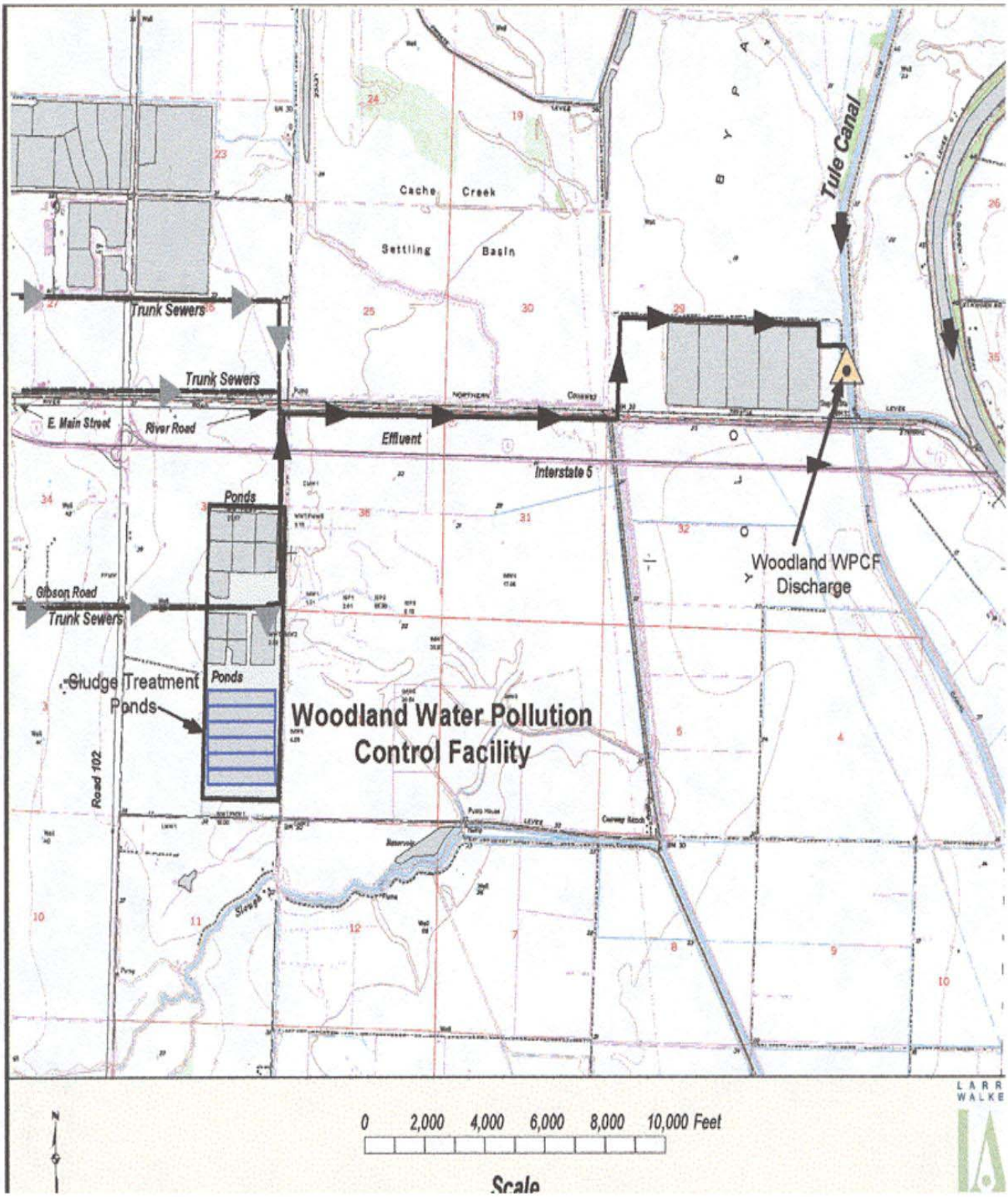
This Order includes receiving water limitations for turbidity based on the water quality objective described in the Basin Plan.

Toxicity

The Basin Plan states that "All 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 "as a minimum, compliance with this objective…shall be evaluated with a 96-hour bioassay." Order No. R5-2003-0031 requires both acute and chronic toxicity monitoring to evaluate compliance with this water quality objective. The Basin Plan also states: "…effluent limits based upon acute biotoxicity tests of effluents will be prescribed…". Effluent limitations for acute toxicity are included in the Order.

GROUNDWATER LIMITATION

Beneficial uses of groundwater include municipal and domestic (MUN) and agricultural water supply. The Basin Plan states, on page III-9.0: "Groundwater shall not contain chemical constituents in concentrations that adversely affect beneficial uses". The recommended secondary MCL for electrical conductivity is 900 μmhos/cm. The Agricultural Water Quality Goal is 700 μmhos/cm. Groundwater sampling results provided by the Discharger in the Report of Waste Discharge indicate that elevated level of electrical conductivity was detected in the down-gradient monitoring well MW-5 at a maximum level of 3,259 μmhos/cm. Groundwater sampling results from December of 2000 through August of 2002 revealed that levels of electrical conductivity have been increased in the groundwater flow direction. It indicates that the discharge from the wastewater treatment plant has a reasonable potential for wastewater percolating to the groundwater to cause or contribute to cause elevated levels of electrical conductivity in the groundwater. Therefore, this Order includes groundwater limitation and monitoring of electrical conductivity in the groundwater.



SITE LOCATION MAP

CITY OF WOODLAND
WATER POLLUTION CONTROL FACILITY
YOLO COUNTY

N
W E
S

approximate scale
1 in. = 4,000 feet

CONTINUOUS CONCENTRATION
30-DAY AVERAGE CONCENTRATIONS OF AMMONIA

Total Ammonia Concentration (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 (mg N/l)
T = temperature (ºC)

FOUR-DAY AVERAGE CONCENTRATION OF AMMONIA

Total Ammonia Concentrations (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	16.7	16.7	15.1	13.3	11.8	10.3	9.04	7.95	6.99	6.14
6.6	16.4	16.4	14.9	13.1	11.5	10.1	8.91	7.83	6.88	6.05
6.7	16.1	16.1	14.6	12.9	11.3	9.94	8.74	7.68	6.75	5.94
6.8	15.7	15.7	14.3	12.8	11.1	9.71	8.54	7.51	6.60	5.80
6.9	15.3	15.3	13.9	12.2	10.7	9.44	8.30	7.30	6.41	5.64
7.0	14.8	14.8	13.4	11.8	10.4	9.12	8.02	7.05	6.19	5.45
7.1	14.2	14.2	12.9	11.3	9.95	8.75	7.69	6.76	5.94	5.22
7.2	13.5	13.5	12.3	10.8	9.46	8.32	7.31	6.43	5.65	4.97
7.3	12.7	12.7	11.5	10.1	8.91	7.84	6.89	6.05	5.32	4.68
7.4	11.8	11.8	10.8	9.46	8.31	7.31	6.42	5.65	4.96	4.36
7.5	10.9	10.9	9.92	8.72	7.66	6.74	5.92	5.20	4.57	4.02
7.6	9.94	9.94	9.03	7.94	6.98	6.14	5.39	4.74	4.17	3.66
7.7	8.95	8.95	8.13	7.15	6.28	5.52	4.85	4.27	3.75	3.30
7.8	7.96	7.96	7.23	6.36	5.59	4.91	4.32	3.79	3.34	2.93
7.9	6.99	6.99	6.36	5.59	4.91	4.32	3.80	3.34	2.93	2.58
8.0	6.08	6.08	5.53	4.86	4.27	3.76	3.30	2.90	2.55	2.24
8.1	5.24	5.24	4.77	4.19	3.68	3.24	2.85	2.50	2.20	1.93
8.2	4.48	4.48	4.07	3.58	3.15	2.77	2.43	2.14	1.88	1.65
8.3	3.81	3.81	3.46	3.04	2.68	2.35	2.07	1.82	1.60	1.40
8.4	3.22	3.22	2.93	2.58	2.26	1.99	1.75	1.54	1.35	1.19
8.5	2.72	2.72	2.48	2.18	1.91	1.68	1.48	1.30	1.14	1.00
8.6	2.30	2.30	2.09	1.84	1.61	1.42	1.25	1.10	0.964	0.848
8.7	1.95	1.95	1.77	1.55	1.37	1.20	1.06	0.928	0.816	0.717
8.8	1.65	1.65	1.50	1.32	1.16	1.02	0.897	0.788	0.693	0.609
8.9	1.41	1.41	1.28	1.13	0.992	0.872	0.766	0.674	0.592	0.520
9.0	1.22	1.22	1.11	0.971	0.854	0.751	0.660	0.580	0.510	0.448

$$2.5CCC = 2.5 \times \left(\frac{0.0577}{1+10^{7.688-pH}} + \frac{2.487}{1+10^{pH-7.688}} \right) \times MIN\left(2.85, 1.45 \cdot 10^{0.028(25-T)}\right)$$

where

CCC = criteria continuous concentration (mg N/l)
T = temperature (ºC)