US EPA Region 10
NPDES Permits Unit
1200 6th Ave M/S OWW-130
Seattle, WA 98101

FACT SHEET

**The United States Environmental Protection Agency (EPA)
Plans To Issue A National Pollutant Discharge Elimination System (NPDES) Permit to:**

Confederated Tribes of Warm Springs Reservation of Oregon Kah-Nee-Ta Resort
Warm Springs, Oregon 97761

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EPA Proposes To Issue NPDES Permit

EPA proposes to issue an NPDES permit to the facility referenced above. The draft permit places conditions on the discharge of pollutants from the wastewater treatment plant to waters of the United States. In order to ensure protection of water quality and human health, the permit places limits on the types and amounts of pollutants that can be discharged from the facility.

This Fact Sheet includes:

- information on public comment, public hearing, and appeal procedures
- a listing of proposed effluent limitations, and other conditions for each facility
- a map and description of the discharge locations
- technical material supporting the conditions in each permit

401 Certification for Facilities that Discharge to Tribal Waters

EPA is requesting the CTWSRO certify the NPDES permit for the CTWSRO Kah-Nee-Ta Resort under section 401 of the Clean Water Act. The CTWSRO provided preliminary comments prior to the Public Notice, which have been incorporated into the draft permit.

Public Comment

Persons wishing to comment on, or request a Public Hearing for the draft permit for the facility may do so in writing by the expiration date of the Public Comment period. A request for a Public Hearing must state the nature of the issues to be raised as well as the requester's name, address and telephone number. All comments and requests for Public Hearings must be in writing and should be submitted to EPA as described in the Public Comments Section of the

attached Public Notice.

After the Public Notice expires, and all comments have been considered, EPA's Regional Director for the Office of Water will make a final decision regarding permit issuance. If no substantive comments are received, the tentative conditions in the draft permit will become final, and the permit will become effective upon issuance. If comments are received, EPA will address the comments and issue the permit. The permit will become effective 30 days after the issuance date, unless an appeal is submitted to the Environmental Appeals Board within 30 days.

Documents are Available for Review.

The draft NPDES permit and related documents can be reviewed or obtained by visiting or contacting EPA's Regional Office in Seattle between 8:30 a.m. and 4:00 p.m., Monday through Friday (see address below). The draft permit, fact sheet, and other information can also be found by visiting the Region 10 website at "www.epa.gov/r10earth/water.htm."

United States Environmental Protection Agency
Region 10
1200 Sixth Avenue, OW-130
Seattle, Washington 98101
(206) 553-8414 or 1-800-424-4372 (within Region 10)

The Fact Sheet and draft permit are also available at:

United States Environmental Protection Agency
Oregon Operations Office
811 SW 6th Avenue, 3rd Floor
Portland, Oregon 97204
(503) 326-2653

Tribal Administration Building
Mail Reception Desk
1233 Veterans Street
Warm Springs, Oregon 97761
(541) 553-1161

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1Q10	1 day, 10 year low flow
7Q10	7 day, 10 year low flow
AML	Average Monthly Limit
BOD_5	Biochemical oxygen demand, five-day
BE	Biological evaluation
°C	Degrees Celsius
cfs	Cubic feet per second
CFR	Code of Federal Regulations
CV	Coefficient of Variation
CWA	Clean Water Act
DMR	Discharge Monitoring Report
DO	Dissolved oxygen
EFH	Essential Fish Habitat
EPA	U.S. Environmental Protection Agency
ESA	Endangered Species Act
I/I	Inflow and Infiltration
lbs/day	Pounds per day
LTA	Long Term Average
mg/L	Milligrams per liter
ml	milliliters
ML	Minimum Level
µg/L	Micrograms per liter
mgd	Million gallons per day
MDL	Maximum Daily Limit
MPN	Most Probable Number
N	Nitrogen
NMFS	National Marine Fisheries Service
NPDES	National Pollutant Discharge Elimination System
OW	Office of Water
O&M	Operations and maintenance
POTW	Publicly owned treatment works
QAP	Quality assurance plan
RP	Reasonable Potential
RPM	Reasonable Potential Multiplier
s.u.	Standard Units
TMDL	Total Maximum Daily Load
TRE	Toxicity Reduction Evaluation
TSD	Technical Support document (EPA, 1991)
TSS	Total suspended solids
USFWS	U.S. Fish and Wildlife Service
USGS	United States Geological Services

UV	Ultraviolet radiation
WLA	Wasteload allocation
WQBEL	Water quality-based effluent limit
WWTP	Wastewater treatment plant

I. APPLICANT

This fact sheet provides information on the draft NPDES permits for the following entity:

Confederated Tribes of the Warm Springs Reservation of Oregon
NPDES Permit No.: OR-0034100

P.O. Box K
Warm Springs, Oregon 97761

Facility contacts: Rod Durfee and Delbert Garcia

II. FACILITY INFORMATION

The Confederated Tribes of Warm Springs Reservation of Oregon (CTWSRO) owns and operates a wastewater treatment facility at the Warm Springs Kah-Nee-Ta Resort consisting of three facultative lagoons operated in series. Water is processed through a chlorine contact chamber. Typically, the treated and chlorinated effluent is discharged into the Warm Springs River once every 1-2 months in the summer and once every 2-3 months in the winter, although there have been years of continuous discharge. According to the permit application, discharges typically last for up to 14 days. Specific information on the facility is provided in Appendix A.

III. RECEIVING WATER

The Kah-Nee-Ta resort discharges to the Warm Springs River, a tributary of the Deschutes River, which drains the east side of the Cascade Range in north-central Oregon. The watershed lies approximately between Mount Jefferson and Timothy Lake, with the northwestern and southwestern boundaries of the Warm Springs Indian Reservation. The headwaters are less than one-quarter mile from the Wasco County and Clackamas County boundary (which follows the Cascade Crest). The river flows generally eastward, with occasional diagonals southeast or northeast. It joins the Deschutes River at river mile 83.7. Because the river is within the Warm Springs Reservation, the permit was written to meet the water quality standards set by the CTWSRO Tribal Council. The Tribe's water quality standards are at least as stringent as the State of Oregon's water quality standards for the Deschutes River. The designated beneficial uses for the Warm Springs River are found in Tables 1 and 4 of the Tribe's water quality standards. The Warm Springs River water quality reach 1 (WARMSP1) from Table 4 of the Tribe's water quality standards was used to determine the beneficial uses for the Warm Springs River (See Map 5 of Tribe's water quality standards). The beneficial uses for WARMSP1 include: public domestic water supply; industrial water supply irrigation; livestock watering; anadromous fish passage, salmonid fish rearing and spawning; resident fish and aquatic life; wildlife and hunting; fishing; water contact recreation; aesthetic quality; and cultural and religious practices.

A. Low Flow Conditions

Flow information from the USGS was used to determine the flow conditions for each of the receiving waters. The 1Q10 and the 7Q10 were calculated for the facility. Low flow conditions are used to do reasonable potential analyses, and to calculate water quality based effluent limits (see Appendix C and Appendix D).

United States Geological Survey (USGS) gage (Station 14097100, Warm Springs River near Kah-Nee-Ta Hot Springs, OR, Lat 44°51'24" Long -121°08'55") data from 1972 through 2006 indicates that the 7 day, 10 year low flow (7Q10) for this reach of the Warm Springs River is 200 cubic feet per second (cfs) and the 1 day, 10 year low flow (1Q10) is 184 cfs. At a maximum design flow (based on maximum daily effluent flow from recent monitoring data) of approximately 0.37 MGD (0.537 cfs), the Kah-Nee-Ta Resort effluent should receive an approximate 372:1 dilution (7Q10 of 200 cfs/Kah-Nee-Ta Resort design flow of 0.537 cfs = 372).

B. Water Quality Standards

An NPDES permit must ensure that the discharge from the facility complies with the Tribe's water quality standards. The Tribe's water quality standards are composed of use classifications, numeric and/or narrative water quality criteria, and an anti-degradation policy. The use classification system designates the beneficial uses (such as cold water biota, contact recreation, etc.) that each water body is expected to achieve. The numeric and/or narrative water quality criteria are the criteria deemed necessary, by the Tribe, to support the beneficial use classification of each water body. The anti-degradation policy represents a three-tiered approach to maintain and protect various levels of water quality and uses. Because the final effluent limits in the draft permit are based on current water quality criteria or technology-based limits that are derived from and comply with water quality standards, the discharges as authorized in the draft permit will not result in degradation of the receiving water.

C. Water Quality Limited

Any water body for which the water quality does not, and/or is not expected to meet, applicable water quality standards is defined as a "water quality limited segment."

Section 303(d) of the Clean Water Act (CWA) requires states to develop a Total Maximum Daily Load (TMDL) management plan for water bodies determined to be water quality limited segments. The TMDL documents the amount of a pollutant a water body can assimilate without violating a state's or Tribe's water

quality standards and allocates that load to known point sources and nonpoint sources. The allocations for point sources are then incorporated into the NPDES permit.

A search of Oregon DEQ's and EPA's 2002 303(d) database for the Lower Deschutes watershed, HUC 17070306, indicated that Warm Springs River had not been assessed during the 2002 assessment. However, the Deschutes River, to which the Warm Springs River is a tributary, was listed on the 303(d) list in 2002, as having state and state seasonal impairments for dissolved oxygen, pH, and temperature (List ID: OR1209151456389_46.4_99.8). However, no TMDLs were reported by the state. Based on these findings, there are no additional requirements relevant to the Warm Springs Kah-Nee-Ta Resort from water quality limited segments or TMDLs in Warm Springs River. The CTWSRO has not yet developed a 303(d) list.

IV. EFFLUENT LIMITATIONS

A. Basis for Permit Effluent Limits

In general, the CWA requires that the limits for a particular pollutant be the more stringent of either technology-based effluent limits or water quality-based limits. Technology-based limits are set according to the level of treatment that is achievable using available technology. A water quality-based effluent limit is designed to ensure that the water quality standards of a water body are being met and they may be more stringent than technology-based effluent limits. The basis for the proposed effluent limits in the draft permit is provided in Appendix B.

B. Proposed Effluent Limitations

The following summarizes the proposed effluent limitations that are in the draft permit.

1. The pH range must be between 6.5 to 8.5 standard units.

2. Final BOD_5 percent removal limit: The BOD_5 monthly average effluent concentration must not exceed 15 percent of the monthly average influent concentration and percent removal must be reported on the Discharge Monitoring Reports (DMRs). The monthly average percent removal must be calculated from the arithmetic mean of the influent values and the arithmetic mean of the effluent values for that month. Influent and effluent samples must be taken over approximately the same time period.

3. Interim BOD_5 percent removal limit: The BOD_5 monthly average effluent concentration must not exceed 35 percent of the monthly average influent

concentration and percent removal must be reported on the Discharge Monitoring Reports (DMRs). The monthly average percent removal must be calculated from the arithmetic mean of the influent values and the arithmetic mean of the effluent values for that month. Influent and effluent samples must be taken over approximately the same time period.

4. Final TSS percent removal limit: The TSS monthly average effluent concentration must not exceed 15 percent of the monthly average influent concentration and percent removal must be reported on the DMRs. The monthly average percent removal must be calculated from the arithmetic mean of the influent values and the arithmetic mean of the effluent values for that month. Influent and effluent samples must be taken over approximately the same time period.

5. Interim TSS percent removal limit: The TSS monthly average effluent concentration must not exceed 35 percent of the monthly average influent concentration and percent removal must be reported on the DMRs. The monthly average percent removal must be calculated from the arithmetic mean of the influent values and the arithmetic mean of the effluent values for that month. Influent and effluent samples must be taken over approximately the same time period.

6. *Escherichia coli (E. coli)* shall not exceed a 30-day log mean of 126 *E. coli* organisms per 100 mL, based on a minimum of five (5) samples. No single sample shall exceed 406 E. coli organisms per 100 mL.

7. There must be no discharge of any floating solids, visible foam in other than trace amounts, or oily wastes that produce a sheen on the surface of the receiving water.

8. Table 1, below presents both the proposed interim and final average monthly, average weekly, and maximum effluent limits for 5-day biochemical oxygen demand (BOD_5), total suspended solids (TSS), and *E. coli*, and the percent removal requirements for BOD_5, and TSS. Note that the average monthly *E. coli* limit is based on a geometric mean of the samples.

Table 1: Monthly, Weekly, Daily and Instantaneous Maximum Effluent Limitations					
Parameters	**Average Monthly Limit**	**Average Weekly Limit**	**Percent Removal[1]**	**Maximum Daily Limit**	**Instantaneous Maximum Limit**
Biochemical Oxygen Demand (BOD_5)[2] April 1 – October 31 **Final**	10 mg/L 31 lbs/day[2]	15 mg/L 46 lbs/day[2]	85%	---	---
Biochemical Oxygen Demand (BOD_5)[2] November 1 – March 31 **Final**	30 mg/L 93 lbs/day[2]	45 mg/L 139 lbs/day[2]	85%	---	---
Biochemical Oxygen Demand (BOD_5)[2] **Interim**	45 mg/L 139 lbs/day[2]	65 mg/L 201 lbs/day[2]	65%	---	---
Total Suspended Solids (TSS)[2] April 1 – October 31 **Final**	10 mg/L 31 lbs/day[2]	15 mg/L 46 lbs/day[2]	85%	---	---
Total Suspended Solids (TSS)[2] November 1 – March 31 **Final**	30 mg/L 93 lbs/day[2]	45 mg/L 139 lbs/day[2]	85%	---	---
Total Suspended Solids (TSS)[2] **Interim**	45 mg/L 139 lbs/day[2]	65 mg/L 201 lbs/day[2]	65%	---	---
E. coli Bacteria (colonies/100 mL)	126[3] (geometric mean)	---	---	---	406
Total Residual Chlorine[2] **Final**	7.7 µg/L 0.024 lbs/day	---	---	19 µg/L 0.059 lbs/day	---
Total Residual Chlorine[2] **Interim**	500 µg/L 1.54 lbs/day	750 µg/L 2.31 lbs/day	---	---	---
Temperature, °C	---	---	---	---	---
pH, s.u.	6.5 – 8.5 at all times				

Notes:
1 Percent removal is calculated using the following equation: (influent - effluent) ÷ influent.
2 Maximum daily loading is calculated by multiplying the concentration in mg/L by the average daily flow in mgd and a conversion factor of 8.34.
3 Based on a 30-day log mean with a minimum of 5 samples.

C. Schedules of Compliance

Schedules of compliance are authorized, in general, by Federal regulations at 40 CFR 122.47 and by the water quality standards of the CTWSRO (Warm Springs Tribal Code Chapter 432.100(5)). Compliance schedules in a particular permit must be authorized by the CTWSRO. The compliance schedules proposed in the

draft permit are consistent with those described in the draft certification of this permit and in other correspondence with CTWSRO.

Because the facility discharges into the Deschutes River watershed, it must comply with stringent treatment requirements (10 mg/L average monthly limit for BOD and TSS, see below for a full discussion). However, based on evaluation of current effluent monitoring data, the facility is not currently able to meet these stringent limits. Therefore, the proposed permit contains both interim permit limits and final permit limits, and a compliance schedule for meeting the final limits.

A water quality-based effluent limit is proposed for total residual chlorine. However, based on evaluation of current effluent monitoring data, the facility is not currently able to meet these stringent limits. Therefore, the proposed permit contains both interim permit limits and final permit limits, and a compliance schedule for meeting the final limits. The interim chlorine limits are technology-based.

V. MONITORING REQUIREMENTS

A. Basis for Effluent and Surface Water Monitoring

Section 308 of the CWA and federal regulation 40 CFR 122.44(i) require monitoring in permits to determine compliance with effluent limitations. Monitoring may also be required to gather effluent and surface water data to determine if additional effluent limitations are required and/or to monitor effluent impacts on receiving water quality. The permittee is responsible for conducting the monitoring and for reporting results on DMRs to the U.S. Environmental Protection Agency (EPA).

B. Effluent Monitoring

Monitoring frequencies are based on the nature and effect of the pollutant, as well as a determination of the minimum sampling necessary to adequately monitor the facility's performance. Permittees have the option of taking more frequent samples than are required under the permit. These samples can be used for averaging if they are conducted using EPA approved test methods (generally found in 40 CFR 136) and if the Method Detection Limits (MDLs) are less than the effluent limits.

Table 3 present the monitoring requirements for the permittee in the draft permit. The sampling location must be after the last treatment unit and prior to discharge to the receiving water. If no discharge occurs during the reporting period, "no discharge" shall be reported on the DMR.

Table 2: Effluent Monitoring Requirements				
Parameter	**Unit**	**Sample Location**	**Sample Frequency[1]**	**Sample Type**
Flow	mgd	Effluent	Continuous	Recording
BOD_5	mg/L	Influent and Effluent	1/week	24 hour composite
	lbs/day	Influent and Effluent	1/week	24 hour composite
	% Removal	--	–	calculation[3]
TSS	mg/L	Influent and Effluent	1/week	24 hour composite
	lbs/day	Influent and Effluent	1/week	24 hour composite
	% Removal	--	–	calculation[3]
pH	standard units	Effluent	1/week	grab
E. coli Bacteria	colonies/100 ml	Effluent	1/week	grab
Temperature	°C	Effluent	1/month	grab
Total Residual Chlorine	mg/L	Effluent	1/month	grab

Notes:
1 When discharging.
2 Maximum daily loading is calculated by multiplying the concentration in mg/L by the average daily flow in mgd and a conversion factor of 8.34.
3 Percent removal is calculated using the following equation: (influent - effluent) ÷ influent.

C. Surface Water Monitoring

Table 3 presents the proposed surface water monitoring requirements for the draft permit. Monitoring locations must be approved by the CTWSRO Tribal Environmental Office.

Table 3: Surface Water Monitoring Requirements			
Parameter	**Sample Location**	**Sample Frequency**	**Sample Type**
Ammonia, mg/L	Upstream and downstream of treatment plant outfall	1/month[1]	grab
pH, standard units	Upstream and downstream of treatment plant outfall	1/month[1]	grab
Temperature, °C	Upstream and downstream of treatment plant outfall	1/month[1]	grab
Dissolved oxygen	Upstream and downstream of treatment plant outfall	Semi-annually[2]	grab

Table 3: Surface Water Monitoring Requirements			
Parameter	**Sample Location**	**Sample Frequency**	**Sample Type**
Total Phosphorous	Upstream and downstream of treatment plant outfall	Semi-annually[2]	24-hour composite
Orthophosphorous	Upstream and downstream of treatment plant outfall	Semi-annually[2]	24-hour composite

Notes:
1 In summer months (April through October) only
2 Once during the summer (April through October) and once during the winter (November through March)

VI. SLUDGE (BIOSOLIDS) REQUIREMENTS

EPA Region 10 separates wastewater and sludge permitting. Under the CWA, EPA has the authority to issue separate sludge-only permits for the purposes of regulating biosolids. EPA may issue a sludge-only permit to the facility at a later date, as appropriate.

Until future issuance of a sludge-only permit, sludge management and disposal activities at the facility continue to be subject to the national sewage sludge standards at 40 CFR Part 503 and any requirements of the Tribe's biosolids program. The Part 503 regulations are self-implementing, which means that permittee must comply with them whether or not a permit has been issued.

VII. OTHER PERMIT CONDITIONS

A. Quality Assurance Plan

The federal regulation at 40 CFR 122.41(e) requires the permittee to develop procedures to ensure that the monitoring data submitted is accurate and to explain data anomalies if they occur. The permittee is required to develop, maintain and update a quality assurance plan. The plan should reflect current standard operating procedures that the permittee must follow for collecting, handling, storing and shipping samples, laboratory analysis, and data reporting. The plan shall be retained on site and made available to EPA and CTWSRO upon request.

B. Operation and Maintenance Plan

The permit requires the Permittee to properly operate and maintain all facilities and systems of treatment and control. Proper operation and maintenance is essential to meeting discharge limits, monitoring requirements, and all other permit requirements at all times. The Permittee is required to develop, maintain and update an operation and maintenance plan for the facility. The plan shall be retained on site and made available to EPA and CTWSRO upon request.

C. Penalties for Violations of Permit Conditions

Possible penalties for violations of permit conditions are listed in Part IV.B of the draft permit. The CTWSRO has asked if penalties and fines assessed for violations could be directed to the Tribe.

On March 11th, 2005, the EPA Office of Enforcement and Compliance Assurance issued guidance regarding how penalties may be collected jointly with State and local governments and federally recognized Tribes. This guidance states that, in compliance with the Miscellaneous Receipts Act (31 U.S.C. Section 3302), the Agency generally may not direct penalties collected under its own authorities to another governmental agency. However, the Tribe may bring its own action under Tribal law to collect penalties and fines for violating Tribal standards, and the Tribe could join EPA by bringing its own Tribal claims when EPA brings an enforcement action.

D. Additional Permit Provisions

Sections II, III, and IV of the draft permit contains standard regulatory language that must be included in all NPDES permits. Because they are regulations, they cannot be challenged in the context of an NPDES permit action. The standard regulatory language covers requirements such as monitoring, recording, reporting requirements, compliance responsibilities, and other general requirements.

VIII. OTHER LEGAL REQUIREMENTS

A. Endangered Species Act

The Endangered Species Act requires federal agencies to consult with the National Marine Fisheries Service (NMFS) and the U.S. Fish and Wildlife Service (USFWS) if their actions could beneficially or adversely affect any threatened or endangered species. A Biological Assessment (BE) analyzing the effects of the discharge from the treatment facility on listed endangered and threatened species in the vicinity of the facilities was prepared. The BE is available upon request. The BE determined that issuance of this permit may affect, but is not likely to adversely affect the listed fish species (bull trout and steelhead) in the vicinity of the discharge. EPA will seek concurrence from USFWS on the not likely to adversely affect determination.

B. Essential Fish Habitat

Essential fish habitat (EFH) is the waters and substrate (sediments, etc.) necessary for fish to spawn, breed, feed, or grow to maturity. The Magnuson-Stevens Fishery Conservation and Management Act (January 21, 1999) requires EPA to consult with the National Marine Fisheries Service (NMFS) when a proposed

discharge has the potential to adversely affect (reduce quality and/or quantity of) EFH. EFH was evaluated in the BA described above. EPA concludes that the issuance of this permit is not likely to adversely affect EFH for Chinook salmon and coho salmon. EPA will seek concurrence from NMFS on the not likely to adversely affect determination

C. Tribal Certification

Section 401 of the CWA requires EPA to seek Tribal certification before issuing a final permit. As a result of the certification, the Tribe may require more stringent permit conditions or additional monitoring requirements to ensure that the permit complies with water quality standards.

D. Permit Expiration

The permit will expire five years from the effective date of the permit.

Appendix A - Facility Information

	CTWSRO Kah-Nee-Ta Resort
NPDES ID Number:	OR-0034100
Mailing Address:	P.O Box K Warm Springs, Oregon 97761
Facility Background:	The current permit application was received in November 1994.
Collection System Information	
Service Area:	CTWSRO Kah-Nee-Ta Resort
Service Area Population:	1,000
Collection System Type:	100% separated sanitary sewer
Facility Information	
Treatment Train:	Lagoon system and chlorine disinfection
Design Flow:	0.37 mgd (highest daily effluent flow value from recent monitoring data)
Existing Flow:	0.129 mgd (highest average monthly flow rate from recent monitoring data)
Months when Discharge Occurs:	According to the permit application, discharges generally occur in January, April, August, and November. The permit application indicates discharge duration as 14 days.
Outfall Location:	latitude: 44"51’14” , longitude: -121"10’59” (RM 8.1)
Receiving Water Information	
Receiving Water:	Warm Springs River
Subbasin:	Lower Deschutes (HUC 17070306)
Beneficial Uses:	Public domestic water supply, industrial water supply; irrigation; livestock watering; anadromous fish passage; salmonid fish rearing and spawning; resident fish and aquatic life; wildlife and hunting; fishing; and water contact recreation; aesthetic quality; cultural and religious practices.
Water Quality Limited Segment:	None
Low Flow:	1Q10 = 184 cfs, 7Q10 = 200 cfs

Appendix B - Basis for Effluent Limitations

The Clean Water Act (CWA) requires Publicly Owned Treatment Works (POTW) to meet effluent limits based on available wastewater treatment technology. These types of effluent limits are called secondary treatment effluent limits. EPA may find, by analyzing the effect of an effluent discharge on the receiving water, that secondary treatment effluent limits are not sufficiently stringent to meet water quality standards. In such cases, EPA is required to develop more stringent water quality-based effluent limits, which are designed to ensure that the water quality standards of the receiving water are met.

Secondary treatment effluent limits may not limit every parameter that is in an effluent. For example, secondary treatment effluent limits for POTWs have only been developed for five-day biochemical oxygen demand (BOD_5), total suspended solids (TSS), and pH, yet effluent from a POTW may contain other pollutants, such as bacteria, chlorine, ammonia, or metals depending on the type of treatment system used and the service area of the POTW (i.e., industrial facilities as well as residential areas discharge into the POTW). When technology based effluent limits do not exist for a particular pollutant expected to be in the effluent, EPA must determine if the pollutant may cause or contribute to an exceedance of the water quality standards for the water body. If a pollutant causes or contributes to an exceedance of a water quality standard, water quality-based effluent limits for the pollutant must be incorporated into the permit.

The following discussion explains in more detail the derivation of technology-based effluent limits, and water quality-based effluent limits. Part A discusses technology- based effluent limits, Part B discusses water quality-based effluent limits, and Part C discusses facility-specific limits.

A. Technology Based Effluent Limits

1. BOD_5, TSS and pH

Secondary Treatment:
The CWA requires POTWs to meet performance-based requirements based on available wastewater treatment technology. Section 301 of the CWA established a required performance level, referred to as "secondary treatment," that all POTWs were required to meet by July 1, 1977. EPA developed "secondary treatment" regulations, which are specified in 40 CFR 133. These technology-based effluent limits apply to all municipal wastewater treatment plants, and identify the minimum level of effluent quality attainable by secondary treatment in terms of BOD_5, TSS, and pH. The secondary treatment effluent limits are listed in Table B-1.

Table B-1: Secondary Treatment Effluent Limits			
Parameter	**Average Monthly Limit**	**Average Weekly Limit**	**Range**
BOD_5	30 mg/L	45 mg/L	---
TSS	30 mg/L	45 mg/L	---
Removal Rates for BOD_5 and TSS	85%	---	---
pH	---	---	6.0 – 9.0 s.u.

Treatment Equivalent to Secondary:
The regulations include special considerations, referred to as "treatment equivalent to secondary," for waste stabilization ponds and trickling filters. The regulations allow alternative limits for BOD_5 and TSS for facilities using trickling filters or waste stabilization ponds provided the following requirements are met (40 CFR 133.101(g), and 40 CFR 133.105(d)):

- The BOD_5 and TSS effluent concentrations consistently achievable through proper operation and maintenance of the treatment works exceed the minimum level of the effluent quality described above (Secondary Treatment Effluent Limits).
- A trickling filter or waste stabilization pond is used as the principal treatment process.
- The treatment works provide significant biological treatment of municipal wastewater (i.e., a minimum of 65% reduction of BOD_5 is consistently attained).

Treatment Equivalent to Secondary effluent limits are shown in Table B-2.

Table B-2: Treatment Equivalent to Secondary Effluent Limits			
Parameter	**Average Monthly Limit**	**Average Weekly Limit**	**Range**
BOD_5	45 mg/L	65 mg/L	---
TSS	45 mg/L	65 mg/L	---
Removal Rates for BOD_5 and TSS	65%	---	---

Draft Permit Limits:
Monitoring data for the facility was examined to determine if any considerations were necessary in designating effluent limits for BOD_5 and TSS (such as treatment equivalent to secondary limits or reduced percent removal

requirements).

The data review indicated that the facility could not consistently achieve all secondary treatment limits, and therefore considerations for "treatment equivalent to secondary" were necessary (see Tables B-3 – B-5).

Table B-3: Kah-Nee-Ta Resort Monitoring Data

Date	BOD(mg/L) Effluent	BOD(mg/L) Influent	BOD % Removal
12/30/2004	31.00	120	74.17
11/4/2005	10.00	540	98.15
10/22/2004	50.00	120	58.33
10/13/2005	32.00	120	73.33
9/29/2004	26.50	240	88.96
9/8/2005	32.00	200	84.00
8/25/2004	45.00	130	65.38
8/4/2005	46.00	1100	95.82
7/23/2004	40.00	380	89.47
7/7/2005	24.00	180	86.67
6/7/2002	10.00	240	95.83
6/30/2004	22.00	290	92.41
5/9/2003	7.00	360	98.06
4/9/2004	16.00	110	85.45
3/19/2004	20.00	220	90.91
3/31/2005	21.00	70	70.00
2/11/2005	23.00	130	82.31
1/6/2005	15.00	160	90.63
STDV =	12.87	--	11.67
AVG =	26.14	--	84.44
CV =	0.49	--	0.14

Note:
STDV = standard deviation of effluent values
AVG = average of effluent values
CV = coefficient of variation of effluent values

Table B-4: Kah-Nee-Ta Resort Monitoring Data			
Date	TSS(mg/L) Effluent	TSS(mg/L) Inffluent	TSS % Removal
11/7/2005	28	210	86.67
10/1/2004	73	110	33.64
10/26/2004	81	140	42.14
10/14/2005	46	120	61.67
9/16/2002	120	140	14.29
9/14/2005	40	92	56.52
8/30/2004	100	110	9.09
8/9/2005	29	610	95.25
7/27/2004	88	400	78.00
6/7/2002	27	72	62.50
6/30/2004	55	230	76.09
6/10/2005	16	99	83.84
5/13/2003	8	99	91.92
4/5/2005	36	110	67.27
3/19/2004	30	120	75.00
2/14/2005	38	140	72.86
1/4/2005	26	220	88.18
1/10/2005	34	120	71.67
STDV =	31.05	STDV =	25.20
AVG =	48.61	AVG =	64.81
CV =	0.64	CV =	0.39

Note:
STDV = standard deviation of effluent values
AVG = average of effluent values
CV = coefficient of variation of effluent values

Table B-5: Kah-Nee-Ta Resort Performance Limits								
	AML Prob'y Basis	AWL Prob'y Basis	# of Samples per Month	# of Samples per Week	LTA Coeff. Var. (CV)	Long Term Average	Average Monthly Limit (AML)	Average Weekly Limit (AWL)
PARAMETER	decimal	decimal	n	n	decimal	mg/L	mg/L	mg/L
BOD	0.95	0.95	4	1	0.49	26.14	37.8	50.3
TSS	0.95	0.95	4	1	0.64	48.61	77.4	107.3
BOD% removal	0.05	0.05	4	1	0.14	84.44	75.1	66.5
TSS% removal	0.05	0.05	4	1	0.39	64.81	46.3	32.5

Note:
Calculations are based on procedures in table 5-2 of the Technical Support Document for Water Quality-based Toxics Control.
$AML = LTA * e^{[z\sigma_n - 0.5\sigma_n^2]}$
$AWL = LTA * e^{[z\sigma_n - 0.5\sigma_n^2]}$
$z = 1.645$ for 95^{th} percentile
n = number of samples/month, week

The facility has been measuring BOD and TSS monthly during discharge. However, in order to calculate the 95^{th} percentile values, the equation requires inputs for both the number of samples per week and the number of samples per month. Because the facility does not discharge on a continual basis and therefore does not have a regular sampling schedule, a regular sampling schedule had to be imposed on the data in order to make the equations work. Therefore, the number of samples per week and per month were based on the anticipated sampling

requirements included in this permit.

The AML for BOD that is consistently achievable by the facility is 37.8 mg/L, and the AWL for BOD that is consistently achievable by the facility is 50.3 mg/L. These values exceed secondary treatment limits of 30 mg/L for AML and 45 mg/L for AWL. The AML for TSS that is consistently achievable by the facility is 77 mg/L, and the AWL for TSS that is consistently achievable by the facility is 107 mg/L. These values exceed secondary treatment limits of 30 mg/L for AML and 45mg/L for AWL. The facility can consistently achieve an average monthly BOD percent removal of 75.1%. This value is greater than the 65% removal value needed to provide significant biological treatment of municipal wastewater. Thus, the facility meets the criterion to be considered for Treatment Equivalent to Secondary.

Evaluation of The Kah-Nee-Ta Wastewater Treatment Facility:

To be eligible for "treatment equivalent to secondary treatment," the facility must meet all three criteria as defined in 40 CFR 133.101(g). The Kah-Nee-Ta Wastewater Treatment Facility meets all three of these conditions, and therefore is eligible for consideration of the Treatment Equivalent to Secondary treatment standards.

Rationale for meeting condition (1) of 40 CFR 133.101(g): The Kah-Nee-Ta Resort Wastewater Treatment Facility does meet this criterion because analysis of all available monitoring data on file indicates that the facility could not, at the 95^{th} percentile level, meet the Secondary Treatment Limits for BOD_5 and TSS for both monthly and weekly averages (See Table B-2). Therefore, the facility does exceed the minimum level of effluent quality set forth in 40 CFR Sections 133.102(a) and 133.102(b).

Rationale for meeting condition (2): The Kah-Nee-Ta Resort Wastewater Treatment Plant meets this criterion because the facility does utilize waste stabilization ponds (more specifically, three facultative lagoons operated in series) as the principle process of treating wastewater.

Rationale for meeting condition (3): The facility does meet this criterion because the facility has demonstrated by its previously submitted monitoring data that it could consistently achieve the percent removal rates for the Federal Equivalent to Secondary Treatment Limits for BOD_5. For all available monitoring data (See Table B-3a,b) on file at EPA, the 5^{th} percentile of BOD_5 removal rates is 75.1 for average monthly, which is greater than the 65% removal rate required by Treatment Equivalent to Secondary standard. Due to the fact that all conditions in 40 CFR 133.101(g), (k) are met, the facility is eligible for the "Treatment Equivalent to Secondary" standards found in 40 CFR 133.105.

2. Technology-based Interim Chlorine Limits

The Kah-Nee-Ta Wastewater System uses chlorine to disinfect its wastewater. A technology-based 0.5 mg/L average monthly limit for chlorine is derived from standard operating practices. The Water Pollution Control Federation's *Chlorination of Wastewater* (1976) states that a properly designed and maintained wastewater treatment plant can achieve adequate disinfection if a 0.5 mg/L chlorine residual is maintained after 15 minutes of contact time. Therefore, a wastewater treatment plant that provides adequate chlorine contact time can meet a 0.5 mg/L total residual chlorine limit on a monthly average basis. In addition to average monthly limits (AMLs), federal regulation 40 CFR 122.45(d)(2) requires effluent limits for POTWs to be expressed as average weekly limits (AWLs) unless impracticable. The AWL is calculated to be 1.5 times the AML, consistent with the "secondary treatment" limits for BOD5 and TSS. This results in an AWL for chlorine of 0.75 mg/L. EPA believes these limits represent the "best practicable waste treatment technology" for chlorine, which POTWs were required to achieve by July 1st, 1983 (40 CFR 125.3(a)(1)(ii)).

EPA has determined that these effluent limits are not sufficiently stringent to meet water quality standards, however, the more stringent water quality-based effluent limits that are necessary to meet water quality standards cannot be met by the facility at this time, so the Tribe has indicated that it will authorize a 1-year compliance schedule. During the 1-year compliance schedule the technology-based chlorine limits described above apply on an interim basis.

3. Mass-based Limits

The federal regulation at 40 CFR § 122.45 (f) require BOD_5, TSS, and chlorine limitations to be expressed as mass based limits using the design flow of the facility. The mass based limits are expressed in lbs/day and are calculated as follows:

Mass based limit (lbs/day) = concentration limit (mg/L) x design flow (mgd) x 8.34

4. Basis for final BOD and TSS limits

The facility will ultimately be required to meet the Tribe's treatment requirements for discharges into the Deschutes River Basin (10 mg/L monthly average BOD and TSS) during periods of low flow (April – October) and secondary treatment during periods of high river flow (see secondary treatment limits in Table B-1 and 40 CFR Part 133). These treatment requirements appear in Chapter 432.200 of the Warm Springs Tribal Code. The facility is not currently meeting secondary treatment requirements for BOD_5 and TSS. Absent more stringent Tribal

treatment requirements, the facility would be eligible for treatment equivalent to secondary, (see discussion above). Therefore, interim limits of treatment equivalent to secondary are proposed during the five-year term of the compliance schedule to meet the more stringent Tribal treatment requirements, which constitute the basis for the final BOD_5 and TSS limits.

B. Water Quality-Based Effluent Limits

The following discussion is divided into four sections. Section 1 discusses the statutory basis for including water quality-based effluent limits in NPDES permits, section 2 discusses the procedures used to determine if water quality-based effluent limits are needed in an NPDES permit, section 3 discusses the procedures used to develop water quality based-effluent limits, and section 4 discusses the specific water quality-based limits.

1. Statutory Basis for Water Quality-Based Limits

Section 301(b)(1)(C) of the CWA requires the development of limitations in permits necessary to meet water quality standards by July 1, 1977. Discharges to Tribal waters must also comply with limitations imposed by the Tribe as part of its certification of NPDES permits under section 401 of the CWA.

The NPDES regulation (40 CFR 122.44(d)(1)) implementing section 301 (b)(1)(C) of the CWA requires that permits include limits for all pollutants or parameters which are or may be discharged at a level which will cause, have the reasonable potential to cause, or contribute to an excursion above any Tribal water quality standard, including Tribal narrative criteria for water quality.

The regulations require that this evaluation be made using procedures which account for existing controls on point and nonpoint sources of pollution, the variability of the pollutant in the effluent, species sensitivity (for toxicity), and where appropriate, dilution in the receiving water. The limits must be stringent enough to ensure that water quality standards are met, and must be consistent with any available wasteload allocation.

2. Reasonable Potential Analysis

When evaluating the effluent to determine if water quality-based effluent limits are needed based on chemical specific numeric criteria, a projection of the receiving water concentration (downstream of where the effluent enters the receiving water) for each pollutant of concern is made. The chemical specific concentration of the effluent and receiving water and, if appropriate, the dilution available from the receiving water are factors used to project the receiving water concentration. If the projected concentration of the receiving water exceeds the

numeric criterion for a specific chemical, then there is a reasonable potential that the discharge may cause or contribute to an excursion above the applicable water quality standard, and a water quality-based effluent limit is required.

Sometimes it is appropriate to allow a small area of receiving water to provide dilution of the effluent. These areas are called mixing zones. Mixing zone allowances will increase the mass loadings of the pollutant to the water body, and decrease treatment requirements. Mixing zones can be used only when there is adequate receiving water flow volume and the receiving water is below the chemical specific numeric criterion necessary to protect the designated uses of the water body. Mixing zones must be authorized by CWTSRO. None of the water quality-based effluent limits in this permit are based on mixing zones.

Reasonable Potential Calculations

To determine if there is "reasonable potential" to cause or contribute to an exceedance of the water quality criteria for a given pollutant, the EPA compares applicable water quality criteria to the maximum expected receiving water concentrations for a particular pollutant. If the expected receiving water concentration exceeds the criteria, there is reasonable potential and a water quality-based effluent limit must be included in the permit.

EPA used the recommendations in Chapter 3 of the *Technical Support Document for Water Quality-based Toxics Control* (TSD, EPA 1991) to conduct the reasonable potential analysis for the CTWSRO WWTP.

a). Effluent Concentration

The maximum projected effluent concentration (C_e) in the mass balance equation is represented by the 99th percentile, calculated using the statistical approach recommended in the TSD. The 99th percentile effluent concentration is calculated by multiplying the maximum reported effluent concentration by a reasonable potential multiplier. The reasonable potential multiplier accounts for uncertainty in the data. The multiplier decreases as the number of data points increases and variability of the data decreases. Variability is measured by the coefficient of variation (CV) of the data. When there are not enough data to reliably determine a CV, the TSD recommends using 0.6 as a default value. A partial listing of reasonable potential multipliers can be found in Table 3-1 of the TSD. EPA evaluated the CTWSRO permit application and available monitoring data to determine the maximum reported effluent concentrations. The maximum reported effluent value from all chlorine monitoring data available from monitoring data reports (chlorine data from August 2004 through September 2006) was 1.3 mg/L chlorine (reported in September

2006). The coefficient of variation from the chlorine monitoring data was 0.938, leading to a reasonable potential multiplier of 1.062 and a maximum projected effluent concentration (C_e) of 1,380 μg/L. See Table B-6, below, for a summary of the maximum reported effluent concentration, the reasonable potential multiplier, and the maximum projected effluent concentration.

b). Effluent Flow

The effluent flow used in the equation is the maximum daily flow reported from the facility. The maximum daily flow of 0.37 mgd (0.57 cfs) was used to calculate the permit limits.

c). Upstream (Ambient) Concentration

The ambient concentration in the mass balance equation is based on a reasonable worst-case estimate of the pollutant concentration upstream from the discharge. For criteria that are expressed as maxima (such as chlorine), the 95th percentile of the ambient data is generally used as an estimate of worst-case. Ambient data was unavailable for chlorine, and therefore zero concentration was used in the mass balance equations.

d). Upstream Flow

The 1Q10 and 7Q10 flows are 184 cfs and 200 cfs, respectively (118.92 and 129.26 mgd). However, because no mixing zones were allowed, these flow rates were not used in the calculations.

In accordance with Section 432.100(4)(c) of the CTWSRO WQS, only the Tribe may authorize mixing zones within the reservation. If the CTWSRO authorizes a mixing zone in its final 401 certification, EPA will recalculate the effluent limits based on the mixing zone.

e). "Reasonable Potential" Calculation

Table B-6 summarizes the data, multipliers, and criteria used to determine "reasonable potential" to exceed criteria. Section 4, below, provides a detailed discussion of the development of water quality-based effluent limitations for specific pollutants.

TABLE B-6: Reasonable Potential Calculations

Parameter	Max. Reported Effluent Conc.	CV	RP Multiplier	Max. Projected Effluent Conc (C_e)	Upstrm Conc (C_u)	Projected Downstrm Conc. (C_d)	Most Stringent Criterion
Total Residual Chlorine	1,300	.938	1.062	1.380	0	1.380[3]	11

Notes:
1 No mixing zone is allowed.
2 The CV was calculated using all available effluent data (375 data points) collected from August 2004 through September 2006.
3 Maximum projected ambient concentration indicates "reasonable potential" to exceed water quality standards.

3. Wasteload Allocation Development

Once EPA has determined that a water quality-based limit is required for a pollutant, the first step in developing a permit limit is development of a WLA for the pollutant. A WLA is the concentration (or loading) of a pollutant that the permittee may discharge without causing or contributing to an exceedance of WQS in the receiving water. The WLAs were calculated based on a mixing zone for chlorine based on meeting water quality criteria at "end-of-pipe" for E. coli and pH.

a). Mixing zone-based WLA

Where the Tribe authorizes a mixing zone for the discharge (according to Section 432.100(4)(c)), the WLA is calculated as a mass balance, based on the available dilution, background concentrations of the pollutant(s) and the water quality criteria. However, the Tribe has not authorized a mixing zone for any pollutants, therefore, EPA has used an "end-of-pipe" WLA, as described below.

b). "End-of-Pipe" WLA

In some cases, there is no dilution available, either because the receiving water exceeds the criteria or because the Tribe has decided not to authorize a mixing zone for a particular pollutant. When there is no dilution, the criterion becomes the WLA. Establishing the criterion as the WLA ensures that the permittee does not contribute to an exceedance of the criteria.

Because acute aquatic life and chronic aquatic life apply over different time frames and may have different mixing zones, it is not possible to compare them directly to determine which criterion results in the most stringent limits. The acute criteria are applied as a one-hour average and

have a smaller mixing zone, while the chronic criteria are applied as a four-day average and have a larger mixing zone. To allow for comparison, the acute and chronic WLAs are is statistically converted to long-term average WLAs. The most stringent long-term average WLA is used to calculate the permit limits.

4. Permit Limit Derivation

Once the WLA has been developed, EPA applies the statistical permit limit derivation approach described in Chapter 5 of the TSD to obtain daily maximum and monthly average permit limits. This approach takes into account effluent variability (through the CV), sampling frequency, and the difference in time frames between the monthly average and daily maximum limits.

The daily maximum limit is based on the CV of the data and the probability basis, while the monthly average limit is dependent on these two variables and the monitoring frequency. As recommended in the TSD, EPA used a probability basis of 95 percent for monthly average limit calculation and 99 percent for the daily maximum limit calculation. As with the reasonable potential calculation, when there were not enough data to calculate a CV, EPA assumed a CV of 0.6 for both monthly average and daily maximum calculations.

4. Specific Water Quality-Based Effluent Limits

(a) Toxic Substances

The CTWSRO water quality standards for toxics are contained in the Warm Springs Tribal Code Chapter 432, section 432.100 (2)(p). Toxic substances shall not be introduced to the waters of the Reservation in amounts, concentrations, or combinations which may be harmful, may chemically change to harmful forms in the environment, or may accumulate in sediments or bioaccumulate in aquatic life or wildlife to levels that adversely affect public health, safety, or welfare; aquatic life; wildlife; or other designated beneficial uses. Because there are no significant industrial discharges to the facility, and concentrations of priority pollutants from facilities without a significant industrial component are typically low, it is anticipated that toxicity will not be a problem in the facility discharges. Therefore, water quality-based effluent limits have not been proposed for the draft permit.

(b) Chlorine

The CTWSRO water quality standards for chlorine are contained in the Warm Springs Tribal Code Chapter 432, section 432.100 (2)(p), Table 3.

Chlorine Tribal water quality standards state that acute and chronic concentrations are not to exceed .019 mg/L, and .011 mg/L respectively. Effluent limits for chlorine are proposed in order to meet these standards based on an end-of-pipe wasteload allocation. Acute and chronic waste load allocations of chlorine shall be 0.019 mg/L, and 0.011 mg/L respectively. Acute and chronic long-term averages shall be: 0.0041 mg/L and 0.0043 mg/L respectively. The maximum daily limit is determined to be 0.019 mg/L, and the average monthly limit is determined to be 0.0077 mg/L.

The facility cannot immediately comply with these water quality-based effluent limits. The CTWSRO has indicated that it intends to authorize a 1-year schedule of compliance for these water quality-based effluent limits. In the interim, technology-based chlorine limits apply (see the discussion under Part A, "Technology Based Effluent Limits," above). See Appendix D for calculations of the final water quality based chlorine limits.

(c) Floating, Suspended or Submerged Materials

Surface waters shall be free from floating, suspended or submerged materials.

(d) Temperature

The Confederated Tribes of Warm Springs Reservation of Oregon WQS 432.025 require: No measurable surface water temperature increase resulting from anthropogenic activities is allowed unless a management plan has been reviewed and approved by the Tribe. The Tribes may allow a variance to the standards on a site-specific basis in accordance with section 432.120, and after full satisfaction of the public participation of the Tribe's continued integrated planning process. Variance standards will be set using the best data available and reviewed every three years as part of the triennial review process. This plan must show how the thermal load is (or will be) minimized and how the activity does not (or will not) interfere with attainment of numeric criteria within the watershed in question (See Table 4 CTWSRO WQS, and appropriate watershed maps for locations). This standard applies to the following:

(i) In a water body for which salmonid fish rearing (Table 4 CTWSRO WQS) is a designated beneficial use, and in which surface water temperatures exceed 64.0°F(17.8°C); or

(ii) In waters and periods of the year determined by the Tribe,

(listed in Table 4 CTWSRO WQS, and Figure 1), to support native salmonid spawning, egg incubation, and fry emergence from the egg and from the gravels in a reach which exceeds 55.0°F(12.8°C); or

(iii) In waters determined by the Tribe to support or to be necessary to maintain the viability of native Oregon bull trout, (listed in Table 4 CTWSRO WQS, and Figure 1) when surface water temperatures exceed 50.0°F(10.0°C); or

(iv) In waters determined by the Tribe to be ecologically significant cold-water refugia (Table 4 CTWSRO WQS); or

(v) In stream segments containing federally listed Threatened and Endangered species.

(e) *Escherichia coli* (*E. coli*) Bacteria

The CTWSRO WQS 432.025 contains water quality criteria for bacteria (*E. coli*).

a. A single sample of four hundred and six *E. coli* organisms per one hundred mL; or

b. A geometric mean of one hundred and twenty six E. coli organisms per one hundred mL based on a minimum of five samples taken, every three to five days, over a thirty day period.

No mixing zone is authorized for bacteria in the permit; therefore, the criteria must be met before the effluent is discharged to the receiving water. The proposed water quality-based effluent limits in the draft permit include an average monthly limit (based on the geometric mean) of 126-organisms/100 mL and an instantaneous maximum limit of 406-organisms/100 mL.

Appendix C - Reasonable Potential Determination

To determine if a water quality based effluent limitation is required, the receiving water concentration of pollutants is determined downstream of where the effluent enters the receiving water. If the projected receiving water concentration is greater than the applicable numeric criterion for a specific pollutant, there is reasonable potential that the discharge may cause or contribute to an excursion above the applicable water quality standard and an effluent limit must be incorporated into the NPDES permit. The receiving water concentration is determined using the following mass balance equation:

$C_d * Q_d = (C_e * Q_e) + (C_u * Q_u)$, which can be rearranged as follows:

$$C_d = \frac{(C_e * Q_e) + (C_u * Q_u)}{Q_d}$$

C_d = receiving water concentration downstream of the effluent discharge
$Q_d = Q_e + Q_u$ = receiving water flow downstream of the effluent discharge
C_e = maximum projected effluent concentration
Q_e = maximum effluent flow
C_u = upstream concentration of pollutant
Q_u = upstream low flow

Flow Conditions / Mixing Zones

The CTWSRO WQS for mixing zones appear in Chapter 431.100(4) of the Tribal Code. The mixing zone rules state that "The Tribe may allow a designated portion of a receiving water to serve as a zone of dilution for wastewaters and receiving waters to mix thoroughly and this zone will be defined as a mixing zone. Mixing zones will not have a reasonable potential to substantially interfere with the existing and designated uses of a waterbody. No mixing will be allowed where the presence of a mixing zone may result in any adverse affect to Threatened and Endangered species." There are additional specific restrictions on the water quality within the mixing zone, and the size of the mixing zone.

When a mixing zone (%MZ) is allowed, the mass balance equation becomes:

$$C_d = \frac{(C_e * Q_e) + (C_u * (Q_u * \%MZ))}{Q_e + (Q_u * \%MZ)}$$

In the above equation, "%MZ" is the percentage of the upstream receiving water flow available for mixing. When a mixing zone is not allowed, the equation simplifies to:

$C_d = C_e$

In this case, no mixing zone was authorized for chlorine. A chlorine mixing zone was considered but EPA determined that the authorization of a mixing zone for chlorine could result in adverse effects to threatened and endangered species. Therefore, EPA and the Tribe determined it was not appropriate to grant a mixing zone for chlorine at this time.

Maximum Projected Effluent Concentration

The maximum projected effluent concentration of chlorine is 1.38 mg/L. See Appendix B for calculations of the maximum projected effluent concentration.

Reasonable Potential Calculations

The following is an example to illustrate the calculations used to determine if chlorine has the reasonable potential to cause or contribute to an exceedance of the water quality standard. Table C-1 summarizes the results of the reasonable potential calculations for the facility.

Information and assumptions for this example are:

- Facility is discharging at a maximum chlorine concentration of 1.38 mg/L
- Wastewater Treatment Plant Design Flow = 0.37 mgd
- Low Flow Conditions:
  - 1Q10 = 118.92 mgd (used to evaluate acute conditions)
  - 7Q10 = 129.26 mgd (used to evaluate chronic conditions)
- The upstream concentration of chlorine is assumed to be zero since there are no sources of chlorine upstream of the discharge.

(1) Determine if there is a reasonable potential for the acute aquatic life criterion to be violated.

MZ = 0% (no mixing zone allowed)
C_e = 1.38 mg/L
C_d = 1.38 mg/L

Since 1.38 mg/L is less than the acute aquatic life criterion (19 μg/L), there is not a reasonable potential for the effluent to cause an exceedance to the water quality standard. Therefore, a water quality based effluent limit is not required.

(2) Determine if there is a reasonable potential for the chronic aquatic life criterion to be violated.

MZ = 0% (no mixing zone allowed)
C_e = 1.38 mg/L
C_d = 1.38 mg/L

Since 1.38 mg/L is greater than the chronic aquatic life criterion (11 μg/L), there is a reasonable potential for the effluent to cause an exceedance to the water quality standard. Therefore, a water quality based effluent limit is required.

TABLE C-1: Reasonable Potential Determination for Chlorine

Facility	Max. Projected Effluent Conc. (C_e), μg/L	Effluent Flow (Q_e), mgd	Upstream concentration (C_u), μg/L	Upstream Flow (Q_u), mgd		Mixing Zone Size (MZ)	Downstream concentration, C_d, μg/L		Does C_d exceed acute or chronic criteria?
				1Q10	7Q10		Acute	Chronic	
Kah-Nee-Ta Resort	1380	0.37	0	118.9	129.3	0%	1380	1380	yes

Appendix D - Effluent Limit Calculation

To support the implementation of EPA's regulations for controlling the discharge of toxicants, EPA developed the *Technical Support Document for Water Quality-Based Toxics Control* (EPA/505/2-90-001, March 1991). The following is a summary of the procedures recommended in the TSD in deriving water quality-based effluent limitations for toxicants. This procedure translates water quality criteria for chlorine to "end of the pipe" effluent limits.

Step 1- Determine the WLA

The acute and chronic aquatic life criteria are converted to acute and chronic waste load allocations (WLA_{acute} or $WLA_{chronic}$) for the receiving waters based on the following mass balance equation:

$Q_dC_d = Q_eC_e + Q_uC_u$

Q_d = downstream flow = $Q_u + Q_e$
C_d = aquatic life criteria that cannot be exceeded downstream
Q_e = effluent flow
C_e = concentration of pollutant in effluent = WLA_{acute} or $WLA_{chronic}$
Q_u = upstream flow
C_u = upstream background concentration of pollutant

Rearranging the above equation to determine the effluent concentration (C_e) or the wasteload allocation (WLA) results in the following:

$$C_e = WLA = \frac{Q_dC_d - Q_uC_u}{Q_e} = \frac{C_d(Q_u + Q_e) - Q_uC_u}{Q_e}$$

When a mixing zone is not allowed (and it is not in this case), this equation becomes:

$C_e = WLA = C_d$

Step 2 - Determine the LTA

The acute and chronic WLAs are then converted to Long Term Average concentrations (LTA_{acute} and $LTA_{chronic}$) using the following equations:

$LTA_{acute} = WLA_{acute} \times e^{[0.5\sigma^2 - z\sigma]}$
where,
σ^2 = $\ln(CV^2 + 1)$
z = 2.326 for 99^{th} percentile probability basis
CV = coefficient of variation = standard deviation/mean

$LTA_{chronic} = WLA_{chronic} \times e^{[0.5\sigma^2 - z\sigma]}$

where,

σ^2 = $\ln(CV^2/4 + 1)$
z = 2.326 for 99th percentile probability basis
CV = coefficient of variation = standard deviation/mean

Step 3 - Most Limiting LTA

To protect a waterbody from both acute and chronic effects, the more limiting of the calculated LTA_{acute} and $LTA_{chronic}$ is used to derive the effluent limitations. The TSD recommends using the 95th percentile for the Average Monthly Limit (AML) and the 99th percentile for the Maximum Daily Limit (MDL).

Step 4 - Calculate the Permit Limits

The maximum daily limit (MDL) and the average monthly limit (AML) are calculated as follows:

$MDL = LTA_{chronic} \times e^{[z\sigma - 0.5\sigma^2]}$
where,
σ^2 = $\ln(CV^2 + 1)$
z = 2.326 for 99th percentile probability basis
CV = coefficient of variation

$AML = LTA_{chronic} \times e^{[z\sigma - 0.5\sigma^2]}$
where,
σ^2 = $\ln(CV^2/n + 1)$
z = 1.645 for 95th percentile probability basis
CV = coefficient of variation = standard deviation/mean
n = number of sampling events required per month for chlorine = 20

The results of the above calculations for each of the facilities are summarized in Table D-1 below.

TABLE D-1: Effluent Limit Calculation

Facility	Criteria (μg/L)		CV	Q_u (mgd)		MZ	Q_e (mgd)[1]	C_u (μg/L)	WLA (μg/L)		LTA (μg/L)		MDL (μg/L)	AML (μg/L)
	Acute	Chronic		1Q10	7Q10				Acute	Chronic	Acute	Chronic		
Kah-Nee-Ta Resort	19	11	0.938	119	129	None	0.37	0	19	11	4.1	4.3	19	7.7

Q_u = upstream flow
CV = coefficient of variation
MZ = mixing zone
Q_e = effluent flow
C_u = upstream concentration
WLA = wasteload allocation
LTA = long term average
MDL = maximum daily limit
AML = average monthly limit