FACT SHEET FOR
THREE RIVERS REGIONAL WASTEWATER TREATMENT PLANT
NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM (NPDES)
PERMIT WA0037788

Purpose of this Fact Sheet

This fact sheet explains and documents the decisions the Department of Ecology (Ecology) made in drafting the proposed NPDES permit for the Three Rivers Regional Wastewater Treatment Plant (Three Rivers WWTP).

This fact sheet complies with Section 173-220-060 of the Washington Administrative Code (WAC), which requires Ecology to prepare a draft permit and accompanying fact sheet for public evaluation before issuing an NPDES permit.

Ecology makes the draft permit and fact sheet available for public review and comment at least 30 days before issuing the final permit. Copies of the fact sheet and draft permit for Three Rivers WWTP, NPDES Permit WA0037788, are available for public review and comment from October 20, 2020, until November 19, 2020. For more details on preparing and filing comments about these documents, please see **Appendix A - Public Involvement Information**.

Staff from the Three Rivers WWTP and contributing jurisdictions reviewed the draft permit and fact sheet for factual accuracy. Ecology corrected any errors or omissions regarding the facility's location, history, wastewater discharges, or receiving water prior to publishing this draft fact sheet for public notice.

After the public comment period closes, Ecology will summarize substantive comments and provide responses to them. Ecology will include the summary and responses to comments in this fact sheet as **Appendix E - Response to Comments**, and publish it when issuing the final NPDES permit. Ecology generally will not revise the rest of the fact sheet. The full document will become part of the legal history contained in the facility's permit file.

Summary

The Three Rivers Regional Wastewater Authority operates an activated sludge wastewater treatment plant that discharges to the Columbia River just downstream of the confluence with the Cowlitz River. Four contributing jurisdictions; the cities of Longview and Kelso, Beacon Hill Water and Sewer District, and Cowlitz County, maintain their own collection systems that discharge to the Three Rivers WWTP. The Three Rivers Regional Wastewater Authority is responsible for permit compliance at the Three Rivers WWTP, while the four contributing jurisdictions are responsible for permit compliance related to their respective collection systems.

Ecology issued the previous permit for this facility on October 24, 2012. The proposed permit contains the same effluent limits for Carbonaceous Biochemical Oxygen Demand (CBOD), Total Suspended Solids (TSS), Fecal Coliform Bacteria, Total Residual Chlorine, and pH as the permit issued in 2012. The proposed permit changes the Total Ammonia effluent limit to a benchmark, due to improvement in the operation of the solids handling area that reduced effluent Ammonia.

The permit adds a Heat Load Limit based on the Total Maximum Daily Load (TMDL) for Temperature in the Columbia and Lower Snake Rivers that was issued by EPA.

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I. INTRODUCTION

The Federal Clean Water Act (FCWA, 1972, and later amendments in 1977, 1981, and 1987) established water quality goals for the navigable (surface) waters of the United States. One mechanism for achieving the goals of the Clean Water Act is the National Pollutant Discharge Elimination System (NPDES), administered by the federal Environmental Protection Agency (EPA). The EPA authorized the state of Washington to manage the NPDES permit program in our state. Our state legislature accepted the delegation and assigned the power and duty for conducting NPDES permitting and enforcement to Ecology. The Legislature defined Ecology's authority and obligations for the wastewater discharge permit program in 90.48 Revised Code of Washington (RCW).

The following regulations apply to domestic wastewater NPDES permits:

- Procedures Ecology Follows for Issuing NPDES Permits [chapter 173-220 Washington Administrative Code (WAC)]
- Technical Criteria for Discharges from Municipal Wastewater Treatment Facilities (chapter 173-221 WAC)
- Water Quality Criteria for Surface Waters (chapter 173-201A WAC)
- Water Quality Criteria for Groundwaters (chapter 173-200 WAC)
- Whole Effluent Toxicity Testing and Limits (chapter 173-205 WAC)
- Sediment Management Standards (chapter 173-204 WAC)
- Submission of Plans and Reports for Construction of Wastewater Facilities (chapter 173-240 WAC)

These rules require any treatment facility owner/operator to obtain an NPDES permit before discharging wastewater to state waters. They also help define the basis for limits on each discharge and for requirements imposed by the permit.

Under the NPDES permit program and in response to a complete and accepted permit application, Ecology must prepare a draft permit and accompanying fact sheet, and make them available for public review before final issuance. Ecology must also publish an announcement (public notice) telling people where they can read the draft permit, and where to send their comments, during a period of 30 days (WAC 173-220-050). (See **Appendix A-Public** Involvement Information for more detail about the public notice and comment procedures.) After the public comment period ends, Ecology may make changes to the draft NPDES permit in response to comment(s). Ecology will summarize the responses to comments and any changes to the permit in **Appendix** E.

II. BACKGROUND INFORMATION

Table 1 General Facility Information

Facility Information	
Applicant	Three Rivers Regional Wastewater Authority Representing Beacon Hill Water and Sewer District, Cowlitz County, City of Kelso, and City of Longview
Facility Name and Address	Three Rivers Regional Wastewater Treatment Plant 467 Fibre Way Longview, WA 98632
Contact at Facility	Name: Duane Leaf Telephone #: 360-577-2040
Responsible Official	Name: Duane Leaf Title: General Manager Address: 467 Fibre Way Longview, WA 98632 Telephone #: 360-577-2040 email: leaf@trrwa.org
Type of Treatment	Plug Flow Activated Sludge Plant with Selectors and Chlorine Disinfection
Facility Location (NAD83/WGS84 Reference Datum)	Latitude: 46.1076 Longitude: -122.9147
Discharge Waterbody Name and Location (NAD83/WGS84 Reference Datum)	Columbia River Latitude: 46.0987 Longitude: -122.9369
Permit Status	
Issuance Date of Previous Permit	October 24, 2012
Application for Permit Renewal Submittal Date	March 30, 2017
Date of Ecology Acceptance of Application	May 1, 2017
Inspection Status	
Date of Last Non-sampling Inspection	August 6, 2015

Figure 1 Facility Location Map

A. Facility Description

History

The first secondary plant was built on the north end of this site in 1976. It consisted of a 10 million gallon per day (mgd) complete mix activated sludge plant. The plant consisted of a headworks, two primary clarifiers, four complete mix aeration basins, two secondary clarifiers, and a chlorine contact chamber. Gravity thickening, heat treatment, coil filter presses, and incineration was used to further process the solids. The ash was hauled to the Cowlitz County Landfill.

The plant was upgraded in 2002 to 26 mgd by adding another plant on the south side of the property. The South Plant consists of two new larger primary clarifiers, two plug flow activated sludge aeration basins, and two larger secondary clarifiers. The solids handling for both the North and South Plants now consists of an RPD process with centrifuges and lime pasteurization to produce Class A biosolids. A gravity belt thickener was added to thicken waste activated sludge before blending with the primary sludge for processing. Both the North and South Plants use a common headworks and also common expanded chlorine contact chambers for chlorination/de-chlorination. Filamentous selectors were added to both the North and South Plants to improve settling of the activated sludge in the secondary clarifiers.

Collection System Status

The collection system is separated into four main basins each with multiple sub-basins. These main basins are in the Contributing Jurisdictions of the city of Kelso, the Beacon Hill Water and Sewer District, the city of Longview, and a small portion of unincorporated Cowlitz County.

Each of the main basins in the collection system is operated by each of the jurisdictions as shown in the summary below. Therefore, the permit includes these jurisdictions on the title page. This listing is needed to make it clear that each jurisdiction is responsible for its portion of the collection system. The following are the number of pump stations in each jurisdiction.

Beacon Hill Water and Sewer District	7 pump stations
City of Kelso	10 pump stations
City of Longview	43 pump stations
Cowlitz County	1 pump station

Each jurisdiction and sewer district maintains its own portion of the system. This separation of each jurisdiction from the WWTP can create problems with consistency in dealing with city ordinances for grease traps; inconsistent management of infiltration and inflow into the collection systems; the listing of industrial users under pretreatment; and even differences in parameters such as pH collected at the WWTP. For these reasons, a Pretreatment Ordinance was adopted by all four entities in July 2012.

KCM authored the final version of the General Sewer Plan for the entire Longview-Kelso Urban Area in February of 1997. The Plan called for increasing the Three Rivers WWTP capacity from 16 mgd to 26 mgd maximum month design flow with a peak day flow of 62.4 mgd. The plan also called for increasing the regional interceptor sewer. These two issues have been addressed. KCM was conservative on their design. The highest peak hour flow recorded at the plant recently was up to 45 million gallons per day. With a peak flow capacity of 62.4 mgd, the Plant is estimated to meet loading demands through the year 2030 based on flow alone. The plant also has capacity to handle the 2030 design 5-Day Biochemical Oxygen Demand (BOD_5) and Total Suspended Solids (TSS) (2011 Kelso General Sewer and Facilities Plan, Gibbs & Olson, Inc.). The original KCM growth projection from 1997 appears to be conservative with a much higher growth rate.

According to the three major sewer districts, the total current population of the Three Rivers tributaries is about 60,000. This population value seems to fit well with the current flows experienced at the plant.

Treatment Processes

You can find basic information describing wastewater treatment processes included in a booklet at the Water Environment Federation website at:

https://www.wef.org/resources/for-the-public/public-information/

The treatment works are actually two similar plants that work in tandem at times (see schematic of entire facility on next page). The North plant is the original older plant and is used mainly to assist the South plant during higher flows and add additional redundancy. The North plant is also used during low flow periods, as it handles lower flows better than the South plant. The South plant was completed in 2002. The flow enters the compound and enters a common headworks for both the north and south plants. At the new headworks, flow is measured with a Parshall flume after which the wastewater is screened with new reciprocating-rake screens. The flow is then degritted in two parallel cyclone grit chambers. Flow is split and sent to each plant as needed.

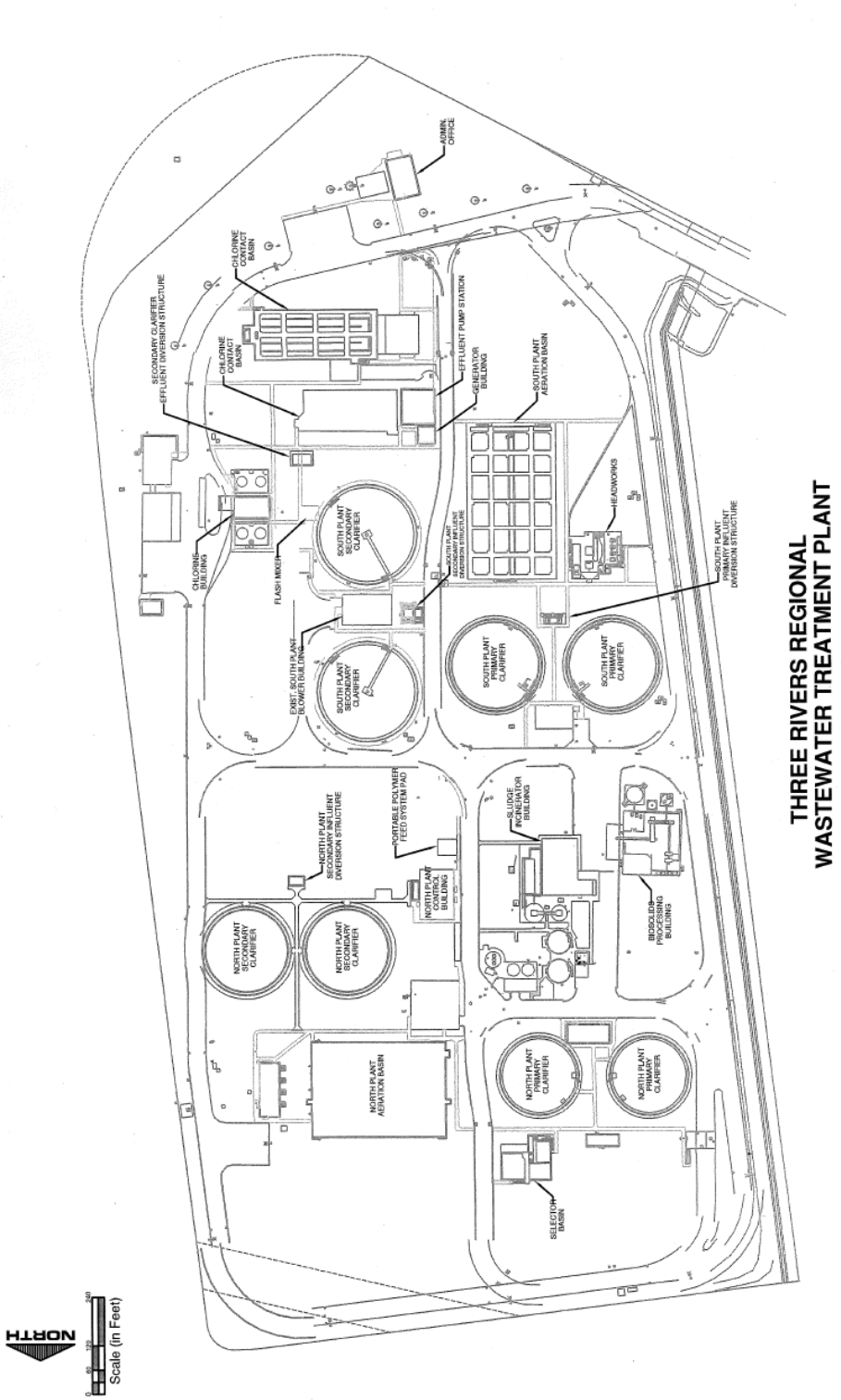
North Plant – 10 MGD Average Flow for the Max Month

The North plant flow is monitored by two parallel Parshall flumes. The flow then enters two parallel primary clarifiers followed by a selector basin and two parallel aeration basins. The aeration basins can be operated in various modes including complete mix and plug flow. The flow then is sent to two parallel secondary clarifiers. The effluent from the North plant is combined with effluent flow from the South plant. The combined flow is then sent to the chlorine contact chamber(s) for disinfection and then de-chlorination.

South Plant – 16 MGD Average Flow for the Max Month

The South plant is 60 percent larger in flow capacity than the North plant and has newer equipment. Otherwise the north and south plants are very similar. Both plants can be operated in plug-flow activated-sludge mode

during low flows or in contact-stabilization mode during higher flows to prevent solids wash-out.



After the flows from the north and south plants are recombined, the effluent is disinfected with liquid sodium-hypochlorite in a contact basin. The effluent is then de-chlorinated with sodium bisulfite solution. The effluent is pumped at times of high river flow.

In October 2003, it was found that the floors of the secondary clarifiers in the North plant were differentially sinking and floating. This settling was causing the influent, effluent, and return activated sludge pipes to shear and the base of the clarifiers to crack. Both of the north-end clarifiers have been replaced with new clarifiers. The Three Rivers Board received Public Works Trust Fund money to replace the clarifiers. That work has been completed.

The facility receives wastewater from several industrial users. Six SIU's were listed in the Permit Application:

Cowlitz County Landfill

Cowlitz County Headquarters Landfill

Foster Farms

Epson Toyocom

Port of Longview

Stowe Woodward

Solvay Chemicals

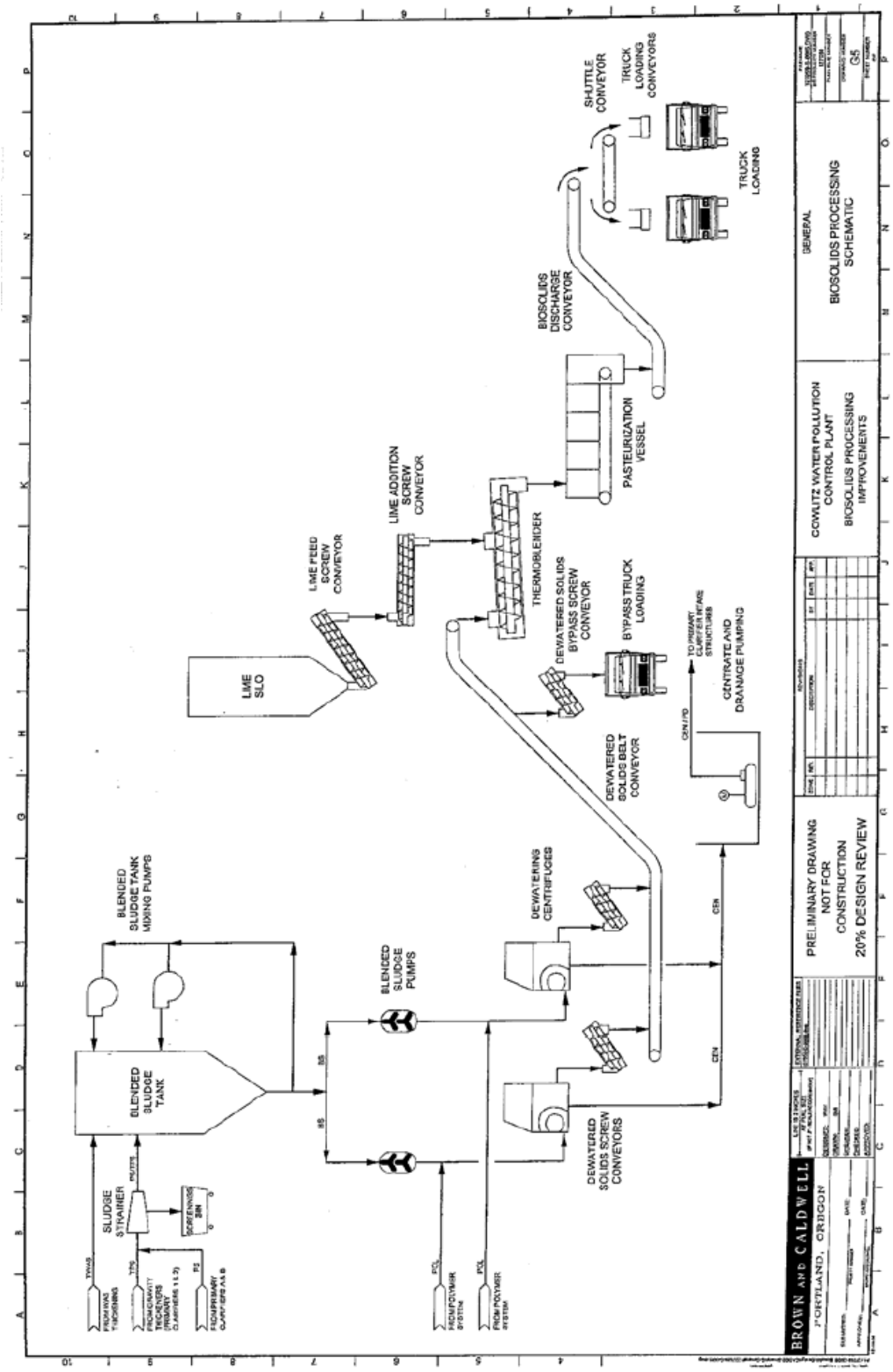
The facility is classified as Class IV based on size (greater than 10 mgd) and technology (activated sludge). The lead operator in responsible charge of this treatment plant must have a group IV certification. The operators in charge of a shift must have at least a group III certification. There are two lead operators at the facility, one of which has a group IV certification and three have a group III certification. The rest of the staff have group II to group IV certifications. The plant is staffed seven days per week for two shifts per day. A Supervisory Control and Data Acquisition (SCADA) system monitors the plant operations during all hours, and staff can be called in when equipment malfunctions.

Solid Wastes/Residual Solids

The treatment facilities remove solids during the treatment of the wastewater at the headworks (grit and screenings), and at the primary and secondary clarifiers, in addition to incidental solids (rags, scum, and other debris) removed as part of the routine maintenance of the equipment. The Three Rivers WWTP drains grit, rags, scum, and screenings and disposes this solid waste at the local landfill. Solids removed from the primary and secondary clarifiers are treated for beneficial re-use.

The solids from the north-end primary clarifiers goes through a pair of gravity thickener basins before being sent to the sludge strainer. The solids from the south-end primary clarifiers is sent directly to the sludge strainer. Waste Activated sludge from the secondary clarifiers from both plants is thickened in a gravity belt thickener with polymers and then

sent on to the blend tank. The waste sludge from all these sources is then blended and sent to dewatering centrifuges after more polymer is added. A thermo-blending process (RDP) with lime and heat produces Class A biosolids.



Discharge Outfall

The treated and disinfected effluent flows into the Columbia River a quarter mile downstream from the confluence with the Cowlitz River. The diffuser discharges 35 feet below Mean Lower Low Water (MLLW) and approximately 150 feet from shore. The outfall diffuser is parallel with the shore and current, is 77 feet long, and has 14 orifices spaced at 4.75 foot intervals. The orifices are 6.5 inches in diameter, face up 20 degrees from horizontal, and alternate between facing away from shore and towards shore.

The outfall is 500 feet downstream of the outfall for West Rock (formally Longview Fibre). The downstream edge of the West Rock's chronic mixing zone is approximately 60 feet from the upstream edge of the Three Rivers WWTP chronic mixing zone.

Although the West Rock mixing zone boundary does not overlap with the Three Rivers WWTP mixing zone, its diluted plume does travel over and into the Three Rivers WWTP plume. Because the West Rock effluent is warm, it likely rises to the surface and creates a partially stratified layer. The Three Rivers WWTP's effluent may also be warm, but not as warm as the West Rock effluent during some period of each year. The mixing zones and dilution were studied (Cosmopolitan, 1999) and dilution will be covered in a later section of this fact sheet.

B. Description of the Receiving Water

The Three Rivers WWTP discharges to the Columbia River. Other nearby point source outfalls include Longview Fibre.

The ambient background data used for this permit includes the following from an Ammonia receiving water study conducted by Windward Environmental LLC, August 28, 2014, Environmental Information Management data gathered by Ecology, and USGS Columbia River Estuary Study (2004-05):

Table 2 Ambient Background Data for May through October

Parameter	Value Used
Temperature (highest)	23.8° C
pH (Maximum)	7.81 standard units
Dissolved Oxygen	10.6 mg/L
Total Ammonia-N	0.036 mg/L
Fecal Coliform	25/100 mL dry weather
Hardness	50 mg/L as $CaCO_3$
Alkalinity	46 mg/L as $CaCO_3$
Lead	<0.08 µg/L
Copper	1.0 µg/L
Zinc	0.6 µg/L

C. Wastewater Influent Characterization

The Three Rivers WWTP reported the concentration of influent pollutants in discharge monitoring reports. The influent wastewater is characterized as follows (five years of data):

Parameter	Units	Average Value	Maximum Value
Carbonaceous Biochemical Oxygen Demand ($CBOD_5$)	mg/L	**209**	**404**
$CBOD_5$	lbs/day	**10,231**	**24,267**
Total Suspended Solids (TSS)	mg/L	**292**	**1,118**
TSS	lbs/day	**14,544**	**54,644**

D. Wastewater Effluent Characterization

The Three Rivers WWTP reported the concentration of pollutants in the discharge in the permit application and in discharge monitoring reports. The tabulated data represents the quality of the wastewater effluent discharged from March 1, 2012, to February 28, 2017. The wastewater effluent is characterized as follows:

Parameter	Units	95th Percentile Average Value	Maximum Value
$CBOD_5$	mg/L	**6**	**21**
$CBOD_5$	lbs/day	**754**	**2,680**
TSS	mg/L	**9**	**20**
TSS	lbs/day	**1,028**	**4,976**
Total Ammonia	mg/L	**7**	**18.5**
Total Ammonia	lbs/day	**670**	**3,348**
Total Residual Chlorine	mg/L	**0.03**	**6**
Total Residual Chlorine	lbs/day	**3**	**31**
Parameter	**Units**	**Maximum Monthly Geometric Mean**	**Maximum Weekly Geometric Mean**
Fecal Coliforms	#/100 mL	**121**	**391**
Parameter	**Units**	**Minimum Value**	**Maximum Value**
pH	standard units	**6.2**	**7.9**

E. Summary of Compliance with Previous Permit Issued

The previous permit placed effluent limits on CBOD, TSS, Fecal Coliform Bacteria, Total Residual Chlorine, Total Ammonia, and pH

The Three Rivers WWTP has mostly complied with the effluent limits and permit conditions throughout the duration of the permit issued on October 24, 2012. Ecology assessed compliance based on its review of the facility's information in the Ecology Permitting and Reporting Information System (PARIS), discharge monitoring reports (DMRs) and on inspections.

The following table summarizes the violations and permit triggers that occurred during the permit term. Permit triggers are not violations but rather when triggered require the permit holder to take an action defined in the permit.

Begin Date	Parameter	Statistical Base	Units	Value	Violation
3/1/2016	Fecal Coliform	Monthly Geometric Mean	#/100 mL	4	Frequency of Sampling Violation
3/1/2017	Chlorine, Total Residual	Average	mg/L	0.034	Numeric Effluent Violation
3/1/2017	pH		Standard Units		Frequency of Sampling Violation

The following table summarizes compliance with recent report submittal requirements.

Submittal Name	Submittal Status	Due Date	Received Date
Application for Permit Renewal	Accepted	4/1/2017	4/4/2017
Industrial User Survey Update - Longview	Accepted	11/15/2018	11/9/2018
Industrial User Survey Update - Kelso	Accepted	11/15/2018	11/9/2018
Industrial User Survey Update - Cowlitz County	Accepted	11/15/2018	11/9/2018
Infiltration And Inflow Evaluation - Beacon Hill	Accepted	6/15/2018	6/5/2018
Infiltration And Inflow Evaluation - Cowlitz Co	Accepted	6/15/2018	11/13/2018
Infiltration And Inflow Evaluation - Kelso	Accepted	6/15/2018	6/1/2018
Infiltration and Inflow Evaluation - Longview	Accepted	6/15/2018	7/9/2018
Infiltration And Inflow Evaluation - Three Rivers	Accepted	6/15/2018	1/25/2018
Wasteload Assessment	Accepted	6/15/2018	1/25/2018

F. State Environmental Policy Act (SEPA) Compliance

State law exempts the issuance, reissuance or modification of any wastewater discharge permit from the SEPA process as long as the permit contains conditions that are no less stringent than federal and state rules and regulations (RCW 43.21C.0383). The exemption applies only to existing discharges, not to new discharges.

III. PROPOSED PERMIT LIMITS

Federal and state regulations require that effluent limits in an NPDES permit must be either technology- or water quality-based.

- Technology-based limits are based upon the treatment methods available to treat specific pollutants. Technology-based limits are set by the EPA and published as a regulation, or Ecology develops the limit on a case-by-case basis (40 CFR 125.3, and chapter 173-220 WAC).

- Water quality-based limits are calculated so that the effluent will comply with the Surface Water Quality Standards (chapter 173-201A WAC), Ground Water Standards (chapter 173-200 WAC), Sediment Quality Standards (chapter 173-204 WAC), or the National Toxics Rule (40 CFR 131.36).

- Ecology must apply the most stringent of these limits to each parameter of concern. These limits are described below.

The limits in this permit reflect information received in the application and from supporting reports (engineering, hydrogeology, etc.). Ecology evaluated the permit application and determined the limits needed to comply with the rules adopted by the state of Washington. Ecology does not develop effluent limits for all reported pollutants. Some pollutants are not treatable at the concentrations reported, are not controllable at the source, are not listed in regulation, and do not have a reasonable potential to cause a water quality violation.

Ecology does not usually develop limits for pollutants not reported in the permit application but may be present in the discharge. The permit does not authorize discharge of the non-reported pollutants. During the five-year permit term, the facility's effluent discharge conditions may change from those conditions reported in the permit application. The facility must notify Ecology if significant changes occur in any constituent [40 CFR 122.42(a)]. Until Ecology modifies the permit to reflect additional discharge of pollutants, a permitted facility could be violating its permit.

A. Design Criteria

Under WAC 173-220-150 (1)(g), flows and waste loadings must not exceed approved design criteria. Ecology approved design criteria for this facility's treatment plant in the Facilities Plan dated 1999 and prepared by Carollo Engineers. The table below includes design criteria from the referenced report.

Table 7 Design Criteria for Three Rivers WWTP

Parameter	Design Quantity
Maximum Month Design Flow (MMDF)	26 MGD

Parameter	Design Quantity
$CBOD_5$ Loading for Maximum Month	26,000 lbs/day
BOD_5 Loading for Maximum Month	31,200 lbs/day
TSS Loading for Maximum Month	32,100 lbs/day

B. Technology-Based Effluent Limits

Federal and state regulations define technology-based effluent limits for domestic wastewater treatment plants. These effluent limits are given in 40 Code of Federal Regulation (CFR) Part 133 (federal) and in chapter 173-221 WAC (state). These regulations are performance standards that constitute all known, available, and reasonable methods of prevention, control, and treatment (AKART) for domestic wastewater.

The table below identifies technology-based limits for pH, fecal coliform, BOD5, and TSS, as listed in chapter 173-221 WAC. Section III.F of this fact sheet describes the potential for water quality-based limits.

Table 8 Technology-based Limits

Parameter	Average Monthly Limit	Average Weekly Limit
$CBOD_5$ (concentration)	25 mg/L	40 mg/L
$CBOD_5$ (concentration)	In addition, the $CBOD_5$ effluent concentration must not exceed 15 percent of the average influent concentration.	
TSS (concentration)	30 mg/L	45 mg/L
TSS (concentration)	In addition, the TSS effluent concentration must not exceed 15 percent of the average influent concentration.	
Parameter	**Monthly Geometric Mean Limit**	**Weekly Geometric Mean Limit**
Fecal Coliform Bacteria	200 organisms/100 mL	400 organisms/100 mL
Parameter	**Daily Minimum**	**Daily Maximum**
pH	6.0 Standard Units	9.0 Standard Units

The existing permit has an average monthly chlorine limit of 0.03 mg/L and the facility is able to comply with it. The proposed permit includes the same limit.

Technology-based mass limits are based on WAC 173-220-130(3)(b), WAC 173-221-030(11)(b), WAC 173-220-130(1)(a) and (g), and WAC 173-221-040(1). Ecology calculated the monthly and weekly average mass limits for $CBOD_5$ and TSS as follows:

Average Monthly Mass Effluent Limit = Influent Mass Design Loading Criteria (lbs/day) x 0.15

Average Weekly Mass Effluent Limit = 1.5 x Average Monthly Mass Effluent TSS Limit

Table 9 Technology-based Mass Limits

Parameter	Influent Loading (lbs/day)	Mass Limit (lbs/day)
$CBOD_5$ Monthly Average	26,000	3,900
$CBOD_5$ Weekly Average	39,000	5,850
TSS Monthly Average	32,100	4,815
TSS Weekly Average	48,150	7,223

C. Surface Water Quality-Based Effluent Limits

The Washington State surface water quality standards (chapter 173-201A WAC) are designed to protect existing water quality and preserve the beneficial uses of Washington's surface waters. Waste discharge permits must include conditions that ensure the discharge will meet the surface water quality standards (WAC 173-201A-510). Water quality-based effluent limits may be based on an individual waste load allocation or on a waste load allocation developed during a basin wide Total Maximum Daily Load Study (TMDL).

Numerical Criteria for the Protection of Aquatic Life and Recreation

Numerical water quality criteria are listed in the water quality standards for surface waters (chapter 173-201A WAC). They specify the maximum levels of pollutants allowed in receiving water to protect aquatic life and recreation in and on the water. Ecology uses numerical criteria along with chemical and physical data for the wastewater and receiving water to derive the effluent limits in the discharge permit. When surface water quality-based limits are more stringent or potentially more stringent than technology-based limits, the discharge must meet the water quality-based limits.

Numerical Criteria for the Protection of Human Health

In 1992, U.S. EPA published 91 numeric water quality criteria for the protection of human health that are applicable to dischargers in Washington State in its National Toxics Rule 40 CFR (EPA, 1992). Ecology submitted a standards revision for 192 new human health criteria for 97 pollutants to EPA on August 1, 2016. In accordance with requirements of CWA section 303(c)(2)(B), EPA finalized 144 new and revised Washington specific human health criteria for priority pollutants, to apply to waters under Washington's jurisdiction. EPA approved 45 human health criteria as submitted by Washington. The EPA took no action on Ecology submitted criteria for arsenic, dioxin, and thallium. The existing criteria for these three pollutants as adopted in the National Toxics Rule (40 CFR 131.36) remain in effect.

These newly adopted criteria, located in WAC 173-201A-240, are designed to protect humans from exposure to pollutants linked to cancer and other diseases, based on consuming fish and shellfish and drinking contaminated surface waters. The water quality standards also include radionuclide criteria to protect humans from the effects of radioactive substances.

Narrative Criteria

Narrative water quality criteria (e.g., WAC 173-201A-240(1); 2016) limit the toxic, radioactive, or other deleterious material concentrations that the facility may discharge to levels below those which have the potential to:

- Adversely affect designated water uses
- Cause acute or chronic toxicity to biota
- Impair aesthetic values
- Adversely affect human health

Narrative criteria protect the specific designated uses of all fresh waters (WAC 173-201A-200, 2016) and of all marine waters (WAC 173-201A-210, 2016) in the state of Washington.

Antidegradation

Description--The purpose of Washington's Antidegradation Policy (WAC 173-201A-300-330; 2016) is to:

- Restore and maintain the highest possible quality of the surface waters of Washington.
- Describe situations under which water quality may be lowered from its current condition.
- Apply to human activities that are likely to have an impact on the water quality of surface water.
- Ensure that all human activities likely to contribute to a lowering of water quality, at a minimum, apply AKART.
- Apply three tiers of protection (described below) for surface waters of the state.

Tier I ensures existing and designated uses are maintained and protected and applies to all waters and all sources of pollutions. Tier II ensures that waters of a higher quality than the criteria assigned are not degraded unless such lowering of water quality is necessary and in the overriding public interest. Tier II applies only to a specific list of polluting activities. Tier III prevents the degradation of waters formally listed as "outstanding resource waters," and applies to all sources of pollution.

A facility must prepare a Tier II analysis when all three of the following conditions are met:

- The facility is planning a new or expanded action
- Ecology regulates or authorizes the action
- The action has the potential to cause measurable degradation to existing water quality at the edge of a chronic mixing zone

Facility Specific Requirements--This facility must meet Tier I requirements.

Dischargers must maintain and protect existing and designated uses. Ecology must not allow any degradation that will interfere with, or become injurious to, existing or designated uses, except as provided for in chapter 173-201A WAC.

Ecology's analysis described in this section of the fact sheet demonstrates that the proposed permit conditions will protect existing and designated uses of the receiving water.

Mixing Zones

A mixing zone is the defined area in the receiving water surrounding the discharge port(s), where wastewater mixes with receiving water. Within mixing zones the pollutant concentrations may exceed water quality numeric standards, so long as the discharge doesn't interfere with designated uses of the receiving water body (for example, recreation, water supply, and aquatic life and wildlife habitat, etc.). The pollutant concentrations outside of the mixing zones must meet water quality numeric standards.

State and federal rules allow mixing zones because the concentrations and effects of most pollutants diminish rapidly after discharge, due to dilution. Ecology defines mixing zone sizes to limit the amount of time any exposure to the end-of-pipe discharge could harm water quality, plants, or fish.

The state's water quality standards allow Ecology to authorize mixing zones for the facility's permitted wastewater discharges only if those discharges already receive AKART. Mixing zones typically require compliance with water quality criteria within a specified distance from the point of discharge and must not use more than 25 percent of the available width of the water body for dilution [WAC 173-201A-400 (7)(a)(ii-iii) or WAC 173-201A-400(7)(b)(ii-iii)].

Ecology uses modeling to estimate the amount of mixing within the mixing zone. Through modeling Ecology determines the potential for violating the water quality standards at the edge of the mixing zone and derives any necessary effluent limits. Steady-state models are the most frequently used tools for conducting mixing zone analyses. Ecology chooses values for each effluent and for receiving water variables that correspond to the time period when the most critical condition is likely to occur (see Ecology's *Permit Writer's Manual*). Each critical condition parameter, by itself, has a low probability of occurrence and the resulting dilution factor is conservative. The term "reasonable worst-case" applies to these values.

The mixing zone analysis produces a numerical value called a Dilution Factor (DF). A dilution factor represents the amount of mixing of effluent and receiving water that occurs at the boundary of the mixing zone. For example, a dilution factor of 4 means the effluent is 25 percent and the receiving water is 75 percent of the total volume of water at the boundary of the mixing zone. Ecology uses dilution factors with the water quality criteria to calculate reasonable potentials and effluent limits. Water quality standards include both aquatic life-based criteria and human health-based criteria. The former are applied at both the acute and chronic mixing zone boundaries; the latter are applied only at the chronic boundary. The concentration of pollutants at the boundaries of any of these mixing zones may not exceed the numerical criteria for that zone.

Most aquatic life *acute* criteria are based on the assumption that organisms are not exposed to that concentration for more than one hour and more often than one exposure in three years. Most aquatic life *chronic* criteria are based on the assumption that organisms are not exposed to that concentration for more than four consecutive days and more often than once in three years.

The two types of human health-based water quality criteria distinguish between those pollutants linked to non-cancer effects (non-carcinogenic) and those linked to cancer effects (carcinogenic). The human health-based water quality criteria incorporate several exposure and risk assumptions. These assumptions include:

- A 70-year lifetime of daily exposures
- An ingestion rate for fish or shellfish measured in kg/day
- An ingestion rate of two and four tenths (2.4) liters/day for drinking water (increased from two liters/day in the 2016 Water Quality Standards update)
- A one-in-one-million cancer risk for carcinogenic chemicals

This permit authorizes a small acute mixing zone, surrounded by a chronic mixing zone around the point of discharge (WAC 173-201A-400). The water quality standards impose certain conditions before allowing the discharger a mixing zone:

1. Ecology must specify both the allowed size and location in a permit.

   The proposed permit specifies the size and location of the allowed mixing zone (as specified below).

2. The facility must fully apply "all known, available, and reasonable methods of prevention, control and treatment" (AKART) to its discharge.

   Ecology has determined that the treatment provided at the Three Rivers WWTP meets the requirements of AKART (see "Technology-based Limits").

3. Ecology must consider critical discharge conditions.

   Surface water quality-based limits are derived for the water body's critical condition (the receiving water and waste discharge condition with the highest

potential for adverse impact on the aquatic biota, human health, and existing or designated waterbody uses). The critical discharge condition is often pollutant-specific or waterbody-specific.

Critical discharge conditions are those conditions that result in reduced dilution or increased effect of the pollutant. Factors affecting dilution include the depth of water, the density stratification in the water column, the currents, and the rate of discharge. Density stratification is determined by the salinity and Temperature of the receiving water. Temperatures are warmer in the surface waters in summer. Therefore, density stratification is generally greatest during the summer months. Density stratification affects how far up in the water column a freshwater plume may rise. The rate of mixing is greatest when an effluent is rising. The effluent stops rising when the mixed effluent is the same density as the surrounding water. After the effluent stops rising, the rate of mixing is much more gradual. Water depth can affect dilution when a plume might rise to the surface when there is little or no stratification. The table below [Table 6, page 19 of Windward (2014)] identifies the critical summer conditions when dilution is lowest, Temperatures are highest, and pH's are highest. Windward (2014) did a sensitivity analysis on the rest of the year and determined there was likely no reasonable potential for Three Rivers WWTP to violate water quality standards for Ammonia. Ecology performed a reasonable potential analysis for the summer critical period and found no reasonable potential to violate water quality standards for Ammonia. The previous permit has a limit on Ammonia because of high effluent Ammonia values due to startup of their RDP solids processing facility return flow. The Ammonia levels came down to an average value of around 5 mg/L from October 2008 – 2014. This resulted in no reasonable potential for an Ammonia water quality violation during the dry season. Windward (2014) verified that the plant would not violate Ammonia water quality limits the rest of the year.

Table 6. Results of the total ammonia reasonable potential analysis for the TRRWA WWTP

Season	Ambient Ammonia (µg N/L)[a]	State Water Quality Standard[a,b]		Max Concentration at the Edge of...		Limit Req'd?	Effluent Percentile Value	Pn	Max Effluent (µg N/L)[a]	CV[a]	s	No. of Samples[a]	Multi-plier	Acute Dilution Factor[a]	Chronic Dilution Factor[a]
		Acute (µg N/L)	Chronic (µg N/L)	Acute Mixing Zone (µg N/L)	Chronic Mixing Zone (µg N/L)										
Dry	36	6,800	1,040	616	274	NO	0.95	0.950	3,740[c]	0.87	0.75	58[d]	1.00	6.4	15.6
Spring	27	10,700	2,140	1,447	609	NO	0.95	0.854	5,800	0.89	0.77	19	1.57	6.4	15.6
Summer	32	7,000	1,000	1,004	431	NO	0.95	0.794	3,300	0.91	0.78	13	1.90	6.4	15.6
Fall	42	6,120	1,410	1,486	634	NO	0.95	0.607	3,900	0.70	0.63	6	2.38	6.4	15.6

[a] User input values, all other values computed by spreadsheet.
[b] Acute and chronic total ammonia criteria are based on 10th percentile WQC calculated from paired 15-minute continuous pH and temperature data recorded by the datasonde.
[c] 95th percentile effluent total ammonia concentration was calculated by log-transforming the dataset, calculating the 95th percentile with Microsoft Excel's® "PERCENTILE" function, and then converting the value back by taking the anti-log.
[d] The number of dry season samples was increased from 26 to 58 so that the spreadsheet returned a value of 1 in the "Multiplier" column according to Ecology's guidance (Ecology 2011) because the number of samples exceeded 20.

CV – coefficient of variation (user input based on effluent data standard deviation divided by mean)
Pn – percentile represented by the highest concentration in the effluent dataset (value retuned by the spreadsheet)
s– spreadsheet formula value = square root(natural log(CV^2+1)
TRRWA – Three Rivers Regional Wastewater Authority
WQC – water quality criteria
WWTP – wastewater treatment plant

Ecology's *Permit Writer's Manual* describes additional guidance on criteria/design conditions for determining dilution factors. The manual can be obtained from Ecology's website at: https://fortress.wa.gov/ecy/publications/documents/92109.pdf

Table 10 Critical Conditions Used to Model the Discharge

Critical Condition	Value
The thirty-day low river flow with a recurrence interval of five years (30Q5)	136,360 cfs
Critical low river flow used instead of 7Q10 flow because of dams	97,400 cfs
River depth at the 7Q10 period	35 feet
River velocity	0 ft per second (10^{th} percentile current velocity) 1 ft per second (90^{th} percentile current velocity)
Channel width	2,790 feet
Maximum average monthly effluent flow for chronic and human health non-carcinogen	18 million gallons per day (MGD)
Annual average flow for human health carcinogen during the critical summer low flow	8 MGD
Maximum daily flow for acute mixing zone during the critical summer low flow	12 MGD
7-DAD MAX Effluent Temperature	21.4 degrees C

Ecology obtained ambient data at critical conditions in the vicinity of the outfall from the Windward 2014 study, previous permits, DMRs, the Ambient Water Quality Study by Cosmopolitan Engineering (2011), and Ecology's EIM site 25A150.

4. Supporting information must clearly indicate the mixing zone would not:

- Have a reasonable potential to cause the loss of sensitive or important habitat
- Substantially interfere with the existing or characteristic uses
- Result in damage to the ecosystem
- Adversely affect public health

Ecology established Washington State water quality criteria for toxic chemicals using EPA criteria. EPA developed the criteria using toxicity tests with numerous organisms and set the criteria to generally protect the species tested and to fully protect all commercially and recreationally important species.

EPA sets acute criteria for toxic chemicals assuming organisms are exposed to the pollutant at the criteria concentration for one hour. They set chronic standards assuming organisms are exposed to the pollutant at the criteria concentration for four days. Dilution modeling under critical conditions generally shows that both acute and chronic criteria concentrations are reached within minutes of discharge.

The discharge plume does not impact drifting and non-strong swimming organisms because they cannot stay in the plume close to the outfall long enough to be affected. Strong swimming fish could maintain a position within the plume, but they can also avoid the discharge by swimming away. Mixing zones generally do not affect benthic organisms (bottom dwellers) because the buoyant plume rises in the water column. Ecology has additionally determined that the effluent will not exceed 33 degrees C for more than two seconds after discharge; and that the Temperature of the water will not create lethal conditions or blockages to fish migration.

Ecology evaluates the cumulative toxicity of an effluent by testing the discharge with Whole Effluent Toxicity (WET) testing.

Because this is a domestic wastewater discharge, the effluent contains fecal coliform bacteria. Ecology developed the water quality criteria for fecal coliforms (discussed below) to assure that people swimming (primary contact recreation) in water meeting the criteria would not develop gastro enteric illnesses. Ecology has authorized a mixing zone for this discharge; and the discharge is subject to an effluent limit of 200 colony forming units/100 mL. The effluent normally meets the water quality criteria for bacteria at the point of discharge and doesn't need dilution to meet the water quality criteria.

Ecology reviewed the above information, the specific information on the characteristics of the discharge, the receiving water characteristics, and the discharge location. Based on this review, Ecology concluded that the discharge does not have a reasonable potential to cause the loss of sensitive or important habitat, substantially interfere with existing or characteristics uses, result in damage to the ecosystem, or adversely affect public health if the permit limits are met.

5. The discharge/receiving water mixture must not exceed water quality criteria outside the boundary of a mixing zone.

   Ecology conducted a reasonable potential analysis, using procedures established by the EPA and by Ecology, for each pollutant and concluded the discharge/receiving water mixture will not violate water quality criteria outside the boundary of the mixing zone if permit limits are met.

6. The size of the mixing zone and the concentrations of the pollutants must be minimized.

   At any given time, the effluent plume uses only a portion of the acute and chronic mixing zone, which minimizes the volume of water involved in mixing. Because tidal currents change direction, the plume orientation within the mixing zone

changes. The plume mixes as it rises through the water column therefore much of the receiving water volume at lower depths in the mixing zone is not mixed with discharge. Similarly, because the discharge may stop rising at some depth due to density stratification, waters above that depth will not mix with the discharge. Ecology determined it is impractical to specify in the permit the actual, much more limited volume in which the dilution occurs as the plume rises and moves with the current.

Ecology minimizes the size of mixing zones by requiring dischargers to install diffusers when they are appropriate to the discharge and the specific receiving waterbody. When a diffuser is installed, the discharge is more completely mixed with the receiving water in a shorter time. Ecology also minimizes the size of the mixing zone (in the form of the dilution factor) using design criteria with a low probability of occurrence. For example, Ecology uses the expected 95th percentile pollutant concentration, the 90th percentile background concentration, the centerline dilution factor, and the lowest flow occurring once in every ten years to perform the reasonable potential analysis.

Because of the above reasons, Ecology has effectively minimized the size of the mixing zone authorized in the proposed permit.

7. Maximum Size of Mixing Zone

The authorized mixing zone does not exceed the maximum size restriction.

8. Acute Mixing Zone

- The discharge/receiving water mixture must comply with acute criteria as near to the point of discharge as practicably attainable.

  Ecology determined the acute criteria will be met at 10 percent of the distance of the chronic mixing zone at the critical low flow.

- The pollutant concentration, duration, and frequency of exposure to the discharge will not create a barrier to migration or translocation of indigenous organisms to a degree that has the potential to cause damage to the ecosystem.

  As described above, the toxicity of any pollutant depends upon the exposure, the pollutant concentration, and the time the organism is exposed to that concentration. Authorizing a limited acute mixing zone for this discharge assures that it will not create a barrier to migration. The effluent from this discharge will rise as it enters the receiving water, assuring that the rising effluent will not cause translocation of indigenous organisms near the point of discharge (below the rising effluent).

- Comply with Size Restrictions

  The mixing zone authorized for this discharge complies with the size restrictions published in chapter 173-201A WAC.

9. Overlap of Mixing Zones

This mixing zone does not overlap another mixing zone.

D. Designated Uses and Surface Water Quality Criteria

Applicable designated uses and surface water quality criteria are defined in chapter 173-201A WAC. In addition, the U.S. EPA set human health criteria for toxic pollutants (EPA 1992). The tables included below summarize the criteria applicable to the receiving water's designated uses.

- Aquatic Life Uses are designated based on the presence of, or the intent to provide protection for the key uses. All indigenous fish and non-fish aquatic species must be protected in waters of the state in addition to the key species. The Aquatic Life Uses for this receiving water are identified below.

Table 11 Freshwater Aquatic Life Uses and Associated Criteria

Salmonid Spawning, Rearing, and Migration	
Temperature Criteria – Highest 7-DAD MAX	17.5°C (63.5°F)
Dissolved Oxygen Criteria – Lowest 1-Day Minimum	8.0 mg/L

Salmonid Spawning, Rearing, and Migration	
Turbidity Criteria	• 5 NTU over background when the background is 50 NTU or less; or • A 10 percent increase in turbidity when the background turbidity is more than 50 NTU.
Total Dissolved Gas Criteria	Total dissolved gas must not exceed 110 percent of saturation at any point of sample collection.
pH Criteria	The pH must measure within the range of 6.5 to 8.5 with a human-caused variation within the above range of less than 0.5 units.

- The *recreational uses* for this receiving water are identified below.

  Table 12 Recreational Uses and Associated Criteria

Recreational Use	Criteria
Primary Contact Recreation	Fecal coliform organism levels must not exceed a geometric mean value of 100 colonies /100 mL, with not more than 10 percent of all samples (or any single sample when less than ten sample points exist) obtained for calculating the geometric mean value exceeding 200 colonies /100 mL.

- The *water supply uses* are domestic, agricultural, industrial, and stock watering.

- The *miscellaneous freshwater uses* are wildlife habitat, harvesting, commerce and navigation, boating, and aesthetics.

E. Water Quality Impairments

The lower Columbia River is listed on the current 303(d) and is impaired for Temperature and bacteria. Ecology has not documented Temperature impairment in the receiving water in the vicinity of the outfall however Ecology considers the entire Columbia River impaired for Temperature. On May 18, 2020, EPA issued a TMDL for temperature in the Columbia and lower Snake Rivers. EPA used heat load (the product of temperature, flow, and a conversion factor) to determine wasteload allocations (WLAs) for three main source categories: tributaries, current and future point sources subject to NPDES permits, and nonpoint source impacts from dams and reservoirs. The Three Rivers STP is listed in the TMDL as receiving a WLA of 3.19×10^9 kilocalories per day (kcal/day) of heat load. EPA calculated the WLA for this facility using a flow of 26.0 MGD and a projected maximum effluent temperature of 32.5°C. A conversion factor of 3,776,290 was used to multiply 26.0 MGD with 32.5°C to get the heat load of 3.19×10^9 kcal/day.

According to the TMDL, the WLA will protect the ambient environment from exceeding applicable temperature criteria if applied from July through September as an average monthly limit. The proposed permit therefore includes the WLA as a monthly average limit. The Permittee must report average flow and temperature values each day in a month and calculate average monthly flow and average temperature values. Finally, the permittee must multiply the average monthly flow, average monthly temperature, and the conversion factor to calculate the average monthly heat load. This calculated heat load must be less than the WLA provided. More information regarding EPA's temperature TMDL can be found at EPA's website at https://www.epa.gov/columbiariver/tmdl-temperature-columbia-and-lower-snake-rivers.

F. Evaluation of Surface Water Quality-Based Effluent Limits for Narrative Criteria

Ecology must consider the narrative criteria described in WAC 173-201A-160 when it determines permit limits and conditions. Narrative water quality criteria limit the toxic, radioactive, or other deleterious material concentrations that the facility may discharge which have the potential to adversely affect designated uses, cause acute or chronic toxicity to biota, impair aesthetic values, or adversely affect human health.

Ecology considers narrative criteria when it evaluates the characteristics of the wastewater and when it implements AKART as described above in the technology-based limits section. When Ecology determines if a facility is meeting AKART it considers the pollutants in the wastewater and the adequacy of the treatment to prevent the violation of narrative criteria.

In addition, Ecology considers the toxicity of the wastewater discharge by requiring WET testing when there is a reasonable potential for the discharge to contain toxics. Ecology's analysis of the need for WET testing for this discharge is described later in the fact sheet.

G. Evaluation of Surface Water Quality-Based Effluent Limits for Numeric Criteria

Pollutants in an effluent may affect the aquatic environment near the point of discharge (near-field) or at a considerable distance from the point of discharge (far-field). Toxic pollutants, for example, are near-field pollutants; their adverse effects diminish rapidly with mixing in the receiving water. Conversely, a pollutant such as BOD_5 is a far-field pollutant whose adverse effect occurs away from the discharge even after dilution has occurred. Thus, the method of calculating surface water quality-based effluent limits varies with the point at which the pollutant has its maximum effect.

With technology-based controls (AKART), predicted pollutant concentrations in the discharge exceed water quality criteria. Ecology therefore authorizes a mixing zone in accordance with the geometric configuration, flow restriction, and other restrictions imposed on mixing zones by chapter 173-201A WAC.

The diffuser at Outfall 001 is 77 feet long, parallel to the shore, with a diameter of 30 inches. The diffuser has a total of fourteen 6.5 inch diameter ports. The distance between ports is 4.667 feet. The diffuser depth is 35 feet below the Mean Lower Low Water (MLLW). Ecology obtained this information from the April 2011 Ambient Water Quality Study Report submitted on April 26, 2011.

Chronic Mixing Zone--WAC 173-201A-400(7)(b) specifies that mixing zones must not extend in any horizontal direction from the discharge ports for a distance greater than 200 feet plus the depth of water over the discharge ports and may not occupy more than 25 percent of the width of the water body as measured during MLLW.

The horizontal distance of the chronic mixing zone is 235 feet from each diffuser port, except on the shoreward side where it intersects the shore. The mixing zone extends from the bottom to the top of the water column.

Acute Mixing Zone--WAC 173-201A-400(8)(b) specifies that in estuarine waters a zone where acute criteria may be exceeded must not extend beyond 10 percent of the distance established for the chronic zone. The acute mixing zone for Outfall 001 extends 23.5 feet in any direction from any discharge port.

Ecology determined the dilution factors that occur within these zones at the critical condition using the 1999 Mixing Zone Study by Cosmopolitan Engineering. The dilution factors are listed below.

Table 13 Dilution Factors (DF)

Criteria	Acute	Chronic
Aquatic Life	6.4	15.6
Human Health, Carcinogen		15.6
Human Health, Non-carcinogen		15.6

Ecology determined the impacts of Dissolved Oxygen deficiency, Nutrients, pH, Fecal Coliform, Chlorine, Ammonia, Metals, other toxics, and Temperature as described below, using the dilution factors in the above table. The derivation of surface water quality-based limits also takes into account the variability of pollutant concentrations in both the effluent and the receiving water.

Dissolved Oxygen--BOD_5 and Ammonia Effects--Natural decomposition of organic material in wastewater effluent impacts dissolved oxygen in the receiving water at distances far outside of the regulated mixing zone. The BOD_5 of an effluent sample indicates the amount of biodegradable material in the wastewater and estimates the magnitude of oxygen consumption the wastewater will generate in the receiving water. The amount of Ammonia-based nitrogen in the wastewater also provides an indication of oxygen demand potential in the receiving water.

Ecology modeled the impact of BOD_5 on the receiving water using the DOSag spreadsheet, at critical condition and with the technology-based effluent limit for $CBOD_5$ described under "Technology-Based Effluent Limits" above. The calculations to determine dissolved oxygen impacts are shown in **Appendix D**.

Ecology predicted no violation of the surface water quality standards for dissolved oxygen due to the impacts of BOD_5 under critical conditions. Therefore, the proposed permit contains the technology-based effluent limit for $CBOD_5$. The permit also does not contain a limit on Ammonia based on dissolved oxygen impacts (Ammonia toxicity is examined elsewhere in this fact sheet).

pH--Ecology modeled the impact of the effluent pH on the receiving water using the calculations from EPA, 1988, and the chronic dilution factor tabulated above. **Appendix D** includes the model results.

Ecology predicts no violation of the pH criteria under critical conditions. Therefore, the proposed permit includes technology-based effluent limits for pH. Ecology included a technology-based limit of a pH range of 6.0 to 9.0 in the permit.

Fecal Coliform--Ecology modeled the numbers of fecal coliform by simple mixing analysis using the technology-based limit of 400 organisms per 100 ml and a dilution factor of 6.4.

Under critical conditions, modeling predicts no violation of the water quality criterion for fecal coliform. Therefore, the proposed permit includes the technology-based effluent limit for fecal coliform bacteria.

Turbidity--Ecology evaluated the impact of turbidity based on the range of total suspended solids in the effluent and turbidity of the receiving water. Ecology expects no violations of the turbidity criteria outside the designated mixing zone provided the facility meets its technology-based total suspended solids permit limits.

Toxic Pollutants--Federal regulations (40 CFR 122.44) require Ecology to place limits in NPDES permits on toxic chemicals in an effluent whenever there is a reasonable potential for those chemicals to exceed the surface water quality criteria. Ecology does not exempt facilities with technology-based effluent limits from meeting the surface water quality standards.

The following toxic pollutants are present in the discharge: Chlorine, Ammonia, and heavy metals. Other priority pollutants analyzed for this permit cycle were below the detection level as the Three Rivers WWTP removed them quite well. Ecology conducted a reasonable potential analysis (See **Appendix D**) on these parameters to determine whether it would require effluent limits in this permit.

Windward Environmental (2014) performed a sensitivity analysis for Ammonia for the wetter and cooler seasons and determined no Reasonable Potential for Ammonia to violate a water quality limit.

Ammonia's toxicity depends on that portion which is available in the unionized form. The amount of Unionized Ammonia depends on the Temperature and pH in the receiving freshwater. To evaluate Ammonia toxicity, Ecology used the available receiving water information for ambient station 25A150 and Ecology spreadsheet tools as well as the 2014 Windward Study.

Valid ambient background data were available for Temperature, pH, Ammonia, Dissolved Oxygen, and Fecal Coliform Bacteria. Ecology used all applicable data to evaluate reasonable potential for this discharge to cause a violation of water quality standards.

Ecology determined that Temperature, pH, Ammonia, Chlorine, Dissolved Oxygen, and Fecal Coliform pose no reasonable potential to exceed the water quality criteria at the critical condition using procedures given in EPA, 1991 (**Appendix D**) and as described above. Ecology's determination assumes that this facility meets the other effluent limits of this permit.

Water Quality Criteria for most metals published in chapter 173-201A WAC are based on the dissolved fraction of the metal (see footnotes to table WAC 173-201A-240(3); 2016). Three Rivers WWTP staff may provide data clearly demonstrating the seasonal partitioning of the dissolved metal in the ambient water in relation to an effluent discharge. Ecology may adjust a metal's translator on a site-specific basis when data is available clearly demonstrating the seasonal partitioning in the ambient water in relation to an effluent discharge.

Temperature--The state Temperature standards [WAC 173-201A-200-210 and 600-612] include multiple elements:

- Annual Summer Maximum Threshold Criteria (June 15th to September 15th)
- Supplemental Spawning and Rearing Season Criteria (September 15th to June 15th)
- Incremental Warming Restrictions
- Protections Against Acute Effects

Ecology evaluates each criterion independently to determine reasonable potential and derive permit limits.

- Annual Summer Maximum and Supplementary Spawning/Rearing Criteria

Each water body has an annual maximum Temperature criterion [WAC 173-201A-200(1)(c), 210(1)(c), and Table 602]. These threshold criteria (e.g., 12, 16, 17.5, 20°C) protect specific categories of aquatic life by controlling the effect of human actions on summer Temperatures.

Some waters have an additional threshold criterion to protect the spawning and incubation of salmonids (9°C for char and 13°C for salmon and trout) [WAC 173-201A-602, Table 602]. These criteria apply during specific date-windows.

The threshold criteria apply at the edge of the chronic mixing zone. Criteria for most fresh waters are expressed as the highest 7-Day average of daily maximum Temperature (7-DADMax). The 7-DADMax Temperature is the arithmetic average of seven consecutive measures of daily maximum Temperatures. Criteria for marine waters and some fresh waters are expressed as the highest 1-Day annual maximum Temperature (1-DMax).

- Incremental Warming Criteria

The water quality standards limit the amount of warming human sources can cause under specific situations [WAC 173-201A-200(1)(c)(i)-(ii), 210(1)(c)(i)-(ii)]. The incremental warming criteria apply at the edge of the chronic mixing zone.

At locations and times when background Temperatures are cooler than the assigned threshold criterion, point sources are permitted to warm the water by only a defined increment. These increments are permitted only to the extent doing so does not cause Temperatures to exceed either the annual maximum or supplemental spawning criteria.

At locations and times when a threshold criterion is being exceeded due to natural conditions, all human sources, considered cumulatively, must not warm the water more than 0.3°C above the naturally warm condition.

When Ecology has not yet completed a TMDL, our policy allows each point source to warm water at the edge of the chronic mixing zone by 0.3°C. This is true regardless of the background Temperature and even if doing so would cause the Temperature at the edge of a standard mixing zone to exceed the numeric threshold criteria. Allowing a 0.3°C warming for each point source is reasonable and protective where the dilution factor is based on 25 percent or less of the critical flow. This is because the fully mixed effect on

Temperature will only be a fraction of the 0.3°C cumulative allowance (0.075°C or less) for all human sources combined.

- Protections for Temperature Acute Effects

Instantaneous lethality to passing fish: The upper 99th percentile daily maximum effluent Temperature must not exceed 33°C, unless a dilution analysis indicates ambient Temperatures will not exceed 33°C two seconds after discharge.

General lethality and migration blockage: Measurable (0.3°C) increases in Temperature at the edge of a chronic mixing zone are not allowed when the receiving water Temperature exceeds either a 1DMax of 23°C or a 7DADMax of 22°C.

Lethality to incubating fish: Human actions must not cause a measurable (0.3°C) warming above 17.5°C at locations where eggs are incubating.

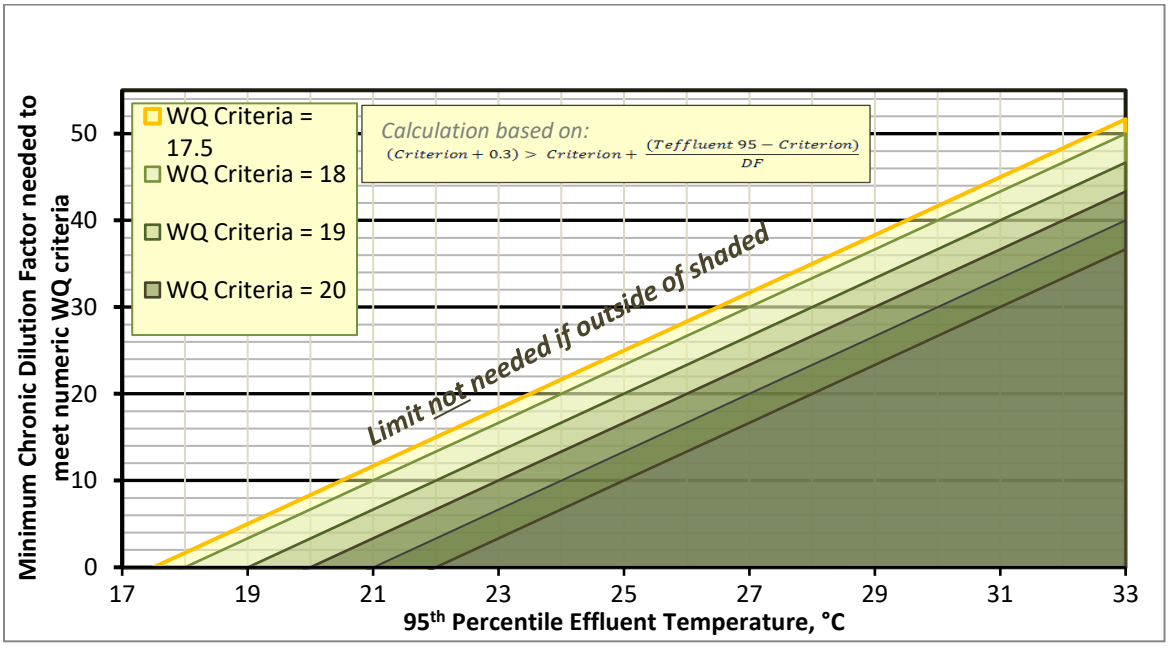
Reasonable Potential Analysis

Annual Summer Maximum and Incremental Warming Criteria: Ecology calculated the reasonable potential for the discharge to exceed the annual summer maximum and the incremental warming criteria at the edge of the chronic mixing zone during critical conditions. No reasonable potential exists to exceed the Temperature criterion where:

(Criterion + 0.3) > [Criterion + (Teffluent95 – Criterion)/DF].

The figure below graphically portrays the above equation and shows the conditions when a permit limit will apply.

Figure 2 Dilution Necessary to Meet Criteria at Edge of Mixing Zone



$$(17.5 + 0.3) > (17.5 + (21.4 – 17.5)/15.6).$$

Therefore, the proposed permit does not include a Temperature limit. The permit requires additional monitoring of effluent Temperatures and does include a Heat Limit based on the EPA's temperature TMDL. Ecology will reevaluate the reasonable potential during the next permit renewal.

H. Human Health

Washington's water quality standards include numeric human health-based criteria for 97 priority pollutants that Ecology must consider when writing NPDES permits.

Ecology determined the effluent may contain chemicals of concern for human health, based on (1) the facility's status as an EPA major discharger and (2) data or information indicating the discharge contains regulated chemicals.

Ecology evaluated the discharge's potential to violate the water quality standards as required by 40 CFR 122.44(d) by following the procedures published in the *Technical Support Document for Water Quality-Based Toxics Control* (EPA/505/2-90-001) and Ecology's *Permit Writer's Manual* to make a reasonable potential determination. The evaluation showed that the discharge has no reasonable potential to cause a violation of water quality standards, except for Arsenic. For all the other parameters tested an effluent limit is not needed.

Ecology submitted newly adopted state Human Health Water Quality Criteria to the EPA for Clean Water Act review and approval in August 2016. Parts of that submittal to EPA were new total arsenic criteria of 10 µg/L for both marine and freshwaters. Additional requirements in the new state rule included pollutant minimization requirements for anthropogenic inputs of arsenic from both indirect and direct discharges. The state's new total arsenic criteria match the EPA's Safe Drinking Water Act maximum contaminant level (MCL) used in Washington State for drinking water protection. The state's new arsenic criteria took into account existing scientific data, high concentrations of naturally occurring arsenic in the State of Washington, and EPA's CWA approval of 10 µg/L total arsenic criteria in almost all other western states.

Ecology intended the new total arsenic criteria to supersede the inorganic arsenic human health criteria adopted for the State of Washington by the EPA in the 1992 National Toxics Rule (NTR; 40 CFR 131.36). The EPA's 1992 risk based human health criterion for marine waters is 0.14 µg/L inorganic arsenic, and is based on exposure from fish and shellfish tissue ingestion. The freshwater criterion is 0.018 µg/L, and is based on exposure from fish and shellfish tissue and surface water ingestion. The 2016 arsenic criteria adopted by Ecology eliminated uncertainties associated with the cancer potency factor used by the EPA in the 1992 NTR arsenic standards. However, the EPA disapproved Ecology's proposed total arsenic criteria in November 2016 and retained the inorganic arsenic human health criteria set in the 1992 NTR. The EPA's Technical Support Document for the approval/disapproval of Washington's Human Health Water Quality Criteria states that the federal agency intends to conduct a toxicological review of inorganic arsenic in 2017. The work has not yet been completed. This toxicological review could lead to an opportunity for Ecology to participate in a national dialogue associated with the update of the arsenic criteria in section 304(a) of the Clean Water Act. Until the EPA inorganic arsenic review is completed, scientific information is updated, and Washington State adopts into rule EPA CWA-approvable new total or inorganic arsenic criteria, the EPA's existing marine and freshwater inorganic arsenic criteria remain in effect at 0.14 and 0.018 µg/L.

The EPA's disapproval of Washington's new total arsenic criteria continues to create several difficulties in the wastewater discharge permitting process. One issue, as mentioned above, involves natural background concentrations of both marine and freshwaters that exceed the criteria. This can be particularly problematic for groundwater-sourced drinking waters with arsenic concentrations above 0.018 µg/L, which then pass through wastewater treatment plants after initial use. In this situation, no implementation tool exists to account for the naturally occurring element in the drinking water source. Intake credits do not apply in this situation because the source water and the receiving water must be the same body of water or proven to be hydraulically connected. Another issue is the lack of a 40 CFR 136-approved analytical method for inorganic arsenic that can be used for compliance assessment. Evaluation of point source discharges for effluent limit compliance must use 40 CFR 136 methods. The current 40 CFR 136-approved method for arsenic measures the total recoverable portion of the metal, and does not differentiate the inorganic portion. The lack of federally approved translators for inorganic-to-total recoverable arsenic in discharges increases the difficulty in assigning an effluent limitation for discharges to surface waters.

Attainment of Washington's inorganic arsenic criteria remains challenging if not improbable. At best, current treatment technologies may be capable of arsenic removal to approximate concentrations ranging from 0.5-1 µg/L. The difference between the best available treatment technology and numeric effluent limits based on the criteria creates difficulty for both existing and proposed discharges. Ecology intends to continue to pursue a solution to the regulatory issue of groundwater sources with high arsenic concentrations that would cause treatment plant effluent to exceed effluent limits based on the numeric criteria.

Where numeric effluent limits are infeasible, 40 CFR 122.44(k) provides for the use of Best Management Practices (BMPs) to control or abate the discharge of pollutants. This provision in the federal regulations provides the basis for Ecology's permitting strategy for inorganic arsenic until the EPA revisits their criteria development procedures and develops site specific total-to-inorganic arsenic translators for individual dischargers. Components of Ecology's permitting strategy include permit requirements to monitor for total recoverable arsenic, implementation of source control BMPs, and an adaptive management process to refine BMPs for continuous pollutant minimization. While numeric effluent limits based on the human health inorganic arsenic criteria remain infeasible, Washington NPDES permits will continue to contain numeric effluent limits for arsenic based on best available treatment technology and aquatic life-based criteria as appropriate.

This permit requires ongoing monitoring of Arsenic as part of the regular priority pollutant scan. The permit does not contain an Arsenic limit because of the above, so the focus will be on source control and pollutant minimization.

I. Sediment Quality

The aquatic sediment standards (chapter 173-204 WAC) protect aquatic biota and human health. Under these standards Ecology may require a facility to evaluate the potential for its discharge to cause a violation of sediment standards (WAC 173-204-400). You can obtain additional information about sediments at the Aquatic Lands Cleanup Unit website. https://ecology.wa.gov/Spills-Cleanup/Contamination-cleanup/Sediment-cleanups.

Due to the fact that the area is regularly dredged by the Corp of Engineers, it is unlikely that toxic sediments have built up over the years. No sediment monitoring is required at the outfall site.

J. Whole Effluent Toxicity

The water quality standards for surface waters forbid discharge of effluent that has the potential to cause toxic effects in the receiving waters. Many toxic pollutants cannot be measured by commonly available detection methods. However, laboratory tests can measure toxicity directly by exposing living organisms to the wastewater and measuring their responses. These tests measure the aggregate toxicity of the whole effluent, so this approach is called WET testing. Some WET tests measure acute toxicity and other WET tests measure chronic toxicity.

- *Acute toxicity tests measure mortality as the significant response* to the toxicity of the effluent. Dischargers who monitor their wastewater with acute toxicity tests find early indications of any potential lethal effect of the effluent on organisms in the receiving water.

- *Chronic toxicity tests measure various sublethal toxic responses*, such as reduced growth or reproduction. Chronic toxicity tests often involve either a complete life cycle test on an organism with an extremely short life cycle, or a partial life cycle test during a critical stage of a test organism's life. Some chronic toxicity tests also measure organism survival.

  Laboratories accredited by Ecology for WET testing know how to use the proper WET testing protocols, fulfill the data requirements, and submit results in the correct reporting format. Accredited laboratory staff know about WET testing and how to calculate an NOEC, LC50, EC50, IC25, etc. Ecology gives all accredited labs the most recent version of Ecology Publication No. WQ-R-95-80, *Laboratory Guidance and Whole Effluent Toxicity Test Review Criteria* (https://fortress.wa.gov/ecy/publications/documents/9580.pdf), which is referenced in the permit. Ecology recommends that Three Rivers WWTP staff send a copy of the acute or chronic toxicity sections(s) of its NPDES permit to the laboratory.

  WET testing conducted during effluent characterization showed no reasonable potential for effluent discharges to cause receiving water acute or chronic toxicity. The proposed permit will not include an acute or chronic WET limit. Three Rivers WWTP must retest the effluent before submitting an application for permit renewal.

- If this facility makes process or material changes which, in Ecology's opinion, increase the potential for effluent toxicity, then Ecology may (in a regulatory order, by permit modification, or in the permit renewal) require the facility to conduct additional effluent characterization. Three Rivers WWTP may demonstrate to Ecology that effluent toxicity has not increased by performing additional WET testing and/or chemical analyses after the process or material changes have been made. Ecology recommends that the Permittee check with it first to make sure that Ecology will consider the demonstration adequate to support a decision to not require an additional effluent characterization.

- If WET testing conducted for submittal with a permit application fails to meet the performance standards in WAC 173-205-020, Ecology will assume that effluent toxicity has increased.

K. Groundwater Quality Limits

The groundwater quality standards (chapter 173-200 WAC) protect beneficial uses of groundwater. Permits issued by Ecology must not allow violations of those standards (WAC 173-200-100).

The Three Rivers WWTP does not discharge wastewater to the ground. No permit limits are required to protect groundwater.

L. Comparison of Effluent Limits and Benchmarks with the Previous Permit Issued on October 24, 2012

Table 14 Comparison of Previous and Proposed Effluent Limits and Benchmarks

		Previous Effluent Limits: Outfall # 001		**Proposed Effluent Limits & Benchmarks: Outfall # 001**	
Parameter	**Basis of Limit**	**Average Monthly**	**Average Weekly**	**Average Monthly**	**Average Weekly**
Carbonaceous Biochemical Oxygen Demand (5-day)	Technology	25 mg/L 3,978 lbs/day 85% removal of influent $CBOD_5$	40 mg/L 5,867 lbs/day	25 mg/L 3,900 lbs/day 85% removal of influent $CBOD_5$	40 mg/L 5,850 lbs/day
Total Suspended Solids	Technology	30 mg/L 4,815 lbs/day 85% removal of influent TSS	45 mg/L 7,223 lbs/day	30 mg/L 4,815 lbs/day 85% removal of influent TSS	45 mg/L 7,223 lbs/day
Total Ammonia (as NH_3-N) May through October	Water Quality	15 mg/L 3,253 lbs/day	33.7 mg/L 7,308 lbs/day	No limit	No limit
Total Ammonia (as NH3-N) November through April	Water Quality	22.8 mg/L 4,944 lbs/day	51.5 mg/L 11,167 lbs/day	No limit	No limit
Total Ammonia (as N) May through October	Effluent Benchmark	No Limit	No Limit	15 mg/L	No Limit
Total Ammonia (as N) November through April	Effluent Benchmark	No Limit	No Limit	22.8 mg/L	No Limit

		Previous Effluent Limits: Outfall # 001		**Proposed Effluent Limits & Benchmarks: Outfall # 001**	
Parameter	**Basis of Limit**	**Monthly Geometric Mean Limit**	**Weekly Geometric Mean Limit**	**Monthly Geometric Mean Limit**	**Weekly Geometric Mean Limit**
Fecal Coliform Bacteria, #/100 mL	Technology	200	400	200	400
		Previous Effluent Limits: Outfall # 001		**Proposed Effluent Limits & Benchmarks: Outfall # 001**	
Parameter	**Basis of Limit**	**Limit**		**Limit**	
pH, Std units	Technology	6 – 9		6 - 9	
Parameter	**Basis of Limit**	**Average Monthly**	**Average Weekly**	**Average Monthly**	**Average Weekly**
Total Residual Chlorine	Water Quality	0.03 mg/L, 7 lbs/day	0.09 mg/L, 20 lbs/day	0.03 mg/L, 7 lbs/day	0.09 mg/L, 20 lbs/day
Heat Load	TMDL WLA	No Limit	No Limit	3.19×10^9 kcal/day	No Limit

The permit eliminates the Ammonia limit and replaces it with a benchmark. It was discovered that after the plant staff mastered the operation of the solids handling process (centrifuge and RDP, Ammonia levels in the effluent dropped dramatically so that concentrations no longer trigger a reasonable potential to violate Water Quality Standards (Windward, 2014, Table 2 and Figure 5). Eliminating the effluent limit is consistent with Ecology guidance on anti-backsliding (Permit Writer's Manual, pages 29-30). The new benchmark value will alert operators to changes in operations that would raise seasonal effluent concentrations to a level (approximately 15 mg/L and 23 mg/L, respectively) that could trigger the need for effluent limits. Current effluent concentrations are generally well below these values. Three Rivers has not had a monthly average over 15 mg/L in the last 10 years, and has only had a handful of single sample results that have exceeded the benchmark, the maximum of which was 18.5 mg/L. While the benchmark is only strictly needed in the summer months to prevent Ammonia toxicity, benchmarks are applied year round to assure Three Rivers does not violate water quality standards, maintains past levels of performance and continues to reduce Ammonia. The winter time benchmark matches the old winter limit. The benchmarks also help ensure that future effluent concentrations do not violate anti-degradation requirements, as referenced in Ecology guidance on anti-backsliding.

Note: Prior to 11/4/12, Three Rivers was testing Ammonia monthly.

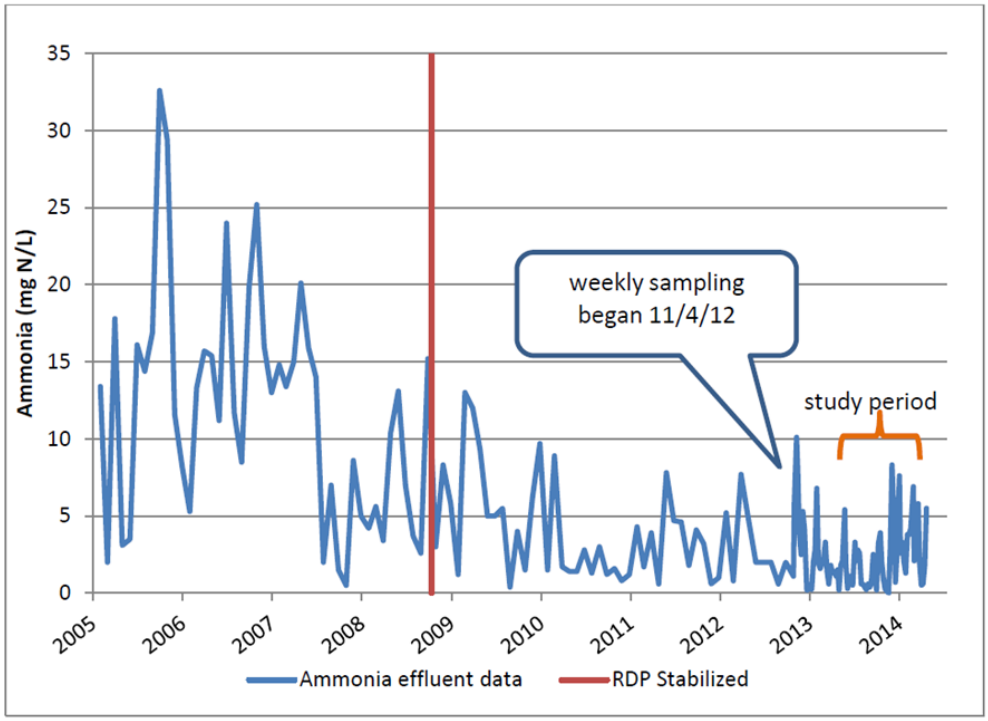


Figure 5. Effluent total ammonia before and after RDP process was stabilized

Table 2. Summary of effluent total ammonia data

Season[a]	Minimum Conc. (mg N/L)	Average Conc. (mg N/L)	Maximum Conc. (mg N/L)	95th Percentile Anti-log (mg N/L)[b]	Coefficient of Variation	No. of Samples
Dry	0.2	1.6	5.4	3.7	0.87	26
Spring	0.2	2.0	5.8	5.5	0.89	19
Summer	0.2	1.2	3.3	3.0	0.91	13
Fall	0.2	2.1	3.9	3.7	0.70	6

[a] Dry season is May through October. Dates used to define seasons were March 20 to June 20 (spring), June 21 to September 21 (summer), and September 22 to December 20 (fall).

[b] Value used in RPA if number of samples ≥ 20.

RPA – reasonable potential analysis

IV. MONITORING REQUIREMENTS

Ecology requires monitoring, recording, and reporting (WAC 173-220-210 and 40 CFR 122.41) to verify that the treatment process is functioning correctly and that the discharge complies with the permit's effluent limits.

If a facility uses a contract laboratory to monitor wastewater, it must ensure that the laboratory uses the methods and meets or exceeds the method detection levels required by the permit. The permit describes when facilities may use alternative methods. It also describes what to do in certain situations when the laboratory encounters matrix effects. When a facility uses an alternative method as allowed by the permit,

it must report the test method, Detection Level (DL), and Quantitation Level (QL) on the discharge monitoring report or in the required report.

A. Wastewater Monitoring

The monitoring schedule is detailed in the proposed permit under Special Condition S2. Specified monitoring frequencies take into account the quantity and variability of the discharge, the treatment method, past compliance, significance of pollutants, and cost of monitoring. The required monitoring frequency is consistent with agency guidance given in the current version of Ecology's *Permit Writer's Manual* (Publication Number 92-109) for a major activated sludge plant.

The previous permit reduced the monitoring frequency for $CBOD_5$ and TSS from five days a week to three days a week based on Ecology's *Permit Writer's Manual*, Chapter 13, Section 1.3.3. At the time of the previous permit, the effluent values for $CBOD_5$ and TSS had stayed below 25 percent of their permit limits for the previous two years, allowing the reduction in monitoring. The exemplary performance at the Three Rivers WWTP allows the continuation of the three days per week monitoring for this permit term. Ecology may increase the frequency of monitoring, if loading to the plant dramatically increases, the effluent concentrations increase greatly, or if the removal efficiency significantly deteriorates.

The previous permit increased Total Ammonia monitoring to weekly, which is being maintained in this permit. Ecology added influent Ammonia sampling to this permit (1/week) to provide a better accounting of oxygen demand substances in influent wastewater.

Monitoring of sludge quantity and quality is necessary to determine the appropriate uses of the sludge. Biosolids monitoring is required by the current state and local Solid Waste Management Program and also by EPA under 40 CFR 503.

As a major discharger that has local limits, Three Rivers WWTP is required to sample influent, final effluent, and sludge for toxic pollutants in order to characterize the industrial input. Sampling is also done to determine if pollutants interfere with the treatment process or pass-through the plant to the sludge or the receiving water. The monitoring data can be used to confirm the local limits which commercial and industrial users must meet.

B. Lab Accreditation

Ecology requires that facilities must use a laboratory registered or accredited under the provisions of chapter 173-50 WAC, Accreditation of Environmental Laboratories, to prepare all monitoring data (with the exception of certain parameters). Ecology accredited the laboratory at this facility for:

Table 15 Accredited Parameters

Parameter Name	Category	Method Name	Matrix Description
Solids, Total Suspended	General Chemistry	SM 2540 D-2011	Non-Potable Water
Chlorine (Residual), Total	General Chemistry	SM 4500-Cl G-2011	Non-Potable Water

Parameter Name	Category	Method Name	Matrix Description
pH	General Chemistry	SM 4500-H+ B-2011	Non-Potable Water
Dissolved Oxygen	General Chemistry	SM 4500-O G-2011	Non-Potable Water
Biochemical Oxygen Demand (BOD), Carbonaceous BOD (CBOD)	General Chemistry	SM 5210 B-2011	Non-Potable Water
Fecal coliform-count	Microbiology	SM 9222 D (mFC)-06	Non-Potable Water

V. OTHER PERMIT CONDITIONS

A. Reporting and Record Keeping

Ecology based Special Condition S3 on its authority to specify any appropriate reporting and record keeping requirements to prevent and control waste discharges (WAC 173-220-210).

B. Prevention of Facility Overloading

Overloading of the treatment plant is a violation of the terms and conditions of the permit. To prevent this from occurring, RCW 90.48.110 and WAC 173-220-150 require Three Rivers WWTP to:

- Take the actions detailed in proposed permit Special Condition S4.
- Design and construct expansions or modifications before the treatment plant reaches existing capacity.
- Report and correct conditions that could result in new or increased discharges of pollutants.

Special Condition S4 restricts the amount of flow.

C. Operation and Maintenance (O&M)

The proposed permit contains Special Condition S5 as authorized under RCW 90.48.110, WAC 173-220-150, chapter 173-230 WAC, and WAC 173-240-080. Ecology included it to ensure proper operation and regular maintenance of equipment, and to ensure that Three Rivers WWTP takes adequate safeguards so that it uses constructed facilities to their optimum potential in terms of pollutant capture and treatment.

D. Pretreatment

Duty to Enforce Discharge Prohibitions

This provision prohibits the Publicly Owned Treatment Works (POTW) from authorizing or permitting an industrial discharger to discharge certain types of waste into the sanitary sewer.

1. The first section of the pretreatment requirements prohibits the POTW from accepting pollutants which causes "pass-through" or "interference." This general prohibition is from 40 CFR §403.5(a). **Appendix C** of this fact sheet defines these terms.

2. The second section reinforces a number of specific state and federal pretreatment prohibitions found in WAC 173-216-060 and 40 CFR §403.5(b). These reinforce that the POTW may not accept certain wastes, which:

    a. Are prohibited due to dangerous waste rules

    b. Are explosive or flammable

    c. Have too high or low of a pH (too corrosive, acidic or basic)

    d. May cause a blockage such as grease, sand, rocks, or viscous materials

    e. Are hot enough to cause a problem

    f. Are of sufficient strength or volume to interfere with treatment

    g. Contain too much petroleum-based oils, mineral oil, or cutting fluid

    h. Create noxious or toxic gases at any point

    Forty (40) CFR Part 403 contains the regulatory basis for these prohibitions, with the exception of the pH provisions which are based on WAC 173-216-060.

3. The third section of pretreatment conditions reflects state prohibitions on the POTW accepting certain types of discharges unless the discharge has received prior written authorization from Ecology. These discharges include:

    a. Cooling water in significant volumes

    b. Stormwater and other direct inflow sources

    c. Wastewaters significantly affecting system hydraulic loading, which do not require treatment

Federal and State Pretreatment Program Requirements

Ecology administers the Pretreatment Program under the terms of the addendum to the "Memorandum of Understanding between Washington Department of Ecology and the United States Environmental Protection Agency, Region 10" (1986) and 40 CFR, part 403. Under this delegation of authority, Ecology issues wastewater discharge permits for significant industrial users (SIUs) discharging to POTWs which have not been delegated authority to issue wastewater discharge permits. Ecology must approve, condition, or deny new discharges or a significant increase in the discharge for existing significant industrial users (SIUs) [40 CFR 403.8 (f)(1)(i) and (iii)].

Industrial dischargers must obtain a permit from Ecology before discharging waste to the Three Rivers WWTP [WAC 173-216-110(5)]. Industries discharging wastewater that is similar in character to domestic wastewater do not require a permit.

Routine Identification and Reporting of Industrial Users

The permit requires non-delegated POTWs to take "continuous, routine measures to identify all existing, new, and proposed Significant Industrial Users (SIUs) and Potential Significant Industrial Users (PSIUs)" discharging to their sewer system. Examples of such routine measures include regular review of water and sewer billing records, business license and building permit applications, advertisements, and personal reconnaissance. System maintenance personnel should be trained on what to look for so they can identify and report new industrial dischargers in the course of performing their jobs. The POTW may not allow SIUs to discharge prior to receiving a permit, and must notify all industrial dischargers (significant or not) in writing of their responsibility to apply for a State Waste Discharge Permit. The POTW must send a copy of this notification to Ecology.

Requirements for Performing an Industrial User Survey

This POTW has the potential to serve significant industrial or commercial users and must conduct an Industrial User (IU) survey. The purpose of the IU Survey is to identify all facilities that may be subject to pretreatment standards or requirements so that Ecology can take appropriate measures to control these discharges. The POTW should identify each such user, and require them to apply for a permit before allowing their discharge to the POTW to commence. For SIUs, the POTW must require they actually are issued a permit prior to accepting their discharge. The steps the POTW must document in their IU Survey submittal include:

1. The POTW must develop a master list of businesses that may be subject to pretreatment standards and requirements and show their disposition. This list must be based on several sources of information including business licenses, and water and sewer billing records.

2. The POTW must canvas all the potential sources, having them either complete a survey form or ruling them out by confirming they only generate domestic wastewater.

3. The POTW must develop a list of the SIUs and potential SIUs in all areas served by the POTW. The list must contain sufficient information on each to allow Ecology to decide which discharges merit further controls such as a state waste discharge permit.

Ecology describes the information needed in IU Survey submittals to allow Ecology to make permitting decision in the manual "Performing an Industrial User Survey." Properly completing an Industrial User Survey helps Ecology control discharges that may otherwise harm the POTW including its collection system, processes, and receiving waters. Where surveys are incomplete, Ecology may take such enforcement as appropriate and/or require the POTW to develop a fully delegated pretreatment program.

The proposed permit requires the Three Rivers WWTP to conduct an industrial user survey to determine the extent of compliance of all industrial users of the sanitary sewer and wastewater treatment facility with federal pretreatment regulations [40 CFR Part 403 and Sections 307(b) and 308 of the Clean Water Act)], with state regulations (chapter 90.48 RCW and chapter 173-216 WAC), and with local ordinances.

E. Solid Wastes

To prevent water quality problems the facility is required in permit Special Condition S7 to store and handle all residual solids (grit, screenings, scum, sludge, and other solid waste) in accordance with the requirements of RCW 90.48.080 and state water quality standards.

The final use and disposal of sewage sludge from this facility is regulated by U.S. EPA under 40 CFR 503, and by Ecology under chapter 70.95J RCW, chapter 173-308 WAC "Biosolids Management," and chapter 173-350 WAC "Solid Waste Handling Standards." The disposal of other solid waste is under the jurisdiction of the Cowlitz County Health Department.

Requirements for monitoring sewage sludge and record keeping are included in this permit. Ecology will use this information, required under 40 CFR 503, to develop or update local limits.

F. Outfall Evaluation

The proposed permit requires the Three Rivers Regional Wastewater Authority to conduct an outfall inspection and submit a report detailing the findings of that inspection (Special Condition S9). The inspection must evaluate the physical condition of the discharge pipe and diffusers, and evaluate the extent of sediment accumulations in the vicinity of the outfall.

G. General Conditions

Ecology bases the standardized General Conditions on state and federal law and regulations. They are included in all individual domestic wastewater NPDES permits issued by Ecology.

VI. PERMIT ISSUANCE PROCEDURES

A. Permit Modifications

Ecology may modify this permit to impose numerical limits, if necessary to comply with water quality standards for surface waters, with sediment quality standards, or with water quality standards for groundwaters, based on new information from sources such as inspections, effluent monitoring, outfall studies, and effluent mixing studies.

Ecology may also modify this permit to comply with new or amended state or federal regulations.

B. Proposed Permit Issuance

This proposed permit meets all statutory requirements for Ecology to authorize a wastewater discharge. The permit includes limits and conditions to protect human health and aquatic life, and the beneficial uses of waters of the state of Washington. Ecology proposes to issue this permit for a term of five years.

VII. REFERENCES FOR TEXT AND APPENDICES

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Permit and Wastewater Related Information

https://ecology.wa.gov/Regulations-Permits/Guidance-technical-assistance/Water-quality-permits-guidance

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APPENDIX A--PUBLIC INVOLVEMENT INFORMATION

Ecology proposes to reissue a permit to the Three Rivers Regional Wastewater Authority. The permit includes wastewater discharge limits and other conditions. This fact sheet describes the facility and Ecology's reasons for requiring permit conditions.

Ecology placed a Public Notice of Application on June 12, 2018; June 19, 2018; June 4, 2019; and June 11, 2019; in the *Longview Daily News* to inform the public about the submitted application and to invite comment on the reissuance of this permit.

Ecology will place a Public Notice of Draft on October 20, 2020, in the *Longview Daily News* to inform the public and to invite comment on the proposed draft National Pollutant Discharge Elimination System permit and fact sheet.

The notice:

- Tells where copies of the draft permit and fact sheet are available for public evaluation (a local public library, the closest regional or field office, posted on our website).
- Offers to provide the documents in an alternate format to accommodate special needs.
- Asks people to tell us how well the proposed permit would protect the receiving water.
- Invites people to suggest fairer conditions, limits, and requirements for the permit.
- Invites comments on Ecology's determination of compliance with antidegradation rules.
- Urges people to submit their comments, in writing, before the end of the comment period.
- Tells how to request a public hearing about the proposed NPDES permit.
- Explains the next step(s) in the permitting process.

Ecology has published a document entitled *Frequently Asked Questions about Effective Public Commenting*, which is available on our website at https://fortress.wa.gov/ecy/publications/documents/0307023.pdf.

You may obtain further information from Ecology by telephone, 360-407-6278, or by writing to the address listed below.

Water Quality Permit Coordinator
Department of Ecology
Southwest Regional Office
PO Box 47775
Olympia, WA 98504-7775

The primary authors of this permit and fact sheet are Al Bolinger and Dave Dougherty.

APPENDIX B --YOUR RIGHT TO APPEAL

You have a right to appeal this permit to the Pollution Control Hearing Board (PCHB) within 30 days of the date of receipt of the final permit. The appeal process is governed by chapter 43.21B RCW and chapter 371-08 WAC. "Date of receipt" is defined in RCW 43.21B.001(2) (see glossary).

To appeal you must do the following within 30 days of the date of receipt of this permit:

- File your appeal and a copy of this permit with the PCHB (see addresses below). Filing means actual receipt by the PCHB during regular business hours.
- Serve a copy of your appeal and this permit on Ecology in paper form - by mail or in person. (See addresses below.) E-mail is not accepted.

You must also comply with other applicable requirements in chapter 43.21B RCW and chapter 371-08 WAC.

ADDRESS AND LOCATION INFORMATION

Street Addresses	Mailing Addresses
Department of Ecology Attn: Appeals Processing Desk 300 Desmond Drive Southeast Lacey, WA 98503 **Pollution Control Hearings Board** 1111 Israel Road Southwest, Suite 301 Tumwater, WA 98501	**Department of Ecology** Attn: Appeals Processing Desk PO Box 47608 Olympia, WA 98504-7608 **Pollution Control Hearings Board** PO Box 40903 Olympia, WA 98504-0903

APPENDIX C--GLOSSARY

1-DMax or 1-day maximum Temperature -- The highest water Temperature reached on any given day. This measure can be obtained using calibrated maximum/minimum thermometers or continuous monitoring probes having sampling intervals of thirty minutes or less.

7-DADMax or 7-day average of the daily maximum Temperatures -- The arithmetic average of seven consecutive measures of daily maximum Temperatures. The 7-DADMax for any individual day is calculated by averaging that day's daily maximum Temperature with the daily maximum Temperatures of the three days prior and the three days after that date.

Acute toxicity --The lethal effect of a compound on an organism that occurs in a short time period, usually 48 to 96 hours.

AKART -- The acronym for "all known, available, and reasonable methods of prevention, control and treatment." AKART is a technology-based approach to limiting pollutants from wastewater discharges, which requires an engineering judgment and an economic judgment. AKART must be applied to all wastes and contaminants prior to entry into waters of the state in accordance with RCW 90.48.010 and 520, WAC 173-200-030(2)(c)(ii), and WAC 173-216-110(1)(a).

Alternate point of compliance -- An alternative location in the groundwater from the point of compliance where compliance with the groundwater standards is measured. It may be established in the groundwater at locations some distance from the discharge source, up to, but not exceeding the property boundary and is determined on a site specific basis following an AKART analysis. An "early warning value" must be used when an alternate point is established. An alternate point of compliance must be determined and approved in accordance with WAC 173-200-060(2).

Ambient water quality -- The existing environmental condition of the water in a receiving water body.

Ammonia -- Ammonia is produced by the breakdown of nitrogenous materials in wastewater. Ammonia is toxic to aquatic organisms, exerts an oxygen demand, and contributes to eutrophication. It also increases the amount of chlorine needed to disinfect wastewater.

Annual average design flow (AADF -- average of the daily flow volumes anticipated to occur over a calendar year.

Average monthly (intermittent) discharge limit-- The average of the measured values obtained over a calendar months' time taking into account zero discharge days.

Average monthly discharge limit -- The average of the measured values obtained over a calendar months' time.

Background water quality -- The concentrations of chemical, physical, biological or radiological constituents or other characteristics in or of groundwater at a particular point in time upgradient of an activity that has not been affected by that activity, [WAC 173-200-020(3)]. Background water quality for any parameter is statistically defined as the 95% upper tolerance interval with a 95% confidence based on at least eight hydraulically upgradient water quality samples. The eight samples are collected over a period of at least one year, with no more than one sample collected during any month in a single calendar year.

Best management practices (BMPs) -- Schedules of activities, prohibitions of practices, maintenance procedures, and other physical, structural and/or managerial practices to prevent or reduce the pollution of waters of the state. BMPs include treatment systems, operating procedures, and practices to control: plant site runoff, spillage or leaks, sludge or waste disposal, or drainage from raw material storage. BMPs may be further categorized as operational, source control, erosion and sediment control, and treatment BMPs.

BOD_5 -- Determining the five-day Biochemical Oxygen Demand of an effluent is an indirect way of measuring the quantity of organic material present in an effluent that is utilized by bacteria. The BOD5 is used in modeling to measure the reduction of dissolved oxygen in receiving waters after effluent is discharged. Stress caused by reduced dissolved oxygen levels makes organisms less competitive and less able to sustain their species in the aquatic environment. Although BOD_5 is not a specific compound, it is defined as a conventional pollutant under the federal Clean Water Act.

Bypass -- The intentional diversion of waste streams from any portion of a treatment facility.

Categorical pretreatment standards -- National pretreatment standards specifying quantities or concentrations of pollutants or pollutant properties, which may be discharged to a POTW by existing or new industrial users in specific industrial subcategories.

Chlorine -- A chemical used to disinfect wastewaters of pathogens harmful to human health. It is also extremely toxic to aquatic life.

Chronic toxicity -- The effect of a compound on an organism over a relatively long time, often 1/10 of an organism's lifespan or more. Chronic toxicity can measure survival, reproduction or growth rates, or other parameters to measure the toxic effects of a compound or combination of compounds.

Clean water act (CWA -- The federal Water Pollution Control Act enacted by Public Law 92-500, as amended by Public Laws 95-217, 95-576, 96-483, 97-117; USC 1251 et seq.

Compliance inspection-without sampling -- A site visit for the purpose of determining the compliance of a facility with the terms and conditions of its permit or with applicable statutes and regulations.

Compliance inspection-with sampling -- A site visit for the purpose of determining the compliance of a facility with the terms and conditions of its permit or with applicable statutes and regulations. In addition it includes as a minimum, sampling and analysis for all parameters with limits in the permit to ascertain compliance with those limits; and, for municipal facilities, sampling of influent to ascertain compliance with the 85 percent removal requirement. Ecology may conduct additional sampling.

Composite sample -- A mixture of grab samples collected at the same sampling point at different times, formed either by continuous sampling or by mixing discrete samples. May be "time-composite" (collected at constant time intervals) or "flow-proportional" (collected either as a constant sample volume at time intervals proportional to stream flow, or collected by increasing the volume of each aliquot as the flow increased while maintaining a constant time interval between the aliquots).

Construction activity -- Clearing, grading, excavation, and any other activity, which disturbs the surface of the land. Such activities may include road building; construction of residential houses, office buildings, or industrial buildings; and demolition activity.

Continuous monitoring -- Uninterrupted, unless otherwise noted in the permit.

Critical condition -- The time during which the combination of receiving water and waste discharge conditions have the highest potential for causing toxicity in the receiving water environment. This situation usually occurs when the flow within a water body is low, thus, its ability to dilute effluent is reduced.

Date of receipt – This is defined in RCW 43.21B.001(2) as five business days after the date of mailing; or the date of actual receipt, when the actual receipt date can be proven by a preponderance of the evidence. The recipient's sworn affidavit or declaration indicating the date of receipt, which is unchallenged by the agency, constitutes sufficient evidence of actual receipt. The date of actual receipt, however, may not exceed forty-five days from the date of mailing.

Detection limit -- The minimum concentration of a substance that can be measured and reported with 99 percent confidence that the pollutant concentration is above zero and is determined from analysis of a sample in a given matrix containing the pollutant.

Dilution factor (DF) -- A measure of the amount of mixing of effluent and receiving water that occurs at the boundary of the mixing zone. Expressed as the inverse of the percent effluent fraction, for example, a dilution factor of 10 means the effluent comprises 10% by volume and the receiving water 90%.

Distribution uniformity -- The uniformity of infiltration (or application in the case of sprinkle or trickle irrigation) throughout the field expressed as a percent relating to the average depth infiltrated in the lowest one-quarter of the area to the average depth of water infiltrated.

Early warning value -- The concentration of a pollutant set in accordance with WAC 173-200-070 that is a percentage of an enforcement limit. It may be established in the effluent, groundwater, surface water, the vadose zone or within the treatment process. This value acts as a trigger to detect and respond to increasing contaminant concentrations prior to the degradation of a beneficial use.

Enforcement limit -- The concentration assigned to a contaminant in the groundwater at the point of compliance for the purpose of regulation, [WAC 173-200-020(11)]. This limit assures that a groundwater criterion will not be exceeded and that background water quality will be protected.

Engineering report -- A document that thoroughly examines the engineering and administrative aspects of a particular domestic or industrial wastewater facility. The report must contain the appropriate information required in WAC 173-240-060 or 173-240-130.

Fecal coliform bacteria -- Fecal coliform bacteria are used as indicators of pathogenic bacteria in the effluent that are harmful to humans. Pathogenic bacteria in wastewater discharges are controlled by disinfecting the wastewater. The presence of high numbers of fecal coliform bacteria in a water body can indicate the recent release of untreated wastewater and/or the presence of animal feces.

Grab sample -- A single sample or measurement taken at a specific time or over as short a period of time as is feasible.

Groundwater -- Water in a saturated zone or stratum beneath the surface of land or below a surface water body.

Industrial user -- A discharger of wastewater to the sanitary sewer that is not sanitary wastewater or is not equivalent to sanitary wastewater in character.

Industrial wastewater -- Water or liquid-carried waste from industrial or commercial processes, as distinct from domestic wastewater. These wastes may result from any process or activity of industry, manufacture, trade or business; from the development of any natural resource; or from animal operations such as feed lots, poultry houses, or dairies. The term includes contaminated stormwater and, also, leachate from solid waste facilities.

Interference -- A discharge which, alone or in conjunction with a discharge or discharges from other sources, both:

- Inhibits or disrupts the POTW, its treatment processes or operations, or its sludge processes, use or disposal; and

- Therefore is a cause of a violation of any requirement of the POTW's NPDES permit (including an increase in the magnitude or duration of a violation) or of the prevention of sewage sludge use or disposal in compliance with the following statutory provisions and regulations or permits issued thereunder (or more stringent State or local regulations): Section 405 of the Clean Water Act, the Solid Waste Disposal Act (SWDA) (including title II, more commonly referred to as the Resource Conservation and Recovery Act (RCRA), and including State regulations contained in any State sludge management plan prepared pursuant to subtitle D of the SWDA), sludge regulations appearing in 40 CFR Part 507, the Clean Air Act, the Toxic Substances Control Act, and the Marine Protection, Research and Sanctuaries Act.

Local limits -- Specific prohibitions or limits on pollutants or pollutant parameters developed by a POTW.

Major facility -- A facility discharging to surface water with an EPA rating score of > 80 points based on such factors as flow volume, toxic pollutant potential, and public health impact.

Maximum daily discharge limit -- The highest allowable daily discharge of a pollutant measured during a calendar day or any 24-hour period that reasonably represents the calendar day for purposes of sampling. The daily discharge is calculated as the average measurement of the pollutant over the day.

Maximum day design flow (MDDF) -- The largest volume of flow anticipated to occur during a one-day period, expressed as a daily average.

Maximum month design flow (MMDF) -- The largest volume of flow anticipated to occur during a continuous 30-day period, expressed as a daily average.

Maximum week design flow (MWDF) -- The largest volume of flow anticipated to occur during a continuous 7-day period, expressed as a daily average.

Method detection level (MDL) -- See Detection Limit.

Minor facility -- A facility discharging to surface water with an EPA rating score of < 80 points based on such factors as flow volume, toxic pollutant potential, and public health impact.

Mixing zone -- An area that surrounds an effluent discharge within which water quality criteria may be exceeded. The permit specifies the area of the authorized mixing zone that Ecology defines following procedures outlined in state regulations (chapter 173-201A WAC).

National pollutant discharge elimination system (NPDES) -- The NPDES (Section 402 of the Clean Water Act) is the federal wastewater permitting system for discharges to navigable waters of the United States. Many states, including the state of Washington, have been delegated the authority to issue these permits. NPDES permits issued by Washington State permit writers are joint NPDES/State permits issued under both state and federal laws.

pH -- The pH of a liquid measures its acidity or alkalinity. It is the negative logarithm of the hydrogen ion concentration. A pH of 7 is defined as neutral and large variations above or below this value are considered harmful to most aquatic life.

Pass-through -- A discharge which exits the POTW into waters of the State in quantities or concentrations which, alone or in conjunction with a discharge or discharges from other sources, is a cause of a violation of any requirement of the POTW's NPDES permit (including an increase in the magnitude or duration of a violation), or which is a cause of a violation of State water quality standards.

Peak hour design flow (PHDF) -- The largest volume of flow anticipated to occur during a one-hour period, expressed as a daily or hourly average.

Peak instantaneous design flow (PIDF) -- The maximum anticipated instantaneous flow.

Point of compliance -- The location in the groundwater where the enforcement limit must not be exceeded and a facility must comply with the Ground Water Quality Standards. Ecology determines this limit on a site-specific basis. Ecology locates the point of compliance in the groundwater as near and directly downgradient from the pollutant source as technically, hydrogeologically, and geographically feasible, unless it approves an alternative point of compliance.

Potential significant industrial user (PSIU) --A potential significant industrial user is defined as an Industrial User that does not meet the criteria for a Significant Industrial User, but which discharges wastewater meeting one or more of the following criteria:

a. Exceeds 0.5 % of treatment plant design capacity criteria and discharges <25,000 gallons per day or;

b. Is a member of a group of similar industrial users which, taken together, have the potential to cause pass through or interference at the POTW (e.g. facilities which develop photographic film or paper, and car washes).
Ecology may determine that a discharger initially classified as a potential significant industrial user should be managed as a significant industrial user.

Quantitation level (QL) -- Also known as Minimum Level of Quantitation (ML) – The lowest level at which the entire analytical system must give a recognizable signal and acceptable calibration point for the analyte. It is equivalent to the concentration of the lowest calibration standard, assuming that the lab has used all method-specified sample weights, volumes, and cleanup procedures. The QL is calculated by multiplying the MDL by 3.18 and rounding the result to the number nearest to (1, 2, or 5) x 10^n, where n is an integer. (64 FR 30417). ALSO GIVEN AS: The smallest detectable concentration of analyte greater than the Detection Limit (DL) where the accuracy (precision & bias) achieves the objectives of the intended purpose. (Report of the Federal Advisory Committee on Detection and Quantitation Approaches and Uses in Clean Water Act Programs Submitted to the US Environmental Protection Agency December 2007).

Reasonable potential -- A reasonable potential to cause a water quality violation, or loss of sensitive and/or important habitat.

Responsible corporate officer -- A president, secretary, treasurer, or vice-president of the corporation in charge of a principal business function, or any other person who performs similar policy- or decision-making functions for the corporation, or the manager of one or more manufacturing, production, or operating facilities employing more than 250 persons or have gross annual sales or expenditures exceeding $25 million (in second quarter 1980 dollars), if authority to sign documents has been assigned or delegated to the manager in accordance with corporate procedures (40 CFR 122.22).

Sample Maximum -- No sample may exceed this value.

Sewage Sludge – the solid, semisolid, or liquid residue generated during the treatment of domestic sewage in a treatment works.

Significant industrial user (SIU) --

1) All industrial users subject to Categorical Pretreatment Standards under 40 CFR 403.6 and 40 CFR Chapter I, Subchapter N and;

2) Any other industrial user that: discharges an average of 25,000 gallons per day or more of process wastewater to the POTW (excluding sanitary, noncontact cooling, and boiler blow-down wastewater); contributes a process wastestream that makes up 5 percent or more of the average dry weather hydraulic or organic capacity of the POTW treatment plant; or is designated as such by the Control Authority* on the basis that the industrial user has a reasonable potential for adversely affecting the POTW's operation or for violating any pretreatment standard or requirement [in accordance with 40 CFR 403.8(f)(6)].

Upon finding that the industrial user meeting the criteria in paragraph 2, above, has no reasonable potential for adversely affecting the POTW's operation or for violating any pretreatment standard or requirement, the Control Authority* may at any time, on its own initiative or in response to a petition received from an industrial user or POTW, and in accordance with 40 CFR 403.8(f)(6), determine that such industrial user is not a significant industrial user.

*The term "Control Authority" refers to the Washington State Department of Ecology in the case of non-delegated POTWs or to the POTW in the case of delegated POTWs.

Slug discharge -- Any discharge of a non-routine, episodic nature, including but not limited to an accidental spill or a non-customary batch discharge to the POTW. This may include any pollutant released at a flow rate that may cause interference or pass through with the POTW or in any way violate the permit conditions or the POTW's regulations and local limits.

Soil scientist -- An individual who is registered as a Certified or Registered Professional Soil Scientist or as a Certified Professional Soil Specialist by the American Registry of Certified Professionals in Agronomy, Crops, and Soils or by the National Society of Consulting Scientists or who has the credentials for membership. Minimum requirements for eligibility are: possession of a baccalaureate, masters, or doctorate degree from a U.S. or Canadian institution with a minimum of 30 semester hours or 45 quarter hours professional core courses in agronomy, crops or soils, and have 5,3,or 1 years, respectively, of professional experience working in the area of agronomy, crops, or soils.

Solid waste -- All putrescible and non-putrescible solid and semisolid wastes including, but not limited to, garbage, rubbish, ashes, industrial wastes, swill, sewage sludge, demolition and construction wastes, abandoned vehicles or parts thereof, contaminated soils and contaminated dredged material, and recyclable materials.

Soluble BOD_5 -- Determining the soluble fraction of Biochemical Oxygen Demand of an effluent is an indirect way of measuring the quantity of soluble organic material present in an effluent that is utilized by bacteria. Although the soluble BOD_5 test is not specifically described in Standard Methods, filtering the raw sample through at least a 1.2 um filter prior to running the standard BOD_5 test is sufficient to remove the particulate organic fraction.

State waters -- Lakes, rivers, ponds, streams, inland waters, underground waters, salt waters, and all other surface waters and watercourses within the jurisdiction of the state of Washington.

Stormwater--That portion of precipitation that does not naturally percolate into the ground or evaporate, but flows via overland flow, interflow, pipes, and other features of a stormwater drainage system into a defined surface water body, or a constructed infiltration facility.

Technology-based effluent limit -- A permit limit based on the ability of a treatment method to reduce the pollutant.

Total coliform bacteria--A microbiological test, which detects and enumerates the total coliform group of bacteria in water samples.

Total dissolved solids--That portion of total solids in water or wastewater that passes through a specific filter.

Total maximum daily load (TMDL) --A determination of the amount of pollutant that a water body can receive and still meet water quality standards.

Total suspended solids (TSS) -- Total suspended solids is the particulate material in an effluent. Large quantities of TSS discharged to a receiving water may result in solids accumulation. Apart from any toxic effects attributable to substances leached out by water, suspended solids may kill fish, shellfish, and other aquatic organisms by causing abrasive injuries and by clogging the gills and respiratory passages of various aquatic fauna. Indirectly, suspended solids can screen out light and can promote and maintain the development of noxious conditions through oxygen depletion.

Upset -- An exceptional incident in which there is unintentional and temporary noncompliance with technology-based permit effluent limits because of factors beyond the reasonable control of the Permittee. An upset does not include noncompliance to the extent caused by operational error, improperly designed treatment facilities, lack of preventative maintenance, or careless or improper operation.

Water quality-based effluent limit -- A limit imposed on the concentration of an effluent parameter to prevent the concentration of that parameter from exceeding its water quality criterion after discharge into receiving waters.

APPENDIX D--TECHNICAL CALCULATIONS

Several of the Excel® spreadsheet tools used to evaluate a discharger's ability to meet Washington State water quality standards can be found in the PermitCalc workbook on Ecology's webpage at: https://ecology.wa.gov/Regulations-Permits/Guidance-technical-assistance/Water-quality-permits-guidance.

Simple Mixing:

Ecology uses simple mixing calculations to assess the impacts of certain conservative pollutants, such as the expected increase in fecal coliform bacteria at the edge of the chronic mixing zone boundary. Simple mixing uses a mass balance approach to proportionally distribute a pollutant load from a discharge into the authorized mixing zone. The approach assumes no decay or generation of the pollutant of concern within the mixing zone. The predicted concentration at the edge of a mixing zone (C_{mz}) is based on the following calculation:

$$C_{mz} = Ca + \frac{(Ce - Ca)}{DF}$$

where: Ce = Effluent Concentration
Ca = Ambient Concentration
DF = Dilution Factor

Reasonable Potential Analysis:

The spreadsheets Input 2 – Reasonable Potential, and LimitCalc in Ecology's PermitCalc Workbook determine reasonable potential (to violate the aquatic life and human health water quality standards) and calculate effluent limits. The process and formulas for determining reasonable potential and effluent limits in these spreadsheets are taken directly from the *Technical Support Document for Water Quality-based Toxics Control*, (EPA 505/2-90-001). The adjustment for autocorrelation is from EPA (1996a), and EPA (1996b).

Calculation of Water Quality-Based Effluent Limits:

Water quality-based effluent limits are calculated by the two-value wasteload allocation process as described on page 100 of the TSD (EPA, 1991) and shown below.

1. Calculate the acute wasteload allocation WLA_a by multiplying the acute criteria by the acute dilution factor and subtracting the background factor. Calculate the chronic wasteload allocation (WLA_c) by multiplying the chronic criteria by the chronic dilution factor and subtracting the background factor.

WLA_a = (acute criteria x DF_a) – [(background conc. x (DF_a - 1)]
WLA_c = (chronic criteria x DF_c) – [(background conc. x (DF_c -1)]
where: DF_a = Acute Dilution Factor
DF_c = Chronic Dilution Factor

2. Calculate the long term averages (LTA_a and LTA_c) which will comply with the wasteload allocations WLA_a and WLA_c.

$LTA_a = WLA_a \times e^{[0.5\sigma^2 - z\sigma]}$

where: $\sigma^2 = \ln[CV^2 + 1]$

$z = 2.326$

CV = coefficient of variation = std. dev/mean

$LTA_c = WLA_c \times e^{[0.5\sigma^2 - z\sigma]}$

where: $\sigma^2 = \ln[(CV^2 \square 4) + 1]$

$z = 2.326$

3. Use the smallest LTA of the LTA_a or LTA_c to calculate the maximum daily effluent limit and the monthly average effluent limit.

MDL = Maximum Daily Limit

$MDL = LTA \times e^{(Z\sigma - 0.5\sigma^2)}$

where: $\sigma^2 = \ln[CV^2 + 1]$

$z = 2.326$ (99th percentile occurrence)

LTA = Limiting long term average

AML = Average Monthly Limit

$AML = LTA \times e^{(Z\sigma_n - 0.5\sigma_n^2)}$

where: $\sigma^2 = \ln[(CV^2 \div n) + 1]$

n = number of samples/month

$z = 1.645$ (95^{th} % occurrence probability)

LTA = Limiting long term average

Instructions

Reasonable Potential Calculation

Facility	ree Rivers Regional W astewater Pl
Water Body Type	Freshwater
Rec. Water Hardness	37.1 mg/L

Dilution Factors:	Acute	Chronic
Aquatic Life	6.4	15.6
Human Health Carcinogenic		15.6
Human Health Non-Carcinogenic		15.6

Pollutant, CAS No. & NPDES Application Ref. No.			AMMONIA, Criteria as Total NH3	ANTIMONY (INORGANIC) 7440360 1M	ARSENIC (inorganic)	CADMIUM - 7440439 4M Hardness dependent	CHLORINE (Total Residual) 7782505	CHROMIUM(TRI) -16065831 5M Hardness dependent	COPPER - 744058 6M Hardness dependent	LEAD - 7439921 7M Dependent on hardness	MERCURY 7439976 8M	NICKEL - 7440020 9M - Dependent on hardness	SELENIUM 7782492 10M
Effluent Data	# of Samples (n)		26	5	17	15	26	4	5	5	5	5	5
	Coeff of Variation (Cv)		0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6
	Effluent Concentration, ug/L (Max. or 95th Percentile)		7,000	0.569	3.22	0.009	30	130	4.196	0.5448	0.02	0.00537	0.66
	Calculated 50th percentile Effluent Conc. (when n>10)												
Receiving Water Data	90th Percentile Conc., ug/L		36			0.04	0.4	0.8		0.08		0.51	
	Geo Mean, ug/L			0.14	0.9				1		0		0.2
Water Quality Criteria	Aquatic Life Criteria, ug/L	Acute	6,401	-	-	1.26306	19	243.6028	6.685413	21.6162	2.1	611.746	20
		Chronic	890	-	-	0.49491	11	79.02225	4.864742	0.84235	0.012	67.9394	5
	WQ Criteria for Protection of Human Health, ug/L		-	6	0.018	-	-	-	1300	-	0.14	80	60
	Metal Criteria Translator, decimal	Acute	-	-	-	0.943	-	0.316	0.996	0.466	0.85	0.998	-
		Chronic	-	-	-	0.943	-	0.86	0.996	0.466	-	0.997	-
	Carcinogen?		N	N	Y	N	N	N	N	N	N	N	N

Aquatic Life Reasonable Potential

Effluent percentile value			0.950			0.950	0.950	0.950	0.950	0.950	0.950	0.950	0.950
s	$s^2=\ln(CV^2+1)$		0.555			0.555	0.555	0.555	0.555	0.555	0.555	0.555	0.555
Pn	Pn=(1-confidence level)$^{1/n}$		0.891			0.819	0.891	0.473	0.549	0.549	0.549	0.549	0.549
Multiplier			1.00			1.50	1.00	2.59	2.32	2.32	2.32	2.32	2.32
Max concentration (ug/L) at edge of...		Acute	1,124			0.036	5.025	17.269	1.518	0.160	0.006	0.432	0.240
		Chronic	482			0.038	2.297	19.276	0.623	0.113	0.003	0.478	0.098
Reasonable Potential? Limit Required?			**NO**			**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**

Aquatic Life Limit Calculation

# of Compliance Samples Expected per month		
LTA Coeff. Var. (CV), decimal		
Permit Limit Coeff. Var. (CV), decimal		
Waste Load Allocations, ug/L	Acute	
	Chronic	
Long Term Averages, ug/L	Acute	
	Chronic	
Limiting LTA, ug/L		
Metal Translator or 1?		
Average Monthly Limit (AML), ug/L		
Maximum Daily Limit (MDL), ug/L		

Human Health Reasonable Potential

s	$s^2=\ln(CV^2+1)$			0.55451	0.554513				0.554513		0.55451	0.55451	0.55451
Pn	Pn=(1-confidence level)1/n			0.549	0.838				0.549		0.549	0.549	0.549
Multiplier				0.93363	0.578173				0.933632		0.93363	0.93363	0.93363
Dilution Factor				15.6	15.6				15.6		15.6	15.6	15.6
Max Conc. at edge of Chronic Zone, ug/L				0.16508	0.961649				1.2E+00		0.0012	0.00032	0.22668
Reasonable Potential? Limit Required?				**NO**	**YES**				**NO**		**NO**	**NO**	**NO**

Human Health Limit Calculation

# of Compliance Samples Expected per month	1
Average Monthly Effluent Limit, ug/L	**-12.8592**
Maximum Daily Effluent Limit, ug/L	**-18.7592**

Comments/Notes:

References: WAC 173-201A.
Technical Support Document for Water Quality-based Toxics Control, US EPA, March 1991, EPA/505/2-90-001, pages 56/99

Calculation of Fecal Coliform at Chronic Mixing Zone

INPUT	
Chronic Dilution Factor	15.6
Receiving Water Fecal Coliform, #/100 ml	18
Effluent Fecal Coliform - worst case, #/100 ml	400
Surface Water Criteria, #/100 ml	*100*
OUTPUT	
Fecal Coliform at Mixing Zone Boundary, #/100 ml	**42**
Difference between mixed and ambient, #/100 ml	24

Conclusion: At design flow, the discharge has no reasonable potential to violate water quality standards for fecal coliform.

Calculation of Dissolved Oxygen at Chronic Mixing Zone

INPUT	
Chronic Dilution Factor	15.6
Receiving Water DO Concentration, mg/L	9.1
Effluent DO Concentration, mg/L	10.0
Effluent Immediate DO Demand (IDOD), mg/L	1
Surface Water Criteria, mg/L	*8*
OUTPUT	
DO at Mixing Zone Boundary, mg/L	**9.09**
DO decrease caused by effluent at chronic boundary, mg/L	**0.01**

Conclusion: At design flow, the discharge has no reasonable potential to violate water quality standards for dissolved oxygen.

References: EPA/600/6-85/002b and EPA/430/9-82-011

Freshwater Un-ionized Ammonia Criteria Calculation

Based on Chapter 173-201A WAC, amended November 20, 2006

		mixed @ Acute Boundary	mixed @ Chronic Boundary	mixed @ Whole River
INPUT				
1. Receiving Water Temperature (deg C):	22.1	22.2	22.2	#VALUE!
2. Receiving Water pH:	7.9	7.9	7.9	#VALUE!
3. Is salmonid habitat an existing or designated use?	Yes	Yes	Yes	Yes
4. Are non-salmonid early life stages present or absent?	Present	Present	Present	Present
OUTPUT				
Using mixed temp and pH at mixing zone boundaries?		no		
Ratio	13.500	13.500	13.500	#VALUE!
FT	1.400	1.400	1.400	#VALUE!
FPH	1.036	1.042	1.039	#VALUE!
pKa	9.336	9.332	9.335	#VALUE!
Unionized Fraction	0.038	0.037	0.037	#VALUE!
Unionized ammonia NH3 criteria (mg/L as NH_3)				
Acute:	0.294	0.295	0.000	#VALUE!
Chronic:	0.041	0.041	0.041	#VALUE!
RESULTS				
Total ammonia nitrogen criteria (mg/L as N):				
Acute:	6.401	6.535		#VALUE!
Chronic:	0.890		0.895	#VALUE!

Freshwater Temperature Reasonable Potential and Limit Calculation

Based on WAC 173-201A-200(1)(c)(i)--(ii) and the Water Quality Program Guidance. All data inputs must meet WQ guidelines. The Water Quality temperature guidance document may be found at: https://fortress.wa.gov/ecy/publications/summarypages/0610100.html

	Core Summer Critera	Supplemental Criteria
INPUT	**July 1-Sept 14**	**Sept 15-July 1**
1. Chronic Dilution Factor at Mixing Zone Boundary	15.6	15.6
2. 7DADMax Ambient Temperature (T) (Upstream Background 90th percentile)	18.8 °C	
3. 7DADMax Effluent Temperature (95th percentile)	22.9 °C	
4. Aquatic Life Temperature WQ Criterion in Fresh Water	17.5 °C	
OUTPUT		
5. Temperature at Chronic Mixing Zone Boundary:	19.1 °C	0.0 °C
6. Incremental Temperature Increase or decrease:	0.3 °C	0.0 °C
7. Maximum Allowable Incremental Temperature Increase:	0.3 °C	0.3 °C
8. Maximum Allowable Temperature at Mixing Zone Boundary:	19.1 °C	0.3 °C
A. If ambient temp is warmer than WQ criterion		
9. Does temp fall within this warmer temp range?	YES	YES
10. Temperature Limit if Required:	NO LIMIT	NO LIMIT
B. If ambient temp is cooler than WQ criterion but within 28/(T_{amb}+7) and within 0.3 °C of the criterion		
11. Does temp fall within this incremental temp. range?	---	---
12. Temp increase allowed at mixing zone boundary, if required:	---	---
C. If ambient temp is cooler than (WQ criterion-0.3) but within 28/(T_{amb}+7) of the criterion		
13. Does temp fall within this Incremental temp. range?	---	---
14. Temp increase allowed at mixing zone boundary, if required:	---	---
D. If ambient temp is cooler than (WQ criterion - 28/(T_{amb}+7))		
15. Does temp fall within this Incremental temp. range?	---	---
16. Temp increase allowed at mixing zone boundary, if required:	---	---
RESULTS		
17. Do any of the above cells show a temp increase?	**NO**	**NO**
18. Temperature Limit if Required?	**NO LIMIT**	**NO LIMIT**

Calculation of pH of a Mixture of Two Flows

Based on the procedure in EPA's DESCON program (EPA, 1988. Technical Guidance on Supplementary Stream Design Conditions for Steady State Modeling. USEPA Office of Water, Washington D.C.)

INPUT			
	@ Acute Boundary	@ Chronic Boundary	@ Whole River
1. Dilution Factor at Mixing Zone Boundary	6.4	15.6	
2. Ambient/Upstream/Background Conditions			
Temperature (deg C):	22.10	22.10	22.10
pH:	7.93	7.93	7.93
Alkalinity (mg CaCO3/L):	40.40	40.40	40.40
3. Effluent Characteristics			
Temperature (deg C):	22.90	22.90	22.90
pH:	7.90	7.90	7.90
Alkalinity (mg CaCO3/L):	150.00	150.00	150.00
OUTPUT			
1. Ionization Constants			
Upstream/Background pKa:	6.37	6.37	6.37
Effluent pKa:	6.36	6.36	6.36
2. Ionization Fractions			
Upstream/Background Ionization Fraction:	0.97	0.97	0.97
Effluent Ionization Fraction:	0.97	0.97	0.97
3. Total Inorganic Carbon			
Upstream/Background Total Inorganic Carbon (mg CaCO3/L):	42	42	42
Effluent Total Inorganic Carbon (mg CaCO3/L):	154	154	154
4. Condtions at Mixing Zone Boundary			
Temperature (deg C):	22.23	22.15	#VALUE!
Alkalinity (mg CaCO3/L):	57.53	47.43	#VALUE!
Total Inorganic Carbon (mg CaCO3/L):	59.14	48.74	#VALUE!
pKa:	6.37	6.37	#VALUE!
RESULTS			
pH at Mixing Zone Boundary:	**7.92**	**7.92**	**#VALUE!**

Streeter-Phelps Analysis of Critical Dissolved Oxygen Sag

INPUT			
1. EFFLUENT CHARACTERISTICS			
Discharge (cfs):			26
$CBOD_5$ (mg/L):			40
NBOD (mg/L):			2.6
Dissolved Oxygen (mg/L):			11
Temperature (deg C):			2028.4.7
2. RECEIVING WATER CHARACTERISTICS			
Upstream Discharge (cfs):			97400
Upstream $CBOD_5$ (mg/L):			1.5
Upstream NBOD (mg/L):			0.2
Upstream Dissolved Oxygen (mg/L):			9.12
Upstream Temperature (deg C):			20.7
Elevation (ft NGVD):			0
Downstream Average Channel Slope (ft/ft):			0.00088
Downstream Average Channel Depth (ft):			35
Downstream Average Channel Velocity (fps):			1
3. REAERATION RATE (Base e) at 20 deg C (day^{-1}):			3.57
Reference	Applic. Vel (fps)	Applic. Dep (ft)	Suggested Values
Churchill	1.5 - 6	2 - 50	0.03
O'Connor and Dobbins	0.1 - 1.5	2 - 50	0.06
Owens	0.1 - 6	1 - 2	0.03
Tsivoglou-Wallace	0.1 - 6	0.1 - 2	2.03
4. BOD DECAY RATE (Base e) AT 20 deg C (day^{-1}):			0.23
(or use *Wright and McDonnell eqn, 1979, for small rivers.) Enter this value -->*			0.04

OUTPUT	
1. INITIAL MIXED RIVER CONDITION	
$CBOD_5$ (mg/L):	1.5
NBOD (mg/L):	0.2
Dissolved Oxygen (mg/L):	9.1
Temperature (deg C):	20.7
2. TEMPERATURE ADJUSTED RATE CONSTANTS (Base e)	
Reaeration (day^-1):	3.63
BOD Decay (day^-1):	0.24
3. CALCULATED INITIAL ULTIMATE CBODU AND TOTAL BODU	
Initial Mixed CBODU (mg/L):	2.2
Initial Mixed Total BODU (CBODU + NBOD, mg/L):	2.4
4. INITIAL DISSOLVED OXYGEN DEFICIT	
Saturation Dissolved Oxygen (mg/L):	8.968
Initial Deficit (mg/L):	-0.15
5. TRAVEL TIME TO CRITICAL DO CONCENTRATION (days):	0.99
6. DISTANCE TO CRITICAL DO CONCENTRATION (miles):	16.25
7. CRITICAL DO DEFICIT (mg/L):	0.13
8. CRITICAL DO CONCENTRATION (mg/L):	**8.84**

APPENDIX E--RESPONSE TO COMMENTS

[Ecology will complete this section after the public notice of draft period.]