FACT SHEET FOR WINLOCK WASTEWATER TREATMENT PLANT
NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM (NPDES)
PERMIT WA0021199

Date of Public Notice: xx/xx/xxxx

Permit Effective Date: xx/xx/xxxx

Purpose of this Fact Sheet

This fact sheet explains and documents the decisions the Department of Ecology (Ecology) made in drafting the proposed National Pollutant Discharge Elimination System (NPDES) permit for the city of Winlock.

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 the city of Winlock, NPDES permit WA0021199, are available for public review and comment from _____, until _____. For more details on preparing and filing comments about these documents, please see **Appendix A - Public Involvement Information**.

The city of Winlock 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 city of Winlock operates a Membrane Bioreactor (MBR) wastewater treatment plant that discharges to Olequa Creek. The previous permit issued by Ecology for this facility became effective on September 1, 2007.

The proposed permit contains the same effluent limits for Total Suspended Solids (TSS), Biochemical Oxygen Demand (BOD), Copper, and Fecal Coliform as the permit issued in 2007. The proposed permit includes revised limits for pH. The bacteria indicator has also changed from Fecal Coliform bacteria to *E.coli.* The proposed permit includes a new requirement to monitor *E.coli* but does not change the existing technology-based bacteria effluent limit. It does not include any other significant changes.

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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 thirty 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 — Facility Information

Applicant	City of Winlock
Facility Name and Address	Winlock Wastewater Treatment Plant 1209 Southwest Mayer Street Winlock, WA 98596
Contact at Facility	Name: Rodney Cecil Title: Superintendent Telephone #: (360) 785-4565 Email: winws@cityofwinlock.com
Responsible Official	Name: Brandon Svenson Title: Mayor Address: PO Box 777 Winlock, WA 98596 Telephone #: (360)785-3811 Email: mayor@cityofwinlock.com
Type of Treatment	Membrane Bioreactor with UV Disinfection
Facility Location (NAD83/WGS84 Reference Datum)	Latitude: 46.48222 Longitude: -122.94599
Discharge Waterbody Name and Location (NAD83/WGS84 Reference Datum)	Olequa Creek Latitude: 46.48197 Longitude: 122.94618

Permit Status

Issuance Date of Previous Permit: July 23, 2007

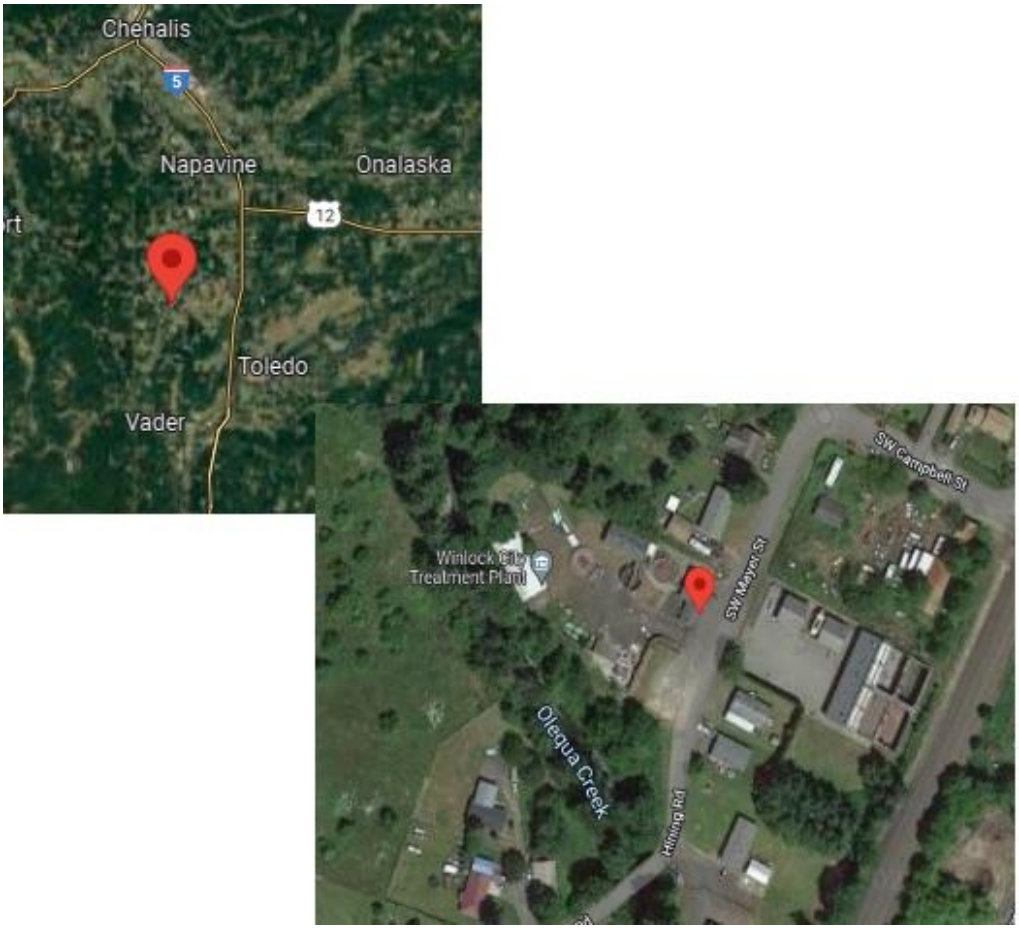
Application for Permit Renewal Submittal Date: March 30, 2012

Date of Ecology Acceptance of Application: March 20, 2014

Inspection Status

Date of Last Non-sampling Inspection: March 17, 2022

Figure 1 Facility Location Map



A. Facility description

History

The city of Winlock (City) is located approximately 17 miles south of the city of Chehalis and two miles west of Interstate-5 at exit 63. The City built the original collection system in the 1920s and added centralized wastewater treatment in the mid-1950s. Original treatment processes consisted of a 55-foot diameter trickling filter, a 28-foot diameter Imhoff tank (used for clarification and anaerobic digestion), an 18-foot diameter secondary clarifier, chlorine disinfection and uncovered sludge drying beds. In 1977, the City upgraded the trickling filters to Rotating Biological Contactors (RBCs) with primary and secondary clarification and disinfection. The most recent upgrade in 2008 relocated part of the facility across the road and upgraded biological treatment from RBCs to a Membrane Bioreactor (MBR) process with UV disinfection. The MBRs have the capability of producing effluent comparable to reclaimed water; however, the City has not identified a

beneficial use and has not applied for a reclaimed water generation permit from the Department of Ecology (Ecology).

Collection System Status

Due to excessive Inflow and infiltration (I/I) to the collection system in the 1980s, the City replaced approximately 80 percent (%) of the original sewer interceptors in the early 1990s. The 2003 General Sewer Plan (GSP) developed by Gibbs and Olson includes an extensive inventory of the Winlock collection system. Five sewer basins and two pump stations within City limits collect and deliver sewage to the Winlock Wastewater Treatment Plant (WWTP).

Influent flows indicate severe I/I within the collection system. The proposed permit will require the city of Winlock to characterize their collection system during this permit and implement an I/I reduction program.

The city of Winlock maintains four ordinances (Nos. 874, 875, 876, and 915) that detail requirements for water and wastewater service construction and installation, and establish charges, rates and fees for sewer service within the City. The Urban Growth Area (UGA) as defined in the City's Comprehensive Plan dictates the sewer service area. Existing agreements with Lewis County allow the City to provide urban utility services to new development occurring within county designated urban growth areas.

Table 2, below, shows the collection system inventory as listed in the 2008 GSP. This summary excludes the eastern sewer extension to the edge of the UGA.

Table 2 — Summary of Collection System Length and Diameter (*GSP, Gibbs and Olson, 2008)*

Sewer Basin	6-inch Diameter Pipe, LF	8-inch Diameter Pipe, LF	10-inch Diameter Pipe, LF	12-inch Diameter Pipe, LF	18-inch Diameter Pipe, LF
A	535	8,862	2,577	540	0
B	2,510	5,897	0	139	0
C	159	15,408	146	0	0
D	1,200	5,369	793	3,081	0
E	0	677	3,636	861	670
Total Length	4,404	36,213	7,152	4,621	670

Treatment Processes

The new WWTP, constructed in 2008, replaced the RBC treatment plant with an MBR treatment process and expanded the site across S.W. Mayer Avenue to the southeast. Raw wastewater enters the plant and receives preliminary treatment at the headworks through two helisieve fine screen units which remove particles larger than 1/8-inch protecting the membranes from pass through of larger solids. The headworks bypass channel contains a manual bar screen as a precaution against unexpected screen failure and/or overload conditions.

A cyclonic grit removal system downstream of the fine screens further removes particles that may cause excessive wear and tear on pumps and other plant equipment. The City records screened and degritted influent flows using a 9-inch Parshall flume downstream of the grit removal system. This flume and its ultrasonic flow meter can reliably measuring flows from 0.06 to 3.3 MGD. The influent sampler located at the headworks provides representative, flow-paced 24-hour composite samples.

A below grade pump station adjacent to the headworks conveys screened and degritted influent to the MBR basins. The pump station consists of four submersible pumps: two small capacity (duty) and two large capacity pumps. All of the pumps have Variable Frequency Drives (VFDs) allowing pump motors to handle a range of flows without requiring hard stop/starts cycles. The two small pumps each have a maximum capacity of 0.5 MGD while the two large pumps can each convey up to 2 MGD. This pump station can convey 3.0 MGD with the largest pump out of service.

During design, Ecology requested the pump station be equipped with a catastrophic overflow provision in the event flows exceed the rated firm capacity (3.0 MGD) of the influent lift station. Engineers repurposed the old chlorine contact basin into an overflow basin for both the pump station and the MBR tanks. It also serves as a wetwell for pumping disinfected wastewater into Olequa Creek during high flow periods when gravity flow through the existing outfall cannot occur. This overflow provision minimizes flood risk during a catastrophic storm event. Bypass regulations prevent use of this overflow as a normal operating practice. The proposed permit includes a compliance schedule for reducing I/I and investigating flow equalization alternatives. See section V.F in this fact sheet for more information about the steps the city of Winlock must take to eliminate this bypass.

The Winlock WWTP utilizes two identical MBR treatment trains which provide 100 percent (%) redundancy. Both MBR treatment trains consist of a large basin divided into one anoxic basin, one pre-aeration basin, and two membrane basins

utilizing common wall construction. Each of the four membrane basins has seven racks of membranes with each rack consisting of 200-Kubota flat-plate membranes.

The City uses one treatment train at a time to preserve the life of the membranes. Recycle pumps transfer mixed liquor from the anoxic basin to the pre-aeration basin in the single treatment train. These recycle pumps also have VFDs which allows the recycle rate to automatically adjust to the influent flow. Mixers in both the anoxic and pre-aeration basins keep the wastewater and solids in suspension prior to filtration.

Five blowers provide aeration for the MBR process. Two blowers (one duty, one spare) provide air to the pre-aeration basins. The remaining three blowers (two duty, one spare) provide air to the membrane basins. Blower sizing allows for the installation of a second row of membrane cartridges without replacing the aeration equipment if the City ever has the need to double the MBR treatment capacity. Each blower has a VFD allowing turn down capability to avoid unnecessary air delivery. Dissolved Oxygen (DO) probes in the pre-aeration basins control blower operation allowing the WWTP to maintain adequate DO to drive the biological processes without over aerating.

Centrifugal permeate pumps remove filtered effluent from the MBR basin for UV disinfection prior to discharge into Olequa Creek. Each membrane train has two permeate pumps (one duty, one standby). Flow control valves maintain a consistent permeate pumping rate. The closed conduit UV disinfection system can provide disinfection for flow rates up to 2.0 MGD. Provisions for expansion will allow the City to install a third UV unit in case a need for additional disinfection capacity arises.

Two centrifugal sludge pumps (one duty, one standby) remove Waste Activated Sludge (WAS) from the MBR basin and pump the solids to the primary digester for aeration and mixing. Three digester basins aerate and mix the WAS through educator tubes and submerged coarse bubble aerators. A submersible pump sends primary digester solids to a membrane thickener. These thickened solids are then returned to the primary digester in a repeating circular flow pattern. As the primary digester reaches capacity, thickened solids transfer to the secondary digester (the former primary clarifier) via submersible pump. A similar transfer of thickened solids occurs from the secondary digester as it reaches capacity to the third digester (the former secondary clarifier). Once the third digester reaches capacity, thickened solids must be transferred via submersible pump to a truck loading facility for removal from the system.

Five blowers provide aeration and mixing of solids in the membrane thickener and three digester basins. The blower arrangement allows for redundant capacity when any duty blower has to undergo maintenance or repair. The former RBC building houses the solids handling blowers. In addition, this retrofitted building also houses the two permeate pumps (one duty, one standby) for the membrane thickener. Permeate from the membrane thickener returns by gravity to the influent pump station and combines with influent flows for treatment in the MBR process.

Ecology classifies the Winlock WWTP as a Group II facility. Therefore, the operator in responsible charge must maintain a Group II certification in order to operate the treatment plant.

Solid Wastes/Residual Solids

The treatment facility removes solids during the treatment of the wastewater at the headworks (grit and screenings) in addition to incidental solids (rags, scum, and other debris) removed as part of the routine maintenance of the equipment. The city of Winlock drains grit, rags, scum, and screenings and disposes this solid waste at the local landfill. Solids removed from the MBR process receive treatment through membrane thickening and aerobic digestion, producing Class B Biosolids. A private contractor hauls processed biosolids offsite for land application. This facility has met the solid waste requirements for screening, as required by WAC 173-308-205, by meeting minimum screening requirements.

Discharge Outfall

The treated and disinfected effluent flows into Olequa Creek through a ten-inch outfall with five 4-inch diffuser ports. In August 2007, the City plugged the outer most 4-inch diffuser port by removing the existing 90-degree bend and installing a blind flange on the header pipe in Olequa Creek as directed in the previous permit.

B. Description of the Receiving Water

The Winlock WWTP discharges to Olequa Creek. Other nearby point source outfalls include the city of Vader which discharges downstream of the Winlock WWTP. Significant nearby non-point sources of pollutants include agricultural practices. Section IIIE of this fact sheet describes any receiving waterbody impairments.

The ambient background data collected by the City under the previous permit (August 2017-June 2022) and used for this permit includes the following:

Table 3 — Ambient Background Data

Parameter	Value Used
Temperature (highest annual 1-DMax)*	22°C
pH (Maximum / Minimum)	6.32/8.75 standard units
Hardness (90th Percentile)	49.0 mg/L as CaCO3
Lead	< 0.1 µg/L
Copper	4.6 µg/L
Zinc	29 µg/L

*Ambient temperature data reported includes a mix of ambient air and water temperature. Ecology used BPJ when looking at temperature values; however, uncertainty remains in the 1-DAD max value found in Olequa Creek.

C. Wastewater Influent Characterization

The Winlock WWTP reported the concentration and load of influent pollutants in discharge monitoring reports from June 2017 – May 2022. The influent wastewater is characterized as follows:

Table 4 — Wastewater Influent Characterization

Parameter	Units	# of Samples	Average Value	Maximum Value
Biochemical Oxygen Demand (BOD_5)	mg/L	529	130	306
BOD_5	lbs/day	529	140	529
Total Suspended Solids (TSS)	mg/L	530	120	460
TSS	lbs/day	530	130	889
Ammonia (NH_3 as N)	mg/L	86	36.0	47.0
Flow (Daily)	MGD	1857	0.172	1.90

D. Wastewater Effluent Characterization

The Winlock 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 June 2017 – May 2022. The wastewater effluent is characterized as follows:

Table 5 — Wastewater Effluent Characterization

Parameter	Units	# of Samples	Average Value	Maximum Value
BOD_5	mg/L	529	1.08	7.30
BOD_5	lbs/day	529	1.68	23.9
TSS	mg/L	531	0.39	6.05
TSS	lbs/day	531	0.56	11.7
Ammonia (NH_3 as N)	mg/L	87	0.03	0.21
Copper, Total Recoverable	µg/L	20	7.1	15
Lead, Total Recoverable	µg/L	20	29.3	500
Zinc, Total Recoverable	µg/L	20	35.6	200
Temperature, 1 Day Max	°C	427	24 (reflects poor data collection. Ecology cannot determine the actual average as the tidbit collected ambient air temps)	36 (reflects poor data collection. Ecology cannot determine the actual average as the tidbit collected ambient air temps)

Parameter	Units	# of Samples	Maximum Monthly Geometric Mean	Maximum Weekly Geometric Mean
Fecal Coliform	#/100mL	61	4	60

Parameter	Units	# of Samples	Minimum Value	Maximum Value
pH	standard units	1857	5.8	7.8

E. Summary of Compliance with Previous Permit Issued

The previous permit placed effluent limits on conventional pollutants, Ammonia, and Copper.

The city of Winlock has complied with the effluent limits and permit conditions throughout the duration of the permit issued on July 23, 2007, with the exceptions listed below. Ecology assessed compliance based on its review of the facility's Discharge Monitoring Reports (DMRs) and on inspections.

The following table summarizes the violations and permit triggers that occurred during the permit term.

Table 6 - Violations/Permit Triggers

Begin Date	Parameter	Statistical Base	Units	Value	Limit Min/Max	Violation
8/1/2017	pH	Single Sample	Standard Units	5.8	6.0/9.0	Numeric effluent violation
9/1/2017	Copper	Average	µg/L	11	8.6	Numeric effluent violation
10/1/2017	Ambient Monitoring					Analysis not Conducted
6/1/2018	Copper	Average	µg/L	11	8.6	Numeric effluent violation
7/1/2018	Copper	Average	µg/L	14	8.6	Numeric effluent violation

Begin Date	Parameter	Statistical Base	Units	Value	Limit Min/Max	Violation
8/1/2018	BOD5	Single Sample	mg/L	-	-	Frequency of Sampling Violation
3/1/2019	Temperature	Single Sample	°C		Improper/ Incorrect Reporting	Permit Violation
6/1/2019	Copper	Average	µg/L	12	8.6	Numeric effluent violation
7/1/2019	Copper	Average	µg/L	15	8.6	Numeric effluent violation
8/1/2019	Copper	Average	µg/L	9.4	8.6	Numeric effluent violation
9/1/2019	Copper	Average	µg/L	9.5	8.6	Numeric effluent violation
9/1/2019	Temperature		°C			Frequency of Sampling Violation
9/1/2019	Temperature	Daily Maximum	°C			Improper/ Incorrect Reporting
10/1/2019	Temperature		°C			Frequency of Sampling Violation
6/1/2020	Temperature		°C			Frequency of Sampling Violation
7/1/2020	Temperature	Single Sample	°C			Improper/ Incorrect Reporting

Begin Date	Parameter	Statistical Base	Units	Value	Limit Min/Max	Violation
8/1/2020	Copper	Average	µg/L	8.7	8.6	Numeric effluent violation
3/1/2021	Temperature		°C			Frequency of Sampling Violation
6/1/2021	Ammonia	Single Sample	mg/L			Analysis not Conducted
1/1/2022	Flow	Single Sample	MGD	1.896	1.00	85% Design Criteria
5/1/2022	Temperature	Daily Maximum	Degrees C			Analysis not Conducted

The following table summarizes compliance with report submittal requirements over the last five years of the extended permit term (June 2017 – May 2022).

Table 7 - Permit Submittals

Submittal Name	Submittal Status	Due Date	Received Date	Reviewed Date
Infiltration And Inflow Evaluation	Accepted	7/15/2017	1/11/2017	1/26/2017
Infiltration And Inflow Evaluation	Accepted	7/15/2018	1/8/2018	1/16/2018
Infiltration And Inflow Evaluation	Accepted	7/15/2019	1/15/2019	1/22/2019
Infiltration And Inflow Evaluation	Accepted	7/15/2020	1/21/2020	1/29/2020
Infiltration And Inflow Evaluation	Accepted	7/15/2021	1/14/2021	1/27/2021
Outfall Evaluation	Accepted	10/15/2017	8/11/2017	8/24/2017
Outfall Evaluation	Accepted	10/15/2018	6/8/2018	7/3/2018

Submittal Name	Submittal Status	Due Date	Received Date	Reviewed Date
Outfall Evaluation	Accepted	10/15/2019	6/26/2019	8/2/2019
Outfall Evaluation	Accepted	10/15/2020	5/14/2020	10/2/2020
Outfall Evaluation	Accepted	10/15/2021	9/17/2021	9/27/2021
Wasteload Assessment	Accepted	7/15/2017	1/11/2017	1/26/2017
Wasteload Assessment	Accepted	7/15/2018	1/8/2018	1/16/2018
Wasteload Assessment	Accepted	7/15/2019	1/15/2019	1/22/2019
Wasteload Assessment	Accepted	7/15/2020	1/21/2020	1/29/2020
Wasteload Assessment	Accepted	7/15/2021	1/14/2021	1/27/2021

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 Federal Water Quality Criteria Applicable to Washington (40 CFR 131.45)

- 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 city of Winlock Amended General Sewer Plan/Facilities Plan dated October 2007 and prepared by Gibbs & Olson, Inc. The table below includes design criteria from the referenced report.

Table 8 — Design Criteria for the Winlock Wastewater Treatment Plant

Parameter	Design Quantity
Maximum Month Design Flow (MMDF) Dry Season (June – Sept)	0.491 MGD
Maximum Month Design Flow (MMDF) Wet Season (Oct – May)	1.00 MGD
Peak Day Design Flow Dry Season (June – Sept)	0.865 MGD
Peak Day Design Flow Wet Season (Oct – May)	2.00 MGD
BOD_5 Loading for Maximum Month	1,084 lbs/day
TSS Loading for Maximum Month	723 lbs/day
NH_3 Loading for Maximum Month	125 lbs/day

B. Technology-Based Effluent Limits

Federal and state regulations define some technology-based effluent limits for domestic wastewater treatment plants. These effluent limits are given in 40 CFR Part 133 (federal) and in chapter 173-221 WAC (state).

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 9 — Technology-Based Limits

Parameter	Average Monthly Limit	Average Weekly Limit
BOD_5 (concentration)	30 mg/L	45 mg/L

BOD_5 (concentration): In addition, the BOD_5 effluent concentration must not exceed 15 percent (%) of the average influent concentration.

Parameter	Average Monthly Limit	Average Weekly Limit
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

Technology-based mass limit for BOD5 is based on WAC 173-220-130(3)(b) and WAC 173-221-030(11)(b). Ecology calculated the monthly and weekly average mass limit for BOD_5 as follows:

Mass Limit = CL x DF x CF

Where :

CL = Technology-based concentration limits listed in the above table

DF = Maximum Monthly Average Design flow (MGD)

CF = Conversion factor of 8.34

Table 10 - Technology-Based Mass Limits

Parameter	Concentration Limit (mg/L)	Mass Limit (lbs/day)
BOD_5 Monthly Average	30	123
BOD_5 Weekly Average	45	185

Technology-based mass limit for Total Suspended Solids (TSS) is 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 limit for 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 Limit

Table 11 - Technology-Based Mass Limits

Parameter	Influent Loading (lbs/day)	Mass Limit (lbs/day)
TSS Monthly Average	723	109
TSS Weekly Average		164

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 (WLA) or on a WLA developed during a basin-wide Total Maximum Daily Load Study (TMDL).

Numeric Criteria for the Protection of Aquatic Life and Recreation

Numeric 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 numeric 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.

Numeric Criteria for the Protection of Human Health

Numeric criteria for the protection of human health are promulgated in Chapter 173-201A WAC and 40 CFR 131.45. These criteria are designed to protect human health 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 All Known, Available, and Reasonable Methods of Prevention, Control, and Treatment (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 does not 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)(i-iii) or WAC 173-201A-400(7)(b)(i-ii)].

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 numeric value called a Dilution Factor (DF). A DF 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 four 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 DF 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 numeric 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 Winlock WWTP meets the requirements of AKART.

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. 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://apps.ecology.wa.gov/publications/documents/92109.pdf.

Table 12 - Critical Conditions Used to Model the Discharge

Critical Condition	Value
The seven-day-average low river flow with a recurrence interval of ten years (7Q10)	4.82 cfs
River depth at the 7Q10 period	0.9 feet
River velocity	0.152 ft/sec
Channel width	39.2 feet
7-DAD MAX Effluent temperature	unknown

Ecology obtained ambient data at critical conditions in the vicinity of the outfall from the water quality sampling conducted as part of the previous permit (Gibbs and Olson, 2005).

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.

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. 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 for 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 ten-year 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. 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.

Freshwater Aquatic Life Uses and Associated Criteria

Table 13 - Core Summer Salmonid Habitat

Criteria	Limit
Temperature Criteria – Highest 7-DAD MAX	16°C (60.8°F)
Dissolved Oxygen Criteria	9.5 mg/L
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.

Criteria	Limit
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 0.2 units.

- The recreational use for this receiving water is primary contact recreation. ***E.coli*** organism levels must not exceed a geometric mean value of 100 CFU or MPN per 100 mL, with not more than 10 percent of all samples (or any single sample when less than ten sample points exist) obtained within the averaging period exceeding 320 CFU or MPN per 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

Ecology has not documented any water quality impairments in the receiving water in the vicinity of the outfall.

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

Ecology must consider the narrative criteria described in WAC 173-201A-260 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 92-inches long with a diameter of 10 inches. The diffuser has a total of five 4-inch diameter ports. The distance between ports is 1.5 feet. The diffuser depth is less than 1 foot.

Chronic Mixing Zone —WAC 173-201A-400(7)(a) specifies that Mixing Zones must not extend in a downstream direction from the discharge ports for a distance greater than 300 feet plus the depth of water over the discharge ports or extend upstream for a distance of over 100 feet, not utilize greater than 25 percent of the flow, and not occupy greater than 25 percent of the width of the water body. The Mixing Zone extends from the bottom to the top of the water column.

The Chronic Dilution Factor below is based on a width restriction of 9.8 feet.

Acute Mixing Zone — WAC 173-201A-400(8)(a) specifies that in rivers and streams a zone where acute toxics criteria may be exceeded must not extend beyond 10 percent of the distance towards the upstream and downstream boundaries of the chronic zone, not use greater than 2.5 percent of the flow and not occupy greater than 25 percent of the width of the water body. The Mixing Zone extends from the bottom to the top of the water column.

The Acute Dilution Factor below is based on a downstream distance of 31 feet.

Ecology determined the dilution factors that occur within these zones at the critical condition using the Mixing Zone analysis conducted for the 2005 General Sewer Plan by Gibbs and Olson. The dilution factors are listed below. Ecology used Chronic Dilution Factors for Human Health as a conservative measure. The next permit cycle will require a Mixing Zone analysis to update dilution factors and Mixing Zone parameters after completion of the prioritized corrective actions identified in the Inflow and Infiltration Evaluation.

Table 14 - Dilution Factors (DF)

Criteria	Acute	Chronic
Aquatic Life	3.27	7.11
Human Health, Carcinogen		7.11
Human Health, Non-carcinogen		7.11

Ecology determined the impacts of Dissolved Oxygen deficiency, pH, Fecal Coliform, Ammonia, Metals, 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.

Ecology reviewed the Streeter-Phelps DOsag model output developed by Gibbs & Olsen which estimated the impact of BOD_5 on the receiving water at critical condition and with the Technology-Based Effluent Limit for BOD_5 described under "Technology-Based Effluent Limits" above.

Ecology predicted no violation of the Surface Water Quality Standards for Dissolved Oxygen at the edge of the Mixing Zone due to the impacts of BOD_5 under critical conditions. Therefore, the proposed permit contains the Technology-Based Effluent Limit for BOD_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.

Under critical conditions, modeling predicts a violation of the pH criteria for the receiving water as the effluent changes the receiving water pH by more than 0.2 Standard Units. Therefore, the proposed permit includes Water Quality-Based Effluent Limits for pH of 7.5 to 9.0 during the core salmonid spawning period of June through September. Technology based pH effluent limits apply during the months of October through May.

Bacteria — In the previous permit cycle, Ecology modeled the number of Fecal Coliform by simple mixing analysis using the technology-based limit of 400 organisms per 100 mL and a dilution factor of 7.11. That analysis showed no violation of the Fecal Coliform recreational use criterion under critical conditions. The Technology-Based Limits for Fecal Coliform in chapter 173-221 WAC are still in effect. Without effluent data for E.coli, Ecology cannot determine whether the discharge will violate the recreational use criterion for E.coli. Given that the characteristics of the receiving water and the discharge have not changed substantially since the analysis conducted in the previous permit cycle, and the transition is a change in bacterial indicator not more or less stringent than the

previous criterion, the proposed permit will maintain the Technology-Based Effluent Limit for Fecal Coliform. In addition, the Permittee will be required to monitor for both Fecal Coliform and E.coli. Ecology will use this data to assess the reasonable potential to exceed the applicable recreational use criterion in the next iteration of this permit.

Turbidity — Ecology evaluated the impact of Turbidity based on the range of TSS 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 TSS permit limits.

Toxic Pollutants (aquatic life) — Federal regulations (40 CFR Part 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: Ammonia and heavy metals. Ecology conducted a reasonable potential analysis (See **Appendix D**) on these parameters to determine whether it would require effluent limits in this permit.

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 available ambient data and spreadsheet tools.

No valid ambient background data was available for Ammonia; therefore, Ecology used zero for background. Ecology required the city of Winlock to collect background concentrations for Copper, Lead, and Zinc near the point of discharge in the last permit cycle.

Ecology determined that Ammonia, Copper, Lead, and Zinc 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.

Ecology did not remove the effluent limit for Copper in the proposed permit to avoid triggering anti-backsliding regulations.

Temperature — The state Temperature Standards [WAC 173-201A, WAC 173-201A-200, WAC 173-201A-600, and WAC 173-201A-602] include multiple elements:

- Annual summer maximum threshold criteria (June 15 to September 15)
- Supplemental spawning and rearing season criteria (September 15 to June 15)

- Incremental warming restrictions
- Guidelines on preventing acute lethality and barriers to migration of salmonids

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) and WAC 173-201A-602, 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 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)]. 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.

- Guidelines to prevent acute lethality or barriers to migration of salmonids. These site-level considerations do not override the temperature criteria listed above.

  - 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: Temperatures at the edge of a Chronic Mixing Zone must not exceed either a 1DMax of 23°C or a 7DADMax of 22°C. When adjacent downstream temperatures are 3°C or cooler, the 1DMax at the edge of the Chronic Mixing Zone must not exceed 22°C.
- Lethality to incubating fish: The Temperature must not exceed 17.5°C at locations where eggs are incubating.

Reasonable Potential Analysis

Data Collection Required: Ecology does not have sufficient information on the temperature of the effluent or the receiving water to determine compliance with Water Quality Criteria for Temperature. The proposed permit requires the city of Winlock to monitor effluent and receiving water Temperature and report the results to Ecology. The city of Winlock did monitor for Temperature during the previous permit cycle; however, the data collected could not be readily used for reasonable potential analyses given the mixed results that included continuous ambient air and water temperatures for both the creek and effluent. Monitoring must be repeated. The city of Winlock must consult with Ecology on the placement of these devices to ensure representative data collection.

Ecology will reevaluate reasonable potential for Temperature after two years of critical season data collection.

H. Human Health

Washington's Water Quality Standards include Numeric Human Health-Based Criteria for Priority Pollutants that Ecology must consider when writing NPDES permits.

Ecology determined the applicant's discharge is unlikely to contain chemicals regulated to protect human health. Ecology will reevaluate this discharge for impacts to human health at the next permit reissuance.

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)

Through a review of the discharger characteristics and of the effluent characteristics, Ecology determined that this discharge has no reasonable potential to violate the Sediment Management Standards.

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 whole effluent toxicity (WET) testing. Some WET tests measure acute toxicity and other WET tests measure chronic toxicity.

Using the screening criteria in WAC 173-205-040, Ecology determined that toxic effects caused by unidentified pollutants in the effluent are unlikely. Therefore, this permit does not require WET testing. Ecology may require WET testing in the future if it receives information indicating that toxicity may be present in this effluent.

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

L. Comparison of Effluent Limits with the Previous Permit Issued on July 27, 2007

Table 15 - Comparison of Existing and Proposed Effluent Limits – Outfall 001

Limit	Basis of Limit	Existing permit limit	Proposed permit limit
Biochemical Oxygen Demand (5-day) – Average Monthly	Technology	30 mg/L, 123 lbs/day, 85% removal of influent BOD	30 mg/L, 123 lbs/day, 85% removal of influent BOD
Biochemical Oxygen Demand (5-day) – Average Monthly – Average Weekly	Technology	45 mg/L, 185 lbs/day	45 mg/L, 185 lbs/day

Limit	Basis of Limit	Existing permit limit	Proposed permit limit
Total Suspended Solids – Average Monthly	Technology	30 mg/L, 109 lbs/day, 85% removal of influent TSS	30 mg/L, 109 lbs/day, 85% removal of influent TSS
Total Suspended Solids – Average Weekly	Technology	45 mg/L, 164 lbs/day	45 mg/L, 164 lbs/day
Fecal Coliform Bacteria – Monthly Geometric Mean	Technology	200#/100 mL	200#/100 mL
Fecal Coliform Bacteria – Weekly Geometric Mean	Technology	400#/100 mL	400#/100 mL
pH – Daily Minimum (June – Sept)	Technology	6.0	7.5
pH – Daily Minimum (Oct - May)	Technology	6.0	6.0
pH – Daily Maximum (Oct - May)	Technology	9.0	9.0
pH – Daily Maximum (June – Sept)	Technology	9.0	9.0
Copper, Total Recoverable – Average Monthly	WQ	8.6 µg/L	8.6 µg/L
Copper, Total Recoverable – Maximum Daily	WQ	17.2 µg/L	17.2 µg/L

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 (DMR) or in the required report.

A. Wastewater Monitoring

The monitoring schedule is detailed in the proposed permit under Special Condition S.2. 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 an activated sludge plant using an MBR process.

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.

Ecology has required monitoring of both fecal coliform and E.coli in the permit application. This dual monitoring will help inform both Ecology and city of Winlock of the correlation between the two indicators. Dual monitoring requirements consist of splitting an effluent grab sample in the field prior to laboratory analyses for both Fecal Coliform and E.coli. The city of Winlock must submit results as part of the annual permit renewal application monitoring data.

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 16 - Accredited Parameters

Parameter Name	Category	Method Name	Matrix Description
TSS	General Chemistry	SM 2540 D-2011	Non-Potable Water
pH	General Chemistry	SM 4500-H+ B-2011	Non-Potable Water
Ammonia as N	General Chemistry	SM 4500-NH3 F-2011	Non-Potable Water
BOD_5	General Chemistry	SM 5210 B-2011	Non-Potable Water
Fecal Coliform	Bacteria	SM 9222D (mFC)-06	Non-Potable Water

The Winlock WWTP laboratory must receive accreditation for chlorine if it remains a backup disinfection method for the POTW. Permit reapplication E.coli analyses will require accreditation if the city does not elect to use a contract laboratory.

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 the city of Winlock 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

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 the city of Winlock takes adequate safeguards so that it uses constructed facilities to their optimum potential in terms of pollutant capture and treatment.

The city of Winlock has documented or suspects inflow, infiltration, overflows, failures in its collection system and it needs to further characterize the problem. The proposed permit requires submission of an updated operation and maintenance manual for the entire sewage system.

Significant portions of the collection system are over 40 years old, were constructed using techniques such as concrete pipes with oakum packing and/or have numerous manholes, which were not installed using modern materials. Ecology expects leaks are present in the collection system due to its age, materials used, and construction methods for its

installation. Therefore, the proposed permit requires the city of Winlock to characterize the collection system for the presence of leaks by providing the following information:

- Volume of the annual average and peak daily flow under worst conditions (inflow or infiltration) attributed to leaks
- Location of leaks
- Volume of excess flow contributed by a **run of sewer** or other defined area such as a sewer system sub-basin

Three good references to aid in these tasks include:

- American Society of Civil Engineers and Water Environment Federation Manual of Practice FD-6, *Existing Sewer Evaluation and Rehabilitation*.
- U.S. Environmental Protection Agency, Handbook for Sewer System Infrastructure Analysis and Rehabilitation, EPA/625/6-91/030, 1991.
- Washington State Department of Transportation, Standard Specifications for Road, Bridge, and Municipal Construction, M 41-10, (most recent edition).

Following characterization of the leaks, Ecology may require corrective actions by issuing an administrative order following review of the assessment.

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.

- 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.
- 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:

  1. Are prohibited due to dangerous waste rules

2. Are explosive or flammable

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

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

5. Are hot enough to cause a problem

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

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

8. 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.

- 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:

1. Cooling water in significant volumes

2. Stormwater and other direct inflow sources

3. 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 SIUs [40 CFR 403.8 (f)(1)(i)-(iii)].

Industrial dischargers must obtain a permit from Ecology before discharging waste to the Winlock 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 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.

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 Part 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 Lewis 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 Part 503, to develop or update local limits.

F. Engineering Documents

The proposed permit includes a requirement for the city of Winlock to prepare and submit an Engineering Report for Ecology review and approval in the last year of the permit cycle (Special Condition S9). The scope of this engineering report must develop alternatives and select the preferred alternative for elimination of the internal lift station bypass to Olequa Creek. Use of this bypass even during periods of extreme wet weather events does not meet requirements of the Clean Water Act.

Following report approval, Ecology may require corrective actions by issuing an administrative order or through a modification of this permit.

G. Outfall Evaluation

The proposed permit requires the city of Winlock to conduct an outfall inspection and submit a report detailing the findings of that inspection (Special Condition S10). 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.

H. 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 numeric 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

Gibbs & Olsen

2005. General Sewer Plan/Facilities Plan

2008. Amended General Sewer Plan/Facilities Plan

Environmental Protection Agency (EPA)

1992. National Toxics Rule. Federal Register, V. 57, No. 246, Tuesday, December 22, 1992.

1991. *Technical Support Document for Water Quality-based Toxics Control*. EPA/505/2-90-001.

1988. *Technical Guidance on Supplementary Stream Design Conditions for Steady State Modeling*. USEPA Office of Water, Washington, D.C.

1985. *Water Quality Assessment: A Screening Procedure for Toxic and Conventional Pollutants in Surface and Ground Water*. EPA/600/6-85/002a.

1983. *Total Alkalinity of Surface Waters.* https://www.usgs.gov/media/images/total-alkalinity-surface-waters-epa-1983

1983. *Water Quality Standards Handbook*. USEPA Office of Water, Washington, D.C.

Tsivoglou, E.C., and J.R. Wallace.

1972. *Characterization of Stream Reaeration Capacity*. EPA-R3-72-012. (Cited in EPA 1985 op.cit.)

Washington State Department of Ecology.

July 2018. *Permit Writer's Manual*. Publication Number 92-109 (https://apps.ecology.wa.gov/publications/documents/92109.pdf)

September 2011. *Water Quality Program Guidance Manual – Supplemental Guidance on Implementing Tier II Antidegradation*. Publication Number 11-10-073 (https://apps.ecology.wa.gov/ecy/publications/summarypages/1110073.html)

October 2010 (revised). *Water Quality Program Guidance Manual – Procedures to Implement the State's Temperature Standards through NPDES Permits*. Publication Number 06-10-100 (https://apps.ecology.wa.gov/publications/summarypages/0610100.html)

Laws and Regulations (http://leg.wa.gov/LawsAndAgencyRules/Pages/default.aspx)

Permit and Wastewater Related Information (https://ecology.wa.gov/Regulations-Permits/Guidance-technical-assistance/Water-quality-permits-guidance)

Water Pollution Control Federation.

1976. *Chlorination of Wastewater*.

Wright, R.M., and A.J. McDonnell.

1979. *In-stream Deoxygenation Rate Prediction*. Journal Environmental Engineering Division, ASCE. 105(EE2). (Cited in EPA 1985 op.cit.)

APPENDIX A — PUBLIC INVOLVEMENT INFORMATION

Ecology proposes to reissue a permit to the city of Winlock. 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; June 11, 2019; June 11, 2020; June 18, 2020; June 16, 2021; June 23, 2021; June 7, 2022; and June 14, 2022, in the Chronicle 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 _____, in the Chronicle 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://apps.ecology.wa.gov/publications/documents/0307023.pdf.

You may obtain further information from Ecology by email at carey.cholski@ecy.wa.gov or by writing to the address listed below.

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

The primary author of this permit and fact sheet is M. Eleanor Ott, P.E.

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.

Table 17 - Address and Location Information

Street Addresses	Mailing Addresses
Department of Ecology Attn: Appeals Processing Desk 300 Desmond Drive Southeast Lacey, WA 98503	**Department of Ecology** Attn: Appeals Processing Desk PO Box 47608 Olympia, WA 98504-7608
Pollution Control Hearings Board 1111 Israel Road Southwest, Suite 301 Tumwater, WA 98501	**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 RCW 90.48.520, 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 month's 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 percent upper tolerance interval with a 95 percent 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 (BMP) – 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.

BOD5 – 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 percent by volume and the receiving water 90 percent.

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 WAC 173-240-130.

Enterococci – A subgroup of fecal streptococci that includes *S. faecalis, S. faecium, S. gallinarum,* and *S. avium.* The enterococci are differentiated from other streptococci by their ability to grow in 6.5 percent sodium chloride, at pH 9.6, and at 10°C and 45°C.

E. coli – A bacterium in the family Enterobacteriaceae named Escherichia coli and is a common inhabitant of the intestinal tract of warm-blooded animals, and its presence in water samples is an indication of fecal pollution and the possible presence of enteric pathogens.

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 501, 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 percent 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 or contribute to 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.

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

$z = 2.326$

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

Dilution Factor Calculations and Receiving Water Critical Conditions

Facility Name	Winlock WWTP
Receiving Water	Olequa Creek (June - Sept)

Step 1: Enter Waterbody Type

Water Body Type	Freshwater

Step 2: Enter Dilution Factors -OR- Calculate DFs by entering Facility/Receiving Water Flow Data

Do you want to enter dilution factors -or- flow data?	Dilution Factors

	Max Dilution Factor Allowed
Aquatic Life - Acute	3.3
Aquatic Life - Chronic	7.1
HH-Non-Carcinogen	7.1
HH-Carcinogen	7.1
Whole river at 7Q10	

Step 3: Enter Critical Data

	Effluent	Receiving Water
Temp, °C	27	21.3
pH, s.u.	6	8.75
Alkalinity, mg/L as CaCO3		
Hardness, mg/L CaCO3	48	49.2
Salinity, psu		
Receiving water TSS, mg/L (leave blank if unknown)		
If TSS is annual data, enter 'A'; if from critical period, enter 'S'; If no TSS, leave blank		

Step 4: Specifiy if using 'Mixed' values for hardness, temperature, and pH

	Use 'Mixed Hardness' (Y/N)	Use 'Mixed Max Temp' (Y/N)	Use 'Mixed pH (Y/N)
	N	Y	Y
Acute Zone Boundary	48.8	23.0	
Chronic Zone Boundary	49.0	22.1	
Whole river at 7Q10			

Reasonable Potential Calculation

Facility	Winlock WWTP
Water Body Type	Freshwater
Rec. Water Hardness	49.2 mg/L

Dilution Factors:	Acute	Chronic
Aquatic Life	3.3	7.1
Human Health Carcinogenic		7.1
Human Health Non-Carcinogenic		7.1

Pollutant, CAS No. & NPDES Application Ref. No.			AMMONIA, Criteria as Total NH3	COPPER - 744058 6M Hardness dependent	LEAD - 7439921 7M Dependent on hardness	ZINC - 7440666 13M hardness dependent							
Effluent Data	# of Samples (n)		87	21	20	20							
	Coeff of Variation (Cv)		1.13	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)		390	15	0.5	39							
	Calculated 50th percentile Effluent Conc. (when n>10)			7.7		27							
Receiving Water Data	90th Percentile Conc., ug/L		0	4.6	0.1	29							
	Geo Mean, ug/L			0		0							
Water Quality Criteria	Aquatic Life Criteria, ug/L	Acute	1,346	8.72235	29.6012	62.7492							
		Chronic	177	6.19176	1.15352	57.2995							
	WQ Criteria for Protection of Human Health, ug/L		-	1300	-	2300							
	Metal Criteria Translator, decimal	Acute	-	0.996	0.466	0.996							
		Chronic	-	0.996	0.466	0.996							
	Carcinogen?		N	N	N	N							

Aquatic Life Reasonable Potential

Effluent percentile value			0.950	0.950	0.950	0.950
s	$s^2=\ln(CV^2+1)$		0.907	0.555	0.555	0.555
Pn	Pn=(1-confidence level)$^{1/n}$		0.966	0.867	0.861	0.861
Multiplier			1.00	1.00	1.36	1.36
Max concentration (ug/L) at edge of...		Acute	119	7.762	0.167	36.341
		Chronic	55	6.054	0.131	32.376
Reasonable Potential? Limit Required?			**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	0.55451	
Pn	Pn=(1-confidence level)1/n	0.867	0.861	
Multiplier		0.5396	0.54811	
Dilution Factor		7.1	7.1	
Max Conc. at edge of Chronic Zone, ug/L		1.08451	3.80282	
Reasonable Potential? Limit Required?		**NO**	**NO**	

Human Health Limit Calculation

# of Compliance Samples Expected per month				
Average Monthly Effluent Limit, ug/L				
Maximum Daily Effluent Limit, ug/L				

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

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):	21.3	23.0	22.1	#VALUE!
2. Receiving Water pH:	8.8	#DIV/0!	#DIV/0!	#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	#DIV/0!	#DIV/0!	#VALUE!
FT	1.400	1.400	1.400	#VALUE!
FPH	1.000	#DIV/0!	#DIV/0!	#VALUE!
pKa	9.361	9.307	9.336	#VALUE!
Unionized Fraction	0.197	#DIV/0!	#DIV/0!	#VALUE!
Unionized ammonia NH3 criteria (mg/L as NH_3)				
Acute:	0.322	#DIV/0!	#DIV/0!	#VALUE!
Chronic:	0.042	#DIV/0!	#DIV/0!	#VALUE!
RESULTS				
Total ammonia nitrogen criteria (mg/L as N):				
Acute:	1.346	#DIV/0!		#VALUE!
Chronic:	0.177		#DIV/0!	#VALUE!

Data source:

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**	
1. Dilution Factor at Mixing Zone Boundary	3.3	7.1	
2. Ambient/Upstream/Background Conditions			
Temperature (deg C):	20.70	21.30	
pH:	7.37	8.20	8.2/6.5 (90th, 10th percentiles)
Alkalinity (mg CaCO3/L):	100.00	50.00	
3. Effluent Characteristics			
Temperature (deg C):	21.70	22.10	
pH:	6.30	7.50	
Alkalinity (mg CaCO3/L):	50.00	50.00	
4. Aquatic Life Use Designation	Char spawning & rearing and/or core summer habitat		
OUTPUT			
1. Ionization Constants			
Upstream/Background pKa:	6.38	6.37	
Effluent pKa:	6.37	6.37	
2. Ionization Fractions			
Upstream/Background Ionization Fraction:	0.91	0.99	
Effluent Ionization Fraction:	0.46	0.93	
3. Total Inorganic Carbon			
Upstream/Background Total Inorganic Carbon (mg CaCO3/L):	110	51	
Effluent Total Inorganic Carbon (mg CaCO3/L):	109	54	
4. Condtions at Mixing Zone Boundary			
Temperature (deg C):	21.00	21.41	
Alkalinity (mg CaCO3/L):	84.85	50.00	
Total Inorganic Carbon (mg CaCO3/L):	109.75	51.16	
pKa:	6.38	6.37	
5. Allowable pH change	NA	0.20	
RESULTS			
pH at Mixing Zone Boundary:	**6.91**	**8.01**	
pH change at Mixing Zone Boundary:	0.46	0.19	
Is permit limit needed?	NO	NO	

APPENDIX E — RESPONSE TO COMMENTS

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