FACT SHEET FOR NPDES PERMIT WA0025151

Energy Northwest Columbia Generating Station

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 Energy Facility Site Evaluation Council (EFSEC) made in drafting the proposed National Pollutant Discharge Elimination System (NPDES) permit for Columbia Generating Station, operated by Energy Northwest.

This fact sheet complies with Section 463-76-034 of the Washington Administrative Code (WAC), which requires EFSEC to prepare a draft permit and accompanying fact sheet for public evaluation before issuing an NPDES permit.

EFSEC makes the draft permit and fact sheet available for public review and comment at least thirty (30) days before issuing the final permit. Copies of the fact sheet and draft permit for Columbia Generating Station, NPDES permit WA0025151, are available for public review and comment from insert month day, year until month day, year. For more details on preparing and filing comments about these documents, please see Appendix A - Public Involvement Information.

Energy Northwest reviewed the draft permit and fact sheet for factual accuracy. EFSEC corrected any errors or omissions regarding the facility's location, history, discharges, or receiving water prior to publishing this draft fact sheet for public notice.

After the public comment period closes, EFSEC will summarize substantive comments and provide responses to them. EFSEC 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. EFSEC 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

Energy Northwest operates a nuclear-fueled steam electric power generation plant that discharges to the Columbia River. EFSEC issued the current permit on September 30, 2014 and modified the permit on February 8, 2016 and again on March 19, 2019. The current permit reflects changes to the facility's dehalogenation process made in 2019.

Effluent limits for pH, flow, chromium, zinc, total residual halogens, PCBs, and priority pollutants contained in chemicals added for cooling system maintenance are unchanged from the permit issued in 2014.

Summary of changes in the proposed permit:

- Added limit and DMR reporting for heat load based on the Total Maximum Daily Load (TMDL) for temperature in the Columbia and Lower Snake Rivers.
- Removed the limit for acute whole effluent toxicity, based on the facility meeting the performance standard throughout the previous permit term. Acute WET testing requirements are reduced from quarterly to twice during the permit term.
- Removed permit conditions and monitoring related to the Outfall 002 discharge to ground, which has been replaced by a non-discharging evaporative lagoon.
- Metals monitoring - chromium and zinc increased to 2/month for better monitoring of effluent limit compliance. Copper removed from monthly monitoring and included in annual priority pollutant monitoring.
- PCBs included in annual priority pollutant monitoring.
- Groundwater studies required by the previous permit were completed and accepted by EFSEC. The proposed permit does not authorize any discharges to groundwater other than stormwater covered under the UIC Program.
- Cooling water intake structures - the entrainment characterization study and the operation and maintenance manual required by the previous permit were completed and accepted by EFSEC. The proposed permit includes updated requirements for compliance with Section 316(b) of the Clean Water Act.

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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 the Department of Ecology (Ecology) and EFSEC. The Legislature defined Ecology's and EFSEC's authority and obligations for the wastewater discharge permit program in 90.48 RCW[1] (Revised Code of Washington).

The following regulations apply to industrial NPDES permits:

- Procedures EFSEC follows for issuing NPDES permits (chapter 173-220 WAC[2])
- Water quality criteria for surface waters (chapter 173-201A WAC[3])
- Water quality criteria for ground waters (chapter 173-200 WAC[4])
- Whole effluent toxicity testing and limits (chapter 173-205 WAC[5])
- Sediment management standards (chapter 173-204 WAC[6])
- Submission of plans and reports for construction of wastewater facilities (chapter 173-240 WAC[7])

These rules require any industrial 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 performance requirements imposed by the permit.

Under the NPDES permit program and in response to a complete and accepted permit application, EFSEC must prepare a draft permit and accompanying fact sheet, and make them available for public review before final issuance. EFSEC 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[8]). (See *Appendix A-Public Involvement Information* for more detail about the public notice and comment procedures). After the public comment period ends, EFSEC may make changes to the draft NPDES permit in response to comment(s). EFSEC will summarize the responses to comments and any changes to the permit in Appendix E.

[1] https://app.leg.wa.gov/RCW/default.aspx?cite=90.48
[2] https://apps.leg.wa.gov/WAC/default.aspx?cite=173-220
[3] https://apps.leg.wa.gov/WAC/default.aspx?cite=173-201A
[4] https://apps.leg.wa.gov/WAC/default.aspx?cite=173-200
[5] https://apps.leg.wa.gov/WAC/default.aspx?cite=173-205
[6] https://apps.leg.wa.gov/WAC/default.aspx?cite=173-204
[7] https://apps.leg.wa.gov/WAC/default.aspx?cite=173-240
[8] https://app.leg.wa.gov/WAC/default.aspx?cite=173-220-050

II. Background Information

Table 1 - Facility Information

Applicant:	**Energy Northwest**
Facility Name and Address	Columbia Generating Station P.O. Box 968 (Mail Drop PE20) Richland, WA 99352
Contact at Facility	Marshall Schmitt Title: Environmental Scientist Telephone: (509) 372-5334
Responsible Official	Scott Vance Vice President, Corporate Governance & General Counsel PO Box 968, Mail Drop 1020, Richland, WA 99352 Telephone: (509) 377-4650 Fax: (509) 372-5330
Industry Type	Electric Services
Categorical Industry	40 CFR Part 423 Steam Electric Power Generating Point Source Category
Type of Treatment	Cooling, disinfection, neutralization (blowdown) Filtration, ion exchange (processed radwaste water)
SIC Codes	4911
NAIC Codes	221113
Facility Location (NAD83/WGS84 reference datum)	Latitude: 46.47170 Longitude: -119.33280
Discharge Waterbody Name and Location (NAD83/WGS84 reference datum)	Columbia River (RM 351.75) Latitude: 46.47139 Longitude: -119.26250
Intake Structures	Latitude: 46.471419 Longitude: -119.262954

Permit Status

Issuance Date of Previous Permit: September 30, 2014

Application for Permit Renewal Submittal Date: May 1, 2019

Date of EFSEC Acceptance of Application: August 6, 2019

Inspection Status

Date of Last Non-sampling Inspection: September 27, 2022

Figure 1 - Facility Location Map

The Columbia Generating Station (CGS) is on the left side of the image with the Columbia River approximately three miles east, along the right border. CGS resides within the Hanford Nuclear Reservation and is approximately 15 miles north of Richland, WA.

II.A. Facility description

1. History

The Columbia Generating Station (CGS) is a 1,236- megawatt boiling water reactor that uses nuclear fission to produce heat. Energy Northwest owns and operates this facility, located on leased land within the U.S. Department of Energy (USDOE) Hanford Site in Benton County about 12 miles north of Richland, Washington. CGS employs about 1,100 people and produces electricity 24 hours a day, 7 days a week when in operation. The reactor is shut down approximately every two years for refueling and maintenance. The last planned outage occurred from May 8 to June 19, 2021. CGS produces eight to nine billion kilowatt-hours of electricity annually, representing four percent of the power consumed in the northwest.

The 1,089 acre site includes several buildings and structures located three miles west of the Columbia River. Construction of the plant began in 1973. The Nuclear Regulatory Commission (NRC) issued an operating license in 1983 and the first electricity was produced in May of 1984. In May 2012, NRC issued a renewed operating license to Energy Northwest, which expires 12/20/2043.

Energy Northwest replaced the main steam condenser during a 2011 refueling outage. The admiralty brass condenser tubes were replaced with titanium to reduce copper content in reactor feed water and blowdown, reduce radiation exposure, and improve operational efficiencies.

2. Industrial Processes

The Columbia Generating Station's (CGS) Standard Industrial Classification (SIC) Code is 4911, Electric Services. The North American Industry Classification System (NAICS) Code is 221113, Nuclear Electric Power Generation. The facility is subject to EPA Categorical Pretreatment Standards 40 Code of Federal Regulations (CFR) Part 423 Steam Electric Power Generating Point Source Category.

The main activity at the site is production of commercial electric power from nuclear energy. The boiling water type nuclear reactor uses light water as the moderator and enriched uranium in pellet form as the nuclear fuel. Demineralized water passes around zirconium tubes containing the reactor fuel in the core and is converted to steam at about 70 atmospheres (1000 psi). The electrical generator is turned by a steam powered turbine converting thermal energy to mechanical energy and ultimately to electrical energy.

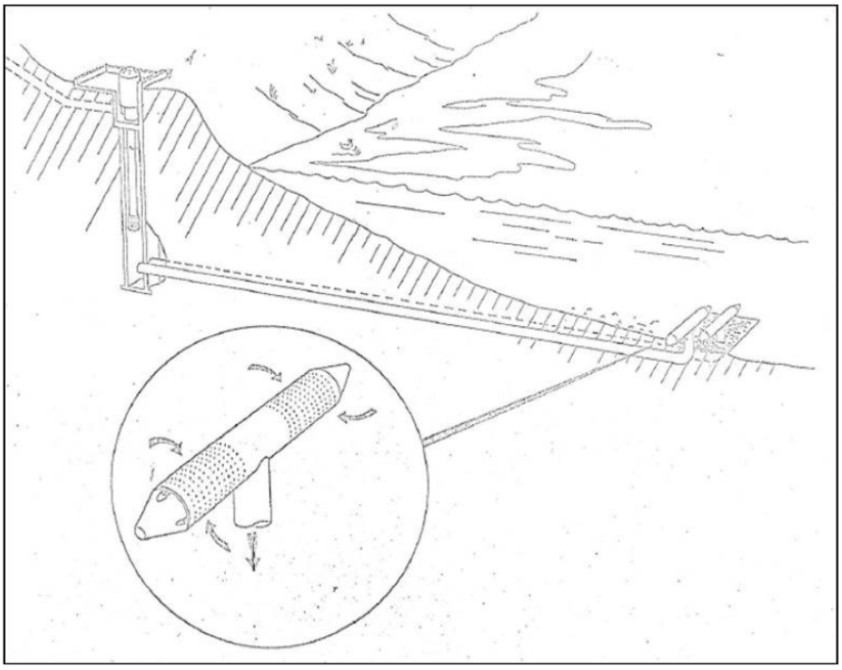
The primary use for the process water is non-contact cooling water. Flow is recirculated through six mechanical draft cooling water towers where heat is rejected to the atmosphere. Evaporation, drift, and blowdown losses are replenished from the Columbia River. CGS also produces potable water and water for use in the reactor on-site.

This NPDES permit covers discharges of pollutants not otherwise covered by EFSEC Council Resolution or other authority, such as the NRC, in any wastewater discharges to waters of the state.

3. Cooling Water Intakes

The CGS cooling water intake consists of two screened cylinders. Each cylinder is 30 feet long and is composed of two intake screens each 6.5 ft long. The screens consist of an outer and inner sleeve of perforated pipe. The outer sleeve is 42" diameter with 3/8" holes and the inner sleeve is 36" diameter with ¾" holes. Columbia River water flows by gravity through the intake structures into the pump well on the river shore, where it is then pumped to the CGS facility. The intake screens were designed for low through-screen velocities to minimize impingement and entrainment.

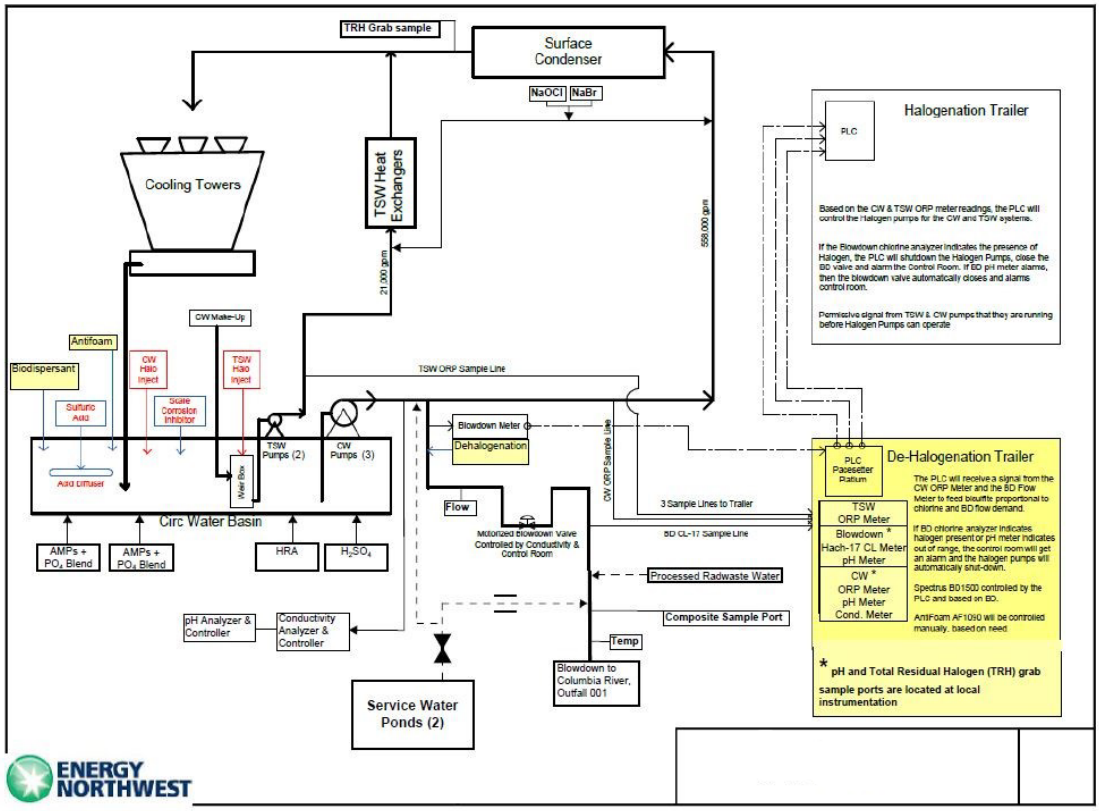
Figure 2 - CGS cooling water intake structures



4. Wastewater Treatment processes discharging to Outfall 001 (Columbia River at RM 351.75)

Figure 3 shows a flow diagram of the circulating cooling water system.

Figure 3 - Cooling Water System Schematic



Circulating cooling water blowdown – The major waste stream, in terms of volume, is the blowdown from the non-contact circulating cooling water system, which cools the steam condenser and associated machinery. This water is circulated at approximately 600,000 gallons per minute (gpm), cooled by the evaporative process in six mechanical draft cooling towers, and recycled. The evaporated water and that lost through drift and blowdown is replenished from the Columbia River at an average rate of about 15,000 gpm. Evaporation of the cooling water results in the concentration of dissolved solids. To limit the buildup of dissolved salts, a portion of the cooling water is released to the river as blowdown through to Outfall 001.

Although the blowdown stream is intended to be a relatively constant discharge, several factors can cause variation in the chemical composition of the discharge. The most important factor is the adjustable blowdown rate that determines the concentration factor for dissolved material in the circulating water. CGS has typically operated between 5 cycles of concentration (about 2,850 gpm blowdown) and 12 cycles of concentration (about 850 gpm blowdown). The permit application reports an average flow of 1.91 MGD.

The chemical composition of the blowdown is affected by the circulating water treatment regime. Sulfuric acid is added to help maintain pH in the range of 8.2 to 8.6 for optimal reduction of biofouling and scale. The water is also treated with DVS3A002 which is a

HEDP (1hydroxy-ethylidne-1, 1, diphosphonate) and AMPs (amino-trimethylene-phosphonate) copolymer blend that functions as a calcium scale inhibitor and a dispersant. Sodium tolyltriazole, which is a halogen-resistant azole (HRA), is added separately for copper alloy corrosion control.

On March 19, 2019 EFSEC modified the NPDES permit to improve the inhibition of biological fouling of the circulating water and plant service water systems. This improvement involves changing from a batch to a continuous halogenation process, with continuous injection of the same halogenation agents (sodium hypochlorite and sodium bromide). CGS adds two additional chemicals to assist the effectiveness of the halogenation, a biodispersant (surfactant) and an antifoaming agent. To prevent the discharge of elevated halogens (i.e., chlorine and bromine derivatives) to Outfall 001, the dehalogenation agent sodium bisulfite is continuously added to the blowdown in a controlled manner. The batch process for microbiocidal treatment is available as a backup procedure in the event of a problem with the effluent total residual halogen (TRH) analyzer or other problem with the continuous halogenation/dehalogenation system.

Another factor causing short-term increases in metal concentrations in the cooling water is the periodic dewatering and mechanical cleaning of the condenser tubes during maintenance outages. Online cooling tower cleaning to remove silt and organic matter can cause some of the material to become re-suspended such that the solids concentration in the blowdowm is slightly higher than normal. Cooling water (and blowdown) suspended solids concentrations are also increased during dust storms and large wildfire events with heavy ambient smoke because the towers act like large air scrubbers. Seasonal increase in makeup water turbidity also results in higher cooling water suspended solids.

Condenser cleaning water - Periodically the main condenser becomes scaled. This reduces plant efficiency to the point that chemical cleaning of the main condenser is necessary. Blowdown to the river will be secured and a cleaning agent, FerroquestTM or equivalent, will be added to the circulating water system. Sodium tolyltriazole will be added for copper metal corrosion protection. After the treated water has circulated a sufficient time to remove most of the scale (estimated to be one or two hours), sodium hydroxide will be added for pH adjustment. At the completion of the cleaning process, if any permit condition is not met, circulating water will be pumped to a storage location using temporary pumps and piping. During this pumping process, the concentration of constituents in the circulating water will be reduced by the addition of makeup water from the river. When the circulating water meets all conditions for discharge, blowdown to the river will be initiated. After the condenser cleaning process is completed, the stored water will be treated as necessary to meet discharge requirements. Following achievement of discharge limits, the water will be pumped back to the circulating water basin at CGS. Sediment from the cleaning process will be analyzed and disposed in accordance with the solid waste control plan.

Standby Service Water (SSW) system– The SSW system removes reactor decay heat during normal shutdown conditions and provides a heat sink for emergency equipment

during a plant transient or accident. The SSW system is a closed-loop circulating water system that draws cooling water from an onsite reservoir, and returns heated water to the reservoir. The primary reason for discharging service water is to reduce the concentration of sulfur or chlorides that have the potential to induce corrosion. Other reasons for discharging include the need to perform maintenance on the submerged components in the spray ponds, the need to clean out accumulations of sediments in the ponds, or to reduce suspended solids in the ponds. Infrequently, several million gallons of standby service water might be released to the blowdown line or to the cooling water system over a period of a couple days to multiple weeks. This water tends to be of lower cycles of concentration than the circulating cooling water. No discharges from the SSW system occurred during the previous permit term.

Radioactive wastewater treatment system effluent – This is treated wastewater from the "primary water system" (reactor water for steam production) that Energy Northwest must occasionally discharge when the plant storage inventory is full or if the total organic content of the water is too high to be used in the plant. This is relatively pure, low conductivity water that is released in batches of about 15,000 gallons at rates of up to 190 gpm. It is filtered and treated through an ion exchange process to reduce radioactive impurities prior to discharge. There have been no releases from this system since September 19, 1998.

Plant Service Water (TSW) - During Plant Service Water (TSW) system outages approximately 110,000 gallons of TSW water is drained via the blowdown line. The TSW system maintenance is infrequent and occurs approximately every ten years.

5. Evaporation Ponds

A series of double-lined, evaporative lagoons is located approximately 1500 feet northeast of the plant. Runoff from the power block building and stormwater collected in the bermed area around the Diesel Fuel Polishing Building is discharged to the evaporations ponds. Non-stormwater wastewater streams discharging into the evaporation ponds include backwash from the potable water and process water treatment systems, sumps and floor drains, and the fire protection system. These lagoons do not discharge into surface waters or ground waters.

6. Stormwater

Stormwater runoff from parking lots, support building, and other impervious surfaces are discharged to multiple UIC wells at the facility. The UIC wells are registered with the statewide Underground Injection Control (UIC) program[9]. The proposed permit requires Energy Northwest to submit an update to the stormwater pollution prevention plan (SWPPP) developed during the previous permit cycle.

[9] https://ecology.wa.gov/Regulations-Permits/Guidance-technical-assistance/Underground-injection-control-program

7. Sanitary wastes

Sanitary waste from the facility is piped to a treatment system located approximately one-half mile to the southeast. The facility uses aeration lagoons and facultative stabilization ponds to treat sanitary waste. Discharge of treated wastewater to ground is regulated under Temporary State Waste Discharge permit ST0501312.

8. Solid wastes

Several waste streams from the facility are addressed in the Solid Waste Control Plan. General refuse, scrap metal, metal and polyurethane drums, and worn vehicle and equipment tires are recycled or disposed of off-site. Demolition and construction debris are primarily disposed of at the City of Richland Municipal Landfill. Energy Northwest can also dispose of some waste in the onsite inert waste landfill. Used oil and hydraulic fluid is collected in drums until recyclable quantities are accumulated and transported off-site for recycling. Petroleum contaminated soils are land-farmed at the City of Richland Municipal Landfill or transported to a hazardous waste landfill off-site.

Cooling system sediments from the cooling tower decks and basins are collected approximately annually and placed in a disposal cell south of the towers. Sediments are periodically removed from the service water spray ponds and disposed of in the cooling tower sediment disposal cells.

EFSEC Council Resolution or other authority such as the Nuclear Regulatory Commission regulates the handling, treatment, storage, disposal and release of dangerous and radioactive wastes. The scope of this proposed permit does not include these activities beyond the requirement in S5.A to follow the procedures in the most current resolution pertaining to the disposal of sediments from the cooling water system and double-lined impoundment.

9. Discharge outfall

The treated effluent flows into the Columbia River through Outfall 001 at river mile 351.75. At minimum river flow of 36,000 cfs, a buried 18-inch pipe emerges at the outfall approximately 175 feet from the west shoreline and at a depth of seven feet. The slot-nozzle outfall is aligned perpendicular to the river flow, is 8-inches high, 32-inches wide and extends upwards from the river bed at a 15° angle.

II.B. Description of the receiving water

Columbia Generating Station discharges to the Columbia River at rive mile 351.75. No other point source outfalls are nearby. Significant nearby non-point sources of pollutants include discharges from agricultural areas to the east and north along the Columbia River. Nearby drinking water intakes include one for the facility approximately 700 feet upstream and those of the Cities of Richland and Pasco located approximately 12 miles downstream to the south. Section III.D of this fact sheet describes any receiving waterbody impairments.

The ambient background data used for this permit includes the following from Ecology's ambient monitoring location 36A070 (Columbia River at Vernita Bridge, upstream from the discharge), from 1990-present:

Table 2 - Ambient Background Data

Parameter	Value Used
Temperature (90th percentile 1-DMax)	19.5 °C
pH (90th/10th percentile)	8.4/7.8 standard units
Dissolved Oxygen (10th percentile)	9.7 mg/L
Total Ammonia-N	0.041 mg/L (from permit application, intake water data)
E.coli (average)	10/100 mL
Turbidity (average)	1.5 NTU
Hardness	65 mg/L as CaCO3
Alkalinity	60.4 mg/L as CaCO3
Chromium (dissolved, 90th percentile)	0.60 µg/L
Copper	1.2 µg/L
Lead	0.075 µg/L
Nickel	1.1 µg/L
Silver	Not detected
Zinc	4.5 µg/L

II.C. Wastewater characterization

Energy Northwest 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 November 2014 through May 2022. Of the priority pollutants, only those with detected results are listed here.

Table 3 - Wastewater Characterization, Outfall 001

Parameter	Units	# of Samples	Average Value	Maximum Value
Flow - monthly average	MGD	monthly	2.2	4.7
Flow - daily max	MGD	daily	2.2	6.7
Temperature	°C	daily	26.7	33.1 (95th %tile)
Turbidity	NTU	90	9	26 (95th %tile)
Total Residual Halogen	mg/L	continuous monitor	<0.1	<0.1
Chromium, Total	µg/L	97	1.4	2.8 (95th %tile)
Copper, Total	µg/L	97	14	20 (95th %tile)
Zinc, Total	µg/L	97	19	38 (95th %tile)
Biochemical Oxygen Demand (BOD_5)	mg/L	3	<2.0	<2.0
Chemical Oxygen Demand (COD)	mg/L	3	37	39
Total Organic Carbon	mg/L	3	13	15
Total Suspended Solids (TSS)	mg/L	37	9.1	45
Ammonia (as N)	mg/L	37	0.071	0.250

Parameter	Units	# of Samples	Average Value	Maximum Value
Bromide	mg/L	3	13.6	16.0
Chlorine	mg/L	3	<0.1	<0.1
Color	CU	3	10	10
Fecal Coliform	#/100 ml	3	3.3	7.8
Fluoride	mg/L	37	0.65	0.90
Nitrate-Nitrite (as N)	mg/L	37	1.24	3.25
Nitrogen, Total Organic (as N)	mg/L	3	1.35	1.52
Oil and Grease	mg/L	4	0	<1
Phosphorus, Total (as P)	mg/L	37	2.68	3.44
Beta Radioactivity, Total	pCi/L	36	7.48	17.1
Sulfate	mg/L	37	572	760
Aluminum, Total	mg/L	3	0.18	0.18
Barium, Total	mg/L	37	0.28	0.37
Boron, Total	mg/L	3	0.0378	0.0479
Cobalt, Total	mg/L	3	0.00041	0.00042
Iron, Total	mg/L	37	0.37	1.3
Magnesium, Total	mg/L	37	44	58
Molybdenum, Total	mg/L	3	0.0079	0.0081
Manganese, Total	mg/L	37	0.034	0.092
Tin, Total	mg/L	3	<0.001	<0.001
Titanium, Total	mg/L	37	0.019	0.066
Antimony, Total	µg/L	7	1.3	1.6
Arsenic, Total	µg/L	37	6.4	9.5
Lead, Total	µg/L	37	0.9	3.5
Mercury, Total	ng/L	7	2.27	4.07
Nickel, Total	µg/L	37	7.7	12
Selenium, Total	µg/L	37	3.6	7.4
Silver, Total	µg/L	37	0.015	0.24
Bromoform	µg/L	7	0.20	0.63
2-Nitrophenol	µg/L	4	0.21	0.54
4-Nitrophenol	µg/L	4	0.47	1.56
Bis(2-Ethylhexyl) Phthalate	µg/L	4	0.98	2.16

Parameter	Units	# of Samples	Minimum Value	Maximum Value
pH	s.u.	Continuous monitor	6.8	8.8

II.D. Summary of compliance with previous permit Issued

The previous permit placed effluent limits on flow, pH, acute toxicity, total residual halogens, total chromium, total zinc, polychlorinated biphenyl compounds (PCBs), and 126

priority pollutants (40 CFR 423 Appendix A) contained in chemicals added for cooling tower maintenance, except chromium and zinc.

CGS has complied with the effluent limits and permit conditions throughout the duration of the permit issued on September 30, 2014. EFSEC assessed compliance based on its review of the facility's information in Ecology's Permitting and Reporting Information System (PARIS), discharge monitoring reports (DMRs) and on inspections.

The following table summarizes compliance with report submittal requirements over the permit term.

Table 4 - Permit Submittals

Submittal Name	Due Date	Received Date	Permit Section
Application for permit renewal	5/1/2019	4/30/2019	S.6
Chronic toxicity - Testing when there is no permit limit - results	5/1/2019	1/21/2019	S.19.F
Acute toxicity - compliance testing for acute toxicity	4/30/2015	3/12/2015	S.13.A
Acute toxicity - compliance testing for acute toxicity	7/31/2015	5/14/2015	S.13.A
Acute toxicity - compliance testing for acute toxicity	10/31/2015	9/21/2015	S.13.A
Acute toxicity - compliance testing for acute toxicity	1/31/2016	12/3/2015	S.13.A
Acute toxicity - compliance testing for acute toxicity	4/30/2016	3/9/2016	S.13.A
Acute toxicity - compliance testing for acute toxicity	7/31/2016	6/20/2016	S.13.A
Acute toxicity - compliance testing for acute toxicity	10/31/2016	9/12/2016	S.13.A
Acute toxicity - compliance testing for acute toxicity	1/31/2017	11/30/2016	S.13.A
Acute toxicity - compliance testing for acute toxicity	4/30/2017	3/20/2017	S.13.A
Acute toxicity - compliance testing for acute toxicity	7/31/2017	6/6/2017	S.13.A
Acute toxicity - compliance testing for acute toxicity	10/31/2017	9/11/2017	S.13.A
Acute toxicity - compliance testing for acute toxicity	1/31/2018	11/29/2017	S.13.A
Acute toxicity - compliance testing for acute toxicity	4/30/2017	4/4/2017	S.13.A
Acute toxicity - compliance testing for acute toxicity	4/30/2018	3/14/2018	S.13.A
Acute toxicity - compliance testing for acute toxicity	7/30/2018	6/12/2018	S.13.A
Acute toxicity - compliance testing for acute toxicity	10/30/2018	9/5/2018	S.13.A
Acute toxicity - compliance testing for acute toxicity	1/30/2019	12/6/2018	S.13.A
Acute toxicity - compliance testing for acute toxicity	4/30/2019	2/21/2019	S.13.A
Acute toxicity - compliance testing for acute toxicity	7/30/2019	5/21/2019	S.13.A
Acute toxicity - compliance testing for acute toxicity	10/30/2019	9/9/2019	S.13.A
Acute toxicity - compliance testing for acute toxicity	1/30/2020	12/17/2019	S.13.A
Acute toxicity - compliance testing for acute toxicity	4/30/2020	3/9/2020	S.13.A
Acute toxicity - compliance testing for acute toxicity	7/30/2020	5/27/2020	S.13.A
Acute toxicity - compliance testing for acute toxicity	10/30/2020	9/2/2020	S.13.A
Acute toxicity - compliance testing for acute toxicity	1/30/2021	12/14/2020	S.13.A

Acute toxicity - compliance testing for acute toxicity	4/30/2021	2/24/2021	S.13.A
Acute toxicity - compliance testing for acute toxicity	7/30/2021	5/27/2021	S.13.A
Acute toxicity - compliance testing for acute toxicity	10/30/2021	9/9/2021	S.13.A
Acute toxicity - compliance testing for acute toxicity	1/30/2022	12/9/2021	S.13.A
Acute toxicity - compliance testing for acute toxicity	4/30/2022	2/16/2022	S.13.A
Acute toxicity - compliance testing for acute toxicity	7/30/2022	5/24/2022	S.13.A
Outfall evaluation	5/1/2019	1/17/2019	S.11
Operation and maintenance manual for evaporative pond system	12/1/2014	3/31/2014	S.4.Aa1/S 7
Submit a notice of completion of double-lined impoundment	5/1/2015	5/1/2015	S.7
Spill control plan update with permit application	5/1/2019	10/10/2018	S.9.A.1
Solid Waste Control Plan Update with permit application	5/1/2019	10/10/2018	S.5.C
Scope of work for analysis of circulating cooling H2O losses	11/1/2016	10/31/2016	S.7.3
Scope of work for analysis of circulating cooling H2O losses	11/1/2016	8/1/2017	S.7.3
Scope of work for analysis of circulating cooling H2O losses	11/1/2016	8/23/2017	S.7.3
Engineering Report for Circulating Cooling Water System Losses	5/1/2019	4/24/2019	S.7.4
Ground Water Quality Assurance Project Plan (QAPP) Update	5/1/2015	4/30/2015	S.7.5
Ground Water (QAPP) Update-Tasks 1-5 Findings	5/1/2019	4/22/2019	S.7.6
Report Relocation of temperature monitoring location	11/15/2015	11/1/2015	S.7.7/G21
Report Installation of sampling equip to collect 24 hour comp samples	11/15/2015	10/22/2015	S.7.8/G21
Storm Water Pollution Prevention Plan (SWPPP)	11/1/2015	10/22/2015	S.10
Cooling Water Intake Structure O&M Manual	11/1/2015	10/27/2015	S.12.A.1.a
Entrainment Characterization Study Design	11/1/2015	10/28/2015	S.12.B.1
Entrainment Characterization Study Report	5/1/2019	2/12/2019 (interim) 2/26/2020 (final)	S.12.B.2

II.E. 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[10]). 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 EFSEC develops the limit on a case-by-case basis (40 CFR 125.3[11], and chapter 173-220 WAC[12]).
- Water quality-based limits are calculated so that the effluent will comply with the Surface Water Quality Standards (chapter 173-201A WAC[13]), Ground Water Standards (chapter 173-200 WAC[14]), Sediment Quality Standards (chapter 173-204 WAC[15]), or the Federal Water Quality Criteria Applicable to Washington (40 CFR 131.45[16]).
- EFSEC 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.). EFSEC evaluated the permit application and determined the limits needed to comply with the rules adopted by the state of Washington. EFSEC 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.

The proposed permit does not include 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 EFSEC if significant changes occur in any constituent [40 CFR 122.42(a)[17]]. Until EFSEC modifies the permit to reflect additional discharge of pollutants, a permitted facility could be violating its permit.

[10] http://app.leg.wa.gov/RCW/default.aspx?cite=43.21C.0383
[11] https://www.ecfr.gov/current/title-40/chapter-I/subchapter-D/part-125#125.3
[12] https://apps.leg.wa.gov/WAC/default.aspx?cite=173-220
[13] https://apps.leg.wa.gov/WAC/default.aspx?cite=173-201A
[14] https://apps.leg.wa.gov/WAC/default.aspx?cite=173-200
[15] https://apps.leg.wa.gov/WAC/default.aspx?cite=173-204
[16] https://www.ecfr.gov/current/title-40/chapter-I/subchapter-D/part-131#131.45
[17] https://www.ecfr.gov/current/title-40/chapter-I/subchapter-D/part-122/subpart-C/section-122.42

III.A. Technology-based effluent limits

EFSEC must ensure that facilities provide all known, available, and reasonable methods of prevention, control, and treatment (AKART) when it issues a permit. Technology-based effluent limitations for steam electric power generation are detailed in 40 CFR 423.

Applicable standards for Columbia Generating Station are best available technology economically achievable (BAT) standards in 40 CFR 423.13.

The technology-based limit for total residual halogen, PCBs, and priority pollutants are based on 40 CFR 423.13. Application of the BAT standards (200 µg/L chromium, 1,000 µg/L zinc) would result in potential violation of water quality standards. Columbia Generating Station does not add chemicals containing chromium and zinc to the cooling tower discharge. Therefore, the previous permit established limits for chromium and zinc that are protective of water quality standards without allowing for dilution. These limits are achievable based on demonstrated performance and are considered to be technology-based effluent limits.

Limits for pH and flow are based on demonstrated performance at the facility.

Table 5 - Technology-based Limits

Parameter	Average Monthly Limit	Maximum Daily Limit
Flow	5.6 million gallons/day (mgd)	9.4 mgd
Total Residual Halogen	NA	0.1 mg/L[1]
Chromium (Total)	8.2 µg/L	16.4 µg/L
Zinc (Total)	53 µg/L	107 µg/L
PCBs	No discharge	No discharge
126 priority pollutants (40 CFR 423 Appendix A) contained in chemicals added for cooling tower maintenance, except chromium and zinc	No detectable amount	No detectable amount

Parameter	Daily Minimum	Daily Maximum
pH	6.5 standard units	9.0 standard units

[1]Total Residual Halogen: BAT effluent limits at 40 CFR 423.13(d)(1) for free available chlorine are maximum concentration 0.5 mg/L and average 0.2 mg/L. The proposed maximum daily limit of 0.1 mg/L total residual halogen is more protective than the BAT chlorine limits. This is the same limit as in the previous permit and the facility is able to comply with it.

III.B. Surface water quality-based effluent limits

The Washington State surface water quality standards (chapter 173-201A WAC[18]) 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

[18] https://apps.leg.wa.gov/WAC/default.aspx?cite=173-201A

will meet the surface water quality standards (WAC 173-201A-510). Water quality-based effluent limits may be based on an individual waste load allocation or on a waste load allocation developed during a basin wide total maximum daily load study (TMDL).

1. 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. EFSEC 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.

2. 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[19]. 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.

3. Narrative criteria

Narrative water quality criteria (e.g., WAC 173-201A-240(1)) 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) and of all marine waters (WAC 173-201A-210) in the state of Washington.

4. Antidegradation

The purpose of Washington's Antidegradation Policy (WAC 173-201A-300-330) 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).

[19] https://www.ecfr.gov/current/title-40/chapter-I/subchapter-D/part-131#131.45

- 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.
- EFSEC 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. EFSEC 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.
- EFSEC'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.

5. Mixing zones

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

State and federal rules allow mixing zones because the concentrations and effects of most pollutants diminish rapidly after discharge, due to dilution. EFSEC 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 EFSEC to authorize mixing zones for the facility's permitted wastewater discharges only if those discharges already receive all known, available, and reasonable methods of prevention, control, and treatment (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% of the available width of the water body for dilution (WAC 173-201A-400 (7)(a)(ii-iii)).

EFSEC uses modeling to estimate the amount of mixing within the mixing zone. Through modeling EFSEC 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. EFSEC 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. 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 dilution factor represents the amount of mixing of effluent and receiving water that occurs at the boundary of the mixing zone. For example, a dilution factor of 4 means the effluent is 25% and the receiving water is 75% of the total volume of water at the boundary of the mixing zone. EFSEC uses dilution factors with the water quality criteria to calculate reasonable potentials and effluent limits. Water quality standards include both aquatic life-based criteria and human health-based criteria. The former are applied at both the acute and chronic mixing zone boundaries; the latter are applied only at the chronic boundary. The concentration of pollutants at the boundaries of any of these mixing zones may not exceed the numerical criteria for that zone.

Each aquatic life acute criterion is 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. Each aquatic life chronic criterion is 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:

a. EFSEC 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).

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

EFSEC has determined that the treatment provided at Columbia Generating Station meets the requirements of AKART (see "Technology-based Limits").

c. EFSEC 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[20] describes additional guidance on criteria/design conditions for determining dilution factors.

Table 6 - Critical Conditions Used to Model the Discharge

Critical Condition	Value
Seven-day-average low river flow with a recurrence interval of ten years (7Q10)	52,700 cubic feet per second (cfs)
River depth at the 7Q10 period	8.5 feet
River velocity	5.35 ft per second
Manning roughness coefficient	0.02
Channel width	1,400 feet
Maximum average monthly effluent flow for chronic and human health non-carcinogen	4.3 MGD
Annual average flow for human health carcinogen	2.8 MGD
Maximum daily flow for acute mixing zone	5.9 MGD
7-DAD MAX/1-DAD-MAX Effluent temperature	31.9°C

EFSEC obtained ambient data at critical conditions in the vicinity of the outfall from the permit application, DMRs and the *Energy Northwest Columbia Generating Station Effluent Mixing Study* (R. E. Welch Environmental Services, 2008).

[20] https://apps.ecology.wa.gov/publications/summarypages/92109.html

d. 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. EFSEC 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.

EFSEC evaluates the cumulative toxicity of an effluent by testing the discharge with whole effluent toxicity (WET) testing.

EFSEC 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, EFSEC 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.

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

EFSEC 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.

f. 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. EFSEC 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.

EFSEC minimizes the size of mixing zones by requiring dischargers to install diffusers when they are appropriate to the discharge and the specific receiving waterbody. When a diffuser is installed, the discharge is more completely mixed with the receiving water in a shorter time. EFSEC 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, EFSEC 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, EFSEC has effectively minimized the size of the mixing zone authorized in the proposed permit.

g. Maximum size of mixing zone.

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

h. Acute mixing zone.

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

EFSEC determined the acute criteria will be met at 10% 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.

i. Overlap of Mixing Zones.

This mixing zone does not overlap another mixing zone.

III.C. Designated uses and surface water quality criteria

Applicable designated uses and surface water quality criteria are defined in chapter 173-201A WAC[21]. The table included below summarizes the criteria applicable to this facility's discharge.

1. Freshwater Aquatic Life Uses and Associated Criteria

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

Table 7 - Salmonid Spawning, Rearing, and Migration

Criteria	Value
Temperature Criteria – Highest 7-DAD MAX	20°C (68°F) Temperature must not exceed a 1-DMax of 20°C due to human activities. When natural conditions exceed a 1-DMax of 20°C, no temperature increase will be allowed which will raise the receiving water temperature by greater than 0.3°C; nor shall such temperature increases, at any time, exceed t=34/(T+9)
Dissolved Oxygen Criteria – Lowest 1-Day Minimum	8.0 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.
pH Criteria	The pH must measure within the range of 6.5 to 8.5 with a human-caused variation within the above range of less than 0.5 units.

2. Recreational use and criteria

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.

[21] https://apps.leg.wa.gov/WAC/default.aspx?cite=173-201A

3. Water supply uses
The water supply uses are domestic, agricultural, industrial, and stock watering.

4. Miscellaneous freshwater uses
The miscellaneous freshwater uses are wildlife habitat, harvesting, commerce and navigation, boating, and aesthetics.

III.D. Water quality impairments

Portions of the Columbia River are listed on the current 303(d) as impaired for temperature, bacteria, dissolved oxygen, pH, PCBs, aldrin, chlordane, dieldrin, and 4,4'-DDE. There are no listed impairments in the vicinity of the CGS outfall.

EPA completed a Total Maximum Daily Load (TMDL) Analysis to Limit Discharges of 2,3,7,8-TCDD (Dioxin) to the Columbia River Basin (Ecology Publication 09-10-058[22]) in 1991. This publication is a United States Environmental Protection Agency document.

The Total Maximum Daily Load (TMDL) for Total Dissolved Gas in the Mid-Columbia River and Lake Roosevelt, developed jointly by Washington State, the Spokane Tribe of Indians, and EPA, addresses total dissolved gas (TDG) in the Columbia River and Lake Roosevelt from the Canadian border to the Snake River (Ecology Publication 04-03-002[23]). Elevated TDG levels, which can cause "gas bubble trauma" in fish, are caused by spills from Mid-Columbia dams and by upstream sources. Separate allocations apply to fish passage and non-fish passage conditions. Allocations must be met below the spillway of each dam (near the end of the aerated zone). The implementation plan describes compliance with both Endangered Species Act and TMDL requirements.

The Columbia and Lower Snake Rivers are listed on the state's polluted waters list for high water temperatures that are above Washington water quality standards and can harm aquatic life. Because the Columbia and Snake Rivers cross multiple state boundaries and span almost 900 miles, the federal Environmental Protection Agency (EPA) published the Total Maximum Daily Load (TMDL) for temperature in the Columbia and Lower Snake Rivers[24] on May 20, 2020. EPA used heat load (the product of temperature, flow, and a conversion factor) to determine Wasteload Allocations (WLAs) for three main source categories: tributaries, current and future point sources subject to NPDES permits, and nonpoint source impacts from dams and reservoirs. The TMDL includes a waste load allocation (WLA) for the Columbia Generating Station.

III.E. Evaluation of surface water quality-based effluent limits for narrative criteria

EFSEC must consider the narrative criteria described in WAC 173-201A-260[25] 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

[22] https://apps.ecology.wa.gov/publications/SummaryPages/0910058.html
[23] https://apps.ecology.wa.gov/publications/summarypages/0403002.html
[24] https://www.epa.gov/columbiariver/tmdl-temperature-columbia-and-lower-snake-rivers
[25] https://apps.leg.wa.gov/wac/default.aspx?cite=173-201A-260

have the potential to adversely affect designated uses, cause acute or chronic toxicity to biota, impair aesthetic values, or adversely affect human health.

EFSEC considers narrative criteria when it evaluates the characteristics of the wastewater and when it implements all known, available, and reasonable methods of treatment and prevention (AKART) as described above in the technology-based limits section. When EFSEC 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, EFSEC considers the toxicity of the wastewater discharge by requiring whole effluent toxicity (WET) testing when there is a reasonable potential for the discharge to contain toxics. EFSEC's analysis of the need for WET testing for this discharge is described later in the fact sheet.

III.F. Evaluation of surface water quality-based effluent limits for numeric criteria

1. Mixing zones and dilution factors

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 biological oxygen demand (BOD) 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. EFSEC 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[26].

The diffuser at Outfall 001 is a single port structure aligned perpendicular to the river flow. It is 8-inches high, 32-inches wide, and extends upwards from the river bed at a 15 degree angle. The diffuser depth is 8.5 feet during critical low flow conditions. EFSEC obtained this information from the *Energy Northwest Columbia Generating Station Effluent Mixing Study*, June 2008.

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% of the flow, and not occupy greater than 25% of the width of the water body. The mixing zone extends from the bottom to the top of the water column.

[26] https://apps.leg.wa.gov/WAC/default.aspx?cite=173-201A

The chronic dilution factor below is based on a downstream distance of 308 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% of the distance towards the upstream and downstream boundaries of the chronic zone, not use greater than 2.5% of the flow and not occupy greater than 25% 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.

EFSEC determined the dilution factors that occur within these zones at the critical condition based on review of the *Energy Northwest Columbia Generating Station Effluent Mixing Study*, July 2008. Ecology's *Permit Writer's Manual* recommends that dilution for human health criteria be evaluated at the harmonic mean flow for carcinogens and 30Q5 for non-carcinogens. The study did not evaluate these conditions. Therefore, EFSEC used the dilution factor for aquatic life chronic criteria as a conservative estimate to evaluate human health criteria.

The study used the CORMIX Hydrodynamic Mixing Zone Model (CORMIX1 – Version 5.0). Energy Northwest also conducted an in-situ tracer study using forward looking infrared (FLIR) technology focusing on temperature as a dilution tracer. The dilution factors are listed below.

Table 8 - Dilution Factors (DF)

Criteria	Acute	Chronic
Aquatic Life	9	93
Human Health, Carcinogen		93
Human Health, Non-carcinogen		93

EFSEC determined the impacts of pH, ammonia, metals, other toxics, and temperature as described below, using the dilution factors in the above table. The derivation of surface water quality-based limits also takes into account the variability of pollutant concentrations in both the effluent and the receiving water.

2. pH

EFSEC modeled the impact to receiving waters under critical conditions using technology-based limits for pH (6.5 – 9.0) and the *pH-mix-fresh* worksheet in EFSEC's PermitCalc spreadsheet. Appendix D includes the model results. Model calculations predict no violation of the pH criteria under critical conditions. Because the facility has demonstrated it can meet the previous permit limits of 6.5 to 9.0, the proposed permit includes the technology-based effluent limits for pH of 6.5 to 9.0.

3. Aquatic Life Toxic Pollutants

Federal regulations (40 CFR 122.44[27]) require EFSEC to place limits in NPDES permits on toxic chemicals in an effluent whenever there is a reasonable potential for those

[27] https://www.ecfr.gov/current/title-40/chapter-I/subchapter-D/part-122#122.44

chemicals to exceed the surface water quality criteria. EFSEC 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. EFSEC 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, EFSEC used the available receiving water information for Ecology's ambient station 36A070 and spreadsheet tools developed by Ecology.

Valid ambient background data were available for ammonia, chromium, copper, lead, nickel, silver, and zinc. EFSEC used all applicable data to evaluate reasonable potential for this discharge to cause a violation of water quality standards.

EFSEC determined that ammonia, aluminum, arsenic, chromium, copper, iron, lead, mercury, nickel, selenium, silver, and zinc pose no reasonable potential to cause or contribute to exceedances of the water quality criteria at the critical condition using procedures given in EPA, 1991 (Appendix D) and as described above. EFSEC's determination assumes that this facility meets the other effluent limits of this permit.

4. Temperature

The state temperature standards (WAC 173-201A, WAC 173-201A-200, WAC 173-201A-600, and WAC 173-201A-602) include multiple elements:

a. Annual summer maximum threshold criteria (June 15 to September 15)
b. Supplemental spawning and rearing season criteria (September 15 to June 15)
c. Incremental warming restrictions
d. Guidelines on preventing acute lethality and barriers to migration of salmonids

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

a. 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 for some fresh waters are expressed as the highest 1-Day annual maximum temperature (1-DMax).

b. 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.

c. Guidelines to prevent acute lethality or barriers to migration of salmonids. These site-level considerations do not override the temperature criteria listed above.
   i. 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.
   ii. General lethality and migration blockage: The temperature 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 more cooler, the 1DMax at the edge of the chronic mixing zone must not exceed 22°C.
   iii. Lethality to incubating fish: The temperature must not exceed 17.5°C at locations where eggs are incubating.

Temperature Limit

This discharge is regulated by the Total Maximum Daily Load (TMDL) for temperature in the Columbia and Lower Snake Rivers[28] waste load allocation (WLA) for the Columbia Generating Station. The WLA is 1.27E+09 kilocalories per day (kcal/day) of heat load, to be applied as a monthly average limit from June 1 through October 31. The proposed permit includes an effluent limit for temperature derived from the completed TMDL. The average monthly heat load is calculated from the average monthly temperature and flow rate as follows: Heat Load (kcal/day) = Flow (mgd) x Temperature (°C) x 3.78×10^6.

Reasonable Potential Analysis for annual summer maximum and incremental warming criteria

EFSEC calculated the reasonable potential for the discharge to exceed the annual summer maximum and the incremental warming criteria (See temperature calculations in Appendix D). The discharge is allowed to warm the water by a defined increment only when the background (ambient) temperature is cooler than the assigned threshold

[28] https://www.epa.gov/columbiariver/tmdl-temperature-columbia-and-lower-snake-rivers

criterion. EFSEC allows warming increments only when they do not cause temperatures to exceed either the annual maximum or supplemental spawning criteria.

The allowable warming increment, t, is the lesser of: $t = 28/(T_{ambient} + 7)$, or the numeric criterion minus the ambient temperature. For this discharge the allowable increment t is: 20°C - 19.5°C = 0.5°C.

The temperature at the edge of the chronic mixing zone is:

$T_{chronic} = T_{ambient} + (T_{effluent95} - T_{ambient})/DF)$

$T_{ambient}$ = 90th percentile annual 1-DMax background temperature

$T_{effluent95}$ = 95th percentile 1-DMax) effluent temperature

$T_{chronic} = 19.5 + (33.1 - 19.5)/93) = 19.6°C$

So the temperature increase from the discharge is 19.6-19.5 = 0.1°C.

The incremental increase for this discharge is within the allowable amount. Therefore, the proposed permit includes the temperature limit based on the TMDL WLA.

Instantaneous lethality to passing fish: Near-field dilution analysis demonstrates that the plume temperature is less than 33°C two seconds after discharge. EFSEC calculated the plume temperature two seconds after discharge using the equations shown below and data from the Energy Northwest Columbia Generating Station Effluent Mixing Study (June 2008) which used the CORMIX Hydrodynamic Mixing Zone Model (CORMIX1-Version 5.0). EFSEC reviewed the CORMIX1 Prediction File used to determine dilution factors for the proposed permit to determine a value for DF@2second. The file predicts the end of the near-field region at 1.25 seconds with a corresponding centerline dilution factor of 3.7. This value was used for DF@2seconds in the equation.

The results demonstrate there is no reasonable potential for instantaneous lethality to passing fish.

$T_{2sec} = T_{ambient90} + (T_{effluent99} - T_{ambient90})/(DF@2seconds)$.

Where:

T_{2sec} = plume temperature 2-seconds after discharge.

$T_{ambient90}$ = 90th percentile of annual maximum 1DMax background temperatures.

$T_{effluent99}$ = 99th percentile of maximum 1DMax effluent temperatures.

DF@2seconds = centerline dilution factor at 2 seconds plume travel during a 7Q10 period.

$T_{2sec} = 22 + (34.9-22)/(3.7) = 25.6°C$

III.G. Human health

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

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

EFSEC evaluated the discharge's potential to violate the water quality standards as required by 40 CFR 122.44(d)[29] by following the procedures published in the Technical Support Document for Water Quality-Based Toxics Control (EPA/505/2-90-001)[30] and Ecology's Permit Writer's Manual[31] to make a reasonable potential determination. The evaluation showed that the discharge has no reasonable potential to cause a violation of water quality standards, and an effluent limit is not needed, for antimony, bis(2-ethylhexyl) phthalate, bromoform, copper, iron, mercury, nickel, selenium, and zinc.

III.H. Sediment quality

The aquatic sediment standards (chapter 173-204 WAC[32]) protect aquatic biota and human health. Under these standards EFSEC 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[33].

Through a review of the discharger characteristics and of the effluent characteristics, EFSEC determined that this discharge has no reasonable potential to violate the sediment management standards. The velocity of the Columbia River in the vicinity of the outfall inhibits sediment deposition. Visual inspection of the outfall during the evaluation conducted on September 17, 2018 confirms this finding.

III.I. Groundwater quality limits

The groundwater quality standards (chapter 173-200 WAC[34]) protect beneficial uses of groundwater. Permits issued by EFSEC must not allow violations of those standards (WAC 173-200-100).

The previous permit included groundwater monitoring for two outfalls where facility water was discharged to ground. These outfalls were discontinued when the facility built a large evaporation impoundment that is double-lined with leak detection. CGS no longer discharges wastewater to the ground. The outfalls that discharged to ground but no longer do so were removed from the permit.

The previous permit also required Energy Northwest to conduct a groundwater monitoring study to assess the effects of circulating cooling water system leakage. This study has been

[29] https://www.ecfr.gov/current/title-40/chapter-I/subchapter-D/part-122#122.44
[30] https://www3.epa.gov/npdes/pubs/owm0264.pdf
[31] https://apps.ecology.wa.gov/publications/summarypages/92109.html
[32] https://apps.leg.wa.gov/WAC/default.aspx?cite=173-204
[33] https://ecology.wa.gov/Spills-Cleanup/Contamination-cleanup/Sediment-cleanups
[34] https://apps.leg.wa.gov/WAC/default.aspx?cite=173-200

completed, reviewed by Ecology, Dept. of Health, and EFSEC, accepted, and finalized. The compliance schedule specified in the previous permit has been resolved.

After reviewing the completed study and an additional ten years of groundwater data provided by Energy Northwest, EFSEC has determined that this proposed permit will not contain any further groundwater monitoring requirements.

III.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.

- Acute toxicity tests measure mortality as the significant response to the toxicity of the effluent. Dischargers who monitor their wastewater with acute toxicity tests find early indications of any potential lethal effect of the effluent on organisms in the receiving water.
- Chronic toxicity tests measure various sublethal toxic responses, such as reduced growth or reproduction. Chronic toxicity tests often involve either a complete life cycle test on an organism with an extremely short life cycle, or a partial life cycle test during a critical stage of a test organism's life. Some chronic toxicity tests also measure survival.

Laboratories accredited by Ecology for WET testing must use the proper WET testing protocols, fulfill the data requirements, and submit results in the correct reporting format according to the procedures in the most recent version of Ecology's Laboratory Guidance and Whole Effluent Toxicity Test Review Criteria (Publication 95-80)[35]. EFSEC recommends that the regulated facility send a copy of the acute and chronic toxicity sections(s) of its NPDES permit to the laboratory.

All WET testing results conducted in order to monitor for compliance with an acute WET limit assigned in a previous permit met the acute toxicity performance standard defined in WAC 173-205-02036. This testing has continued to meet the standard after modifications to the dehalogenation system in 2019. The Permittee has not made any other changes to the facility which would trigger an additional effluent characterization pursuant to WAC 173-205-060. For these reasons, EFSEC has not included the acute WET limit or additional characterization in the proposed permit. Instead, the Permittee must conduct WET testing at the end of the permit term in order to verify that effluent toxicity has not increased.

WET testing conducted during effluent characterization showed no reasonable potential for effluent discharges to cause receiving water chronic toxicity. The proposed permit will not

[35] https://apps.ecology.wa.gov/publications/SummaryPages/9580.html
[36] https://app.leg.wa.gov/WAC/default.aspx?cite=173-205-020

include a chronic WET limit. The Permittee must retest the effluent before submitting an application for permit renewal.

- If this facility makes process or material changes which, in EFSEC's opinion, increase the potential for effluent toxicity, then EFSEC may (in a regulatory order, by permit modification, or in the permit renewal) require the facility to conduct additional effluent characterization
- If WET testing conducted for submittal with a permit application fails to meet the performance standards in WAC 173-205-020[37], EFSEC will assume that effluent toxicity has increased. Energy Northwest may demonstrate to EFSEC that effluent toxicity has not increased by performing additional WET testing after the process or material changes have been made.

III.K. Comparison of effluent limits with the previous permit as modified on March 19, 2019

Table 9 - Comparison of Previous and Proposed Effluent Limits – Outfall 001

Limit	Basis of Limit	Existing permit limit	Proposed permit limit
Flow - average monthly	Technology	5.6 MGD	5.6 MGD
Flow - maximum daily	Technology	9.4 MGD	9.4 MGD
Total Residual Halogen - maximum daily	Technology	0.1 mg/L	0.1 mg/L
Chromium (Total) - average monthly	Technology	8.2 µg/L	8.2 µg/L
Chromium (Total) - maximum daily	Technology	16.4 µg/L	16.4 µg/L
Zinc (Total) - average monthly	Technology	53 µg/L	53 µg/L
Zinc (Total) - maximum daily	Technology	107 µg/L	107 µg/L
Polychlorinated biphenyl compounds (PCBs)	Technology	No discharge	No discharge
The 126 priority pollutants (40 CFR 423 Appendix A) contained in chemicals added for cooling tower maintenance, except chromium and zinc	Technology	No detectable amount	No detectable amount
pH – Daily Minimum	Technology	6.5 s.u.	6.5 s.u.
pH – Daily Maximum	Technology	9.0 s.u.	9.0 s.u.
Heat Load - average monthly, June-October	WQ - TMDL	none	1.27E+09 kilocalories per day (kcal/day)

[37] https://app.leg.wa.gov/WAC/default.aspx?cite=173-205-020

IV. Monitoring Requirements

EFSEC requires monitoring, recording, and reporting (WAC 173-220-210[38] and 40 CFR 122.41[39]) to verify that the treatment process is functioning correctly and that the discharge complies with the permit's effluent limits.

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

IV.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, and significance of pollutants.

IV.B. Lab accreditation

EFSEC requires that facilities must use a laboratory registered or accredited under the provisions of chapter 173-50 WAC[40], Accreditation of Environmental Laboratories, to prepare all monitoring data (with the exception of certain parameters). Ecology accredited the laboratory at this facility for the following non-potable water parameters:

Table 10 - Accredited Parameters

Category	Method Name	Analyte Name
General Chemistry	EPA 300.0_2.1_1993	Bromide
General Chemistry	EPA 300.0_2.1_1993	Chloride
General Chemistry	EPA 300.0_2.1_1993	Fluoride
General Chemistry	EPA 300.0_2.1_1993	Nitrate
General Chemistry	EPA 300.0_2.1_1993	Nitrate + Nitrite
General Chemistry	EPA 300.0_2.1_1993	Nitrite
General Chemistry	EPA 300.0_2.1_1993	Sulfate
General Chemistry	EPA 410.4_2_1993	Chemical Oxygen Demand (COD)
General Chemistry	SM 2130 B-2011	Turbidity
General Chemistry	SM 2320 B-2011	Alkalinity
General Chemistry	SM 2510 B-2011	Specific Conductance
General Chemistry	SM 2540 C-2011	Solids, Total Dissolved
General Chemistry	SM 2540 D-2011	Solids, Total Suspended
General Chemistry	SM 3500-Cr B-2011	Chromium, Hexavalent
General Chemistry	SM 4500-H+ B-2011	pH

[38] https://apps.leg.wa.gov/WAC/default.aspx?cite=173-220-210
[39] https://www.ecfr.gov/current/title-40/chapter-I/subchapter-D/part-122/subpart-C/section-122.41
[40] https://apps.leg.wa.gov/WAC/default.aspx?cite=173-50

General Chemistry	SM 4500-NH3 D-2011	Ammonia
General Chemistry	SM 4500-O G-2011	Dissolved Oxygen
General Chemistry	SM 4500-P E-2011	Orthophosphate
General Chemistry	SM 4500-P E-2011	Phosphorus, Total
General Chemistry	SM 5210 B-2011	Biochemical Oxygen Demand (BOD)
General Chemistry	SM 5210 B-2011	Carbonaceous BOD (CBOD)
General Chemistry	SM 5310 B-2011	Total Organic Carbon
Metals	EPA 200.8_5.4_1994	Aluminum
Metals	EPA 200.8_5.4_1994	Antimony
Metals	EPA 200.8_5.4_1994	Arsenic
Metals	EPA 200.8_5.4_1994	Barium
Metals	EPA 200.8_5.4_1994	Beryllium
Metals	EPA 200.8_5.4_1994	Cadmium
Metals	EPA 200.8_5.4_1994	Calcium
Metals	EPA 200.8_5.4_1994	Chromium
Metals	EPA 200.8_5.4_1994	Cobalt
Metals	EPA 200.8_5.4_1994	Copper
Metals	EPA 200.8_5.4_1994	Iron
Metals	EPA 200.8_5.4_1994	Lead
Metals	EPA 200.8_5.4_1994	Magnesium
Metals	EPA 200.8_5.4_1994	Manganese
Metals	EPA 200.8_5.4_1994	Molybdenum
Metals	EPA 200.8_5.4_1994	Nickel
Metals	EPA 200.8_5.4_1994	Potassium
Metals	EPA 200.8_5.4_1994	Selenium
Metals	EPA 200.8_5.4_1994	Silver
Metals	EPA 200.8_5.4_1994	Sodium
Metals	EPA 200.8_5.4_1994	Thallium
Metals	EPA 200.8_5.4_1994	Tin
Metals	EPA 200.8_5.4_1994	Vanadium
Metals	EPA 200.8_5.4_1994	Zinc

IV.C. Effluent limits which are near detection or quantitation levels

The water quality-based effluent concentration limits for chromium are near the limits of current analytical methods to detect or accurately quantify. The method detection level (MDL) also known as detection level (DL) is the minimum concentration of a pollutant that a laboratory can measure and report with a 99 percent confidence that its concentration is greater than zero (as determined by a specific laboratory method). The quantitation level (QL) is the level at which a laboratory can reliably report concentrations with a specified level of error. Estimated concentrations are the values between the DL and the QL. EFSEC

requires the facility to report estimated concentrations. When reporting maximum daily effluent concentrations, EFSEC requires the facility to report "less than X" where X is the required detection level if the measured effluent concentration falls below the detection level.

V. Other Permit Conditions

V.A. Reporting and record keeping

EFSEC 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[41]).

V.B. Non routine and unanticipated wastewater

Occasionally, this facility may generate wastewater which was not characterized in the permit application because it is not a routine discharge and was not anticipated at the time of application. These wastes typically consist of waters used to pressure-test storage tanks or fire water systems or of leaks from drinking water systems.

The permit authorizes the discharge of non-routine and unanticipated wastewater under certain conditions. The facility must characterize these waste waters for pollutants and examine the opportunities for reuse. Depending on the nature and extent of pollutants in this wastewater and on any opportunities for reuse, EFSEC may:

- Authorize the facility to discharge the wastewater.
- Require the facility to treat the wastewater.
- Require the facility to reuse the wastewater.

V.C. Spill plan

This facility stores a quantity of chemicals on-site that have the potential to cause water pollution if accidentally released. EFSEC can require a facility to develop best management plans to prevent this accidental release [Section 402(a)(1) of the Federal Water Pollution Control Act (FWPCA)[42] and RCW 90.48.080[43]].

CGS developed a plan for preventing the accidental release of pollutants to state waters and for minimizing damages if such a spill occurs. The proposed permit requires the facility to update this plan if substantial changes are made onsite during the permit term and submit it to EFSEC.

V.D. Solid waste control plan

CGS could cause pollution of the waters of the state through inappropriate disposal of solid waste or through the release of leachate from solid waste.

This proposed permit requires this facility to update the approved solid waste control plan if substantial changes are made onsite during the permit term. The facility must submit the

[41] https://apps.leg.wa.gov/WAC/default.aspx?cite=173-220-210
[42] https://www.epa.gov/cwa-404/clean-water-act-section-402-national-pollutant-discharge-elimination-system
[43] http://app.leg.wa.gov/RCW/default.aspx?cite=90.48.080

updated plan to EFSEC for approval (RCW 90.48.080[44]). Refer to the Ecology guidance document, Developing a Solid Waste Control Plan[45].

V.E. Operation and maintenance manual

EFSEC requires Energy Northwest to take all reasonable steps to properly operate and maintain their wastewater treatment system in accordance with state and federal regulations [40 CFR 122.41(e)[46] and WAC 173-220-150 (1)(g)[47]]. The facility has prepared and submitted an operation and maintenance manual for the cooling water system, and an operation and maintenance manual for the evaporation ponds, as required by state regulation for the construction of wastewater treatment facilities (WAC 173-240-150[48]). Implementation of the procedures in the operation and maintenance manual ensures the facility's compliance with the terms and limits in the permit. The proposed permit requires Energy Northwest to submit updates to each of these manuals.

V.F. Stormwater pollution prevention plan

In accordance with 40 CFR 122.44(k)[49] and 40 CFR 122.44 (s), the proposed permit includes requirements for the implementation and update of a SWPPP along with BMPs to minimize or prevent the discharge of pollutants to waters of the state. BMPs constitute Best Conventional Pollutant Control Technology (BCT) and Best Available Technology Economically Achievable (BAT) for stormwater discharges. EFSEC has determined that Energy Northwest must update the CGS SWPPP and continue to implement adequate BMPs in order to meet the requirements of "all known, available, and reasonable methods of prevention, control, and treatment" (AKART). A SWPPP requires a facility to implement actions necessary to manage stormwater to comply with the state's requirement under chapter 90.48 RCW[50] to protect the beneficial uses of waters of the state.

The SWPPP must identify potential sources of stormwater contamination from industrial activities and identify how it plans to manage those sources of contamination to prevent or minimize contamination of stormwater. Energy Northwest must continuously review and revise the SWPPP as necessary to assure that stormwater discharges do not degrade water quality. It must retain the SWPPP on-site or within reasonable access to the site and available for review by EFSEC.

1. Best Management Practices (BMPs)

BMPs are the actions identified in the SWPPP to manage, prevent contamination of, and treat stormwater. BMPs include 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 also include treatment systems, operating procedures, and practices used to control plant site runoff, spillage or

[44] http://app.leg.wa.gov/RCW/default.aspx?cite=90.48.080
[45] https://apps.ecology.wa.gov/publications/documents/0710024.pdf
[46] https://www.ecfr.gov/current/title-40/chapter-I/subchapter-D/part-122/subpart-C/section-122.41
[47] https://apps.leg.wa.gov/WAC/default.aspx?cite=173-220-150
[48] https://app.leg.wa.gov/wac/default.aspx?cite=173-240-150
[49] https://www.ecfr.gov/current/title-40/chapter-I/subchapter-D/part-122/subpart-C/section-122.44
[50] https://app.leg.wa.gov/RCW/default.aspx?cite=90.48

leaks, sludge or waste disposal, and drainage from raw material storage. Insert name must ensure that its SWPPP includes the operational and structural source control BMPs listed as "applicable" in Ecology's stormwater management manuals. Many of these "applicable" BMPs are sector-specific or activity-specific, and are not required at facilities engaged in other industrial sectors or activities.

2. Ecology-Approved Stormwater Management Manuals

Consistent with RCW 90.48.555 (5) and (6), the proposed permit requires the facility to implement BMPs contained in the Stormwater Management Manual for Eastern Washington (2019)[51], or practices that are demonstrably equivalent to practices contained in stormwater technical manuals approved by Ecology. This should ensure that BMPs will prevent violations of state water quality standards, and satisfy the state AKART requirements and the federal technology-based treatment requirements under 40 CFR part 125.352. The SWPPP must document that the BMPs selected provide an equivalent level of pollution prevention, compared to the applicable Stormwater Management Manuals, including: The technical basis for the selection for all stormwater BMPs (scientific, technical studies, and/or modeling) which support the performance claims for the BMPs selected.

3. Operational Source Control BMPs

Operational source control BMPs include a schedule of activities, prohibition of practices, maintenance procedures, employee training, good housekeeping, and other managerial practices to prevent or reduce the pollution of waters of the state. These activities do not require construction of pollution control devices but are very important components of a successful SWPPP. Employee training, for instance, is critical to achieving timely and consistent spill response. Pollution prevention is likely to fail if the employees do not understand the importance and objectives of BMPs. Prohibitions might include eliminating outdoor repair work on equipment and certainly would include the elimination of intentional draining of crankcase oil on the ground. Good housekeeping and maintenance schedules help prevent incidents that could result in the release of pollutants. Operational BMPs represent a cost-effective way to control pollutants and protect the environment. The SWPPP must identify all the operational BMPs and how and where they are implemented. For example, the SWPPP must identify what training will consist of, when training will take place, and who is responsible to assure that employee training happens.

4. Structural Source Control BMPs

Structural source control BMPs include physical, structural, or mechanical devices or facilities intended to prevent pollutants from entering stormwater. Examples of source control BMPs include erosion control practices, maintenance of stormwater facilities (e.g., cleaning out sediment traps), construction of roofs over storage and working areas, and direction of equipment wash water and similar discharges to the sanitary sewer or a

[51] https://ecology.wa.gov/Regulations-Permits/Guidance-technical-assistance/Stormwater-permittee-guidance-resources/Stormwater-manuals
[52] https://www.ecfr.gov/current/title-40/chapter-I/subchapter-D/part-125#125.3

dead end sump. Structural source control BMPs likely include a capital investment but are cost effective compared to cleaning up pollutants after they have entered stormwater.

5. Treatment BMPs

Operational and structural source control BMPs are designed to prevent pollutants from entering stormwater. However, even with an aggressive and successful program, stormwater may still require treatment to achieve compliance with water quality standards. Treatment BMPs remove pollutants from stormwater. Examples of treatment BMPs are detention ponds, oil/water separators, biofiltration, and constructed wetlands.

6. Volume/Flow Control BMPs

EFSEC recognizes the need to include specific BMP requirements for stormwater runoff quantity control to protect beneficial water uses, including fish habitat. New facilities and existing facilities undergoing redevelopment must implement the requirements for peak runoff rate and volume control identified in the Eastern Washington SWMM (2019). Controlling the rate and volume of stormwater discharge maintains the health of the watershed. Existing facilities should identify control measures that they can implement over time to reduce the impact of uncontrolled release of stormwater.

V.G. Cooling water intake requirements

The Clean Water Act, Section 316(b) requires that the location, design, construction, and capacity of cooling water intake structures reflect the best technology available (BTA) for minimizing adverse environmental impact. The Columbia Generating Station has a cooling water intake with a maximum design flow of 36 MGD. Over 90% of the flow is used exclusively for cooling. Facilities with design intake flows greater than two million gallons per day, of which greater than 25 percent of the water withdrawn is used exclusively for cooling purposes, must comply with specific application requirements and BTA standards in 40 CFR Part 125 Subpart J[53].

Energy Northwest submitted with their permit application the information required by 40 CFR 122.21(r).

Impingement BTA Determination: The owner or operator of an existing facility must comply with one of the alternatives listed in 40 CFR 125.94(c). CGS complies with this requirement by operating a closed-cycle recirculating system. CGS must monitor the actual intake flows at a minimum frequency of daily. The monitoring must be representative of normal operating conditions, and must include measuring cooling water withdrawals, make-up water, and blow down volume.

Entrainment BTA Determination: EPA has not promulgated specific compliance options for the entrainment standard. EFSEC must establish BTA standards for entrainment on a site-specific basis. 40 CFR 125.98(f) includes various factors for consideration in the entrainment determination. The previous permit required Energy Northwest to conduct an entrainment characterization study. EFSEC received an interim report February 7, 2019 and the final report on February 26, 2020. The report was prepared by Anchor QEA and underwent third-

[53] https://www.ecfr.gov/current/title-40/chapter-I/subchapter-D/part-125/subpart-J

party external review by experts in biological monitoring and Columbia River aquatic ecology in accordance with the U.S. Environmental Protection Agency Peer Review Guidelines. Very few fish were entrained over the entire two-year study period. A total of four fish were entrained in 754 hours of monitoring, suggesting the Columbia Generating Station's impact to the fish populations in the Hanford Reach of the Columbia River are minute. Based on the information submitted with the permit application and the results of the characterization study, EFSEC's determination is that the existing closed-cycle recirculating system meets the BTA standard for entrainment and additional control measures are not necessary.

Operation and Maintenance: The permit includes general operation and maintenance requirements as well as reporting requirements to ensure that the cooling water intake structure continues to be operated as designed. Energy Northwest last updated the CGS NPDES Operation and Maintenance Plan on February 3, 2022. Visual impingement monitoring of the TMU river intake structure is conducted on a semiannual basis when the intake structure is operational and the inspection can be conducted safely. Underwater video equipment is deployed from a boat to collect photographic verification. Due to the remote offshore location of the intake structure, weekly visual monitoring is not feasible. The cooling water intake structure is also visually inspected every three years during low water conditions to evaluate the physical condition of the structure.

Energy Northwest must submit an annual certification and report to EFSEC that describes any modifications that affect cooling water withdrawals or operation of the cooling water intake structures. Any significant impingement or entrainment must be reported to EFSEC within 24 hours.

V.H. General conditions

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

VI. Permit Issuance Procedures

VI.A. Permit modifications

EFSEC 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, after obtaining new information from sources such as inspections, effluent monitoring, outfall studies, and effluent mixing studies.

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

VI.B. Proposed permit Issuance

This proposed permit includes all statutory requirements for EFSEC 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. EFSEC proposes to issue this permit for a term of five years.

VII. References for Text and Appendices

Environmental Protection Agency (EPA)

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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. ***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.)

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

Washington State Department of Ecology

July 2018. ***Permit Writer's Manual***. Publication 92-109[54]

September 2011. ***Water Quality Program Guidance Manual – Supplemental Guidance on Implementing Tier II Antidegradation***. Publication 11-10-073[55]

October 2010 (revised). ***Water Quality Program Guidance Manual – Procedures to Implement the State's Temperature Standards through NPDES Permits***. Publication 06-10-100[56]

February 2007. ***Focus Sheet on Solid Waste Control Plan, Developing a Solid Waste Control Plan for Industrial Wastewater Discharge Permittees***, Publication 07-10-024[57].

Laws and Regulations[58]

Permit and Wastewater Related Information[59]

[54] https://apps.ecology.wa.gov/publications/summarypages/92109.html
[55] https://apps.ecology.wa.gov/publications/summarypages/1110073.html
[56] https://apps.ecology.wa.gov/publications/summarypages/0610100.html
[57] https://apps.ecology.wa.gov/publications/SummaryPages/0710024.html
[58] http://leg.wa.gov/LawsAndAgencyRules/Pages/default.aspx
[59] https://ecology.wa.gov/Regulations-Permits/Guidance-technical-assistance/Water-quality-permits-guidance

Appendix A – Public Involvement Information

EFSEC proposes to reissue a permit to Energy Northwest Columbia Generating Station. The permit includes wastewater discharge limits and other conditions. This fact sheet describes the facility and EFSEC's reasons for requiring permit conditions.

EFSEC will place a Public Notice of Draft on date in name of publication 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.
- Urges people to submit their comments, in writing, before the end of the Comment Period
- Tells how to request a public hearing of comments about the proposed NPDES permit.
- Explains the next step(s) in the permitting process.

[Attach printed copy of the Public Notice mail-out]

Frequently Asked Questions about Effective Public Commenting[60]

You may obtain further information from EFSEC by telephone, 360-664-1345, or by writing to the address listed below.

Energy Facility Site Evaluation Council
PO Box 43172
Olympia, WA 98504-3172

The primary author of this permit and fact sheet is Laura Fricke, PE, Department of Ecology.

[60] https://apps.ecology.wa.gov/publications/SummaryPages/0307023.html

Appendix B – Your Right to Appeal

You have a right to appeal this permit. Pursuant to WAC 463-76-063(1), a decision to issue this permit is subject to judicial review pursuant to the Administrative Procedure Act, Chapter 34.05 RCW.

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[61] and RCW 90.48.520[62], WAC 173-200-030(2)(c)(ii)[63], 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)[64].

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.

[61] http://app.leg.wa.gov/RCW/default.aspx?cite=90.48.010
[62] http://app.leg.wa.gov/RCW/default.aspx?cite=90.48.520
[63] https://apps.leg.wa.gov/WAC/default.aspx?cite=173-200-030
[64] https://apps.leg.wa.gov/WAC/default.aspx?cite=173-200-060

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

Background water quality – The concentrations of chemical, physical, biological or radiological constituents or other characteristics in or of groundwater at a particular point in time upgradient of an activity that has not been affected by that activity, [WAC 173-200-020(3)[65]]. Background water quality for any parameter is statistically defined as the 95% upper tolerance interval with a 95% confidence based on at least eight hydraulically upgradient water quality samples. The eight samples are collected over a period of at least one year, with no more than one sample collected during any month in a single calendar year.

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

BOD_5 – Determining the five-day Biochemical Oxygen Demand of an effluent is an indirect way of measuring the quantity of organic material present in an effluent that is utilized by bacteria. The BOD_5 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.

[65] https://apps.leg.wa.gov/WAC/default.aspx?cite=173-200-020

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. EFSEC 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)[66] 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 level – or method detection limit means the minimum concentration of an analyte (substance) that can be reported with 99% confidence that the measured concentration is distinguishable from method blank results as determined by the procedure given in 40 CFR part 136, Appendix B[67].

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

[66] http://app.leg.wa.gov/RCW/default.aspx?cite=43.21B.001
[67] https://www.ecfr.gov/current/title-40/chapter-I/subchapter-D/part-136/appendix-Appendix%20B%20to%20Part%20136

fraction, for example, a dilution factor of 10 means the effluent comprises 10% by volume and the receiving water 90%.

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

Early warning value – The concentration of a pollutant set in accordance with WAC 173-200-070[68] 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)[69]]. 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[70] or WAC 173-240-130[71].

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% 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.

[68] https://apps.leg.wa.gov/WAC/default.aspx?cite=173-200-070
[69] https://apps.leg.wa.gov/WAC/default.aspx?cite=173-200-020
[70] https://apps.leg.wa.gov/WAC/default.aspx?cite=173-240-060
[71] https://apps.leg.wa.gov/WAC/default.aspx?cite=173-240-130

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

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

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

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

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

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

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

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

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

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

Method detection limit (MDL) – See Detection level.

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 EFSEC defines following procedures outlined in state regulations (chapter 173-201A WAC[72]).

National pollutant discharge elimination system (NPDES) – Section 402 of the Clean Water Act[73], 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 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. EFSEC determines this limit on a site-specific basis. EFSEC 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:

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

[72] https://apps.leg.wa.gov/WAC/default.aspx?cite=173-201A
[73] https://www.epa.gov/cwa-404/clean-water-act-section-402-national-pollutant-discharge-elimination-system

- 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).

EFSEC 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 (ML) – The term ‘‘minimum level’’ refers to either the sample concentration equivalent to the lowest calibration point in a method or a multiple of the method detection limit (DL), whichever is higher. Minimum levels may be obtained in several ways: They may be published in a method; they may be based on the lowest acceptable calibration point used by a laboratory; or they may be calculated by multiplying the DL in a method, or the DL determined by a laboratory, by a factor of 3. For the purposes of NPDES compliance monitoring, EPA considers the following terms to be synonymous: ‘‘quantitation limit,’’ ‘‘reporting limit,’’ and ‘‘minimum level’’.

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[74]).

Sample Maximum – No sample may exceed this value.

Significant industrial user (SIU) –

- All industrial users subject to Categorical Pretreatment Standards under 40 CFR Chapter I, Subchapter N[75] and 40 CFR 403.6[76] and;
- 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)].

[74] https://www.ecfr.gov/current/title-40/chapter-I/subchapter-D/part-121#se40.24.121_122
[75] https://www.ecfr.gov/current/title-40/chapter-I/subchapter-N
[76] https://www.ecfr.gov/current/title-40/chapter-I/subchapter-N/part-403

Upon finding that the industrial user meeting the criteria in the second paragraph 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
Un-ionized Ammonia Criteria Calculation:

The table below is a summary of the spreadsheet used by EFSEC, which contains the formulas modified by EPA that were adopted in the 1995 revision of the state water quality standards. Total ammonia, not unionized ammonia, is used in the reasonable potential calculation. Criteria are based on either total or unionized ammonia, depending on salmonid presence, but permittees measure total ammonia. The spreadsheet calculates the concentration of total ammonia in the effluent (as measured by permittee) that will result in the criteria concentration in the receiving water.

Table 11 - Ammonia Criteria Calculation

Freshwater Un-ionized Ammonia Criteria Calculation
Based on Chapter 173-201A WAC, amended November 20, 2006

INPUT	
1. Receiving Water Temperature (deg C):	19.5
2. Receiving Water pH:	8.4
3. Is salmonid habitat an existing or designated use?	Yes
4. Are non-salmonid early life stages present or absent?	Present
OUTPUT	
Using mixed temp and pH at mixing zone boundaries?	no
Ratio	13.500
FT	1.400
FPH	1.000
pKa	9.418
Unionized Fraction	0.087
Unionized ammonia NH3 criteria (mg/L as NH_3)	
Acute:	0.276
Chronic:	0.042
RESULTS	
Total ammonia nitrogen criteria (mg/L as N):	
Acute:	2.593
Chronic:	0.398

Reasonable Potential Analysis:

EFSEC uses spreadsheet tools to determine reasonable potential (to cause or contribute to violations of the aquatic life and human health water quality numeric standards) and to calculate effluent limits. The process and formulas for determining reasonable potential and effluent limits in these spreadsheets come from the Technical Support Document for Water Quality-based Toxics Control, (EPA 505/2-90-001)[77] (TSD). The adjustment for autocorrelation is from EPA (1996a), and EPA (1996b). The tables below show a summary of these calculations.

Table 12 - Aquatic Life Reasonable Potential Part 1

Pollutant, CAS No. & NPDES Application Ref. No.			AMMONIA, Criteria as Total NH3	ALUMINUM, total recoverable, pH 6.5-9.0 7429905	ARSENIC (dissolved) 7440382 2M	CHROMIUM(TRI) -16065831 5M Hardness dependent	COPPER - 744058 6M Hardness dependent	IRON 7439896	LEAD - 7439921 7M Dependent on hardness	MERCURY 7439976 8M
Effluent Data	# of Samples (n)		37	3	37	97	97	37	37	7
	Coeff of Variation (Cv)		0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6
	Effluent Concentration, ug/L (Max. or 95th Percentile)		250	180	9.5	2.8	20	1300	3.5	0.004
	Calculated 50th percentile Effluent Conc. (when n>10)						13	1000		
Receiving Water Data	90th Percentile Conc., ug/L		41	0	0	0.6	1.2	0	0.075	0
	Geo Mean, ug/L						0.7	0		0
Water Quality Criteria	Aquatic Life Criteria, ug/L	Acute	2,593	750	360	385.6	11.339	-	40.282	2.1
		Chronic	398	87	190	125.09	7.8553	1000	1.5697	0.012
	WQ Criteria for Protection of Human Health, ug/L		-	-	-	-	1300	300	-	0.14
	Metal Criteria Translator, decimal	Acute	-	-	1	0.316	0.996	-	0.466	0.85
		Chronic	-	-	1	0.86	0.996	-	0.466	-
	Carcinogen?		N	N	Y	N	N	N	N	N

Aquatic Life Reasonable Potential

Effluent percentile value			0.950	0.950	0.950	0.950	0.950	0.950	0.950	0.950
s	$s^2=\ln(CV^2+1)$		0.555	0.555	0.555	0.555	0.555	0.555	0.555	0.555
Pn	$Pn=(1-\text{confidence level})^{1/n}$		0.922	0.368	0.922	0.970	0.970	0.922	0.922	0.652
Multiplier			1.00	3.00	1.00	1.00	1.00	1.00	1.00	2.01
Max concentration (ug/L) at edge of…		Acute	64	59.991	1.056	0.632	3.280	144.444	0.248	0.001
		Chronic	43	5.806	0.102	0.619	1.401	13.978	0.092	0.000
Reasonable Potential? Limit Required?			**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**

[77] https://www3.epa.gov/npdes/pubs/owm0264.pdf

Table 13 - Aquatic Life Reasonable Potential Part 2

Pollutant, CAS No. & NPDES Application Ref. No.			NICKEL - 7440020 9M - Dependent on hardness	SELENIUM 7782492 10M	SILVER - 7740224 11M dependent on hardness.	ZINC- 7440666 13M hardness dependent
Effluent Data	# of Samples (n)		37	37	37	97
	Coeff of Variation (Cv)		0.6	0.6	0.6	0.6
	Effluent Concentration, ug/L (Max. or 95th Percentile)		12	7.4	0.24	38
	Calculated 50th percentile Effluent Conc. (when n>10)		6.9	5		19
Receiving Water Data	90th Percentile Conc., ug/L		1.1	0	0	4.5
	Geo Mean, ug/L		0.61	0	0	2.6
Water Quality Criteria	Aquatic Life Criteria, ug/L	Acute	983.12	20	1.6445	79.449
		Chronic	109.18	5	-	72.549
	WQ Criteria for Protection of Human Health, ug/L		150	120	-	2300
	Metal Criteria Translator, decimal	Acute	0.998	-	0.85	0.996
		Chronic	0.997	-	-	0.996
	Carcinogen?		N	N	N	N

Aquatic Life Reasonable Potential

Effluent percentile value			0.950	0.950	0.950	0.950
s	$s^2=\ln(CV^2+1)$		0.555	0.555	0.555	0.555
Pn	$Pn=(1-\text{confidence level})^{1/n}$		0.922	0.922	0.922	0.970
Multiplier			1.00	1.00	1.00	1.00
Max concentration (ug/L) at edge of…		Acute	2.308	0.822	0.023	8.205
		Chronic	1.217	0.080	0.003	4.859
Reasonable Potential? Limit Required?			**NO**	**NO**	**NO**	**NO**

Table 14 - Human Health Reasonable Potential

Pollutant, CAS No. & NPDES Application Ref. No.			ANTIMONY (INORGANIC) 7440360 1M	BIS(2-ETHYLHEXYL) PHTHALATE 117817 13B	BROMOFORM 75252 5V	COPPER - 744058 6M Hardness dependent	IRON 7439896	MERCURY 7439976 8M	NICKEL - 7440020 9M - Dependent on hardness	SELENIUM 7782492 10M	ZINC- 7440666 13M hardness dependent
Effluent Data	# of Samples (n)		7	4	7	97	37	7	37	37	97
	Coeff of Variation (Cv)		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)		1.6	2.16	0.63	20	1300	0.004	12	7.4	38
	Calculated 50th percentile Effluent Conc. (when n>10)					13	1000		6.9	5	19
Receiving Water Data	90th Percentile Conc., ug/L					1.2	0	0	1.1	0	4.5
	Geo Mean, ug/L		0	0	0	0.7	0	0	0.61	0	2.6
Water Quality Criteria	Aquatic Life Criteria, ug/L	Acute	-	-	-	11.339	-	2.1	983.12	20	79.449
		Chronic	-	-	-	7.8553	1000	0.012	109.18	5	72.549
	WQ Criteria for Protection of Human Health, ug/L		12	0.23	5.8	1300	300	0.14	150	120	2300
	Metal Criteria Translator, decimal	Acute	-	-	-	0.996	-	0.85	0.998	-	0.996
		Chronic	-	-	-	0.996	-	-	0.997	-	0.996
	Carcinogen?		N	Y	Y	N	N	N	N	N	N
Human Health Reasonable Potential											
s	$s^2=\ln(CV^2+1)$		0.5545	0.5545	0.5545	0.5545	0.5545	0.5545	0.5545	0.5545	0.5545
Pn	Pn=(1-confidence level)1/n		0.652	0.473	0.652	0.970	0.922	0.652	0.922	0.922	0.970
Multiplier			0.8054	1.0385	0.8054	0.3536	0.455	0.8054	0.455	0.455	0.3536
Dilution Factor			93	93	93	93	93	93	93	93	93
Max Conc. at edge of Chronic Zone, ug/L			0.0139	0.0241	5.5E-03	0.8323	10.753	3E-05	0.6776	0.0538	2.7763
Reasonable Potential? Limit Required?			**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**

pH Analysis:

The calculation of pH of a mixture of two flows is based on the procedure in EPA's DESCON program (EPA, 1988. *Technical Guidance on Supplementary Stream Design Conditions for Steady State Modeling*. EPA Office of Water, Washington DC). The major form of alkalinity is assumed to be carbonate alkalinity. Alkalinity and total inorganic carbon are assumed to be conservative.

Table 15 - pH Mixing Calculation

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	
	@ Chronic Boundary
1. Dilution Factor at Mixing Zone Boundary	93.0
2. Ambient/Upstream/Background Conditions	
Temperature (deg C):	19.50
pH:	8.40
Alkalinity (mg CaCO3/L):	60.40
3. Effluent Characteristics	
Temperature (deg C):	33.10
pH:	6.50
Alkalinity (mg CaCO3/L):	130.00
4. Aquatic Life Use Designation	Other species (salmonid/redband trout/warmwater species)
OUTPUT	
1. Ionization Constants	
Upstream/Background pKa:	6.39
Effluent pKa:	6.31
2. Ionization Fractions	
Upstream/Background Ionization Fraction:	0.99
Effluent Ionization Fraction:	0.61
3. Total Inorganic Carbon	
Upstream/Background Total Inorganic Carbon (mg CaCO3/L):	61
Effluent Total Inorganic Carbon (mg CaCO3/L):	214
4. Condtions at Mixing Zone Boundary	
Temperature (deg C):	19.65
Alkalinity (mg CaCO3/L):	61.15
Total Inorganic Carbon (mg CaCO3/L):	62.63
pKa:	6.38
5. Allowable pH change	0.50
RESULTS	
pH at Mixing Zone Boundary:	**8.00**
pH change at Mixing Zone Boundary:	0.40
Is permit limit needed?	NO

Appendix E — Response to Comments

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