Fact Sheet for NPDES Permit WA002515-1

Columbia Generating Station

November 1, 2014

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.

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 WA002515-1, are available for public review and comment from February 3, 2014 until March 16, 2014 (extended to April 18, 2014). 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 will not revise the rest of the fact sheet, but 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 and to ground water. EFSEC issued the current permit for this facility on May 25, 2006. The current permit contains a compliance schedule requiring a number of activities that informed permit reissuance including; a ground water study, an effluent mixing study, and visual inspection of Outfall 001. Energy Northwest also replaced the main steam condenser in 2011, removing a source of copper from discharges to Outfall 001.

Effluent limits for pH, flow, total residual halogen, polychlorinated biphenyl compounds (PCBs), and priority pollutants contained in chemicals added for cooling system maintenance are unchanged from the permit issued in 2006. EFSEC updated effluent limits for temperature and copper based on the effluent mixing study. Technology-based limits were added for chromium and zinc. The proposed permit includes a schedule of activities to address temperature monitoring and compliance with ground water quality standards.

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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 the Energy Facility Site Evaluation Council (EFSEC). The Legislature defined EFSEC's authority and obligations for the wastewater discharge permit program in 90.48 RCW (Revised Code of Washington).

The following regulations apply to industrial NPDES permits:

- Procedures EFSEC follows for issuing NPDES permits (chapter 463-76 WAC)
- Water quality criteria for surface waters (chapter 173-201A WAC)
- Water quality criteria for ground waters (chapter 173-200 WAC)
- Whole effluent toxicity testing and limits (chapter 173-205 WAC)
- Sediment management standards (chapter 173-204 WAC)
- Submission of plans and reports for construction of wastewater facilities (chapter 173-240 WAC)

These rules require any 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 463-76-041). (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**.

II. Background Information

Table 1 General Facility Information

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	Name: Brad C. Barfuss Telephone #: 509-377-4541
Responsible Official	Name: Dale K. Atkinson Title: Vice President, Employee Development/Corporate Services Address: P.O. Box 968 (Mail Drop PE03), Richland, WA 99352-0968 Telephone #: 509-377-4302
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 Names and Locations (NAD83/WGS84 reference datum)	Outfall 001 – Columbia River (river mile 351.75) Latitude: 46.47139 Longitude: 119.26250 Outfall 002 – Ground Water Latitude: 46.47389 Longitude: 119.32861

Permit Status	
Renewal Date of Previous Permit	May 25, 2006

Permit Status	
Application for Permit Renewal Submittal Date	November 24, 2010
Date of Council Acceptance of Application	December 29, 2010

Inspection Status	
Date of Last Non-sampling Inspection Date	November 8, 2012

Figure 1 Facility Location Map

This image is from the Ecology's Facility/Site Database (http://www.ecy.wa.gov/fs/). The Columbia Generating Station is on the left side of the image with the Columbia River approximately three miles east and shown at the right border.

A. Facility description

History

The Columbia Generating Station (CGS) is a 1,170-megawatt boiling water reactor that uses nuclear fission to produce heat. It is owned and operated by Energy Northwest and located on 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 maintenance. It 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.

The Columbia Generating Station permit qualifies as a U.S. Environmental Protection Agency (EPA) major permit.

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.

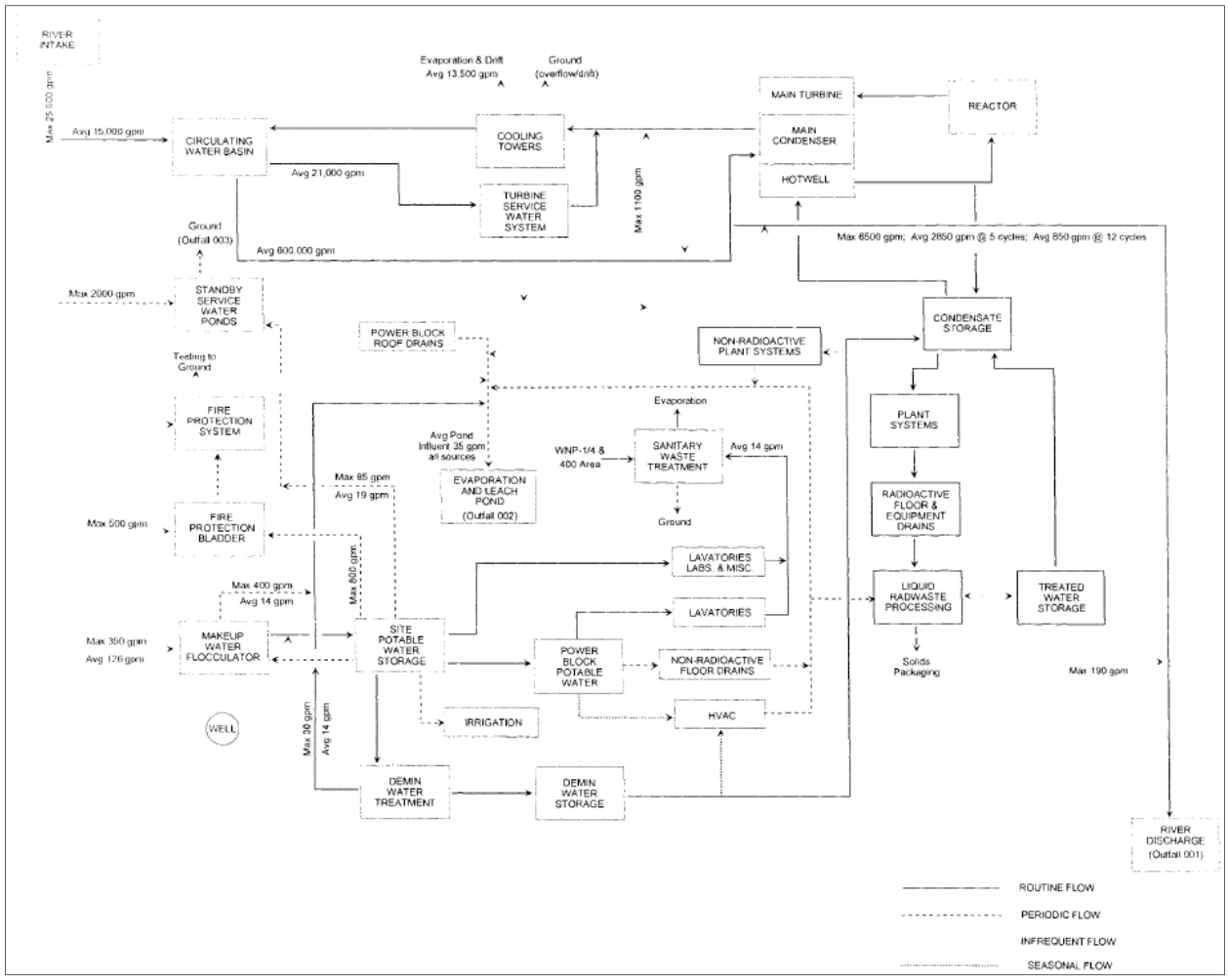
The primary use for the process water is non-contact cooling water. Flow is recirculated through six mechanical draft cooling towers where heat is rejected to the atmosphere. Evaporation, drift, and blowdown losses are replenished from the Columbia River. Energy Northwest also produces potable water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

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

Wastewater Treatment processes

Several separate internal waste streams and their respective treatment systems discharge to two outfalls. The fact sheet describes each process below, organized by outfall. Energy Northwest submitted a flow diagram with the permit application that illustrates wastewater flows at the Columbia Generating Station. Shown here as Figure 2.

Figure 2 Columbia Generating Station Flow Diagram



Discharges to Outfall 001 (Columbia River at river mile 351.75) include:

- 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 cooling tower evaporation and drift losses average 13,500 gpm. Even with replenishment of these losses with new water, the evaporation concentrates the dissolved solids in the circulation water to the point that salts would cause excessive deposition in the system, impeding efficiency. To limit the build-up of mineral salts to tolerable levels, a small portion (typically <5%) of the water is released to Outfall 001 as blowdown. The blowdown discharge is nearly continuous with a maximum flow rate of 6,500 gpm and an average between 2,850 gpm at five cycles of recirculation and 850 gpm at 12 cycles. The permit application reports an average flow of 1,695 gpm.

Energy Northwest adds chemicals to inhibit deposition of solids and to limit corrosion and biological growth in the system. Sulfuric acid is added to maintain pH. A polyphosphate blend is used for corrosion inhibition in mild steel and a phosphonate copolymer to minimize scale formation. Sodium tolytriazole is added separately for copper alloy corrosion control. Microbiocidal treatment is provided with sodium hypochlorite and sodium bromide two to three times per week. Blowdown is terminated during biocide treatment to allow halogen residual to decay. The discharge contains heat, residuals from treatment additives, constituents from the intake Columbia River water (concentrated by evaporation), and system corrosion products.

Periodically the main condenser becomes scaled. This reduces plant efficiency to the point that chemical cleaning of the main condenser is necessary. During cleaning, blowdown is stopped and a cleaning agent is added to the circulating water system. At the completion of the cleaning process, if any permit condition is not met, circulating water is pumped to a storage location using temporary pumps and piping. During this pumping process, the concentration of constituents in the circulating water is reduced by the addition of makeup water from the river. When the circulating water meets all conditions for the discharge, blowdown to the river is initiated. After the condenser cleaning process is completed, the stored water will be treated (if necessary) to meet discharge requirements, then discharged. Any sediment from the cleaning process is analyzed and disposed of in accordance with the facility's solid waste control plan.

Energy Northwest replaced the main condenser in September 2011. The admiralty brass condenser tubes were replaced with titanium, removing a significant source of copper from this discharge.

- Service water system blowdown – The service water system is a separate non-contact cooling water supply and distribution system that serves two purposes: cooling the reactor in the event of malfunction of the regular cooling system, and removing residual heat from the reactor during reactor shutdown periods. The closed-loop system contains approximately twelve million gallons of water in two interconnected basins with an evaporative spray cooling system.

  Microbial growth is controlled with periodic batch additions of 50% hydrogen peroxide and Busan 77. The service water is also treated with sodium silicate for corrosion inhibition. Blowdown of this system is conducted infrequently to reduce concentrations of sulfur, chloride, suspended solids or to drain a basin for maintenance. Discharge may reach 4,000 gpm when it occurs and was last reported in April 2013. The discharge contains concentrated minerals, other constituents of the makeup water, and some material corrosion and wear products. Refer to Section II.A. *Discharge Outfalls* below for further detail on this discharge.

- 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 inventory becomes excessive or when the quality in terms of organic content does not meet specifications. The primary water (produced on site), is very pure (conductivity generally less than 0.2 µmho/cm) but still has the potential for some radioactive contamination. For this

reason, it is filtered and treated through an ion exchange process to reduce radioactive impurities prior to discharge.

The facility discharges this wastewater in batches (15,000 gallons at up to 190 gpm), only after assurance that NRC-dictated radioactivity discharge limits are met. The facility's water management practices make this an infrequent discharge, last occurring September 19, 1998.

Discharges to Outfall 002 (evaporation/leach pond) include:

- Wastewater from potable water production system – This system processes either river or well water through multimedia filtration with flocculent assistance. The wastewater is filter backwash and amounts to 15,000-25,000 gallons in volume two or three times per week. It contains the removed impurities and the flocculent.
- Wastewater from demineralized water treatment system – This system produces water for the reactor steam cycle from the potable water supply. The wastewater is composed of instrument flush water and reverse osmosis reject water. The estimated average discharge is 17,000 gallons per day. It contains natural impurities removed in the treatment process.
- Stormwater from plant building roof drains – The estimated annual average of this discharge is 1,800 gallons per day. Stormwater runoff from other parts of the site, including building roofs and paved areas, is routed to dry wells or enters the soil directly. The facility does not generate runoff that EFSEC would consider as "associated with industrial activity" and it does not discharge stormwater to surface waters.
- Wastewater from drains in General Services and Diesel-Generator Buildings – The General Services Building sump drain collects water from equipment drains and area floor drains. Water sources directed to the sump include HVAC units, intake air washers, pump and valve leakage, demineralized water storage tank overflows, and floor washings. A level switch activates the sump pump and causes the collected water to discharge through Outfall 002. A discharge of 3,000 gallons occurs infrequently, two to three times per year.

  The Diesel-Generator Building floor drains are connected directly to the discharge pipe to Outfall 002. Among the few sources of discharge to these floor drains are the diesel engine cooling jackets from which approximately 3,800 gallons of water treated with a nitrite-based corrosion inhibitor are drained about once a year.
- Wastewater from Turbine Generator Building sumps – Three non-radioactive sumps in the Turbine Generator Building collect wastewater from equipment leakage, washing, and maintenance activities (such as condenser drainage). These sumps could previously be routed to Outfall 002 via the storm drainage system after sampling verified it contained no detectable radioactivity. The normal alignment of these sumps is to the radioactive wastewater treatment system that discharges to Outfall 001 as necessary. They are no longer physically connected to the storm drainage system discharging to Outfall 002.

- Stormwater and/or deluge testing water from the transformer yard –Stormwater and deluge testing water currently discharge to ground. A proposed transformer yard oil collection system would collect stormwater and deluge testing water immediately around each transformer and discharge directly to the evaporative ponds once constructed.

Stormwater discharges:

- Underground injection control (UIC) wells – 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 Department of Ecology (Ecology). The proposed permit requires development and implementation of a stormwater pollution prevention plan (SWPPP) to address these discharges. Specifically, the SWPPP will be used to address the facilities requirement to meet the nonendangerment standard under Chapter 173-218-090. The SWPPP will also address other miscellaneous discharges to ground that may or may not discharge directly to a UIC well including: fire protection system flushing and flow-rate tests, maintenance, and minor construction discharges. Discharges to ground not addressed in the SWPPP may be addressed through *S8. Non-routine and unanticipated discharges* of the proposed permit.

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.

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 the 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.

Sanitary wastes

Sanitary waste from the facility is piped to a treatment system located approximately ½ mile to the southeast. The facility uses aeration lagoons and facultative stabilization ponds to treat sanitary waste. Discharge of treated wastewater to ground is covered by Council Resolution No. 300, available here: http://www.efsec.wa.gov/FILES/resolutions/300.pdf. It is not covered by this permit, and will not be addressed further in this fact sheet.

Discharge outfalls

The treated and disinfected effluent flows into either the Columbia River or ground water through two outfalls:

- Outfall 001 discharges to the Columbia River at river mile 351.75. At minimum regulated flow (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 upward from the river bed at a 15º angle. Energy Northwest evaluated the discharge structure in October 2006 and determined that it was in its original configuration and functioning as designed.
- Outfall 002 discharges through a concrete weir to an unlined channel that empties into a small infiltrating pond located approximately 1500 feet northeast of the plant. The proposed permit requires installation of a double-lined evaporation pond in place of the infiltrating pond.

Previous permits and the 2006 permit authorized discharge of filter backwash associated with cleaning of the standby service water ponds to Outfall 003, a surface depression about 500 feet south of the service water ponds. The proposed permit does not authorize discharges to Outfall 003.

Energy Northwest removed sediment from the service water ponds in March 2013. Divers removed sediment by vacuuming the bottom of the ponds using a closed-loop system that filtered and returned excess water to the ponds. Sediment was disposed of in designated disposal cells per EFSEC Resolution 299, which authorizes the disposal of sediment removed from the ponds and the cooling towers. The sediments may contain very low levels of radionuclides from the Columbia River, from the surrounding soil, and from the plant. For this reason, EFSEC works closely with the Washington State Department of Health (WDOH) in addressing these sediments.

The following April 2013 communication from WDOH staff summarizes the factors considered in both removing authorization to discharge to Outfall 003, and continued authorization of discharges from the service water ponds to Outfall 001:

> "Columbia Generating Station, CGS, has two service water ponds that are available to cool the plant during emergencies and may be used as coolant during routine maintenance outages. The ponds are open, and as such, trap windblown particulates which settle onto the pond floor. Safety parameters require that the sediments in the pond not exceed a specific depth so occasionally Energy Northwest must remove sediments from the service water ponds. In the past this has been accomplished using divers who vacuum the ponds of sediment and by filtering the water to remove the suspended sediments. The sediments have a chance to contain very low levels of fallout radionuclides from the Columbia River, from the surrounding soil, and from the plant itself.
>
> Sediment with radioactive contaminants from the plant is, by definition, considered low level waste. Because the concentrations are very low, the plant requested approval for alternate disposal of the sediments vs. sending the material to an approved low level waste site. EFSEC Resolution 299 authorizes sediment from cooling water systems to be

disposed into designated cells within the boundary of CGS and sets limits for radionuclide concentrations allowed in these cells based on current Hanford clean-up limits. Proper disposal of cooling tower sediments was the original purpose of Resolution 299. Upon plant closure, the final disposition of the material in these cells will be determined.

Energy Northwest is in the process of cleaning the sediment from the service water ponds. Divers have removed sediment by vacuuming the bottom of the ponds and this sediment is being disposed of per EFSEC Resolution 299 into the disposal cells. The plan was then to remove remaining sediment by filtration and backflush the filters onto the ground. The [current] NPDES permit issued by [EFSEC, WA002515-1] allows discharge of filter backwash onto the ground at a location named Outfall 003. However, the sediment within the backwash is not authorized to be placed onto the ground per EFSEC Resolution 299.

Energy Northwest has now revised its plan to remove suspended sediment in the service water ponds and has proposed to address water quality within the service water ponds by bleeding the water in the ponds into the circulating coolant water loop ('bleed and feed' process). Department of Health approves this proposal. The facility will bleed the service water into the circulating coolant water line coming from the condenser to the cooling towers. Water in the cooling towers is largely evaporated, sediments accumulate on the floors of the towers and is removed and disposed of per Resolution 299. Some of the water does return to the circulatory water pumphouse where Columbia River water is added. Occasionally service water is extracted here and discharged to the Columbia River via the monitored pathway.

The Department of Health determines the new proposal is acceptable and protective of public health and the environment for the following reasons:

1. Sediments will be disposed of via approved means (EFSEC Resolution 299)

2. Removal of suspended sediments in water will be accomplished within the normal operations of the plant. The Facility Safety Analysis Report (Chapter 9, auxiliary systems) allows for occasional release of pond water through monitored discharge line to maintain water quality in the standby service water ponds.

3. Water quality within the ponds is monitored routinely and history shows no radioactive contamination in the water above detection limits. Routine plant operations require the facility to collect monthly grab samples of service pond and analyze them for radioactive contaminants at the same detection levels required for environmental samples.

4. The service water discharge is monitored for radioactive contamination through laboratory analysis of monthly samples collected via a flow proportional sampler. The Department of Health provides independent analysis of this monthly sample."

Stormwater runoff flows to over 100 underground injection control (UIC) wells located throughout the site. These UIC wells (and additional wells operated by Energy Northwest) are registered with Ecology under Site Number 31957. More information is available on Ecology's web page here: https://fortress.wa.gov/ecy/uicsearch. Specific wells authorized to

receive stormwater runoff in the proposed permit are identified in the facility's permit application.

B. Description of the receiving water

Columbia Generating Station discharges to the Columbia River at river mile 351.75, and to ground water near the plant. Other nearby point source outfalls are limited by the surrounding 586 square mile Hanford Site. 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 II.E of this fact sheet describes receiving waterbody impairments.

The ambient background data used for this permit includes the following from *Energy Northwest Columbia Generating Station Effluent Mixing Study, June 2008*:

Table 2 Ambient Background Data

Parameter	Value Used
Temperature (highest annual 1-DADMax)	22 °C
pH (geometric mean)	7.9 standard units
Turbidity	0.698 NTU
Hardness	61 mg/L as Ca/Mg
Alkalinity	62 mg/L as CaCO3
Conductivity	126 µS/cm
Ammonia	0.037 mg/L
Nitrate	0.104 mg/L
SO_4	9.9 mg/L
Lead	0.1 µg/L
Copper	0.3 µg/L
Chromium	0.3 µg/L
Zinc	0.9 µg/L
Manganese	3.1 µg/L
Magnesium	4.8 mg/L
Fluorine	0.063 mg/L

Table 2 Ambient Background Data

Parameter	Value Used
Chloride	1.0 mg/L
Magnesium	4.8 mg/L

C. Wastewater characterization

Outfall 001

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 2007 to 2013. The wastewater effluent is characterized as follows:

Table 3 Wastewater Characterization – Outfall 001

Parameter	Units	# of Samples	Average Value	Maximum Value
Biochemical Oxygen Demand (BOD_5)	mg/L	1	Not Applicable (NA)	<2.0
Chemical Oxygen Demand	mg/L	3	27.3	37
Total Suspended Solids (TSS)	mg/L	36	11.8	33
Total Organic Carbon (TOC)	mg/L	3	11.7	13
Ammonia (as N)	mg/L	36	0.077	0.220
Total Residual Halogen	mg/L	1000	NA	<0.1[1]
Hardness	mg/L	3	737	748
Antimony	µg/L	3	2.4	3.51
Copper, Total	µg/L	16	13.3	21.0
Chromium, Total	µg/L	38	1.093	2.8
Zinc, Total	µg/L	38	22.54	41
Lead, Total	µg/L	3	0.4	0.74
Arsenic, Total	µg/L	3	6.12	6.80
Selenium, Total	µg/L	3	1.86	1.94

Table 3 Wastewater Characterization – Outfall 001

Parameter	Units	# of Samples	Average Value	Maximum Value
Bromoform	µg/L	3	1.14	1.43
Mercury	µg/L	3	0.0031	0.00578
Nickel	µg/L	3	3.3	3.65
Asbestos	10^6 fibers/L	1	NA	<0.19
[1] Halogenated waste streams are batch-released and not discharged until total residual halogen concentration complies with the effluent limit of 0.1 mg/L				

Parameter	Units	# of Samples	Maximum Monthly Geometric Mean	Maximum Weekly Geometric Mean
Total Coliforms	col/100 mL	1	NA	122.3
Fecal Coliforms	col/100 mL	1	NA	6.8

Parameter	Units	# of Samples	Minimum Value	Maximum Value
pH	standard units	Continuous	6.8	8.7

Outfall 002

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 2007 to 2010. The wastewater effluent is characterized as follows:

Table 4 Wastewater Characterization – Outfall 002

Parameter	Units	# of Samples	Average Value	Maximum Value
Flow	MGD	1000	0.051	1.52
Fluoride	mg/L	11	0.12	0.18
Nitrate	mg/L	11	0.57	3.8
Nitrite	mg/L	11	0.06	0.25

Table 4 Wastewater Characterization – Outfall 002

Parameter	Units	# of Samples	Average Value	Maximum Value
Gross Beta Radioactivity	pCi/L	36	1.98	19.7
Sulfate	mg/L	11	20.1	31
Barium, Total	µg/L	2	73	81
Iron, Total	µg/L	11	240	490
Manganese, Total	µg/L	11	13.6	280
Nickel	µg/L	11	250	410
Chromium, Total	µg/L	10	100	520
Copper, Total	µg/L	11	7	17
Zinc, Total	µg/L	10	0.0418	0.12
Lead, Total	µg/L	11	.4	1.3
Bis(2-ethylhexyl)phthalate	µg/L	3	1.04	1.62
Chloroform	µg/L	3	1.7	4.10
Chloride [1]	mg/L	13	8.7	9.5
Total dissolved solids [1]	mg/L	13	396.2	480
[1] Chloride and Total dissolved solids data is from January 2011 through February 2012 as reported in *Energy Northwest Columbia Generation Station Groundwater Quality Study Report, May 2012.*				

Parameter	Units	# of Samples	Minimum Value	Maximum Value
pH	standard units	10	7.2	8.3

D. Summary of compliance with previous permit issued May 25, 2006

The previous permit placed effluent limits on temperature, flow, total residual halogen, pH, copper, polychlorinated biphenyl compounds (PCBs), and the 126 priority pollutants (40 CFR 423 Appendix A) contained in chemicals added for cooling tower maintenance, except chromium and zinc.

Columbia Generating Station has complied with the effluent limits and permit conditions throughout the duration of the permit issued on May 25, 2006. EFSEC assessed compliance

based on its review of the facility's information, discharge monitoring reports (DMRs), and on inspections.

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). The exemption applies only to existing discharges, not to new discharges. The Columbia Generating Station is an existing facility.

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, and chapter 173-220 WAC).
- Water quality-based limits are calculated so that the effluent will comply with the Surface Water Quality Standards (chapter 173-201A WAC), Ground Water Standards (chapter 173-200 WAC), Sediment Quality Standards (chapter 173-204 WAC), or the National Toxics Rule (40 CFR 131.36).
- 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.

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

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 following limits for total residual halogen, polychlorinated biphenyl compounds (PCBs), and priority pollutants are based on 40 CRF 423.13. Limits for chromium, zinc, pH, and flow are based on demonstrated performance at the facility. Limits for chromium and zinc are discussed further in Section III.J.

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	Not applicable	0.1 milligrams/liter (mg/L)
Chromium (Total)	8.2 µg/L	16.4 µg/L
Zinc (Total)	53 µg/L	107 µg/L
Polychlorinated biphenyl compounds (PCBs)	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	No detectable amount	No detectable amount

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

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. In addition, neither free available chlorine nor total residual chlorine may be discharged from any unit for more than two hours in one day unless the utility can demonstrate to the State that the units in a particular location cannot operate at or below this level of chlorination.

The 1995 permit fact sheet documents that in March 1975, Energy Northwest requested and received a waiver of the two hour limitation, stating that it was not appropriate for recirculating water cooling systems. EFSEC later approved the use of bromine as well as chlorine biocides at the facility. Bromine has the same limit and is tested by the same procedure as chlorine. Therefore the 2006 permit includes the following limit:

- There shall be no discharge of cooling water from Outfall 001 during biofouling treatments nor until the concentration of total residual halogens is less than 0.1 mg/L for at least 15 minutes.

The proposed permit modifies this limit to address discharges via gravity flow from the over three mile long discharge pipe that may continue even after the circulating water is isolated from the discharge pipe. The facility requested this change during entity review. EFSEC believes the proposed limit is equivalent to the current limit in preventing discharge of total residual halogen concentrations greater than or equal to 0.1 mg/L.

- The circulating water blowdown valves must be closed during biofouling treatments and remain closed until the concentration of total residual halogen is less than 0.1 mg/L for at least 15 minutes.

Cooling Water Intake Structures

EFSEC must ensure the location, design, construction, and capacity of cooling water intake structures reflect the best technology available for minimizing adverse environmental impact, per CWA § 316(b), 33 U.S.C. §1326(b), and 40 CFR 401.14. EPA has not promulgated final rules to establish best technology available (BTA) standards applicable to Columbia Generating Station. Until applicable BTA standards are available, 40 CFR 125.90(b) requires a case-by-case, best professional judgment (BPJ) determination of requirements.

Ecology's Permit Writer's Manual provides general factors to be considered for BPJ determinations including; the appropriate technology for the category or class of the point source, and any unique factors relating to the facility. CWA § 316(b) provides specific factors for consideration including: location, design, construction, capacity, and identification of BTA for minimizing adverse environmental impact.

In addition, EPA promulgated BTA standards for new facilities at 40 CFR Subpart I in 2001, and has proposed rules for existing facilities at 40 CFR Subpart J. EFSEC considered both current rules for new facilities, even though these are not applicable to the existing Columbia Generating Station (CGS), and proposed rules for existing facilities in evaluating appropriate technology applicable to CGS. EFSEC considered correspondence from EPA, National Marine Fisheries Service (NMFS), U.S. Nuclear Regulatory Commission (NRC), and Energy Northwest in evaluating factors unique to the facility.

Location, design, and construction

CGS withdraws water from the Columbia River through two 42-inch diameter inlets perforated with 3/8 inch diameter holes, each approximately 20 feet long and placed parallel to river flow approximately 350 feet offshore at low water. Water flows by gravity to the River Pumphouse.

The intake structures for CGS were designed and constructed in the late 1970s. Energy Northwest provided design and construction documents and correspondence from that time period. Correspondence documents that alternatives were considered and the final intake design was selected to minimize adverse environmental impact, specifically:

- "This intake was selected to minimize the impact of the make-up water withdrawal from the Columbia River, with particular emphasis on salmonid fry. Two characteristics of this intake minimize fish entrainment. First, the intake location is well offshore where the number of downstream salmonid fry are expected to be relatively small. Second, the low intake approach velocities near the perforated pipe are on the order of 0.2 – 0.4 feet per second (fps)."

Correspondence specific to construction indicate that the Army Corps of Engineers conditioned construction of the intakes to minimize environmental impact. Energy Northwest conducts periodic visual inspection of the intakes and has found no evidence of adverse impacts.

Capacity

The term "capacity" is not defined in the CWA or current EPA regulations. In the 1976 Final CWA § 316(b) regulations, EPA proposed defining "capacity" as the "maximum withdrawal rate of water through the cooling water intake structure." 41 Fed. Reg. 17390 (April 26, 1976) (proposed 40 C.F.R. § 402.11(e)). The preamble to the regulations explained that "[the] relative magnitude of flow withdrawn for cooling" was one of the key factors to consider in evaluating the adverse impact from a cooling water intake structure.

CGS's average intake is approximately 20 million gallons per day (MGD) with the majority used exclusively for cooling in a closed cycle recirculating system. 40 CFR Subpart I rules for new facilities, and proposed rules for existing facilities, each set or propose BTA standards to minimize impingement and entrainment of all life stages of fish and shellfish. Impingement occurs when fish or shellfish become entrapped on the outer part of intake screens and entrainment occurs when fish or shellfish pass through the screens and into the cooling water system.

Intake velocity is a primary factor for impingement standards with 0.5 fps identified as the maximum design intake velocity allowed by 40 CFR Subpart I. This intake velocity is also cited in the proposed existing facilities rule. Preliminary information indicates Columbia Generating Station's intake velocities are below this threshold. As indicated above, early design documents report intake velocities of 0.2 to 0.4 fps.

Entrainment standards proposed for existing facilities are either a case-by-case determination or reduction of intake flow to a level commensurate with a closed cycle recirculating system. Columbia Generating Station already operates a closed cycle recirculating system. Energy Northwest staff provided documentation that no entrainment was observed during initial monitoring where small mesh nets designed to collect salmonid fry were placed over the intake pipes in the pump-well of the River Pumphouse. Energy Northwest also provided documentation of fish impingement surveys conducted in the late 1970s and early 1980s. No evidence of impingement was found during any of the surveys.

Economic Considerations

EPA has interpreted CWA § 316(b) to authorize consideration of the cost of the technological options for cooling water intake structure improvements when making determinations of what constitutes BTA for minimizing adverse environmental impacts. First, cost is considered in terms of whether an option is economically "practicable." This can be understood as part of meeting the "availability" component of BTA. Second, EPA also considers costs by determining whether or not the cost of the BTA requirements would be "wholly disproportionate to the environmental benefit to be gained." This comparison is not a cost/benefit analysis; rather, it is a particular type of consideration of costs that EPA has determined, and the courts have upheld, is consistent with Congressional intent under CWA § 316(b).

EFSEC reviewed several recent permits for facilities where 40 CFR 125.90(b) is applicable. Cost analyses reviewed often evaluated the capital costs of implementing technology options considered in the analysis, as well as some evaluation of environmental benefit. Capital costs are the direct monetary cost to the facility of implementing a particular technology. The benefit is often expressed as a reduction in volume of species either impinged or entrained in the facilities evaluated if one technology option or another is selected. This benefit can be from improved stocks of commercially valuable species or indirect social benefit.

EFSEC has found no evidence of impingement or entrainment of species from the intake structures at CGS. Therefore, no monetary or indirect social benefit can be calculated as no cost is currently incurred. Capital costs were not evaluated because no "practicable" technology options could be identified that would provide further minimization of adverse environmental impacts.

Best Technology Available

The location, design, construction, and capacity of the cooling water intake structures at CGS were clearly chosen with the intent to provide the best technology available at the time to their construction to minimize adverse environmental impacts. EFSEC must re-evaluate these factors with each renewal of the facility's NPDES permit. Much of the evaluation for the proposed permit is detailed above. EFSEC evaluated additional information for one specific factor, design of the intake structures.

In May 2012, the National Marine Fisheries Service (NMFS) advised EFSEC of the presence of federally protected species of steelhead and salmon in the vicinity of the intake structures. NMFS referenced 50 CFR 223.203(b)(9) and Juvenile Fish Screen Criteria as applicable "…guidance on water intake systems designed to minimize adverse effects to anadromous fish." The referenced guidance document, Anadromous Salmonid Passage Facility Design, July 2011, also states:

- "Existing facilities may not adhere to the criteria and guidelines listed in this document. However, that does not mean these facilities must be modified specifically for compliance with this document. The intention of these criteria and guidelines is to ensure future compliance in the context of major upgrades and new designs of fish passage facilities."

EFSEC considered these criteria and determined that, at a minimum, Energy Northwest would be required to replace the existing screens with screens containing smaller diameter (3/32 inch) perforations if the guidance were applicable to existing facilities. As a nuclear facility, modification to the intake structures would require a review of NRC safety requirements for any potential conflicts. EPA's proposed rule for existing facilities acknowledges this with a provision specific to nuclear facilities allowing for a site-specific determination of BTA that would not conflict with NRC safety requirements.

NRC provided further information for EFSEC's consideration in a December 2011 response letter to NMFS concerns on the potential "take" of listed species. In the letter, NRC cites three observations that led their staff to conclude in a biological assessment that the cooling system "may affect, but is not likely to adversely affect" both Upper Columbia River spring Chinook salmon and Upper Columbia River steelhead:

- Juvenile Upper Columbia River spring Chinook are too large to be entrained into the cooling system at the time they migrate through the Hanford Reach.
- Since 2006, no evidence of Upper Columbia River steelhead spawning has been observed in the Hanford Reach, and historically, steelhead fry in the Hanford Reach do not emerge until they are about 1 inch long and tend to seek cover after emergence.
- Columbia Generating Station entrainment studies in 1979-1980 and 1985 collected no life stage of Upper Columbia River steelhead.

NMFS indicated in a June 2012 letter to NRC that it did not concur with NRC's determination of 'not likely to adversely affect' ESA listed species. However, no additional information was provided. NMFS again referenced the July 2011 design guidance. EFSEC has determined that this guidance is not applicable to CGS, an existing facility, based on the applicability statement in the document itself and the absence of information indicating impingement or entrainment of listed species from the intake structures.

In February 2013, EPA requested review of a preliminary draft permit and fact sheet, which EFSEC provided in July 2013. Both EPA and NMFS provided extensive comments on the preliminary draft, which documented EFSEC's best professional judgment determination that the existing cooling water intakes represent best technology available. The following requests were included in the respective comment letters:

- NMFS – "EFSEC should revise the proposed permit to include a requirement for Energy Northwest to work in cooperation with NMFS, the Washington State Department of Fish and Wildlife, and NRC to develop and implement a design for the intake screening system that meets NMFS juvenile fish screening criteria within two years of permit issuance."
- EPA – "The EPA contends that it is appropriate after 30 years since completion of the original studies of impingement and entrainment, that new studies be designed and implemented to evaluate fully the environmental impact of the CWIS. Additionally, the permit should require facility planning to evaluate the magnitude and cost of CWIS modifications needed to meet the requirements of section 316(b) and address the concerns expressed by NOAA. Studies undertaken during this permit cycle will inform whether additional actions are needed to minimizing adverse environmental impact and will support the BPJ determination for BTA. Alternately, the permittee may choose to proceed directly to the CWIS modifications to meet the objectives as described by NOAA…"

Conclusions

NMFS comments on the preliminary draft provide expert opinion that risk of impingement and entrainment to endangered species can be lowered with modification of the existing intakes in accordance with their July 2011 guidance. In response, Energy Northwest provided expert opinion supporting the existing intakes as best technology available (Energy Northwest, 2013). EFSEC must consider both opinions in the context of its authorities under the CWA and federal rule for "minimizing adverse environmental impact". No adverse environmental impact has been demonstrated. If it were, this must be considered along with the other factors evaluated above during BPJ analysis. EFSEC believes it has appropriately

considered the potential risks identified by NMFS and EPA in the context of the BPJ analysis and its authorities under the CWA.

EFSEC's best professional judgment determination is that the existing cooling water system intakes location, design, construction, and capacity represent the best technology available for minimizing adverse environmental impact and comply with CWA Section 316(b). EFSEC will reevaluate this determination when final rules applicable to the facility are issued and may modify this proposed permit on the basis of new information. Any modifications will be implemented in accordance with the requirements of WAC 463-76-041, WAC 463-76-042, and WAC 463-76-043.

B. Surface water quality-based effluent limits

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

Numerical criteria for the protection of aquatic life and recreation

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

Numerical criteria for the protection of human health

The U.S. EPA has published 91 numeric water quality criteria for the protection of human health that are applicable to dischargers in Washington State (EPA, 1992). These criteria are designed to protect humans from exposure to pollutants linked to cancer and other diseases, based on consuming fish and shellfish and drinking contaminated surface waters. The water quality standards also include radionuclide criteria to protect humans from the effects of radioactive substances.

Narrative criteria

Narrative water quality criteria (e.g., WAC 173-201A-240(1); 2006) 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, 2006) and of all marine waters (WAC 173-201A-210, 2006) in the state of Washington.

Antidegradation

Description--The purpose of Washington's Antidegradation Policy (WAC 173-201A-300-330; 2006) is to:

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

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

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

- The facility is planning a new or expanded action.
- 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.

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 (see Ecology's *Permit Writer's Manual*). Each critical condition parameter, by itself, has a low probability of occurrence and the resulting dilution factor is conservative. The term "reasonable worst-case" applies to these values.

The mixing zone analysis produces a numerical value called a dilution factor (DF). A dilution factor represents the amount of mixing of effluent and receiving water that occurs at the boundary of the mixing zone. For example, a dilution factor of 10 means the effluent is 10% and the receiving water is 90% 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 liters/day for drinking water.
- A one-in-one-million cancer risk for carcinogenic chemicals.

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

1. **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).

2. **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").

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

Table 6 Critical Conditions Used to Model the Discharge

Critical Condition	Value
The seven-day-average low river flow with a recurrence interval of ten years (7Q10)	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

Table 6 Critical Conditions Used to Model the Discharge

Critical Condition	Value
Maximum average monthly effluent flow for chronic and human health non-carcinogen	4.3 MGD
Annual average flow for human health carcinogen	2.4 MGD
Maximum daily flow for acute mixing zone	5.9 million gallons per day (MGD)
1-DAD MAX Effluent temperature	29.6 degrees 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* conducted in 2008.

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

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

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

EPA sets acute criteria for toxic chemicals assuming organisms are exposed to the pollutant at the criteria concentration for one hour. EPA sets 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.

5. **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.

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

At any given time, the effluent plume uses only a portion of the acute and chronic mixing zone, which minimizes the volume of water involved in mixing. The plume mixes as it rises through the water column therefore much of the receiving water volume at lower depths in the mixing zone is not mixed with discharge. Similarly, because the discharge may stop rising at some depth due to density stratification, waters above that depth will not mix with the discharge. 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.

7. **Maximum size of mixing zone.**

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

8. **Acute mixing zone.**

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

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.

9. Overlap of Mixing Zones.

This mixing zone does not overlap another mixing zone.

C. Designated uses and surface water quality criteria

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

- 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 Freshwater Aquatic Life Uses and Associated Criteria

Salmonid Spawning, Rearing, and Migration	
Temperature Criteria – 1-DMax[1]	20°C (68°F) Temperature must not exceed a 1-DMax of 20.0º C due to human activities. When natural conditions exceed a 1-DMax of 20.0 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.

[1]WAC 172-201A-602 establishes a special condition for the Columbia River in the vicinity of Columbia Generating Station Outfall 001.

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

Table 8 Recreational Uses and Associated Criteria

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

- The *water supply uses* are domestic, agricultural, industrial, and stock watering.
- The *miscellaneous freshwater uses* are wildlife habitat, harvesting, commerce and navigation, boating, and aesthetics.

D. Water quality impairments

The Columbia River is listed on the current 303(d) and is impaired for dioxin and total dissolved gas. Ecology has completed a Total Maximum Daily Load (TMDL) Analysis for dioxin (https://fortress.wa.gov/ecy/publications/SummaryPages/0910058.html) and total dissolved gas (https://fortress.wa.gov/ecy/publications/summarypages/0403002.html).

Ecology has not documented temperature impairment in the receiving water in the vicinity of the outfall however Ecology considers the entire Columbia River impaired for temperature. EPA has prepared a draft TMDL for temperature. However, EPA has delayed issuance pending discussion and information exchanges.

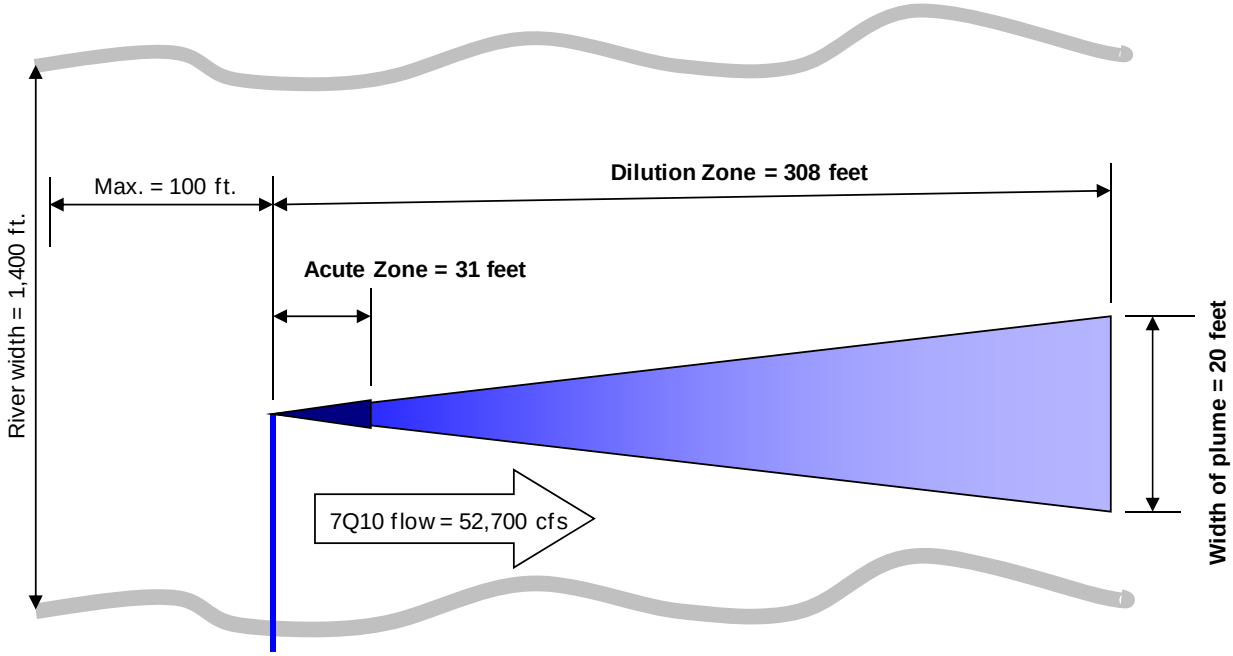
E. Evaluation of surface water quality-based effluent limits for numeric criteria

Pollutants in an effluent may affect the aquatic environment near the point of discharge (near-field) or at a considerable distance from the point of discharge (far-field). Toxic pollutants, for example, are near-field pollutants; their adverse effects diminish rapidly with mixing in the receiving water. Conversely, a pollutant such as 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.

The diffuser at Outfall 001 is a single port structure aligned perpendicular to the river flow, is 8 inches in height, 32 inches wide, and extends upward from the river bed at a 15º angle. The diffuser depth is 8.5 feet at critical condition flow. EFSEC obtained this information from the *Energy Northwest Columbia Generating Station Effluent Mixing Study*, June 2008.

Figure 3 Columbia Generating Station Regulatory Mixing Zone



Outfall port is 8 inches high and 32 inches wide

Located approximately 175 feet from bank at a depth of 8.5 feet at the critical conditions.

Plan View – not to scale

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 horizontal distance of the chronic mixing zone is 308 feet. The mixing zone extends from the top of the discharge port to the water surface.

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 horizontal distance of the acute mixing zone is 31 feet. The mixing zone extends from the top of the discharge port to the water surface. The dilution factor is based on this distance.

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*, June 2008. Ecology's *Permit Writers Manual* gives critical flow conditions for human health criteria as the harmonic mean flow for carcinogens and 30Q5 for non-carcinogens. The study did not evaluate these conditions. Therefore, EFSEC used dilution factors determined for aquatic life criteria as conservative estimates for 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 9 Dilution Factors (DF)

Criteria	Acute	Chronic
Aquatic Life	9	93
Human Health, Carcinogen		Not evaluated, therefore 93 was used
Human Health, Non-carcinogen		Not evaluated, therefore 93 was used

EFSEC determined the impacts of pH, turbidity, ammonia, chlorine, chromium, copper, zinc, 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.

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

EFSEC predicts no violation of the pH criteria under critical conditions. Therefore, the proposed permit includes technology-based effluent limits for pH. Because the facility has demonstrated it can meet previous permit limits of 6.5 to 9.0, the proposed permit includes the technology-based effluent limits for pH of a pH range of 6.5 to 9.0 on the basis of best professional judgment (BPJ).

Turbidity--EFSEC evaluated the impact of turbidity based on the range of turbidity in the effluent and turbidity of the receiving water. Based on visual observation of the facility's effluent, EFSEC expects no violations of the turbidity criteria outside the designated mixing zone.

Toxic Pollutants--Federal regulations (40 CFR 122.44) require EFSEC to place limits in NPDES permits on toxic chemicals in an effluent whenever there is a reasonable potential for those chemicals to exceed the surface water quality criteria. 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, chlorine, chromium, copper, bromoform, zinc, antimony, arsenic, lead, mercury, nickel, and selenium. 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 the effluent mixing study and Ecology spreadsheet tools.

Valid ambient background data were available for ammonia, chlorine, chromium, copper, lead, and zinc (See Table 2). EFSEC used all applicable data to evaluate reasonable potential for this discharge to cause a violation of water quality standards.

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

Temperature--The state temperature standards (WAC 173-201A-200-210 and 600-612) include multiple elements:

- Annual summer maximum threshold criteria (June 15 to September 15)
- Supplemental spawning and rearing season criteria (September 15 to June 15)
- Incremental warming restrictions
- Protections against acute effects

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

- Annual summer maximum and supplementary spawning/rearing criteria

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

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

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

- Incremental warming criteria

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

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

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

When Ecology has not yet completed a TMDL, our policy allows each point source to warm water at the edge of the chronic mixing zone by 0.3°C. This is true regardless of the background temperature and even if doing so would cause the temperature at the edge of a standard mixing zone to exceed the numeric threshold criteria. Allowing a 0.3°C warming for each point source is reasonable and protective where the dilution factor is based on 25% or less of the critical flow. This is because the fully mixed effect on temperature will only be a fraction of the 0.3°C cumulative allowance (0.075°C or less) for all human sources combined.

- Protections for temperature acute effects

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

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

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

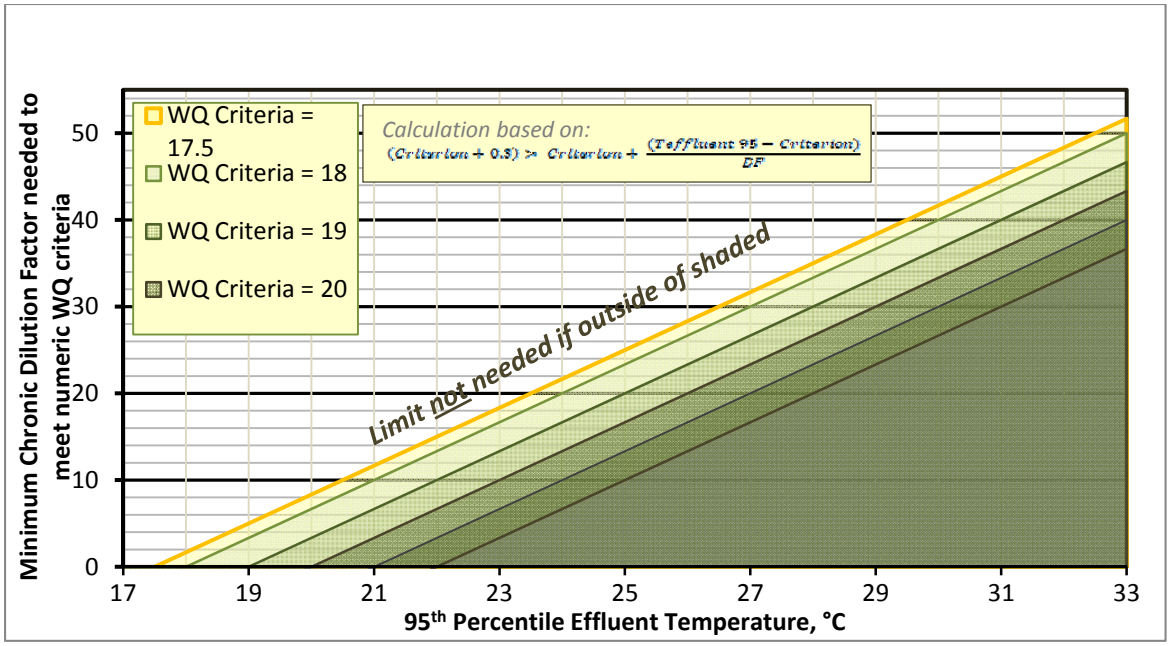
Reasonable Potential Analysis

Annual summer maximum and incremental warming criteria: EFSEC calculated the reasonable potential for the discharge to exceed the annual summer maximum and the incremental warming criteria at the edge of the chronic mixing zone during critical conditions. No reasonable potential exists to exceed the temperature criterion where:

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

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

Figure 4 Dilution Necessary to Meet Criteria at Edge of Mixing Zone



Columbia Generating Station Outfall 001 data input to the above equation yields the following:

- (20 + 0.3) > [20 + (34.9 – 20)/93] or 20.3 > 20.2

Therefore, the proposed permit does not include a temperature limit. The permit requires additional monitoring of effluent temperatures. EFSEC will reevaluate the reasonable potential during the next permit renewal.

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 in **Appendix D**. The results demonstrate there is no reasonable potential for instantaneous lethality to passing fish.

F. Human health

Washington's water quality standards include 91 numeric human health-based criteria that EFSEC must consider when writing NPDES permits. These criteria were established in 1992 by the U.S. EPA in its National Toxics Rule (40 CFR 131.36). The National Toxics Rule allows states to use mixing zones to evaluate whether discharges comply with human health criteria.

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) by following the procedures published in the *Technical Support Document for Water Quality-Based Toxics Control* (EPA/505/2-90-001) and Ecology's *Permit Writer's Manual* to make a reasonable potential determination. The evaluation

showed that the discharge has no reasonable potential to cause a violation of water quality standards, and an effluent limit is not needed.

G. Sediment quality

The aquatic sediment standards (chapter 173-204 WAC) 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. http://www.ecy.wa.gov/programs/tcp/smu/sediment.html

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. This determination is based on the low concentrations of TSS in the discharge, and that the velocity of the Columbia River in the vicinity of the outfall inhibits deposition. This was confirmed in the results of an October 2006 outfall evaluation where sediment deposition was found to be "minimal if not non-existent" downstream of the outfall.

H. Groundwater quality limits

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

Implementation Guidance for the Ground Water Quality Standards (Ecology Publication #96-02) provides guidance for how enforcement limits are determined. The procedure requires a minimum of eight sampling events to establish background. The background monitoring well must be upgradient of the activity and not impacted by facility discharge.

The 2006 permit required Energy Northwest to conduct a groundwater quality study. EFSEC reviewed the *Energy Northwest Columbia Generation Station Groundwater Quality Study Report, May 2012* and determined that the upgradient well for Outfall 002 (MW-9) is impacted by facility discharge and cannot be used as an upgradient well for the purposes of determining impacts to groundwater. While discussing options determining compliance with groundwater quality standards, Energy Northwest indicated a commitment to installing a double-lined evaporation pond with leak detection to replace Outfall 002.

The proposed permit includes a compliance schedule for installation of a double lined evaporation pond. Therefore, continued groundwater monitoring to establish limits for Outfall 002 is unnecessary because the facility will no longer discharge to ground following completion of the pond. However, groundwater monitoring to determine the effects of removing this discharge is necessary. The current groundwater mound under Outfall 002 is expected to recede when discharges cease. Outfall 002 monitoring wells are downgradient from Hanford 618-11 burial ground. Contamination from that burial ground may have been pushed around the mound and not detected. When the mound dissipates, contaminants may be detected in MW-9. EFSEC expects continued monitoring to be addressed in the *Ground Water Quality Study Quality Assurance Project Plan* (QAPP) update required in S7.5 of the proposed permit.

More information about the compliance schedule for groundwater quality activities is presented in Section V.H of this fact sheet.

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

(Note: EFSEC updated this fact sheet section in response to new test results received during the draft public comment period indicating the need for an acute WET limit) WET testing conducted during the previous permit term showed the facility's effluent has a reasonable potential to cause acute toxicity in the receiving water. The proposed permit will include an acute toxicity limit. **The effluent limit for acute toxicity is: No acute toxicity detected in a test sample representing the acute critical effluent concentration (ACEC).** The acute critical effluent concentration (ACEC) is the concentration of effluent at the boundary of the acute mixing zone during critical conditions. The ACEC equals 11% effluent.

Compliance with an acute toxicity limit is measured by an acute toxicity test comparing test organism survival in the ACEC (using a sample of effluent diluted to equal the ACEC) to survival in nontoxic control water. Columbia Generating Station is in compliance with the acute toxicity limit if there is no statistically significant difference in test organism survival between the ACEC sample and the control sample.

WET testing conducted during effluent characterization showed no reasonable potential for effluent discharges to cause receiving water chronic toxicity. The proposed permit will not include a chronic WET limit. Columbia Generating Station 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. Columbia Generating Station may demonstrate to EFSEC that effluent toxicity has not increased by performing additional WET testing and/or chemical analyses after the process or material changes have been made. EFSEC recommends that the Permittee check with it first to make sure that EFSEC will consider the demonstration adequate to support a decision to not require an additional effluent characterization.

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

J. Comparison of effluent limits with previous permit issued May 25, 2006

Table 10 Comparison of Previous and Proposed Effluent Limits

		Previous Effluent Limits: Outfall # 001		Proposed Effluent Limits: Outfall # 001	
Parameter	**Basis of Limit**	**Average Monthly**	**Maximum Daily**	**Average Monthly**	**Maximum Daily**
Flow (mgd)	Technology	5.6	9.4	5.6	9.4
Temperature	Technology	Not applicable (NA)	(Note [1])	NA	
Total Residual Halogen (mg/L)	Technology	NA	0.1	NA	0.1
Total Copper (Dec. – Feb.) (µg/L)	Water Quality	70	108	NA	NA
Total Copper (Mar. – Nov.) (µg/L)	Water Quality	223	345		
Total Chromium (µg/L)	Technology	--	--	8.2	16.4
Total Zinc (µg/L)	Technology	--	--	53	107
Polychlorinated biphenyl compounds (PCBs)	Technology	No discharge	No discharge	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	No detectable amount	No detectable amount
Parameter	**Basis of Limit**	**Limit**		**Limit**	
pH	Technology	Between 6.5 - 9.0 at all times		Between 6.5 - 9.0 at all times	

[1]The temperature of the circulating cooling water blowdown shall not exceed, at any time, the lowest temperature of the circulating cooling water, prior to the addition of makeup water, except that the temperature of the blowdown may be less than the temperature of the river.

Temperature

EFSEC evaluated the temperature limit from previous permits (see footnote to Table 10) and determined that it is based on an outdated version of federal rule. The 1995 permit fact sheet cites Federal Register, Vol. 39, No. 196 as the basis for the technology-based effluent limit for temperature. A 1974 version of 40 CFR 423.13(l)(1) contained this limitation. However, subsequent amendments to 40 CFR 423.13 removed limitations for temperature in 1982. In addition, previous permits did not contain sufficient monitoring requirements to verify the narrative temperature limit.

The proposed permit removes this technology-based temperature limit. EFSEC does not believe removal of this limit results in less stringent requirements. Temperature monitoring during previous permit terms and the 2006 permit term occurs just past the isolation valve for the blowdown line. This is identified in Section 5.0 of the *Columbia Generating Station NPDES Operations and Maintenance Plan, March 2012*, as the lowest temperature point in the circulating cooling water system. In addition, S4.B of the proposed permit prohibits bypass of any portion of the treatment system. If Energy Northwest proposes to relocate the blowdown line withdrawal location to another point in the circulating cooling water system, EFSEC will reevaluate the need for a temperature limit and may modify the permit in accordance with G.3 Permit actions.

EFSEC also evaluated the need for water quality-based limits in Section III.E above and found that no reasonable potential exists to exceed the temperature criterion. EFSEC based the evaluation on data collected at the current temperature monitoring location in the Circulating Pumphouse, adjacent to the cooling towers. The effluent travels over three miles through a vented discharge pipe after passing the existing monitoring location. Therefore, temperatures may not be representative of the actual discharge and are likely to be less than currently reported.

The proposed permit requires Energy Northwest to continue monitoring effluent temperature and to relocate the monitoring device to the facility's River Pumphouse, adjacent to the actual discharge to the Columbia River. EFSEC will reevaluate the reasonable potential during the next permit renewal.

Copper

Copper is not contained in any of the chemicals added for cooling system maintenance and there are no categorical limits for copper in 40 CFR 423. However, the facility detected copper in the discharge in concentrations higher than the receiving water criteria during the previous permit term. A suspected major source was corrosion of the admiralty brass components of the main steam condenser. Energy Northwest replaced the copper condenser tubes in September 2011 with titanium.

The 2006 permit retained interim copper limits from the 1995 permit and required Energy Northwest to conduct an effluent mixing study and, as necessary, propose numeric effluent limits. Mixing study analysis showed no reasonable potential for copper to exceed water quality criteria. This analysis included effluent values for copper observed prior to condenser replacement. Using both pre and post condenser replacement effluent values for copper, EFSEC also determined that copper poses no reasonable potential to exceed the water quality criteria at the critical condition using procedures given in EPA, 1991 (**Appendix D**).

Federal requirements at CWA 402(o), CWA 303(d)(4), and 40 CFR 122.44(l) prohibit less stringent water-quality effluent limits in renewed or reissued permits, with few exceptions. One exception noted in 40 CFR 122.44(l)(2)(i)(A) is when material and substantial alterations to the facility occur after permit issuance that justify a less stringent limit. EFSEC determined that replacement of the condenser constitutes a material and substantial alteration to the facility. The proposed permit does not include a water quality based effluent limit for copper. It does include continued monthly monitoring for copper. EFSEC will reevaluate the reasonable potential for copper during the next permit renewal.

Chromium and Zinc

The 2006 permit fact sheet described the requirement for inclusion of applicable technology-based effluent limits for chromium and zinc (WAC 173-220-130 and 40 CFR 125.3). However, the permit failed to include limits. EPA has established and promulgated technology-based effluent limit guidelines for steam electric power generating at 40 CFR 423. Applicable standards for Columbia Generating Station are best available technology economically achievable (BAT) standards in 40 CFR 423.13.

40 CFR 122.44(l) prohibits less stringent technology-based effluent limits in renewed or reissued permits, with few exceptions. One exception is if the change would constitute a cause for permit modification or revocation and reissuance under 40 CFR 122.62. EFSEC believes the failure to include applicable technology-based effluent limits for chromium and zinc in the previous permit meets the cause for modification in 40 CFR 122.62(a)(15): *To correct technical mistakes, such as errors in calculation, or mistaken interpretations of law made in determining permit conditions*.

EFSEC evaluated the applicable BAT standards for chromium, 200 µg/L, and zinc, 1,000 µg/L for inclusion in the proposed permit as required by 40 CFR 125.3. Effluent discharged at these limits would violate applicable water quality criteria for both parameters. EFSEC cannot propose limits that would result in a violation of water quality criteria.

EFSEC determined that both chromium and zinc pose no reasonable potential to exceed the water quality criteria at the critical condition using procedures given in EPA, 1991 (**Appendix D**). EFSEC used total chromium effluent values in the analysis as a conservative substitute for hexavalent chromium, the most restrictive applicable water quality criteria.

Because EFSEC cannot include the BAT standards, the proposed permit incorporates average monthly and daily maximum limits based on best professional judgment. EFSEC elected not to use the procedures to calculate performance-based limits because many of the samples contained no detectable chromium which complicates the analysis. Instead, EFSEC used procedures given in EPA, 1991 (**Appendix D**) to calculate effluent limits where water quality standards are met at end-of-pipe. Monitoring data from the facility demonstrates that it is capable of consistently meeting the proposed limits without an allowance for mixing. Therefore, EFSEC is imposing these limits as technology-based limits in lieu of the BAT standards. Although calculated using the techniques for human health criteria permit limits, EFSEC is imposing these limits based on its best professional judgment. The limits are not water quality-based limits.

IV. Monitoring Requirements

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

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

The monitoring schedule is detailed in the proposed permit under Special Condition S.2. Specified monitoring frequencies take into account the quantity and variability of the discharge, the treatment method, past compliance, significance of pollutants, and cost of monitoring.

Monitoring of cooling tower blowdown for the 126 priority pollutants (40 CFR 423 Appendix A) contained in chemicals added for cooling tower maintenance, except chromium and zinc is required annually *unless* the Permittee provides engineering calculations which demonstrate that the regulated pollutants are not detectable in the final discharge by the analytical methods in 40 CFR part 136.

Previous permits did not require annual monitoring. The 1995 permit fact sheet states, "The permit will not require monitoring for priority pollutants because there has been no detection of these pollutants associated with chemicals used for cooling tower maintenance." However, 40 CFR 423.13(d)(3) requires engineering calculations if monitoring is not required. Therefore the proposed permit requires either annual monitoring or submittal of engineering calculations.

A. Lab accreditation

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

Table 11 Accredited Parameters

General Chemistry				
Parameter Name	**Analyte Code**	**Method Description**	**NELAC Code**	**Matrix**
Nitrate as N	1810	EPA 300.0_2.1_1993	10053200	Drinking Water (D)
Chloride	1575	EPA 300.0_2.1_1993	10053200	Non-Potable Water (N)
Fluoride	1730	EPA 300.0_2.1_1993	10053200	N
Nitrate	1805	EPA 300.0_2.1_1993	10053200	N
Nitrite	1835	EPA 300.0_2.1_1993	10053200	N

Table 11 Accredited Parameters

General Chemistry				
Parameter Name	**Analyte Code**	**Method Description**	**NELAC Code**	**Matrix**
Sulfate	2000	EPA 300.0_2.1_1993	10053200	N
Chemical Oxygen Demand (COD)	1565	EPA 410.4_2_1993	10077404	N
Turbidity	2055	SM 2130 B-01	20048219	N
Alkalinity	1505	SM 2320 B-97	20045607	N
Specific Conductance	1610	SM 2510 B-97	20048606	N
Solids, Total Dissolved	1955	SM 2540 C-97	20050402	N
Solids, Total Suspended	1960	SM 2540 D-97	20051201	N
Chromium VI	1045	SM 3500-Cr D-90	20067009	N
pH	1900	SM 4500-H+ B-00	20105219	N
Ammonia	1515	SM 4500-NH3 D-97	20109404	N
Orthophosphate	1870	SM 4500-P E-99	20124214	N
Phosphorus, total	1910	SM 4500-P E-99	20124214	N
Total Organic Carbon	2040	SM 5310 B-00	20137819	N
Chlorine (Residual), Total	1940	SM 4500-Cl D-00	20080108	D
Chlorine (Residual), Total	1940	SM 4500-Cl G-00	20081612	D
Chlorine (Residual), Total	1940	SM 4500-Cl D-00	20080108	N
Chlorine (Residual), Total	1940	SM 4500-Cl G-00	20081612	N

Microbiology				
Parameter Name	**Analyte Code**	**Method Description**	**NELAC Code**	**Matrix**
Total Coli/Ecoli - detect	WA6020	SM 9223 B Colilert	20212208	D

Metals				
Parameter Name	**Analyte Code**	**Method Description**	**NELAC Code**	**Matrix**
Copper	1055	EPA 200.8_5.4_1994	10014605	D
Lead	1075	EPA 200.8_5.4_1994	10014605	D
Aluminum	1000	EPA 200.8_5.4_1994	10014605	N
Antimony	1005	EPA 200.8_5.4_1994	10014605	N

Metals				
Parameter Name	**Analyte Code**	**Method Description**	**NELAC Code**	**Matrix**
Arsenic	1010	EPA 200.8_5.4_1994	10014605	N
Barium	1015	EPA 200.8_5.4_1994	10014605	N
Beryllium	1020	EPA 200.8_5.4_1994	10014605	N
Boron	1025	EPA 200.8_5.4_1994	10014605	N
Cadmium	1030	EPA 200.8_5.4_1994	10014605	N
Calcium	1035	EPA 200.8_5.4_1994	10014605	N
Chromium	1040	EPA 200.8_5.4_1994	10014605	N
Cobalt	1050	EPA 200.8_5.4_1994	10014605	N
Copper	1055	EPA 200.8_5.4_1994	10014605	N
Iron	1070	EPA 200.8_5.4_1994	10014605	N
Lead	1075	EPA 200.8_5.4_1994	10014605	N
Magnesium	1085	EPA 200.8_5.4_1994	10014605	N
Manganese	1090	EPA 200.8_5.4_1994	10014605	N
Mercury	1095	EPA 200.8_5.4_1994	10014605	N
Molybdenum	1100	EPA 200.8_5.4_1994	10014605	N
Nickel	1105	EPA 200.8_5.4_1994	10014605	N
Potassium	1125	EPA 200.8_5.4_1994	10014605	N
Selenium	1140	EPA 200.8_5.4_1994	10014605	N
Silver	1150	EPA 200.8_5.4_1994	10014605	N
Sodium	1155	EPA 200.8_5.4_1994	10014605	N
Thallium	1165	EPA 200.8_5.4_1994	10014605	N
Tin	1175	EPA 200.8_5.4_1994	10014605	N
Titanium	1180	EPA 200.8_5.4_1994	10014605	N
Vanadium	1185	EPA 200.8_5.4_1994	10014605	N
Zinc	1190	EPA 200.8_5.4_1994	10014605	N

Radiochemistry				
Parameter Name	**Analyte Code**	**Method Description**	**NELAC Code**	**Matrix**
Gross Alpha	2830	SM 7110 B	20156201	N
Gross Beta	2840	SM 7110 B	20156201	N
Cesium-134	2800	SM 7120 B	20160207	N
Cesium-137	2805	SM 7120 B	20160207	N

Radiochemistry				
Parameter Name	**Analyte Code**	**Method Description**	**NELAC Code**	**Matrix**
Gamma Emitters	WA3000	SM 7120 B	20160207	N
Tritium	3030	SM 7500-3H B	20160809	N
Cesium-134	2800	SM 7120 B	20160207	Solid and Chemical Materials (S)
Cesium-137	2805	SM 7120 B	20160207	S
Gamma Emitters	WA3000	SM 7120 B	20160207	S

B. 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 permitted facilities 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

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).

B. Non routine and unanticipated discharges

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 non-routine and unanticipated discharges 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.

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) and RCW 90.48.080].

Columbia Generating Station developed a plan for preventing the accidental release of pollutants to state waters and for minimizing damages if such a spill occurs. The 2006 permit referred to the plan as a Best Management Practices (BMP) Plan, while the proposed permit uses the more descriptive term of Spill Control Plan. The proposed permit requires the facility to update this plan and submit it to EFSEC.

D. Solid waste control plan

Columbia Generating Station 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 designed to prevent solid waste from causing pollution of waters of the state. The facility must submit the updated plan to EFSEC for approval (RCW 90.48.080). You can obtain an Ecology guidance document, which describes how to develop a Solid Waste Control Plan, at: http://www.ecy.wa.gov/pubs/0710024.pdf

E. Outfall evaluation

The proposed permit requires Columbia Generating Station to conduct an outfall inspection and submit a report detailing the findings of that inspection (Special Condition S11. Outfall evaluation). The inspection must evaluate the physical condition of the discharge pipe and diffusers, and evaluate the extent of sediment accumulations in the vicinity of the outfall.

F. Operation and maintenance manual

EFSEC requires industries 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) and WAC 173-220-150 (1)(g)]. The facility will prepare and submit an operation and maintenance manual as required by state regulation for the construction of wastewater treatment facilities (WAC 173-240-150). Implementation of the procedures in the operation and maintenance manual ensures the facility's compliance with the terms and limits in the permit.

G. Stormwater pollution prevention plan

In accordance with 40 CFR 122.44(k) and 40 CFR 122.44 (s), the proposed permit includes requirements for the development and implementation 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 Columbia Generating Station must develop a SWPPP and 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 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. Columbia Generating Station 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.

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 leaks, sludge or waste disposal, and drainage from raw material storage. Columbia Generating Station 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.

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 (*2004* edition), or any revisions thereof, 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 125.3. 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.

An assessment of how the BMPs will satisfy AKART requirements and the applicable technology-based treatment requirements under 40 CFR part 125.3.

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.

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 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.

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.

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 by chapter 2 in the *Eastern Washington SWMM*. Chapter 6 in the *Eastern Washington SWMM* lists BMPs to accomplish rate and volume control. Chapter 2 (Core Elements for New Development and Redevelopment) in the *Eastern Washington SWMM* contains the minimum technical requirements for facilities east of the Cascades. Although not required to implement these BMPs, controlling 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.

H. Compliance schedule

The proposed permit includes a compliance schedule primarily to address the facility's discharges to ground. It also requires relocation of the facility's temperature monitoring location to the River Pumphouse, adjacent to the Columbia River. Discharge currently travels over three miles through a vented pipe after temperature monitoring and before reaching the River. Temperature from the new location will be more representative of the actual discharge.

The 2006 permit required Energy Northwest to complete a groundwater quality study, which was conducted between October 2007 and October 2010. Energy Northwest submitted the groundwater quality study (*Energy Northwest Columbia Generation Station Groundwater Quality Study Report, May 2012*) with the permit renewal application. They also proposed replacing Outfall 002 with a double-lined evaporation pond with leak detection. EFSEC

considered the study's findings, Energy Northwest's proposal, and past permit documentation to determine appropriate requirements to assure compliance with groundwater quality standards for Outfall 002.

The groundwater quality standards (Chapter 173-200 WAC) and permitting regulations (Chapter 173-216 WAC) require that "all known, available, and reasonable methods of prevention, control, and treatment" (AKART) are applied to discharges. Energy Northwest submitted an engineering report for construction of a double-lined impoundment on June 15, 2013. The compliance schedule in the proposed permit requires submittal of an Operation and Maintenance (O&M) Manual for the double-lined impoundment, and construction of the impoundment. EFSEC has determined that construction and proper O&M of the double-lined impoundment constitutes AKART for discharges to Outfall 002.

The groundwater study also identified significant ground water mounding around the facility's cooling towers, near Outfall 003. Outfall 003 has not received a discharge since 2003, indicating that the mounding is the result of an unintentional discharge. The mounding impacted the upstream monitoring wells for Outfall 003 and enforcement limits could not be determined. The proposed permit does not authorize discharge to Outfall 003 for reasons addressed further in Section II.A of this fact sheet. Because discharges are no longer authorized, continued groundwater monitoring to establish enforcement limits for Outfall 003 is unnecessary. However, continued groundwater monitoring is required to address the mounding observed in the study.

The proposed permit includes requirements for an AKART analysis of the unintentional discharge indicated by the mounding observed around the facility's cooling towers. The analysis, documented in an engineering report prepared in accordance with Chapter 173-240 WAC, must be submitted with the permit renewal application.

In addition, the proposed permit includes a requirement to update the facility's *Ground Water Quality Study Quality Assurance Project Plan (QAPP).* An initial update is required to reflect changes based on the results of studies and the plans and requirements for Outfalls 002 and 003. A second update is required to reflect the findings of the engineering report required for the mounding observed around the cooling towers.

I. 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

A. Permit modifications

EFSEC may modify this permit to impose numerical limits, if necessary to comply with water quality standards for surface waters, with sediment quality standards, or with water quality standards for groundwaters, 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.

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 5 years.

VII. REFERENCES FOR TEXT AND APPENDICES

Energy Northwest

2013. *Why Cylindrical Screens in Flowing Water Impinge and Entrain Few Fish and Its Importance for the Columbia Generation Station's Intake, Discussion Paper for Meeting Between Energy Northwest and National Marine Fisheries Service, November 13, 2013,* November 7, 2013. (Prepared by Charles C. Coutant, Ph.D.)

2012. *Energy Northwest Columbia Generation Station Groundwater Quality Study Report, May 2012.* (Prepared by Freestone Environmental Services, Inc.)

2008. *Energy Northwest Columbia Generation Station Effluent Mixing Study*, June 2008.

1980. *Preoperational Environmental Monitoring Studies Near WNP 1, 2 and 4 August 1978 Through March 1980, June 1980*. (Prepared by Beak Consultants Incorporated)

Environmental Protection Agency (EPA)

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

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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.

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National Marine Fisheries Service

2012. Letter, *Columbia Generating Station – Pending Application for NPDES permit renewal*, May 7, 2012.

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

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

United States Nuclear Regulatory Commission

2011. Letter, *Response to Letter of Non-concurrence on Biological Assessment for Proposed License Renewal of Columbia Generating Station (TAC No. ME3121; NMFS Consultation No. F/NWR/2011/05286),* December 20, 2011.

Washington State Department of Ecology.

December 2011. *Permit Writer's Manual*. Publication Number 92-109 (https://fortress.wa.gov/ecy/publications/SummaryPages/92109.html)

Laws and Regulations (http://www.ecy.wa.gov/laws-rules/index.html)

Permit and Wastewater Related Information (http://www.ecy.wa.gov/programs/wq/permits/guidance.html)

February 2007. *Focus Sheet on Solid Waste Control Plan, Developing a Solid Waste Control Plan for Industrial Wastewater Discharge Permittees*, Publication Number 07-10-024. http://www.ecy.wa.gov/pubs/0710024.pdf

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

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

Appendix A--Public Involvement Information

EFSEC proposes to reissue a permit to Energy Northwest's 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 placed a Public Notice of Application on February 3, 2014 and February 10, 2014 in Tri-City Herald to inform the public about the submitted application and to invite comment on the reissuance of this permit.

EFSEC will place a Public Notice of Draft on February 3, 2014 in Tri-City Herald 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.

STATE OF WASHINGTON

ENERGY FACILITY SITE EVALUATION COUNCIL

PO Box 43172 • Olympia, Washington 98504-3172

PUBLIC NOTICE OF APPLICATION

PUBLIC NOTICE AND PUBLIC

HEARING To receive public comments for the

PROPOSED NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM (NPDES) PERMIT REISSUANCE

For the

ENERGY NORTHWEST COLUMBIA GENERATING STATION

Application for Reissuance

In accordance with the provisions of Chapter 80.50 and 90.48 of the Revised Code of Washington; Chapters 463 and 173 of the Washington Administrative Code; and the Federal Water Pollution Control Act as amended; **NOTICE** is hereby given that the Washington State Energy Facility Site Evaluation Council (EFSEC or Council) has received an application from Energy Northwest, P.O. Box 968, Richland, Washington, 99352-0968, for reissuance of NPDES Permit No. WA-002515-1, for the Columbia Generating Station.

NPDES Permit No. WA-002515-1 is a wastewater discharge permit for Energy Northwest's Columbia Generating Station located on the U.S. Department of Energy's Hanford Site. The Columbia Generating Station is a boiling water nuclear power reactor that has been in commercial operation since 1984. The plant discharges to the Columbia River at Outfall 001. This reissuance also authorizes discharges to ground of process wastewater at Outfall 002 until the completion of Energy Northwest's evaporation pond, which is anticipated to occur by July, 2014. The draft permit also removes Energy Northwest's authorization to discharge process wastewater to ground from Outfall 003.

Tentative Determination to Reissue Permit

A tentative determination has been made to reissue NPDES Permit No. WA-002515-1, for Energy Northwest's Columbia Generating Station (formerly WNP-2) for a period of five years beginning from the date of final adoption, subject to appropriate changes or adjustments as may result from public comments, the public hearing record, or the U.S. Environmental Protection Agency (EPA) review. Pursuant to Council regulation, the tentative determination is based on a draft permit that sets forth the following: 1) proposed effluent limitations; 2) schedules of compliance; and 3) other terms and special conditions. Details about this determination are contained in a fact sheet describing the permit conditions and any changes proposed for this facility.

Public Participation

The purpose of this notice is to inform the public and interested agencies that an application, fact sheet and draft permit are available for review. This notice also serves as an announcement of a public hearing to receive written and oral comments. The public hearing will be held at 1:30 p.m., Thursday, March 6, 2014.

Copies of Application, Fact Sheet and Draft Permit Available

Copies of the application, fact sheet and draft permit are on file in the Council Office, located at the Utilities and Transportation Commission, 1300 S. Evergreen Park Dr. S.W., Olympia, Washington 98504, and are available for inspection and copying by any interested member of the public. Review of the documents can be arranged by calling EFSEC at 360-664-1345. Copies will also be mailed to persons or agencies upon request.

Comments Invited

The Council invites interested persons to submit written comments concerning the tentative determination to reissue the permit. Written comments should be mailed to:

Energy Facility Site Evaluation Council
Attention: Jim La Spina
P.O. Box 43172
Olympia, WA 98504-3172

Comments may also be submitted by email at efsec@utc.wa.gov.

The Council will consider all written comments submitted during the comment period in formulating its final determination. The Council's response to all significant comments will be available upon request. **All comments must be received by EFSEC no later than 5 pm on March 14, 2014.**

Public Hearing

NOTICE IS HEREBY GIVEN that a hearing in this matter will be held at 1:30 p.m., Thursday, March 6, 2014, in Room 206 at the Utilities and Transportation Commission, 1300 S. Evergreen Park Dr. S.W., Olympia, Washington. The hearing will be conducted in accordance with the state's Administrative Procedures Act, Chapter 34.05 Revised Code of Washington.

Council Action

After the public hearing and after the close of the comment period, the Council will consider the information before it and reach a decision on reissuing the permit in such form as it considers appropriate.

Washington State Energy Facility Site Evaluation Council

By_____/s/ _____
Stephen Posner
Interim EFSEC Manager

Dated at Olympia, Washington this 3rd day of February, 2014.

You may obtain further information from EFSEC by telephone, 360-956-2121, or by writing to the address listed below.

Energy Facility Site Evaluation Council
P.O. Box 43172
Olympia, WA 98504-3172

Appendix B--Appeals of the NPDES Permit

This NPDES permit is subject to judicial review pursuant to WAC 463-76-063 and the Administrative Procedure Act, Chapter 34.05 RCW. The Administrative Procedure Act can be found on-line at http://apps.leg.wa.gov/rcw/default.aspx?cite=34.05.

Appendix C--Glossary

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

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

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

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

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

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

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

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

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

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

Background water quality -- The concentrations of chemical, physical, biological or radiological constituents or other characteristics in or of groundwater at a particular point in time upgradient of an activity that has not been affected by that activity, [WAC 173-200-020(3)]. Background water quality for any parameter is statistically defined as the 95% 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.

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

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

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

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

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

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

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

Compliance inspection-with sampling -- A site visit for the purpose of determining the compliance of a facility with the terms and conditions of its permit or with applicable statutes and regulations. In addition it includes as a minimum, sampling and analysis for all parameters with limits in the permit to ascertain compliance with those limits; and, for municipal facilities, sampling of influent to ascertain compliance with the 85 percent removal requirement. 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) as five business days after the date of mailing; or the date of actual receipt, when the actual receipt date can be proven by a preponderance of the evidence. The recipient's sworn affidavit or declaration indicating the date of receipt, which is unchallenged by the agency, constitutes sufficient evidence of actual receipt. The date of actual receipt, however, may not exceed forty-five days from the date of mailing.

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

Point of compliance -- The location in the groundwater where the enforcement limit must not be exceeded and a facility must comply with the Ground Water Quality Standards. 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:

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

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

Quantitation level (QL) -- Also known as Minimum Level of Quantitation (ML) – The lowest level at which the entire analytical system must give a recognizable signal and acceptable calibration point for the analyte. It is equivalent to the concentration of the lowest calibration standard, assuming that the lab has used all method-specified sample weights, volumes, and

cleanup procedures. The QL is calculated by multiplying the MDL by 3.18 and rounding the result to the number nearest to (1,2,or 5) x 10^n, where n is an integer. (64 FR 30417).
ALSO GIVEN AS:
The smallest detectable concentration of analyte greater than the Detection Limit (DL) where the accuracy (precision & bias) achieves the objectives of the intended purpose. (Report of the Federal Advisory Committee on Detection and Quantitation Approaches and Uses in Clean Water Act Programs Submitted to the US Environmental Protection Agency December 2007).

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

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

Significant industrial user (SIU) --

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

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

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

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

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

Soil scientist -- An individual who is registered as a Certified or Registered Professional Soil Scientist or as a Certified Professional Soil Specialist by the American Registry of Certified Professionals in Agronomy, Crops, and Soils or by the National Society of Consulting

Scientists or who has the credentials for membership. Minimum requirements for eligibility are: possession of a baccalaureate, masters, or doctorate degree from a U.S. or Canadian institution with a minimum of 30 semester hours or 45 quarter hours professional core courses in agronomy, crops or soils, and have 5,3,or 1 years, respectively, of professional experience working in the area of agronomy, crops, or soils.

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

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

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

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

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

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

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

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

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

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

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

Appendix D--Technical Calculations

Several of the Excel® spreadsheet tools used to evaluate a discharger's ability to meet Washington State water quality standards can be found on Ecology's webpage at: http://www.ecy.wa.gov/programs/wq/permits/guidance.html.

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

Reasonable Potential Calculation

Facility	Columiba Generating Station
Water Body Type	Freshwater
Rec. Water Hardness	61 mg/L

Dilution Factors:	Acute	Chronic
Aquatic Life	9	93
Human Health Carcinogenic		93
Human Health Non-Carcinogenic		93

Pollutant, CAS No. & NPDES Application Ref. No.			AMMONIA, Criteria as Total NH3	CHLORINE (Total Residual) 7782505	CHROMIUM(HEX) 18540299	COPPER - 744058 6M Hardness dependent	ZINC- 7440666 13M hardness dependent	BROMOFORM 75252 5V	ANTIMONY (INORGANIC) 744036 1M	ARSENIC (dissolved) 7440382 2M	LEAD - 7439921 7M Dependent on hardness	MERCURY 7439976 8M	NICKEL - 7440020 9M - Dependent on hardness	SELENIUM 7782492 10M
Effluent Data	# of Samples (n)		22	1000	38	16	38	3	3	3	3	3	3	3
	Coeff of Variation (Cv)		0.6	0	0.551	0.274	0.381	0.6	0.6	0.6	0.6	0.6	0.6	0.6
	Effluent Concentration, ug/L (Max. or 95th Percentile)		106	100	2.32	19.5	33.94	1.43	3.51	6.8	0.74	0.0058	3.65	1.94
	Calculated 50th percentile Effluent Conc. (when n>10)					13.5								
Receiving Water Data	90th Percentile Conc., ug/L		37	0	1.4	0.9	2.3			0	0.1	0	0	0
	Geo Mean, ug/L					0.3		0	0			0	0	0
Water Quality Criteria	Aquatic Life Criteria, ug/L	Acute	6,766	19	15	10.681	75.286	-	-	360	37.556	2.1	931.69	20
		Chronic	942	11	10	7.4404	68.748	-	-	190	1.4635	0.012	103.47	5
	WQ Criteria for Protection of Human Health, ug/L		-	-	-	1300	-	4.3	14	-	-	0.14	610	170
	Metal Criteria Translator, decimal	Acute	-	-	0.982	0.996	0.996	-	-	1	0.466	0.85	0.998	-
		Chronic	-	-	0.962	0.996	0.996	-	-	1	0.466	-	0.997	-
	Carcinogen?		N	N	N	N	N	Y	N	Y	N	N	N	N

Aquatic Life Reasonable Potential

Effluent percentile value			0.950	0.950	0.950	0.950	0.950		0.950	0.950	0.950	0.950	0.950
s	$s^2=\ln(CV^2+1)$		0.555	0.000	0.515	0.269	0.368		0.555	0.555	0.555	0.555	0.555
Pn	$Pn=(1\text{-confidence level})^{1/n}$		0.873	0.997	0.924	0.829	0.924		0.368	0.368	0.368	0.368	0.368
Multiplier			1.00	1.00	1.00	1.21	1.00		3.00	3.00	3.00	3.00	3.00
Max concentration (ug/L) at edge of...		Acute	45	11.111	1.498	3.401	5.800		2.266	0.204	0.002	1.214	0.647
		Chronic	38	1.075	1.409	1.142	2.639		0.219	0.110	0.000	0.117	0.063
Reasonable Potential? Limit Required?			**NO**	**NO**	**NO**	**NO**	**NO**		**NO**	**NO**	**NO**	**NO**	**NO**
Maximum Daily Limit (MDL), ug/L													

Human Health Reasonable Potential

s	$s^2=\ln(CV^2+1)$			0.2691	0.5545	0.5545		0.5545	0.5545	0.5545
Pn	Pn=(1-confidence level)1/n			0.829	0.368	0.368		0.368	0.368	0.368
Multiplier				0.7742	1.2049	1.2049		1.2049	1.2049	1.2049
Dilution Factor				93	93	93		93	93	93
Max Conc. at edge of Chronic Zone, ug/L				0.4419	1.9E-02	4.5E-02		7E-05	0.0473	0.0251
Reasonable Potential? Limit Required?				**NO**	**NO**	**NO**		**NO**	**NO**	**NO**

Calculation of pH of a Mixture of Two Flows

Supplementary Stream Design Conditions for Steady State Modeling. USEPA Office of Water, Washington D.C.)

INPUT		
	@ Acute Boundary	**@ Chronic Boundary**
1. Dilution Factor at Mixing Zone Boundary	9	93
2. Ambient/Upstream/Background Conditions		
Temperature (deg C):	22.00	22.00
pH:	7.90	7.90
Alkalinity (mg CaCO3/L):	62.00	62.00
3. Effluent Characteristics		
Temperature (deg C):	34.90	34.90
pH:	8.22	8.22
Alkalinity (mg CaCO3/L):	120.00	120.00
OUTPUT		
1. Ionization Constants		
Upstream/Background pKa:	6.37	6.37
Effluent pKa:	6.30	6.30
2. Ionization Fractions		
Upstream/Background Ionization Fraction:	0.97	0.97
Effluent Ionization Fraction:	0.99	0.99
3. Total Inorganic Carbon		
Upstream/Background Total Inorganic Carbon (mg CaCO3/L):	64	64
Effluent Total Inorganic Carbon (mg CaCO3/L):	121	121
4. Condtions at Mixing Zone Boundary		
Temperature (deg C):	23.43	22.14
Alkalinity (mg CaCO3/L):	68.44	62.62
Total Inorganic Carbon (mg CaCO3/L):	70.23	64.44
pKa:	6.36	6.37
RESULTS		
pH at Mixing Zone Boundary:	**7.94**	**7.90**

Freshwater Temperature Reasonable Potential and Limit Calculation

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

	Core Summer Critera
INPUT	**July 1-Sept 14**
1. Chronic Dilution Factor at Mixing Zone Boundary	93.0
2. 7DADMax Ambient Temperature (T) (Upstream Background 90th percentile)	22.0 °C
3. 7DADMax Effluent Temperature (95th percentile)	34.9 °C
4. Aquatic Life Temperature WQ Criterion in Fresh Water	20.0 °C
OUTPUT	
5. Temperature at Chronic Mixing Zone Boundary:	22.1 °C
6. Incremental Temperature Increase or decrease:	0.1 °C
7. Maximum Allowable Incremental Temperature Increase:	0.3 °C
8. Maximum Allowable Temperature at Mixing Zone Boundary:	22.3 °C
A. If ambient temp is warmer than WQ criterion	
9. Does temp fall within this warmer temp range?	YES
10. Temperature Limit if Required:	NO LIMIT
B. If ambient temp is cooler than WQ criterion but within 28/(T_{amb}+7) and within 0.3 °C of the criterion	
11. Does temp fall within this incremental temp. range?	---
12. Temp increase allowed at mixing zone boundary, if required:	---
C. If ambient temp is cooler than (WQ criterion-0.3) but within 28/(T_{amb}+7) of the criterion	
13. Does temp fall within this Incremental temp. range?	---
14. Temp increase allowed at mixing zone boundary, if required:	---
D. If ambient temp is cooler than (WQ criterion - 28/(T_{amb}+7))	
15. Does temp fall within this Incremental temp. range?	---
16. Temp increase allowed at mixing zone boundary, if required:	---
RESULTS	
17. Do any of the above cells show a temp increase?	**NO**
18. Temperature Limit if Required?	**NO LIMIT**

Instantaneous Lethality to Passing Fish Analysis:

EFSEC evaluated the potential for instantaneous lethality to passing fish using the following equation and data from the *Energy Northwest Columbia Generating Station Effluent Mixing Study*, June 2008 which study used the CORMIX Hydrodynamic Mixing Zone Model (CORMIX1 – Version 5.0):

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

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.

EFSEC reviewed the CORMIX1 Prediction File used to determine dilution factors for the proposed permit to determine a value for DF@2seconds. 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 substituted for the DF@2seconds value as follows:

$T_{2sec} = 22 + (37.9 - 22) / (3.7)$.

$T_{2sec} = 10.2$

BPJ Determination of Technology-Based Effluent Limits for Chromium and Zinc:

Aquatic Life and Human Health Limits Calculations

Facility	Columiba Generating Station
Water Body Type	Freshwater
Rec. Water Hardness	61 mg/L

Dilution Factors:	Acute	Chronic
Aquatic Life	1	1
Human Health Carcinogenic		1
Human Health Non-Carcinogenic		1

Pollutant, CAS No. & NPDES Application Ref. No.		CHROMIUM(HEX) 18540299	ZINC- 7440666 13M hardness dependent									
Effluent Data	Coeff of Variation (Cv)	0.551	0.381	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	
Receiving Water Data	90th Percentile Conc., ug/L	1.4	2.3	0	0	0						
	Geo Mean, ug/L		0	0		0						
Water Quality Criteria	Aquatic Life Criteria, ug/L Acute	15	75.286									
	Aquatic Life Criteria, ug/L Chronic	10	68.748									
	WQ Criteria for Protection of Human Health, ug/L	-	-									
	Metal Criteria Translator, decimal Acute	0.982	0.996									
	Metal Criteria Translator, decimal Chronic	0.962	0.996									
	Carcinogen?	N	N									

Aquatic Life Limit Calculation

# of Compliance Samples Expected per month		4	4									
LTA Coeff. Var. (CV), decimal		0.551	0.381									
Permit Limit Coeff. Var. (CV), decimal		0.6	0.6									
Waste Load Allocations, ug/L	Acute	15	75.286									
	Chronic	10	68.748									
Long Term Averages, ug/L	Acute	5.1703	34.217									
	Chronic	5.5292	45.11									
Limiting LTA, ug/L		5.1703	34.217									
Metal Translator or 1?		0.98	1.00									
Average Monthly Limit (AML), ug/L		**8.2**	**53.3**									
Maximum Daily Limit (MDL), ug/L		**16.4**	**107.0**									

Human Health Limit Calculation

# of Compliance Samples Expected per month												
Dilution Factor												1
Average Monthly Effluent Limit, ug/L												
Maximum Daily Effluent Limit, ug/L												

Comments/Notes:

References: WAC 173-201A,

Technical Support Document for Water Quality-based Toxics Control, US EPA, March 1991, EPA/505/2-90-001, pages 56/99

Appendix E--Response to Comments

The public comment period for this permit extended from February 3, 2014 through 5pm on April 18, 2014. Following is a response to comments received. EFSEC consolidated and summarized comments where appropriate. Comments are organized by major topic. The following table associates the commenter(s) with the topic(s) and comment(s) provided:

Commenter	Topic	Comment
Energy Northwest (ENW)	2,3,5,6	2.1, 3.1, 5.1, 6.1, 17.5
Northwest Environmental Advocates (NWEA), Northwest Environmental Defense Center (NEDC), Columbia Riverkeeper	1,5,8,9,10, 11,12,13,14,15, 16,17	1.1, 5.2, 8.1, 9.1, 10.1-10.7, 11.1-11.15, 12.1, 12.2, 13.1, 14.1, 14.2, 15.1-15.3, 16.1,17.6
United States Department of Commerce, National Oceanic and Atmospheric Administration, National Marine Fisheries Service (NMFS)	17	17.2
United States Environmental Protection Agency (EPA)	17	17.1
United States Nuclear Regulatory Commission (NRC)	17	17.3
University Legal Assistance	1	1.1
Washington State Department of Fish and Wildlife (WDFW)	17	17.4
Washington State Department of Natural Resources (DNR)	4	4.1

A complete listing of individual commenters and comments is available at EFSEC's website here: http://www.efsec.wa.gov/Columbia%20Generating%20Station/NPDES%202014.shtml.

1 – Requests for extension of public comment period

Comment 1.1 – Two commenters requested extension of the original comment period.

Response 1.1 – EFSEC extended the comment period from March 14th to April 18, 2014.

Comment 1.2 – U.S. Environmental Protection Agency (EPA) requested 90 days to comment on the permit, as allowed under federal rule and the Memorandum of Agreement (MOA) between EFSEC and EPA.

Response 1.2 – EFSEC accepted comments from EPA on May 5, 2014.

2 – Editorial comments

Comment 2.1 – Factsheet pg.40 – the reference to the footnote to Table 11 should be "Table 10"

Response 2.1 – Correction made

3 – Whole effluent toxicity (WET) monitoring

Comment 3.1 – ENW completed WET effluent characterization monitoring in November 2013. EFSEC coordinated with the Washington State Department of Ecology (Ecology) WET Coordinator to evaluate these results. EFSEC received the evaluation report for the November tests during the public comment period (February 24, 2014). Results indicate the need for an acute WET limit in the permit.

Response 3.1 – EFSEC added an acute WET limit in S1.A of the permit and associated requirements to S12 of the permit. The permit now requires quarterly monitoring for the duration of the permit term. EFSEC will reevaluate the need for WET requirements with the next permit issuance.

4 – Sediment sampling

Comment 4.1 – DNR would like to see sediment sampling as a requirement within the NPDES permit. DNR is particularly concerned about the sediment around the point of discharge. DNR suggests required sediment sampling that includes sampling for the suite of conventional contaminants, as well as metals and organic compounds per WAC 173-204-563. In addition, radiological contaminants of concern, strontium-90, gamma emitting radionuclides (potassium-40, cobalt-60, cesium-137), europium, uranium and plutonium should all be sampled for per subsection (4) of WAC 173-204-563. If sediment sampling becomes a requirement of the NPDES permit, DNR encourages Energy Northwest to submit a sampling and analysis plan for review by DNR's Sediment Quality Unit.

Response 4.1 – EFSEC determined that the discharge has no reasonable potential to violate the sediment management standards (fact sheet III.G). Main factors informing this decision are the low concentrations of total suspended solids in the discharge, corresponding with a lack of sediment deposition in the vicinity of the discharge. The dominant source of sediment is windblown dust captured in the circulating cooling water system. Much of the sediment in the system settles on the floors of the cooling towers and is removed and disposed of per Resolution 299 (fact sheet, pg. 14) prior to discharge. S11 of the permit requires an outfall evaluation during the permit term. EFSEC will make this report available to DNR and use the information to reevaluate the need for sediment sampling at the next reissuance.

5 – Temperature

Comment 5.1 – Permit pg.8, Section S2.A, footnote 5 – ENW recommends that footnote 5 be revised to allow the use of the existing Circulating Water pumphouse (CWP) temperature instrument as an alternative sampling location during maintenance or outages of the new temperature instrument required to be installed at the River pumphouse.

Response 5.1 – EFSEC revised S2.A, footnote 5 to allow use of the existing temperature instrument at the CWP during maintenance or outages of the temperature instrument at the River pumphouse. After the River pumphouse instrument is operational, ENW must notify EFSEC on the monthly report when monitoring results include measurements from the CWP instrument.

Comment 5.2 – The draft permit impermissibly removes narrative temperature limits. Removing the narrative temperature limit violates the anti-backsliding provisions because it provides for a less stringent requirement and does not meet the limited exceptions under section 402(o)(2). The lack of any temperature effluent limit is less stringent than the previous narrative temperature limit. As justification for removing the technology-based effluent limit, EFSEC states that it "does not believe removal of this limit results in less stringent requirements." Fact Sheet at 40. Belief, however, is insufficient. EFSEC has a duty to demonstrate how the deletion of any effluent limit related to temperature is not less stringent than the narrative limit in the previous permit. Due to EFSEC's improper analysis of the water quality standards applicable to CGS's discharges and that the entire Columbia River is considered impaired for temperature, it is likely that the relaxation by removing the narrative technology-based water quality standard will result in CGS's discharges causing or contributing to a violation water quality standards for temperature.

Response 5.2 – The narrative temperature limit EFSEC removed is:

- The temperature of the circulating cooling water blowdown shall not exceed, at any time, the lowest temperature of the circulating cooling water, prior to the addition of makeup water, except that the temperature of the blowdown may be less than the temperature of the river.

As discussed in the fact sheet, the physical location of the discharge of circulating cooling water to the blowdown line and Outfall 001 is at the point of lowest temperature of the circulating cooling water system. That is, the point is located downstream of the cooling towers with no additional sources of heat located between the cooling towers and the discharge location. EFSEC notes that this provision was removed from the federal effluent guidelines during the 1982 rule revision. The preamble to this rule revision discusses the addition of upset and bypass provisions to the NPDES regulations in 1979 (44 FR 32854 32862-3). The proposed permit, and past permits, prohibit bypass of any portion of a treatment facility, which was clearly the intent of the narrative temperature limit. The removal of this narrative limit in no way relaxes or makes less stringent technology-based limitations on the discharge of heat from the facility. EFSEC's evaluation of water-quality based effluent limitations for temperature is detailed in the fact sheet, Section III.E, beginning on page 35.

6 – Evaporative ponds

Comment 6.1 – Permit pg.8, Section S2.A (4) – ENW observes the new evaporation pond flow monitoring requirement was written into the draft permit before the pond was fully designed or constructed. ENW recommends that footnote 1 be revised to authorize daily measurements or calculated estimates of flow when continuous monitoring is not possible.

Response 6.1 – EFSEC revised S2.A (4) to require monitoring of the totalized flow (volume) for all pond influent flows. The permit now requires the sum of all influent flow volumes for each month be reported on the monthly discharge monitoring report (DMR). EFSEC concurs that the evaporative pond cited in the permit was undergoing final design and construction after the draft permit language was written. The final design includes a series of cells within the overall "pond" and accepts discharges from a number of sources (as described in the fact sheet). EFSEC acknowledges that continuous monitoring will not be feasible for every discharge. Continuous monitoring is also not required to meet the monitoring objective, which is to confirm the pond is functioning according to the approved design and operations and maintenance manual.

7 – Spill control plan

Comment 7.1 – Permit pg.21, Section S9.B.1 – ENW recommends this condition be limited to "bulk" rather than "all" products and materials.

Response 7.1 – EFSEC adds the term "bulk" to S9.B.1 of the permit to clarify the intent of the requirement. The fact sheet at V.C *Spill Plan* also speaks to the intent of this requirement.

8 – Copper

Comment 8.1 – The draft permit impermissibly removes copper limits. The 2006 permit included numeric effluent limits for copper. *See* Fact Sheet at 40. In the proposed permit, EFSEC states that it "updated" effluent limits for copper based on the effluent mixing study. Fact Sheet at 1. This relaxation of the effluent limitation for copper violates the CWA's anti-backsliding provisions for two reasons. First, it is not merely a relaxation. Rather, the proposed permit removes any effluent limit on copper. Fact Sheet at 40. The lack of *any* effluent limitation is a far cry from a "less stringent effluent limitation" allowed by the anti-backsliding exceptions. Second, the exception to anti-backsliding cited by EFSEC is inappropriate where the implementation of the less stringent effluent limitation would result in a violation of water quality standards. EFSEC claims a relaxation of the copper effluent limitation is allowed under the exception at 40 C.F.R. § 122.44(l)(2)(i)(A). This regulation is based on the statutory language that creates an exception where "material and substantial alterations or additions to the permitted facility occurred after permit issuance which justify the application of a less stringent effluent limitation." 33 U.S.C. § 1342(o)(2)(A). Regardless of the condenser replacement at the facility, these exceptions do not apply. Both the regulatory and statutory exceptions are subject to the baseline limitation prohibiting a permit with a less stringent effluent limitation if its implementation would result in a violation of a water quality standard. 33 U.S.C. § 1342(o)(3). EFSEC's analysis of the water quality standards applicable to CGS's discharges is incorrect. Under a proper analysis of the applicable water quality standards, it is likely that copper contained in CGS's discharges following the condenser replacement may exceed the water quality criteria.

Response 8.1 – Energy Northwest's replacement of the main condenser was a "material and substantial alteration" to the facility. Monitoring results clearly indicate a significant decrease in copper concentrations in the effluent following condenser replacement. The proposed permit requires continued monitoring for copper. EFSEC does not agree that removal of the copper limit will result in violation of a water quality standard. EFSEC was conservative in its reasonable potential analysis, including pre and post condenser replacement values, and still found no reasonable potential for the discharge to cause or contribute to a violation of water quality

standards. Further information on EFSEC's analysis of the water quality standards is provided in responses at *11 – Water quality standards* below.

9 – Chromium and Zinc

Comment 9.1 – The draft permit impermissibly establishes less stringent effluent limits for chromium and zinc. EFSEC first asserts that it is adding technology-based limits by establishing numeric limits for chromium and zinc in the proposed permit. Fact Sheet at 1. The previous permit in 2006 limited the discharge of chromium and zinc to "no detectable amount." 2006 Permit, page 8. It did not, as EFSEC claims, fail to include limits. By imposing numeric chromium and zinc limits, EFSEC is authorizing ENW to increase the allowable pollutant concentration and load discharged. EFSEC then seems to recognize this, because in the fact sheet it goes on to justify the change under an exception to the anti-backsliding prohibition. Fact Sheet at 42. It cites to a supposed exception where the change would constitute a cause for permit modification or revocation and reissuance under 40 C.F.R. § 122.62. Yet that is not an exception to the anti- backsliding prohibition. The exceptions are listed at 40 C.F.R. § 122.44(l)(2). What EFSEC may be attempting to claim is exception where "technical mistakes or mistaken interpretations of law were made in issuing the permit under subsection (a)(1)(B) of this section." 33 U.S.C. § 1342(o)(2)(B)(ii); 40 C.F.R. § 122.44(l)(2)(i)(B)(2). But that provision only applies if the mistakes were related to a BPJ determination of BAT. Here, EFSEC's 2006 permit provision referenced EPA's applicable limits for chromium and zinc. 40 C.F.R. Part 423 (listing maximum daily and maximum average concentrations for chromium and zinc applicable to nuclear fuel generating units). Thus even that exception would not apply. By imposing less stringent effluent limits for chromium and zinc, EFSEC's proposed permit violates the prohibition against anti-backsliding.

Response 9.1 – EFSEC agrees that 40 CFR 122.(l)(2(i)(b)(2) applies when technical mistakes are related to BPJ determinations of BAT. Application of the BAT standards (200 µg/L chromium, 1,000 µg/L zinc) would result in violation of applicable water quality standards. As described in the fact sheet, EFSEC based the proposed permit limits on BPJ.

The 2006 permit included the following sentence in S1.Discharge Limitations:

- There shall be no detectable amount of priority pollutants (listed in 40 CFR Part 423, Appendix A) in the effluent from chemicals added for cooling system maintenance.

The 2006 fact sheet discusses chromium and zinc beginning on page 15. Referencing *Table 5: Categorical Limits and Maximum Measured Concentrations*, which includes the daily maximum and monthly average categorical limits for chromium and zinc, the fact sheet includes this statement:

- Therefore, the proposed permit incorporates the above effluent guideline limits as effluent limits in Special Condition S1.A of the permit.

The technical mistake and mistaken interpretation of law corrected in the proposed permit is the failure to include the *(except chromium and zinc)* statement from the effluent guidelines in the permit sentence above, and the failure to include appropriate limits for chromium and zinc, in the 2006 permit. Finally, EFSEC notes that the discharge limitation included in the 2006 permit ends with "…in the effluent from chemicals added for cooling system maintenance." ENW does not add chromium or zinc for cooling system maintenance. EPA banned the use of chromium as a

biocide in the early 1990's. The Permittee has monitored and reported detectable amounts of zinc and sometimes chromium throughout the permit term. EFSEC has not taken, and has no plans to take, enforcement actions based on this data. The permit has been implemented consistently as if it did not include limits for chromium and zinc. The mistakes were discovered during permit reissuance and the proposed permit corrects these mistakes.

10 – Monitoring and Reporting

Comment 10.1 – EFSEC's proposed permit merely parrots the federal regulation requiring monitoring that is representative of the monitored activity. It does not specify where the monitoring must occur, or what equipment or method is required.

Response 10.1 – Monitoring locations are specified in S2.A of the permit. Details on location and equipment are provided in operations and maintenance manuals required in S4 of the permit. Additional requirements for monitoring devices are specified in S2.C of the permit. Required test methods are specified in S2.B and Appendix A of the permit.

Comment 10.2 – The permit must require continuous monitoring from outfall 001, especially for priority pollutants.

Response 10.2 – The draft and final permits require continuous monitoring for flow, pH, and temperature. Sufficient methods do not exist for continous monitoring of many priority pollutants. The permit, in S2.A, specifies the minimum sampling frequency and sample type for each parameter where monitoring is required. Specified monitoring frequencies take into account the quantity and variability of the discharge, the treatment method, past compliance, significance of pollutants, and cost of monitoring.

Comment 10.3 – The permit should also require monitoring for organic contaminants in the discharge with a semipermeable membrane device (SPMD). SPMDs are commonly used to monitor for polycyclic aromatic hydrocarbons (PAHs), polychlorinated biphenyls (PCBs), chlorinated pesticides, polybrominated diphenyl ethers (PBDEs), dioxins, and furans.

Response 10.3 – See *Response 10.6* below

Comment 10.4 – The monitoring requirements for any water quality-based permit limits must be established using sufficiently sensitive methods to demonstrate compliance with those effluent limitations.

Response 10.4 – Recommended analytical protocol and required detection and quantitation levels are provided in Appendix A of the permit. From Appendix A, "EFSEC added this appendix to the permit in order to reduce the number of analytical "non-detects" in permit-required monitoring and to measure effluent concentrations near or below criteria values where possible at a reasonable cost."

Comment 10.5 – The proposed permit appears to have used the appropriate methodology, specifying Method 1631E (for Mercury), which is the most sensitive method currently available. Proposed Permit at 37.

Response 10.5 – Yes, Appendix A specifies detection and quantitation levels consistent with those achievable using Method 1631E.

Comment 10.6 – The fact sheet states that there is a technology-based limit for PCBs of "no discharge." The proposed permit specifies the use of Method 608 for PCBs. *See* Proposed

Permit at 41. Use of Method 608 is not sufficient to ensure that the discharge will meet the permit limits of "no discharge" of PCBs because this method is not the most sensitive methods available for detection of PCBs.

Response 10.6 – EFSEC must consider applicable federal rules when specifying permit requirements, including test procedures. 40 CFR 122.41(j) (4) requires, "Monitoring must be conducted according to test procedures approved under 40 CFR Part 136 unless another method is required under 40 CFR subchapters N or O." Method 608 is the most sensitive method approved under 40 CFR Part 136 for PCBs. The permit requires use of this method.

Comment 10.7 – The permit must include a wide variety of monitoring throughout the region of the receiving water that corresponds with the water quality standard criteria and use designations to demonstrate that the discharge does not cause or contribute to a violation of water quality standards. To adequately protect Washington's and Oregon's water quality and the wildlife that depends on it, EFSEC's proposed permit for the CGS should include simple monitoring and reporting requirements.

Response 10.7 – EFSEC requires monitoring, recording, and reporting (WAC 173-220-210 and 40 CFR 122.41) to verify that the treatment process is functioning correctly and that the discharge complies with the permit's effluent limits. EFSEC typically does not include ambient monitoring. As demonstrated by supplemental information provided by the reviewer, a significant amount of ambient monitoring date is available. EFSEC does require ambient monitoring when the data is required to inform permit limit calculations. ENW completed an effluent mixing study in 2008 that included ambient monitoring data used in calculating permit limits. The discharge monitoring schedule is detailed in S2.A of the permit. Reporting and recording requirements are specified in S3 of the permit.

11 – Water quality standards

Comment 11.1 – EFSEC misconstrues the requirements of the CWA and implementing regulations that all NPDES permitted sources must not cause or contribute to water quality standards violations, in part because it apparently does not understand the legal definition of a water quality standard. In short, a permitting agency cannot ignore the narrative criteria and use only numeric criteria where numeric criteria do not exist or where the numeric criteria fall short of providing full support for designated uses. In contrast to the legal definition of a water quality standard and the EPA permitting regulations, and while it discusses the applicable narrative criteria, EFSEC states that it "uses numerical criteria . . . to derive the effluent limits in the discharge permit" (Fact Sheet), page 25. This limitation is plainly inconsistent with legal requirements. EFSEC must also ensure compliance with Washington and Oregon narrative criteria.

Response 11.1 – EFSEC did consider the narrative criteria described in Chapter 173-201A-260 WAC when it determined permit limits and conditions. EFSEC considered the narrative criteria when it evaluated the characteristics of the wastewater and implementation of all known, available, and reasonable methods of treatment and prevention (AKART) as described in the technology-based limits section of the fact sheet. When EFSEC determined that the facility is meeting AKART it considered the pollutants in the wastewater and the adequacy of treatment to prevent the violation of narrative criteria. In addition, EFSEC considered the toxicity of the wastewater discharge by requiring whole effluent toxicity (WET) testing. EFSEC's analysis of

the need for WET testing for discharges to Outfall 001 is described in the fact sheet. See *Response 11.1 – 11.15* for discussion of Oregon water quality standards.

Comment 11.2 – Little, if any, water quality monitoring appears to have taken place in the receiving water. Instead, EFSEC relies on a mixing zone study from June 2008 which evaluated 18 parameters in the immediate area of the discharge. Fact Sheet at 15-16. One problem with relying solely on ambient water quality monitoring, however, is that many toxic contaminants are not measurable at levels known to constitute a violation of water quality standards (e.g., numeric criteria) and because many toxic contaminants build up in depositional areas of sediment and/or tissue of aquatic or aquatic-dependent species downstream. EFSEC cannot rely solely on the states' current 303(d) lists. Both Washington's and Oregon's EPA-approved lists are mere starting points for assessing whether the CGS discharge is contributing to violations of water quality standards. EFSEC, however, must do much more to evaluate the status of the receiving water for the CGS discharge.

Response 11.2 – The mixing zone study referenced was specifically designed and implemented to collect ambient background water quality data for parameters relevant to the discharge, upstream and in the vicinity of the discharge. EFSEC considers this the best available data for use in the reasonable potential evaluation. The study identified measureable levels of ammonia, chromium, copper, zinc, and lead which EFSEC used in the reasonable potential analysis (see fact sheet Appendix D). See *Response 11.1 – 11.15* for further discussion of water quality standards.

Comment 11.3 – EFSEC has failed to identify and take into consideration relevant Washington and Oregon impairments. Washington has identified the following areas of the Columbia River as impaired by the stated pollutants or parameters:

- (Lake Wallula) for temperature, TDG
- (Lake Umatilla) for temperature, TDG, DDE, Chlordane, PCBs, dioxin
- (Lake Celilo) for temperature, TDG, dioxin
- Columbia River for DO, pH, temperature, dioxin, aldrin, chlordane, TDG, dieldrin, PCBs, DDE and bioassay in sediment

Oregon has identified the following segments of the Columbia River as impaired by the stated pollutants or parameters:

- 0-35.2 for arsenic, DDE, dioxin, PCBs, TDG
- 35.2 - 98 for arsenic, DDE, dioxin, PCBs, TDG
- 98 - 142 for arsenic, DDE, dioxin, PCBs, pH (fall/winter/spring), PAHs,
- 142 - 188.6 for dioxin, PCBs, pH, TDG,
- 188.6 - 213.7 for dioxin, TDG
- 213.7 - 287.1 for dioxin, TDG
- 287.1 - 303.9 for dioxin,
- 121.8-319.3 for pH (fall/winter/spring)
- 0 - 306.1 for temperature

Response 11.3 – EFSEC considered the listings identified by the reviewer and concluded that only temperature is relevant to the discharge, which is discussed in the fact sheet. EFSEC followed the procedures in Ecology's *Procedures to Implement the State's Temperature*

Standards through NPDES Permits (October 2010) in evaluating temperature at the facility. The remaining listings are either for parameters not found in the discharge or where the discharge does not have a reasonable potential to contribute to the impairment. For example, total dissolved gas (TDG) impairments are related to spill water from dams (for more on this parameter see: http://www.ecy.wa.gov/programs/wq/tmdl/ColumbiaRvr/ColumbiaTDG.html) See *Response 11.1 – 11.15* for further discussion of water quality standards.

Comment 11.4 – The Fact Sheet does not discuss how Tier I has been protected by the proposed permit terms (Fact Sheet at 26). Specifically, nothing in the Fact Sheet identifies what existing uses might require protection but that are not designated uses. Without an analysis of whether there are any existing uses that have not been designated and therefore not taken into account when numeric criteria were developed, the analysis cannot but fail to evaluate whether the discharge is or is not consistent with Tier I requirements.

Response 11.4 – EFSEC did not find existing uses in its analysis, or in the materials provided by the reviewer, to indicate an existing use not already protected within a more sensitive designated use for this segment of the Columbia River (at Chapter 173-201A-602 (2) WAC). The fact sheet at *III. Proposed Permit Limits, B. Surface water quality-based effluent limits, Facility Specific Requirements,* describes the Tier I analysis.

Comment 11.5 – Many of the numeric criteria established in Northwest states' water quality standards are intended to provide protection for salmonids. However, salmonids are not the most sensitive species in all instances. Therefore, EFSEC must evaluate whether there are designated and/or existing uses downstream of the CGS discharge that are already affected by pollutants including the CGS discharge. There are designated and existing uses that EFSEC has failed to evaluate.

See *Response 11.4 above.*

Comment 11.6 – Although not included in Washington Ecology's 303(d) list or the EFSEC evaluation, data and information exist to demonstrate that chemicals from the Hanford Site are having measurable effects on aquatic species in the CGS receiving water. For example, DOE (2011b) discusses results of sampling in 2006 and 2007 for mussels, sculpin, juvenile suckers, and for Asian clams in situ. Nothing in the EFSEC fact sheet for the proposed CGS permit indicates that these species have been evaluated for existing water quality impacts on them.

See *Response 11.1 – 11.15.*

Comment 11.7 – Federal regulations require that NPDES permits include conditions necessary to ensure compliance with the water quality requirements of all affected states. 40 C.F.R. § 122.44(d)(4). Despite the fact that the discharge from the CGS facility enters the Columbia River at river mile 351.75, which then becomes a bi-state water body at river mile 309, where Oregon water quality standards apply, EFSEC did not evaluate the discharge for compliance with Oregon's water quality standards. Therefore, EFSEC must still determine if the discharge has the reasonable potential to cause or contribute to excursions above Oregon's water quality standards, in addition to Washington's water quality standards. Not only is assuring compliance with Oregon's water quality standards required by law, it is appropriate policy under the circumstances of Washington's wholly outdated standards. Not all of Oregon's aquatic life criteria may be used without further analysis, however. On August 14, 2012, the National Marine Fisheries Service (NMFS) issued a biological opinion (BiOp) on Oregon's updated aquatic life

criteria. The BiOp concluded that the criteria for cadmium, copper, ammonia, and aluminum posed a jeopardy to species listed under the Endangered Species Act (ESA). Consequently, the use of those numeric criteria must be supplemented by use of the applicable narrative criteria to ensure against jeopardy and to ensure that the designated uses are fully supported consistent with the CWA.

See *Response 11.1 – 11.15.*

Comment 11.8 – Washington and Oregon have issued a fish consumption advisory due to elevated levels of mercury and PCBs found in fish tissue from Bonneville Dam, at river mile 145, for 150 miles upstream to McNary Dam, at river mile 292. Neither state has incorporated this fish consumption advisory in its current 303(d) lists. Contributions of mercury and PCBs upstream of river mile 292, from the CGS discharge, would constitute a contribution to the violations of water quality standards represented by these fish consumption advisories regardless of their not having been used by the states to update their 303(d) lists.

See *Response 11.1 – 11.15.*

Comment 11.9 – The fact sheet establishes that mercury is present in the discharge. Fact Sheet at 35. It concludes that there is no reasonable potential for mercury to exceed water quality criteria. *Id; see also id.*at 66. The problem is that this conclusion is based on Washington criteria alone, not the applicable and much more stringent Oregon human health criteria for mercury, and it is based, presumably, upon the belief that mercury is not already impairing the receiving water. As a contribution of mercury from the CGS represents the addition of a bioaccumulative pollutant, the permit must include an effluent limit that takes into consideration this fact and existing controls on point and nonpoint sources of mercury, if any exist.

Response 11.9 – EFSEC does not agree that Oregon mercury criteria are applicable to this discharge, which is at a significant distance upstream from the shared border. In addition, it is not clear which criteria the reviewer is referring to. EFSEC assumes the reviewer is referring to Oregon's criterion for methylmercury (MeHg) since Oregon's aquatic life criteria for mercury are not more stringent than current Washington state criteria. Although the Oregon criteria are not applicable, EFSEC evaluated the discharge for MeHg following Oregon Internal Management Directive; *Implementation of Methylmercury Criterion in NPDES Permits*, January, 2013. Page 2, *Determining Reasonable Potential* – discusses the process for evaluating the MeHg criterion for facilities where the intake water is taken directly from the same body of water as the facility discharges (as at CGS). From this document:

> For facilities where the only source of mercury in the discharge is from the intake water taken directly from the "same body of water" to which the facility discharges, and that there are no known sources or additional contributions of mercury at the facility, the permit writer may reasonably conclude that the discharge <u>does not</u> have reasonable potential to exceed the criterion. An example of this is a facility that uses a surface water as a source of cooling water and that discharges immediately downstream of the intake location. In these situations where there are no known sources or additional contributions of mercury at the facility, the permitting authority could reasonably conclude that there is no reasonable potential to cause or contribute to an exceedance. Furthermore, any slight increase in concentration after discharge (due to evaporation or other water loss) should not increase the bioaccumulation of MeHg in fish tissue unless the fish are known to regularly reside within the mixing zone of the outfall.

Following this procedure, EFSEC would conclude that there is no reasonable potential for the discharge to cause or contribute to an exceedance of the criterion. Again, this analysis was only conducted to provide a fuller response to the comment since the criteria are not applicable to this discharge. See *Response 11.1 – 11.15* for further discussion of water quality standards.

Comment 11.10 – Because some of the toxic contaminants found in downstream sediments and tissue are bioaccumulative, the discharge of these pollutants from the CGS upstream is contributing to violations of narrative water quality standards downstream regardless of Oregon's 303(d) listing policies, which do not amend or otherwise change their water quality standards. EFSEC is obligated to consider the prohibitions on combinations of pollutants set out in the states' narrative criteria in establishing the effluent limits for the CGS.

See *Response 11.1 – 11.15.*

Comment 11.11 – In evaluating the discharge and the proposed permit, EFSEC makes no mention of the releases of radioactive and chemical materials from various aspects of the Hanford Site. When a permitting agency seeks to determine if a "discharge causes, has the reasonable potential to cause, or contributes to an in-stream excursion above a narrative or numeric criteria within a State water quality standard," the permitting agency is required to, *inter alia*, "use procedures which account for existing controls on point and nonpoint sources of pollution[.]" 40 C.F.R. §122.44(d)(1)(ii). Not only has EFSEC not evaluated these releases but it has not accounted for existing controls, if any, on these point and nonpoint sources of toxic pollutants. *See* Washington Closure Hanford, Mission Completion Project Library. Not only does EFSEC need to use these data to assess the quality of the receiving water for pollutants which are present in the CGS discharge and to evaluate the cumulative impact of the pollutants to assure compliance with narrative criteria but it must assess the controls on these pollution sources, along with the irrigation return flows discharging to this portion of the river, in order to develop appropriate water quality-based effluent limits for the discharge.

See *Response 11.1 – 11.15.*

Comment 11.12 – For example, results from later work demonstrates that chromium and chromium VI are "prevalent throughout Reach" and "some metals [are] elevated in 300 Area Sub-area island soils and sediments." USDOE, Data from the Remedial Investigation of Hanford Site Releases to the Columbia River (Oct. 2010) at 8 (Preliminary Findings - new information) (attached as Exhibit 13). The 300 Area Sub-area includes the rivermile of the CGS discharge. *See id.* at 11 (Columbia River Remedial Investigation Area) (300 Area Sub-Area is approximately river miles 340 to 360). The elevated metals include lead and cadmium. While cadmium is not listed as being in the CGS discharge, lead is. These data must be taken into account in establishing the water quality-based effluent limits for the CGS discharge. In addition, cadmium at levels currently allowed by Oregon water quality standards for protection of aquatic life have been determined to cause jeopardy to salmonids. Therefore, in evaluating the combined effect of multiple pollutants to ensure compliance with the narrative criteria and designated use support, the effect of this pollutant cannot be assumed to be that which the states have already used and incorporated into their numeric criteria. The maximum chromium VI detected was in shallow sediments at river mile 357, a few miles downstream of the CGS discharge. *Id.* at 39 (Hexavalent Chromium in Shallow Sediment). The data collected by the US DOE for their human and ecological risk assessments include non-Hanford pollutants, particularly metals, making this a rich source of data. For example, Johnson Island – at rivermile 345-346 – is

described as a "hot area," *id.* at 214 (Exposure Assessment), for both radionuclides and metals, *id.* at 227. Again, EFSEC is obligated to use these data in evaluating the need for WQBELs for the CGS discharge and in establishing such limits.

Response 11.12 – EFSEC notes that ambient background water quality data for chromium and lead were used in evaluating the discharge (see fact sheet Appendix D). Cadmium was not found in the discharge. Page 42 of the fact sheet describes the effluent limits proposed for chromium, which are based on best professional judgment. One reason for this decision is because many of the effluent samples contained no detectable chromium. EFSEC used the procedures given by EPA (see fact sheet Appendix D) to calculate effluent limits for chromium where water quality standards are met at end-of-pipe. That is, the limits include no allowance for mixing. In addition, the permit limits total chromium as a conservative substitute for hexavalent chromium water quality criteria. See *Response 9.1* for more information on chromium. The reasonable potential analysis for lead is also described in the fact sheet at Appendix D. Finally, the data provided is sediment quality data. The concentration of total suspended sediments in the effluent is very low and no sediment deposition has been observed in the vicinity of the outfall. See *Response 4.1* for more information on the evaluation of potential sediment impacts. See *Response 11.1 – 11.15* for further discussion of water quality standards.

Comment 11.13 – In addition to EFSEC's failure to review data on contamination of water, sediment, and tissue to which the CGS may contribute under the terms of its existing permit and the proposed permit, EFSEC also failed to evaluate possible contributions to existing impairments of designated and existing uses. There are a range of aquatic and aquatic-dependent species, including freshwater mussels, in the immediate and near- field area of the discharge which must be considered as Washington's standards require full support of existing and designated uses. In addition, there are pollution impacts to species further downstream which come from pollution sources throughout the Columbia River basin providing another context in which the CGS discharge must be evaluated. Specifically, these include reproductive failure and reproductive abnormalities in bald eagles, mink, and otter from such pollutants as mercury, DDT and its metabolites.

See *Response 11.1 – 11.15.*

Comment 11.14 – EFSEC has failed to "account for existing controls on point and nonpoint sources of pollution," as required by 40 C.F.R. § 122.44(d)(1)(ii) because it has not identified all the pollutants being discharged or released by other sources to the receiving water nor has it evaluated the existing controls on those sources. Moreover, both the Washington and the Oregon narrative criteria for toxics require protection of designated uses from the combined effects of multiple pollutants. In both instances, there need not be proof that the combinations of pollutants are harmful but, rather, the criterion requires that an evaluation be made of the "potential" that multiple chemicals "may" harm uses and that appropriate prohibitions be based on that evaluation. Here, EFSEC has ignored altogether the potential for multiple pollutants from the CGS in conjunction with other point and nonpoint sources to result in harm to designated uses.

Response 11.4 – The proposed permit required whole effluent toxicity (WET) testing for the discharge specifically to address the combinations of pollutants that may harm uses. EFSEC has added additional acute WET testing since the draft (see *Response 3.1* above) based on test results received during the comment period. These additional requirements include an acute WET limit

and the required response for any exceedance of that limit. See *Response 11.1 – 11.15* for further discussion of water quality standards.

Comment 11.15 – In order to evaluate the impact on mass loading that accumulates in tissue and sediment, EFSEC must consider the quality of downstream tissue and sediment and on designated uses, not limited to salmonids. Contamination in sediment does not disperse evenly but, rather, accumulated in depositional areas, downstream of CGS, for example.

See *Response 11.1 – 11.15.*

Response 11.1-15

The reviewer raises several concerns specific to Washington's water quality standards. EFSEC sought and received input from Ecology water quality standards staff during preparation of this document. EFSEC responded above where comments are specific to a parameter or other facility and/or discharge specific detail. The remaining concerns are addressed here.

Ecology is currently working towards adoption of new human health criteria in the water quality standards. Ecology's five year plan, available from: http://www.ecy.wa.gov/programs/wq/swqs/triennial_review.html, indicates that the state's criteria for the protection of aquatic life will also be updated, the process beginning in 2015. Until such standards are effective, EFSEC is obligated to implement the current Washington water quality standards.

While not applicable for the parameters in question, EFSEC also considered Oregon water quality standards in responding to comments. The discharge is located over 42 miles upstream of the Oregon border. Even without an allowance for mixing, sampling indicates the applicable parameters identified in the discharge are below Oregon criteria. Both Washington and Oregon standards authorize the use of mixing zones. Using methods given in EPA, 1991 with any significant amount of mixing (see *15 – Mixing Zones* below) considered, there is no reasonable potential for the discharge to cause or contribute to a violation of Oregon water quality standards. Methylmercury was addressed independently, in *Response 11.9* above.

While EFSEC appreciates the over four thousand pages (exhibits 1-36) of supplemental data provided by the reviewer, much of its content would be more appropriately used in developing a water cleanup plan, or informing standards development, than in evaluating the CGS discharge. The reviewer notes that the narrative criteria in the standards must be considered in evaluating the discharge. EFSEC has described in the fact sheet, and in greater detail above for specific parameters, how it considered the narrative criteria. The permit application did not identify chemicals without numeric criteria as being present in the effluent. Nor is there any indication that such chemicals are added by processes at the facility.

The procedures followed are consistent with well established procedures described in Ecology's *Permit Writer's Manual* (December 2011) and other Ecology guidance documents. It would be inappropriate for EFSEC to interpret the narrative criteria in ways suggested by the reviewer without a proper scientific and policy basis. The suggested process is infeasible on an individual permit basis. It is more appropriate in developing a total maximum daily load (TMDL) and/or informing an update to the water quality standards. EFSEC has shared the information provided with Ecology's Water Quality Program.

12 – Unauthorized pollutants

Comment 12.1 – The Fact Sheet indicates some odd and extra-legal thinking about required effluent limits. Specifically, it states that:

> 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 (Fact Sheet at 19).

EFSEC appears to believe that if a pollutant is "not treatable at the concentrations reported" that no effluent limit need be considered. It has cited no law to support that proposition nor will it find any. This finding is directly contrary to the requirements of EPA regulations. EFSEC also has determined that it is not responsible for any pollutant that the applicant has not identified:

> EFSEC does not usually develop limits for pollutants not reported in the permit application but may be present in the discharge. The permit does not authorize discharge of the non-reported pollutants (Fact Sheet at 19).

While we agree with EFSEC's conclusion that the permit does not authorize discharge of any non-reported pollutants, EFSEC is obligated by Washington's rules to issue a permit that addresses all pollutants. The permit does not, however, state that discharge of any pollutant not named and limited in the permit is a violation of the permit. Instead, it is entirely silent. Therefore, while EFSEC is correct that the proposed permit does not authorize non-reported pollutants, this statement is misleading because neither does it prohibit them. The permit should be revised to clearly prohibit the discharge of unauthorized pollutants. In fact, that is the only way in which EFSEC can ensure that it has not authorized a discharge that may cause or contribute to violations of water quality standards in violation of the statute and implementing regulations.

Response 12.1 – EFSEC does not agree with the conclusions drawn from the quoted statement. This introductory statement in *III. Proposed Permit Limits*, discusses both technology and water quality-based considerations. The first paragraph ends with "…and do not have a reasonable potential to cause a water quality violation" which provides important context and was not discussed in the comment. EFSEC evaluates all pollutants identified in the permit application, discharge monitoring reports, and other credible information specific to the effluent. The evaluations are detailed in the appropriate sections of the fact sheet in *III*. In addition, the permit requires whole effluent toxicity (WET) testing. WET testing is a direct measurement of effluent toxicity. It is addressing pollutants that may be present in a discharge at levels below available method detection levels, and any effects from the combination of pollutants in the effluent. Further, S1.A of the permit limits "The 126 priority pollutants (40 CRF 423 Appendix A) contained in chemicals added for cooling tower maintenance, except chromium and zinc" to *no detectable amount*, and PCBs to *no discharge*. S2.A of the permit requires annual monitoring of the 126 priority pollutants to verify compliance.

Comment 12.2 – It is unclear that the fact sheet contains a complete list of all constituents in the discharge.

Response 12.2 – The fact sheet lists all the constituents identified in the permit application, discharge monitoring reports, and other materials used in preparation of the permit. EFSEC performed reasonable potential analysis on all parameters identified in the discharge to Outfall 001. See fact sheet, Appendix D – Technical Calculations. The Permittee's application and other materials are available from EFSEC's website: http://www.efsec.wa.gov/default.shtm.

13 – Non-routine and unanticipated discharges

Comment 13.1 – The permit also contains a provision that allows so-called "non-routine and unanticipated" discharges without public notice and comment or modification of the permit (Proposed Permit at 20-21). The Fact Sheet provides no legal authority for a permit condition that purports to authorize EFSEC to issue a permit modification through a letter or administrative order. EFSEC cannot modify an NPDES permit in advance through a condition that by- passes public and EPA review. States may establish permit requirements that are more stringent than federal requirements but not less stringent. 40 C.F.R. § 123.25(a). Federal regulations require that draft permits be developed, 40 C.F.R. § 124.6(d), a fact sheet be developed, 40 C.F.R. §§ 124.8 and 124.56, and a public notice be issued and public comment be offered, 40 C.F.R. § 124.10. A permit may be modified, pursuant to 40 C.F.R. § 122.62, where there are alterations or additions to the permitted facility or activity, such as a discharge not previously contemplated, or new information is available that was not available at the time of permit issuance. We are unable to find any provision in law, however, that allows a permitting agency to essentially modify a permit in advance, bypassing all of the procedures that are required by law.

Response 13.1 – S8. *Non-routine and unanticipated discharges* requires an information submittal and approval prior to discharge. S8.2 also explicitly requires compliance with "…effluent limits as established in Special Condition S1 of this permit, water quality standards, and any other limits imposed by EFSEC." This provision is only appropriate for discharges with similar characteristics to those addressed in the permit and treatable by existing treatment systems at the facility. The fact sheet provides potential examples of; pressure-test water, fire system water and leaks from drinking water sources. EFSEC will consider the information submitted and applicable federal and state requirements (including those regarding permit modifications) in determining whether or not to authorize the discharge. If a cause for modification under 40 CFR 122.62 is found in the case-by-case review, the discharge would not be approved outside of the appropriate modification process.

14 – AKART

Comment 14.1 – Meeting Washington's antidegradation policy requires use of AKART. The fact sheet only provides a one-sentence conclusion, without explanation or analysis, which "EFSEC has determined that the treatment provided at Columbia Generating Station meets the requirements of AKART (see "Technology-based Limits")." *Id.* at 28. The referenced section cites to federal limitations for steam electric power generation set out at 40 C.F.R. § 423.13. *Id.* at 20. There is no basis for EFSEC to believe that AKART is the equivalent of only that which the technology- based requirements of the Clean Water Act and EPA's implementing regulations require. Because AKART requires an analysis and because AKART is a part of Washington's water quality standards, the federally-required fact sheet must include the AKART analysis.

Response 14.1 – EFSEC does not "believe that AKART is the equivalent of only that which the technology-based requirements of the Clean Water Act and EPA's implementing regulations

require." The reference cited is to Section III.A "Technology-based effluent limits" of the fact sheet. A discussion of technology-based limits for total residual halogen (and cooling water intake structures) is presented there. EFSEC notes that the proposed limits for total residual halogen are not based solely on federal requirements, as discussed there (and below in response to comment 14.2). The reviewer may also refer to Section III.J for further discussion of the basis for technology-based limits in the permit. The only parameters where the limit is based solely on the federal limitations are PCBs and priority pollutants (except chromium and zinc) where the limits are "no discharge" and "no detectable amount" respectively. EFSEC believes that the requirements for AKART are described appropriately in the fact sheet.

Comment 14.2 – An additional AKART evaluation is required for the use of chlorine and/or bromine. EFSEC establishes that the technology-based limits limit chlorination to less than two hours per day, pursuant to 40 C.F.R. § 423.13(d)(1) without an exception. Fact Sheet at 20. It further states that:

> The 1995 permit fact sheet documents that in March 1975, Energy Northwest requested and received a waiver of the two hour limitation, stating that it was not appropriate for recirculating water cooling systems. EFSEC later approved the use of bromine as well as chlorine biocides at the facility. Bromine has the same limit and is tested by the same procedure as chlorine.

As a result of this waiver, the 2006 permit prohibited discharges during biofouling treatments and "nor until the concentration of total residual halogens is less than 0.1 mg/L for at least 15 minutes." *Id.* at 21. The applicant requested, and EFSEC proposes to agree, that this permit limit be modified "to address discharges via gravity flow from the over three mile long discharge pipe that may continue even after the circulating water is isolated from the discharge pipe." *Id.* The fact sheet states that "EFSEC believes" this limit is the same as the current limit but provides no explanation. The waiver of the technology-based limit places into question the role of AKART in authorizing a mixing zone for chlorine and/or bromine. According to the Washington Permit Writer's Manual, in the example of municipal discharges where technology-based limits do not address ammonia and chlorine, the authorization of a mixing zone based on the use of AKART "should be addressed on the design basis or on a water quality basis." *See* WA DOE Permit Writer's Manual at VI-8. There is here, however, no discussion of how AKART has been evaluated to allow authorization of a mixing zone in light of the waiver of technology-based limits.

Response 14.2 – EFSEC does not agree that the technology-based limits have been waived. The two hour limitation was found to be inappropriate for application at the facility. The potential need for modification of the BAT limitations for chlorine is explicitly discussed in the preamble to the 1982 rule update (47 FR 52302). In addition, the same rule update modified 40 CFR 125.30 (Subpart D – Criteria and Standards for Determining Fundamentally Different Factors Under Sections 301(b)(1)(A), 301(b)(2)(A and (E) of the Act). The Permittee appropriately sought modification of the requirements for "fundamentally different factors" present at the facility.

The permit at S1.A, footnote c, requires the blowdown isolation valves be closed – no discharge to the blowdown line – during biofouling treatments. The 2006 permit prohibited discharge of cooling water from Outfall 001 during biofouling treatments. The modification to the language acknowledges that cooling water may continue to discharge from Outfall 001, as it drains via

gravity flow from the three mile long blowdown line. This discharge however is not water being treated for biofouling because the isolation valves must be closed until the concentration of total residual halogen is less than 0.1 mg/L for at least 15 minutes. This level is below water quality criteria without mixing. EFSEC does not agree that additional AKART evaluation is required at this time for this discharge.

15 – Mixing Zones

Comment 15.1 – Mixing zones are prohibited for pollutants being discharged to water quality limited streams. The EFSEC Fact Sheet states with regard to mixing zones: "[t]he pollutant concentrations outside of the mixing zones must meet water quality *numeric* standards." Fact Sheet at 27 (emphasis added). EFSEC is incorrect in stating that limitations on mixing zones apply only to "numeric standards" when in fact pollutant concentrations outside the mixing zones must meet water quality standards, including both numeric and narrative criteria. The use of a mixing zone has the reasonable potential to cause stress to organisms as well as the build up of toxic contaminants which may cause stress over time. Moreover, EFSEC did not conduct the analysis required by the water quality standards rules, which establish a default that a discharge does not include a mixing zone unless the supporting information supports having one.

Response 15.1 – EFSEC did not state that limitations on mixing zones apply only to numeric standards. EFSEC considered all applicable water quality standards in authorization of the mixing zone. EFSEC's analysis regarding application of water quality standards (Chapter 173-201A-400 WAC) is described in the fact sheet section referenced by the reviewer.

Comment 15.2 – EFSEC errs in concluding that "[t]oxic pollutants . . . are near-field pollutants; their adverse effects diminish rapidly with mixing in the receiving water." Fact Sheet at 32. This is patently absurd. Most toxic pollutants are conservative. Many are Bioaccumulative meaning that their effects do not diminish because they have become diluted but, rather, they become more hazardous because they bioaccumulate and biomagnify in the tissue of aquatic life. Because mixing zones by definition increase the mass loading of a pollutant to a water body, they can only be used when the receiving water has assimilative capacity. The Columbia River, however, does not have assimilative capacity for many toxic constituents, as discussed *supra*, because the receiving water does not meet water quality standards for those pollutants or it is unknown that assimilative capacity exists. In such an instance, the maximum possible effluent limit for the pollutant, in the absence of a wasteload allocation established in a Total Maximum Daily Load, is the applicable criterion itself applied at the end of pipe, not the edge of a mixing zone.

Response 15.2 – The reviewer's comments are more applicable to the water quality standards themselves. EFSEC must implement the existing water quality standards in permits. Washington water quality standards at Chapter 173-201A-400 allow for application of a mixing zone for the parameters limited by the permit. Further discussion of application of the water quality standards is above in *11 – Water quality standards*.

Comment 15.3 – Discharges of pollutants for which a receiving water is impaired may not be given a mixing zone. Once EFSEC has evaluated all the applicable data on downstream water quality violations to which the CGS discharge may contribute, then it can determine for which pollutants it can justify a mixing zone. Until it has done so, the default is that there may be no mixing zone.

Response 15.3 – EFSEC has evaluated applicable data on water quality violations and determined that a mixing zone is allowable and appropriate for the pollutants identified in the discharge. See *Response 11*.3 above for discussion of the impairments cited by the reviewer. Further discussion of application of the water quality standards is above in *11 – Water quality standards*.

16 – Dilution

Comment 16.1 – Dilution in lieu of treatment cannot be authorized by an NPDES permit. The fact sheet establishes that the CGS impermissibly dilutes its effluent prior to discharge in order to meet permit effluent limits (Fact Sheet at 10):

> At the completion of the cleaning process, if any permit condition is not met, circulating water is pumped to a storage location using temporary pumps and piping. During this pumping process, the concentration of constituents in the circulating water is reduced by the addition of makeup water from the river. When the circulating water meets all conditions for the discharge, blowdown to the river is initiated. After the condenser cleaning process is completed, the stored water will be treated (if necessary) to meet discharge requirements, then discharged.

This description quite clearly states that if a permit condition is not met, the effluent is pumped to a storage location during which time river water is added to dilute the concentration of the pollutants, at which point it is discharged. (It is unclear what the last sentence means.). EFSEC is prohibited from issuing a permit that allows for dilution in lieu of treatment.

Response 16.1 – This is an excerpt from a description of the main condenser cleaning process. In the sentence just prior to the one cited, it notes that blowdown is stopped during this process. That is, there is no discharge from upstream of the blowdown isolation valves. There is also no discharge in those cases when circulating cooling water must be pumped to a storage location because sampling indicates that some permit condition is not met. Because water is being removed from the circulating cooling water system during this pumping process, makeup water must be added to maintain adequate cooling flow. This has the effect of reducing the concentration of constituents in the remaining circulating water. However, the water found to be exceeding a permit condition is not diluted during this process. As described, it is pumped to an off-line storage location and treated, if necessary, prior to discharge. Refer to *Figure 2 Columbia Generating Station Flow Diagram* in the fact sheet for more information.

17 – Cooling water intake structure

EPA Comments (17.1)

EPA submitted comments in a May 5, 2014 letter under the timeline established in the memorandum of agreement (MOA) with EFSEC. In addition, EPA reserved the ability to object to the proposed permit. Pursuant to the MOA, EPA will review the proposed final permit to determine whether EPA's comments and concerns have been addressed and, if necessary, object to the final proposed permit.

(From EPA's comment letter) The EPA's comments on the draft permit reflect the lack of current data on impacts of the CWIS on Federally-protected species that may be present and the need to make a BTA determination. We expect these deficiencies can be addressed by

incorporating permit conditions that address the general concerns below as conditions of the final proposed permit:

CWA Section 316(b) Requirements

Section 316(b) of the Clean Water Act requires that National Pollutant Discharge Elimination System (NPDES) permits for facilities with cooling water intake structures (CWIS) ensure that the location, design, construction, and capacity of the structures reflect the best technology available (BTA) for minimizing adverse environmental impact. The conditions of this section of the permit are required to ensure the CWIS is designed, operated and maintained in such manner as to demonstrate compliance with the CWA section 316(b) and any related implementing regulations.

Monitoring

The permit must incorporate monitoring requirements sufficient to quantify the level of impingement and entrainment, including the level of impingement and entrainment of any Federally-protected species that may be present in the vicinity of the intake. The conditions should specify the monitoring location, frequency, duration and methods to determine the extent of impacts caused to species of concern. EFSEC, in consultation with the permittee, NMFS and any experts in the field of study must establish a monitoring program, subject to EPA review, to be carried out through the duration of the permit term.

The facility should be required to measure average monthly and maximum daily intake flow of cooling water through the CWIS and report the values on the monthly discharge monitoring report.

Inspection

The permit must incorporate routine inspections of the CWIS. Inspection techniques may include visual or remote monitoring with photographic records to evaluate impingement of species of concern and to detect and remove debris from the screens. The permittee should establish the frequency and time of year inspection should occur to maximize the overall operation and effectiveness of the CWIS. At a minimum, CWIS inspection should be done on an annual basis during critical period for species of concern.

Reporting

The permit must incorporate requirements to report results of any monitoring for impingement or entrainment, including of Federally-protected species, on a monthly and/or annual basis. It should also include reporting of CWIS inspection findings. The permit's 24-hr reporting requirement should extend to event of unusual significance related to the CWIS.

Operation and Maintenance

The permit must incorporate requirements to operate and maintain the CWIS and associated equipment, to the maximum extent practicable, to minimize adverse environment impacts consistent with the operational and maintenance practices taken into account in the BTA determination. This includes regular inspections and cleaning

of the screen to minimize the through-screen velocity. Inspection records should document inspection dates, findings and maintenance preformed.

Best Technology Available Study and Report

The permit must incorporate requirements for submittal of a document that will serve as the BTA analysis for the facility's CWIS. The study should include analysis of the cost and project related approval/permitting requirements to upgrade the screens to meet the NMFS -Northwest Region screen criteria, and the expected benefits that would result to Federally-protected species. The cost analysis should include an evaluation of alternative construction/installation methods to minimize project-related downtime. The permit should incorporate requirements for a BTA determination based on current information and technology for submittal 12 to 18 months after permit issuance. Additionally, the permit should incorporate a reopener clause to address findings of the revised BTA determination in a timely manner.

National Marine Fisheries Service (NMFS) Comments (17.2)

NMFS submitted comments in a February 28, 2014 letter, summarized here:

NMFS disagrees with EFSEC's determination in the associated Fact Sheet (the draft permit is silent regarding the cooling water intake structure) that the existing cooling water intake screens represent the best available technology to minimize adverse environmental effects. NMFS has extensive experience in fish exclusion and passage systems, has evaluated the CGS intake screen designs and supporting studies, and has determined that they are notably out-of-date and would likely harm some of the juvenile salmon that encounter them.

NMFS Comment on Fact Sheet Page 24-25, Conclusions – This section references ENW's arguments that hydrodynamic effects of the intake structures and fish behavior lead to very small risks to ESA-listed salmon and steelhead juveniles at the intakes, but fails to acknowledge NMFS' rebuttals to those arguments that were provided to EFSEC (letter of December 12, 2013- attached). Failure to consider our responses indicates that EFSEC's approach to developing its best professional judgment is incomplete.

NMFS *Anadromous Salmonid Passage Facility Design* manual is a guidance document, applicable at NMFS' sole discretion under the particular factual situation. The fish screen criteria contained in the manual are based on field and laboratory studies, are designed to provide a high level of protection to juvenile salmonids, and have been widely accepted, including by Washington's Department of Fish and Wildlife. NMFS screen criteria are used as the basis for screen design for any new or existing water intake where NMFS has a current jurisdictional involvement, and the existing water intake screen design (or lack thereof) provides inadequate fish protection. NMFS generally does not pursue existing facilities for screen design revisions unless there is current evidence of Endangered Species Act (ESA) species take, or until a new Federal action requires ESA consultation with NMFS. The U.S. Nuclear Regulatory Commission's relicensing of the CGS is such a new Federal action. Effects associated with implementing the NPDES permit are effects of NRC's relicensing action upon which we [NMFS] are consulting.

NRC Comments (17.3)

The Nuclear Regulatory Commission (NRC) commented on 2/27/2014 that it is not aware of any new and significant information indicating that CGS is entraining either Upper Columbia spring Chinook juveniles or Upper Columbia River steelhead juveniles. Energy Northwest is currently operating CGS, including the cooling water intake structure, in compliance with all of the NRC's rules and regulations.

Washington State Department of Fish and Wildlife (WDFW) Comments (17.4)

WDFW provided comments in an April 18th letter summarized here:

> In summary, WDFW recognizes EFSEC considered expert opinions in the context of its authorities under the CWA and federal rule for "minimizing adverse environmental impact" and found that no adverse environmental impact has been demonstrated. In addition EFSEC considered the potential risks in the context of the BPJ analysis and its authorities under the CWA. Although WDFW recognizes our limited regulatory ability to influence screening improvements within the NPDES process, WDFW would prefer our fish guard WAC, RCW, and the draft *Fish Protection Screen Guidelines for Washington State* be considered in evaluation of the intake system.
>
> WDFW believes EFSEC based their best professional judgment determination - that the existing cooling water system intake location, design, construction, and capacity represent the best technology available for minimizing adverse environmental impact - on the available data. Unfortunately, that data appears to be outdated and unverified. While we recognize the necessity to move forward with permit issuance, WDFW suggests a collective effort from Energy Northwest and the relevant federal, state, and tribal agencies to collect and verify new data associated with the intake screen. We respectfully suggest that EFSEC and Ecology consider clearly acknowledging in the NPDES permit the need to update intake data at the site.

Energy Northwest Comments (17.5)

Energy Northwest (ENW) submitted extensive comments on the cooling water intake structures at CGS. The majority of these comments are contained in two technical papers, the context for which is summarized here (from the ENW comment letter):

- In response to NMFS comment letters and memoranda authored by Mr. Nordland, ENW enlisted the services of Dr. Charles Coutant, PhD to evaluate Columbia's intake structure design, comments submitted by NMFS, and relevant scientific studies and literature. Dr. Coutant's comments were summarized in a paper originally provided to NMFS at our November 2013 meeting, and recently revised for this comment submission. While the NMFS letters and memoranda identify concerns related to Endangered Species Act (ESA) listed species, we believe Dr. Coutant's research into these questions provide objective evidence that counter many of NMFS claims. ENW is submitting Dr. Coutant's paper, *Why Cylindrical Screens in Flowing Water Impinge and Entrain Few Fish and Its Importance for The Columbia Generating Station's Intake,* as part of our NPDES comment response. Further, ENW is submitting a specific summary and response to the NMFS December 12, 2013 memorandum. This response also includes a review of the technical studies and references NMFS used as their basis for the December 12, 2013 memorandum.

The ENW comment letter provides the following general comments (in response to the December 12, 2013 memorandum from NMFS):

- It appears from the attachment to the letter that NMFS staff does not fully understand the Columbia Generating System's (CGS) intake system of in-river cylindrical screens oriented in line with river flow despite our meeting on November 13, 2013. Many aspects of what were analyzed and presented by Energy Northwest (ENW) were misinterpreted by NMFS due to this apparent incomplete understanding.
- The NMFS comments suggest that the agency believes the CGS intake system is a proposed, new system whereas it has been operating successfully in the same place and with the generally expanding salmon populations for nearly 30 years. The hypothesized, detrimental impacts to juvenile salmon have not occurred.
- Detailed biological studies of entrainment in cylindrical screens in flowing water conducted by Alden Hydraulic Laboratories for the Indian Point Energy Center (provided to NMFS by Energy Northwest) do not seem to have been fully appreciated and used by NMFS staff in evaluating the CGS screening facility.
- Although the initial NMFS correspondence re the CGS intake was related to ESA consultation over entrainment of listed species, NMFS' latest comments relate to protection of fry of Hanford fall Chinook, which is not ESA listed and is a thriving population.
- NMFS seems to have not fully considered results of the 1980 pre-operational and 1985 operational entrainment studies that were conducted (with NMFS study-plan review) to assess many of the issues raised hypothetically in the NMFS letter and attachment.
- The main objective of the NMFS letter with attachment seems to be to defend and enforce application of their current (July 2011) screening criteria (e.g., pore size, approach velocity, debris removal) with little attempt to understand what the CGS intake system actually is and how it has performed.
- The NMFS fish-screen experience appears from the references they cite to be primarily with screening of water diversions in irrigation canals using angled rotary drum screens or bar screens, which are unlike the CGS's in-river, cylindrical screens used for cooling-tower make-up water.

NWEA, NEDC, Columbia Riverkeeper Comments (17.6)

Given the specific adverse impacts of cooling water intake structures, a BPJ determination of BTA must focus on minimizing the adverse environmental impacts regarding impingement and entrainment of aquatic life. For ENW's cooling water intake structures in the Columbia River, EFSEC must focus on minimizing impingement or entrainment of fish.

EFSEC failed to conduct its own, or require Energy Northwest to complete, any studies to support its BPJ determination. Outdated studies are not a reasonable basis for assessing the adverse environmental impact of the cooling water intake structures. EFSEC simply states that "[n]o adverse environmental impact has been demonstrated." *See* Fact Sheet at 25. This statement blatantly ignores EPA's comments noting that there have been no current studies to determine whether there is an adverse environmental impact. It is illogical to claim that something does not exist simply because no one has looked for it. EFSEC must consider the likely adverse environmental impacts, as identified by NOAA, along with the other factors when determining BPJ. By failing to rely on or require recent studies of impingement and entrainment

at the facility, EFSEC has completely failed to take a reasoned approach in its assessment of BPJ. EFSEC's failure to determine the existence and scope of adverse environmental impacts violates section 316(b) of the CWA.

EFSEC makes no attempt to identify the critical aquatic organisms in the area potentially affected by the cooling water intake structures. Without this baseline assessment of whether and to what extent thirty years of operating these structures has adversely impacted the environment in the Columbia River, a permit writer is unable to comply with the statutory requirements in section 316(b).

EFSEC's determination fails to comport with the statutory and regulatory requirements for cooling water intake structures. The proposed permit itself does not address section 316(b) of the CWA or cooling water intake structures. In the fact sheet, EFSEC states that its BPJ is that the existing cooling water intake system represents the best technology available for minimizing adverse environmental impacts and achieving compliance with CWA § 316(b). *See* Fact Sheet at 25. This conclusion is flawed because it fails to provide any evidence to support the claimed lack of adverse environmental impact.

EFSEC should not ignore NMFS's 2011 Guidelines. NMFS, *Anadromous Salmonid Passage Facility Design* (July 2011) ("2011 Guidelines") EFSEC is not free to and should not discount NMFS's 2011 Guidelines.

EFSEC's proposed permit improperly and impermissibly authorizes Energy Northwest to retain the existing cooling water system intake structures at the facility without upgrades necessary to protect against fish impingement and entrainment. The current structures represent a 1970s design to minimize fish entrainment. Much has changed since the 1970s, including design improvements and the fact that many species in the Columbia River have been listed and critical habitat has been designated. EFSEC must require ENW to update these outdated structures.

EFSEC's best professional judgment determination fails to consider important factors. Where no federal standards are in place, EFSEC must use its best professional judgment (BPJ) to determine the BTA for minimizing the adverse environmental impact of the cooling water intake structures. EFSEC must revise its BPJ assessment to account for all factors required by CWA regulations in making this case-by-case selection of BTA.

EFSEC's consideration of costs to implement new cooling water intake structures is wholly inadequate because EFSEC provides no foundation for the proposed economic benefit.

EFSEC's determination improperly discounts the advice and ignores the requests of the expert federal agencies. NMFS and EPA have continually voiced concern about the design and adverse impacts of the existing cooling water intake structures. The NRC and EFSEC have failed to give the benefit of the doubt to the species and instead rely on the absence of scientific information to continue using the existing cooling water intake structures that likely harm the imperiled species in the Columbia River. EFSEC should give NMFS's and EPA's opinions the appropriate weight and deference.

EFSEC determined that the 2011 Guidelines may also require review of NRC safety requirements for *potential* conflicts. *See* Fact Sheet at 23. EFSEC then relies on the proposed EPA regulations for the exception allowing for site-specific BTA determinations if the requirements specified by regulation *actually* conflict with NRC safety requirements. Because

EFSEC has conducted no review to make this determination, these side references to exceptions in proposed rules are wholly beyond the scope of this BPJ discussion.

The proposed permit also lacks any required monitoring to assure compliance with section 316(b). EFSEC must require monitoring of the adverse environmental impacts from the existing cooling water intake structures. It is clear from the permit application and fact sheet that there is a lack of information regarding the adverse environmental impacts of the cooling water intake structures on aquatic life. In addition, none of the state or federal entities, tribes, or private entities fully understands where the fish are located in the Columbia River. Given this lack of information, it is essential that EFSEC include monitoring requirements to measure the impacts of the cooling water intake structures to ensure compliance with section 316(b) of the CWA.

In the very least, EFSEC should require include a permit provisions that requires ENW and EFSEC to reconsider this BPJ determination when EPA finalizes the forthcoming section 316(b) regulations for existing facilities. EFSEC has committed to reevaluating its BPJ determination when EPA's final rules are issued, and acknowledges that it may modify the proposed permit accordingly, Fact Sheet at 25, but this commitment should be in the permit itself. EFSEC should include a provision in the proposed permit that allows for EFSEC to modify the permit terms, based on the information currently available. EPA blew past its court ordered deadline for new regulations by April 17, 2014, and instead has requested the court to allow an extension for finalizing the section 316(b) rules by May 16, 2014. *See* Exhibit 21. EFSEC should not give ENW a free pass on improving its extremely outdated structures simply because EPA has ignored judicially ordered deadlines. Including a provision to revisit the BPJ determination would be consistent with EPA's requests.

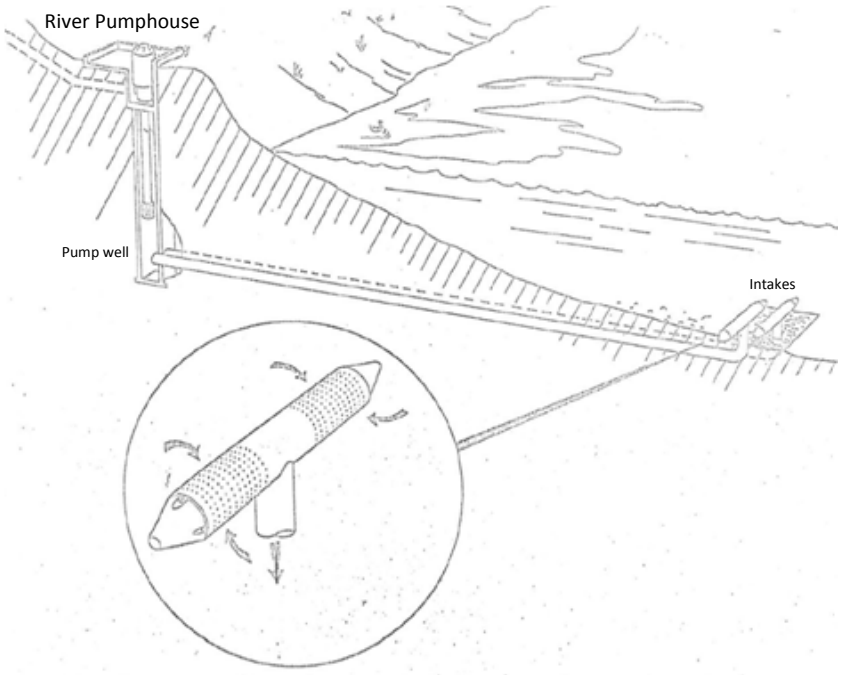
Response 17.1-6

EFSEC included new cooling water intake structure requirements in the final permit. These requirements were developed in response to the range of comments submitted. Response content was influenced by the final 316(b) rule, signed during preparation of these comments. Rather than respond to individual comments, this section provides additional background and the basis for each of the new requirements, thereby responding to the comments as a whole.

First, an overarching critic in the comments was a perceived lack of data used in EFSEC's analysis of Best Technology Available (BTA). To help remedy this, a fuller description of the existing intakes will be helpful. From the fact sheet:

> CGS withdraws water from the Columbia River through two 42-inch diameter inlets perforated with 3/8 inch diameter holes, each approximately 20 feet long and placed parallel to river flow approximately 350 feet offshore at low water. Water flows by gravity to the River Pumphouse.

Artist rendering – from ENW provided design documents:



In evaluating Best Technology Available (BTA), EFSEC considered the design of the CGS intakes as compared to designs considered by EPA in development documents for 316(b) rules. In its comment letter on the draft permit, EPA specifically referred EFSEC to, *Development Document for Best Technology Available for the Location, Design, and Construction, and Capacity of Cooling Water Intake Structures for Minimizing Adverse Environmental Impacts* (EPA, 1976). This document discusses various technologies including "fixed screens" which best fit the technology employed at CGS. It notes that fixed screen installations vary greatly, with effectiveness dependent on site specific design. It also notes:

> "Additions to the inside of the pipe, such as sleeves, may be made to produce equal velocities through the perforations. Very low approach velocities can be achieved with a reasonable total length of perforated pipe, divided into several individual pipes if necessary. In this manner large quantities of water may be handled at what may be substantially less cost and greater fish protection effectiveness than presently used in conventional screens."

EFSEC considered this when evaluating original design documents for the CGS intakes. Extensive studies were conducted to select the final design including study documented in, *Hanford Nuclear Project No. 2 Air and Hydraulic Model Studies of the Perforated Pipe Inlet and Protective Dolphin LHL-599*, (February 1974). This study involved testing of scale models and data analysis to optimize design prior to selection of the final technology. It directly addresses the site specific analysis cited two years later in the 1976 EPA development document, including establishing very low approach velocities through design. Debris deflection and sweeping are also discussed in detail.

Another document considered by EFSEC in its evaluation was, *Technical Development Document for the Proposed Section 316(b) Phase II Existing Facilities Rule* (EPA 821-R-11-001). This document discusses a similar technology to that used at CGS in 6.13 *Coarse Mesh*

Cylindrical Wedgewire. The screens at CGS have circular perforations, rather than the longitudinally adjacent wires of wedgewire systems. However, they are very similar in concept and design. This is particularly true given the two layers of screen at CGS which provide the low, uniform through-screen velocity typical of wedgewire screens. From the document:

> The intake velocity quickly dissipates away from the screen due to the cylindrical shape, thus creating a relatively small flow field in the water body. This small flow field, together with optimal screen orientation, results in a small system profile and minimizes the potential for contact between the screen and any susceptible organisms that may come under the intake's hydraulic influence. In addition, the ambient current crossflow (i.e., to maximize the sweeping velocity provided by the waterbody) carries most free-floating organisms and debris past the screen, removing organisms that are temporarily in contact with or pinned against the screen. As such, screen orientation is also an important component of this technology's overall performance. The low through-slot velocity in combination with the screen orientation and cross current flow carries organisms away from the screen allowing them to avoid or escape the intake current.

The 1974 EFSEC study provides a detailed discussion of how the design was optimized to provide low, equalized intake velocities and maximize the benefits of the relatively high sweeping velocities in the Columbia River.

The 2011 EPA development document mentions in 6.13.1 how sensitive the design is to site-specific factors. It also discusses the performance of this technology (pg. 6-40):

> Cylindrical wedgewire screens have not been used extensively as an impingement control technology at a large number of facilities with large intake flows, but data describing their performance at several installations, as well as laboratory evaluations, suggest a strong potential to reduce impingement impacts when certain design and construction criteria are satisfied. Data from limited studies have shown reductions in impingement of near 100 percent.

The 2011 EPA development document goes on to describe how wedgewire screens were deemed to be pre-approved technology for impingement in the 2004 Phase II rule. They were not included in the 2011 proposed rule specifically because they would already meet the proposed intake velocity criteria. The CGS intakes also meet the proposed maximum intake velocity.

The extensive design documents, along with over 30 years of operation and two separate studies showing no impingement or entrainment, support the conclusions in the EPA development documents that technologies similar to those used at CGS represent best technology available. ENW provided further technical support in the form of expert analysis of the CGS intakes.

EFSEC also considered the NMFS expert analysis which disputed most of the ENW expert analysis. NMFS provided comment that the CGS screens are "…notably out-of-date and would likely harm some of the juvenile salmon that encounter them." NMFS cites their guidance manual, *Anadromous Salmonid Passage Facility Design* (July 2011), as required best technology available. In an August 6, 2013 comment letter, NMFS cited design deficiencies when comparing existing CGS screens to the guidance manual. NMFS recommended the following:

- Design and installation of a waterjet back spray cleaning system
- Replacement of screen mesh with 3/32-inch stainless steel perforated plate

- Balance of screen approach velocities by installing an internal baffle with porosity varied to distribute flow evenly over the entire screen surface
- Install the screens at a lower elevation, if feasible

The NMFS 2011 guidance is predominately focused on dam and irrigation water diversions, not power plant intakes. While the design standards are transferable to the CGS intakes, they would require site-specific considerations to implement. This is precisely the type of site-specific analysis that the CGS intakes have already gone through, as demonstrated in the 1974 study.

The 3/32-inch screen mesh is the primary design upgrade recommended by NMFS. This is a significant decrease in perforation, which would necessitate either a significant increase in through-screen velocity or increase in screen surface area to maintain adequate cooling flow. It also necessitates the back spray cleaning system due to a probable decrease in the efficiency of cleaning by the river's sweeping velocity.

The CGS intakes already have the internal baffle to distribute flow evenly over the entire screen surface, as shown in the 1974 design study. This baffle would likely need to be redesigned with replacement of the external screen with 3/32-inch perforations.

The primary benefit of the 3/32-inch screen mesh is a reduction in entrainment potential, specifically of species of concern in the Pacific Northwest. Entrainment is the other major factor (other than impingement) addressed in the newly signed EPA 316(b) rule. Closed-cycle recirculating cooling systems are cited as the best available technology for minimizing overall withdrawals and therefore minimizing entrainment of organisms. ENW operates a closed-cycle recirculating cooling system consistent with the definition in the final rule.

While the CGS system meets EPA impingement and entrainment criteria, questions remain if this provides adequate protection of species of concern in the vicinity of the CGS intakes, including threatened and endangered species. Preoperational studies in 1978-1980 and follow-up studies in 1985 found no impingement or entrainment of any species. These studies demonstrate that the CGS cooling water intake system functions according to design. Further, this design is supported as best technology available by EPA's rule development documents. It is further supported by the final rule.

The final permit includes requirements to assure the facility continues to operate and maintain the cooling water system according to design. In addition, EFSEC added monitoring and reporting requirements to either confirm earlier findings, or expose the need for further protections to minimize the adverse environmental impacts of the cooling water intakes.

Following is explanatory text for each of the permit conditions added to the final permit in response to comments:

S12. Cooling water intake structure

> *The Permittee must ensure that the cooling water intake structure (CWIS) is designed, operated, and maintained to minimize adverse environmental impact as follows.*

EFSEC added this overarching condition to provide context for the sub-requirements specific to the CGS cooling water intake structure that follow.

S12.A. Operations and maintenance (O&M) manual

The Permittee must, at all times, properly operate and maintain the CWIS including any technology used to minimize impingement and entrainment.

EFSEC added this condition in response to comments from EPA. O&M Manuals are a standard condition in many NPDES permits. ENW's permit already requires an O&M Manual for the circulating water system. However, it lacks specificity about the intake structures. The added condition specifies that the Manual must be approved by EFSEC, including substantial changes or updates. ENW must keep a copy of the approved Manual at the facility and follow the procedures in it.

Required components of the O&M Manual include a 24-hour reporting requirement for significant impingement or entrainment observed. The approved Manual will define 'significant impingement or entrainment'.

S12.A.3 – The permit requires an impingement evaluation procedure be included in the Manual. EPA's 316(b) final rule is signed but not posted in the federal register at the time of this writing. It specifies a required frequency for visual or remote monitoring of at least weekly if feasible, in 40 CFR 125.96(e).

The final rule includes a provision for alternative methods of monitoring if the requirement is not feasible. The rule specifically cites offshore intakes as an example of where weekly visual monitoring may be infeasible. ENW may propose alternative procedures for evaluating impingement if weekly monitoring is infeasible.

ENW periodically deploys a boat for monitoring not required under this permit. They reported that the intakes are often informally observed during this monitoring. EFSEC expects this visual monitoring for impingement to be incorporated into the O&M Manual if feasible.

S12.A.4– The permit also requires ongoing entrainment evaluation. ENW may choose not to include these procedures until after the entrainment characterization study required in S12.B is implemented. While entrainment may be observed in any portion of the cooling water system downstream of the outer surface of the intake structures, it is most likely to be observed at the River Pumphouse in the pump well where the intake piping enters from the river. The River Pumphouse is an unmanned facility over three miles from the plant. The study is likely to require installation of new equipment at the Pumphouse that could be used for ongoing entrainment evaluation.

ENW is encouraged to incorporate ongoing entrainment evaluation into the O&M Manual as soon as possible. However, EFSEC has concluded that it may be unreasonable to require during the study. The 24-hour reporting requirement, which includes reporting any significant entrainment, is required in the first submittal.

S12.B. Entrainment Characterization Study

The Permittee must prepare and conduct an entrainment characterization study consistent with the content requirements in 40 CFR 122.21(r) (9).

This condition was added in response to numerous comments calling for the collection of new data to verify that the facility is functioning as reported in earlier studies reporting no impingement or entrainment observed. Impingement is much less likely given the design of the intakes at CGS. Based on comments, NMFS, EPA, and others tend to agree that the low intake velocities and high sweeping velocities at the intakes make impingement unlikely. However,

some reviewers raised concerns about debris fouling, which may cause higher velocities in un-fouled areas of the screens. EFSEC concludes that the requirements under S12.A.3 are responsive to the comments on the need for further verification of impingement minimization.

NMFS and others primary concerns are related to entrainment potential, given the 3/8-inch perforations in the screen's outer surfaces. While this diameter is compliant with the EPA 316(b) final rule, it is not consistent with NMFS guidance which requires 3/32-inch perforations. EPA comments specifically called for "…monitoring requirements sufficient to quantify the level of impingement and entrainment…" EFSEC included S12.A.3 impingement monitoring requirements and an entrainment study here in S12.B specifically in response to EPA and NMFS comments.

The final EPA 316(b) rule details an *Entrainment Characterization Study* in 40 CFR 122.21(r)(9). EFSEC notes that this is not a requirement that is or would be explicitly required at CGS, because the rule specifies it is applicable to facilities withdrawing greater than 125 million gallons per day (mgd) of actual intake flow. CGS's maximum intake flow is far below 125 mgd. However, the rule requirements provide a reasonable framework for study. From the rule:

> (9) *Entrainment Characterization Study.* The owner or operator of an existing facility that withdraws greater than 125 mgd AIF, where the withdrawal of cooling water is measured at a location within the cooling water intake structure that the Director deems appropriate, must develop for submission to the Director an *Entrainment Characterization Study* that includes a minimum of two years of entrainment data collection. The Entrainment Characterization Study must include the following components:
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> (i) *Entrainment Data Collection Method*. The study should identify and document the data collection period and frequency. The study should identify and document organisms collected to the lowest taxon possible of all life stages of fish and shellfish that are in the vicinity of the cooling water intake structure(s) and are susceptible to entrainment, including any organisms identified by the Director, and any species protected under Federal, State, or Tribal law, including threatened or endangered species with a habitat range that includes waters in the vicinity of the cooling water intake structure. Biological data collection must be representative of the entrainment at the intakes subject to this provision. The owner or operator of the facility must identify and document how the location of the cooling water intake structure in the waterbody and the water column are accounted for by the data collection locations;
>
> (ii) *Biological Entrainment Characterization*. Characterization of all life stages of fish, shellfish, and any species protected under Federal, State, or Tribal law (including threatened or endangered species), including a description of their abundance and their temporal and spatial characteristics in the vicinity of the cooling water intake structure(s), based on sufficient data to characterize annual, seasonal, and diel variations in entrainment, including but not limited to variations related to climate and weather differences, spawning, feeding, and water column migration. This characterization may include historical data that are representative of the current operation of the facility and of biological conditions at the site. Identification of all life stages of fish and shellfish must include identification of any surrogate species used, and identification of data representing both motile and non-motile life-stages of organisms;
>
> (iii) *Analysis and Supporting Documentation*. Documentation of the current entrainment of all life stages of fish, shellfish, and any species protected under Federal, State, or Tribal law (including threatened or endangered species). The documentation may include historical data that are representative of the current operation of the facility and of biological conditions at the site. Entrainment data to support the facility's calculations must be collected during periods of representative operational flows for the cooling water intake structure, and the flows associated with the data collection must be documented. The method used to determine latent mortality along with data for specific organism mortality or survival that is applied to other life-stages or species must be identified. The owner or operator of the facility must identify and document all assumptions and calculations used to determine the total entrainment for that facility together with all methods and quality assurance/quality control procedures for data collection and data analysis. The proposed data collection and data analysis methods must be appropriate for a quantitative survey.

The permit requires ENW to submit the study design to EFSEC for review and approval. EFSEC will seek appropriate input during review of the study design. WDFW and NMFS experts have provided valuable input on the current design of the CGS intake structure. EFSEC will circulate the study design to WDFW and NMFS for review and comment prior to approving the final study design. EFSEC will also consider any peer review of the study design, consistent with the EPA final rule. Approval may require an iterative submittal and review process. EFSEC strongly encourages ENW and NMFS to communicate and coordinate early in development of the study design to fully address any concerns specific to federally-listed threatened and endangered species.

S12.B.3 Engineering analysis – EFSEC added this condition, which may or may not be triggered, in response to comments from EPA. EPA's May 5th comment letter specifically asked for a "Best Technology Available Study and Report" including analysis of the costs and benefits of replacing the current CGS screens with screens consistent with NMFS guidance. EPA requested this study within 12 to 18 months of permit issuance.

Currently available information would value the benefit of replacing the screens very low. No impingement or entrainment has been observed. EFSEC considered this in drafting the requirement to conduct the engineering analysis only if significant entrainment or impingement of federally-listed threatened and endangered species is indicated. This way, the potential benefits of replacing the screens may be properly considered along with the costs. EFSEC fully anticipates NMFS involvement in any determination of the significance of entrainment or impingement that may trigger this requirement.

In S12.B.3.a, EFSEC chose the words "…consistent with approvable design criteria" specifically to indicate the need to consider regulatory approvals in the engineering analysis. EFSEC anticipates approval would be required from WDFW under RCW 77.57.070. WDFW staff have indicated that NMFS guidance would be considered in review and approval of screen replacement. NRC approval would also be required as the cooling water system is a critical safety system at the facility. EPA anticipated NRC requirements in the final rule under 40 CFR 125.94(f) *Nuclear facilities*, allowing for site-specific BTA determinations to avoid conflict with safety requirements.

S12.B.4 Suspension of Entrainment Characterization Study – ENW may suspend the entrainment characterization study if, at any time, they elect to proceed with the engineering analysis and replace the intake structure with approvable design criteria. The purpose of the study is to either confirm earlier studies indicating no impingement or entrainment, or inform the need for additional technologies to minimized adverse environmental impacts. If ENW elects to replace the intake structure according to approvable design criteria, the study is no longer required.

S12.C. Closed-cycle recirculating system

> *The Permittee must continue to operate a closed-cycle recirculating system as defined at 40 CFR 125.92(c).*

EFSEC added this condition in response to comments for more data collection. The content is informed by the EPA 316(b) final rule.

S12.D. Endangered Species Act

> *Nothing in this permit authorizes take for the purposes of a facility's compliance with the Endangered Species Act.*

EFSEC added this condition in response to comments from EPA and NMFS. The content is informed by the EPA 316(b) final rule.

In summary, EFSEC has added conditions to the final permit to ensure compliance with CWA 316(b) and federal rule. The conditions are also responsive to concerns for threatened and endangered species known to be in the vicinity of the outfall. EFSEC will use the information gathered during this permit term to re-evaluate BTA and may modify the permit based on new information.