Fact Sheet for NPDES Permit WA0093317
Spokane County Regional Water Reclamation Facility (SCRWRF)

Purpose of this fact sheet

This fact sheet explains and documents the decisions the Department of Ecology (Ecology) made in drafting the proposed National Pollutant Discharge Elimination System (NPDES) permit for Spokane County Regional Water Reclamation Facility (SCRWRF).

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

Ecology makes the draft permit and fact sheet available for public review and comment at least 30-days before issuing the final permit. Copies of the fact sheet and draft permit for SCRWRF NPDES permit WA0093317, are available for public review and comment from March 18, 2022 until May 3, 2022. For more details on preparing and filing comments about these documents, please see **Appendix A - Public Involvement Information**.

Spokane County Environmental Services Department and Jacobs Engineering (Jacobs), the contract operator, reviewed the draft permit and fact sheet for factual accuracy. Ecology corrected any errors or omissions regarding the facility's location, history, wastewater discharges, or receiving water prior to publishing this draft fact sheet for public notice.

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

Summary

The Spokane County Regional Water Reclamation Facility (SCRWRF) treats mixed domestic and industrial wastewater, and then discharges to the Spokane River. The facility receives domestic wastewater from parts of the Cities of Spokane Valley, Millwood, Liberty Lake, and unincorporated areas in Spokane County. Additionally, they receive industrial wastewater from facilities permitted by the Spokane County Pretreatment Program.

Jacobs operates the SCRWRF under a design, build, and operate contract with Spokane County. Jacobs provides all operations and maintenance of the facility. Under a separated contract, Spokane County also manages the biosolids produced at the facility.

The proposed permit has more stringent toxics limits for cadmium, lead, zinc, and adds a numeric limits for PCBs. The permit has limits that are more stringent for $CBOD_5$ based on technology performance. The permit has a few less stringent limits due to identified calculation errors in the last permit and updated flow information for the Spokane River based on the FERC relicensing.

The proposed permit requires Spokane County to conduct a mixing zone and dye tracer evaluation for the outfall. Additionally, the proposed permit requires Spokane County to conduct a receiving water study for trace metals, DO, pH, alkalinity, and hardness. The proposed permit expands the receiving water temperature study. The proposed permit requires an updated O&M manual that includes the management of the irrigated wastewater applied to the onsite vegetation.

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I. Introduction

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

The following regulations apply to domestic wastewater NPDES permits:

- Procedures Ecology follows for issuing NPDES permits (chapter 173-220 WAC)
- Technical criteria for discharges from municipal wastewater treatment facilities (chapter 173-221 WAC)
- Water quality criteria for surface waters (chapter 173-201A WAC)
- Water quality criteria for groundwaters (chapter 173-200 WAC)
- Whole effluent toxicity testing and limits (chapter 173-205 WAC)
- Sediment management standards (chapter 173-204 WAC)
- Submission of plans and reports for construction of wastewater facilities (chapter 173-240 WAC)

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

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

II. Background Information

Table 1: Facility Information

Applicant	Spokane County Environmental Services Department
Facility Name and Address	Spokane County Regional Water Reclamation Facility 1004 North Freya Street, Spokane, WA 99202
Contact at Facility	Valerie Garcia, Project Manager Jacobs Engineering Group (509) 536-3702
Responsible Official	Robert Lindsay, Environmental Services Administrator 1026 W Broadway Ave, Spokane, WA 99260-0050 (509) 477-7576 Email: rlindsay@Spokanecounty.org
Type of Treatment	Biological Nutrient Removal Membrane Bioreactor
Facility Location (NAD83/WGS84 reference datum)	Latitude:47.6678 Longitude: -117.3566
Discharge Waterbody Name and Location (NAD83/WGS84 reference datum)	Spokane River at River Mile 78.9 Latitude: 47.675833 Longitude: -117.346944
Legal Description of Treated Effluent Irrigation Application Area	At the SCRWRF site, generally in the North 1/2 of the Southwest 1/4 of the Northeast 1/4 of Section 15 Township 25 North Range 43 East, Willamette Meridian

Table 2: Permit Status

Issuance Date of Previous Permit	November 29, 2011
Application for Permit Renewal Submittal Date	October 1, 2015 and January 27, 2021
Date of Ecology Acceptance of Application	November 6, 2015 and March 5, 2021

Table 3: Inspection Status

Date of Last Non-sampling Inspection Date	September 19, 2018

Figure 1: Facility Location Map

A. Facility description

History

Spokane County (the County) began the process of eliminating septic systems above the sole source Spokane Valley-Rathdrum Prairie Aquifer in 1980. Spokane County developed its first comprehensive wastewater plan for unincorporated areas in Spokane County east of the City of Spokane in 1981. This area was incorporated as the City of Spokane Valley in 2003. Most septic tanks within the County sewer service area have now been decommissioned and residents are connected to the County-operated collection system. Before the construction of the County's wastewater treatment system (SCRWRF), Spokane County's collection system delivered customers' raw wastewater to the City of Spokane's Advanced Wastewater Treatment Plant (AWWTP) for treatment. Planning for the SCRWRF started with the 2001 Comprehensive Wastewater Management Plan.

At the time of drafting this proposed permit, the County estimates their treatment plant serves approximately 114,000 customers. The SCRWRF primarily serves residences of the City of Spokane Valley with a County-owned sewer collection system; however, a small fraction of the sewer shed includes areas located within the City of Spokane, Millwood, City of Liberty Lake, and unincorporated Spokane County.

As reported in the previous permit, the planning area for Spokane County Environmental Services divides the County into the 8,359-acre North Spokane Section and the 31,103-acre Spokane Valley Section. Two major interceptors divide the Spokane Valley section into the North Valley Service Area interceptor (NVI) and the Spokane Valley Service Area Interceptor (SVI).

These two interceptors deliver an average of 8 million gallons per day (mgd) to the SCRWRF, built in 2010-2011 and which began discharging under the extended NPDES permit on December 1, 2011. The final effluent from SCRWRF had to meet requirements from the 2010 Spokane River and Lake Spokane Dissolved Oxygen Total Maximum Daily Load (TMDL) on day one. The County has the option to expand its treatment capacity from 8 mgd, in 4 mgd increments, up to 24 mgd at buildout. The County maintains 10 mgd of capacity at the City of Spokane's AWWTP, which alleviates the need for immediate capacity increase.

Collection system status

The County has a relatively new collection system constructed over the past 30 years in conjunction with the septic tank elimination program. Sewers consist primarily of PVC pipe and flow monitoring indicates less than 10% infiltration and inflow. The County has an active operations and maintenance (O&M) program that cleans and inspects the collection system. During the design process for the system, the County estimated 80.5 gallons per capita per day (gpcd) for use in designing the collection system.

The County collects a portion of north Spokane County but ties into the City of Spokane's interceptor system, which the City treats at the AWWTP. The North and Spokane Valley Interceptor pump stations deliver flows to the SCRWRF. The operators direct flows in excess of the capacity of the SCRWRF to the City of Spokane AWWTP.

Treatment processes

You can find basic information describing wastewater treatment processes included in a booklet at the Water Environment Federation website at https://www.wef.org/resources/for-the-public/public-information/.

SCRWRF provides advanced wastewater treatment to approximately 8 mgd of wastewater daily. A flow schematic is available in **Appendix F**, Figure 1. The County financed and owns the treatment plant's construction, but CH2M (acquired by Jacobs in 2017) entered into a design-build-operate agreement with the County. As part of this agreement, Jacobs continues to operate, maintain, and repair the facility. Under a separate contract, the County manages biosolids offsite under Ecology permit number BT1103.

This facility includes the following treatment processes:

- Headworks and primary treatment:
  - Fine screening, grit removal, primary clarification, equalization basin
- Advanced Secondary treatment:
  - Step-feed nitrification/denitrification membrane bioreactor utilizing chemical phosphorus removal
- Disinfection:
  - Sodium hypochlorite disinfection, liquid sodium bisulfite dechlorination
- Solids handling:
  - Anaerobic and aerobic digestion, gravity belt thickening for primary and waste activated sludge, centrifuge dewatering, chemical feed systems and odor control systems
- Other components of the facility include:
  - An administration building with a laboratory, a water resource/education center, and a maintenance building
- The County reuses the highly treated effluent to water landscaping around the facility. The facility does not have a reclaimed water permit. Therefore, they must prevent the public from coming into contact with the landscape watering in publicly accessible areas. The County installed subsurface drip watering in areas with public access. They have an operations and maintenance inspection process for this area to assure that the water is not surfacing or puddling in publicly available areas.

The SCRWRF is a Group IV facility and requires that a Group IV operator oversee the day-to-day operations due to the flow (8 mgd) and advanced treatment processes. A Group III operator must be in charge of each scheduled shift. The SCRWRF currently staffs seven days a week from 7:30 AM - 4:00 PM. They have a standby operator who covers the unstaffed hours.

Ecology conditionally approved the 2007 Spokane County Wastewater Facilities Plan Amendment - Revised Final Draft December 2007, on March 14, 2008. Ecology conditionally approved the Facility Plan due to the delay in providing assessment of the treatment facilities' ability to meet the Spokane River Dissolved Oxygen TMDL wasteload allocations. The County submitted an amendment to the 2007 Plan on June 16, 2010. Ecology approved the amended plan on December 14, 2010. Ecology did not approve the range of offsets in the Delta Elimination Plan. Ecology determined the actual values of the offsets for the three parameters during permit development.

Ecology delegated Spokane County authority for an Industrial Pretreatment Program November 10, 1998. The County has one Significant Industrial Users (SIUs) and six Categorical Industrial Users (CIUs) under permit and discharging to the County's collection system.

Significant Industrial Users:

- American On-Site Services: Porta Potty Rental

Categorical Industrial Users:

- Galaxy Compound Semiconductors
- Honeywell
- Kemira Water Solutions
- Lloyd Industries
- Novation
- US Wax and Polymer

Contract operations

Spokane County contracts the operation and maintenance of the wastewater treatment plant with Jacobs by the terms and conditions contained in a mutually agreed upon service contract. Ecology reviewed the service agreement to ensure it is consistent with chapters 90.46 RCW and 90.48 RCW as required by RCW 70.150.040(9) and provided written comments in 2011. The agreement identifies the responsibilities of both the contractor and the owner.

It is the Water Quality Program's standard procedure to identify contract operators as co-permittees on individual municipal NPDES permits, to address both state and federal requirements for permittees. However, it is not required in every case. Ecology may consider issuing the permit only to the owner; Ecology staff and managers should:

1. Consider the extent of the operator's control over the treatment system, as described in the service agreement.
2. Consider the experience and record of the operator at other facilities.
3. Consider the performance and enforcement provisions in the service agreement between the owner and the operator.
4. Review the recommendations or comments from the Attorney General's office.
5. Make a reasoned decision based on the facts, Ecology guidance, and the manner in which the entities' service agreement defines the responsibilities each will have.

Ecology decided not to include the contractor as co-permittee because Jacobs has been running the facility as designed. The Ecology Attorney General (AG) reviewed the contract between the County and Jacobs and found it holds Jacobs accountable for running the facility to meet water quality NPDES permit requirements. If the domestic wastewater facility does not comply with permit conditions, Ecology will consider the roles identified in the reviewed contract between the owner and operator when it develops both formal and informal enforcement actions.

Solid wastes/Residual Solids

The treatment facilities removes solids during the operations and maintenance of the collection system, treatment of the wastewater at the headworks (grit and screenings), and at the primary clarifiers. In addition to incidental solids (rags, scum, and other debris) removed as part of the routine maintenance of the equipment, SCRWRF drains grit, rags, scum, and screenings, and disposes this solid waste at the Spokane Waste to Energy Facility. Solids removed from the primary clarifiers and membrane bioreactors are treated via anaerobic and aerobic digestion, gravity belt thickening, centrifuge dewatering, chemical feed systems and odor control systems.

Under permit BT1103, the County has a contract with Barr-Tech to take solids. Barr-Tech then composts them under a permit from the Department of Ecology (Permit No. BT1006). This facility has met the solid waste requirements for screening, as required by WAC 173-308-205.

Discharge outfall

The treated and disinfected effluent flows into the Spokane River through a single port 36-inch diameter outfall pipe coupled with a duckbill-style Tideflex valve to prevent backflow during high flow periods. The outfall extends north into the river approximately 75 feet beyond the ordinary high water level on the south bank of the river. The top of the pipe is roughly 15 feet below the ordinary high water line. At the outfall location, river width varies between 200 and 150 feet depending on volumetric flow.

B. Description of the receiving water

The Spokane County Regional Water Reclamation Facility (SCRWRF) discharges to the Spokane River. Upstream of the discharge there are two of the City of Spokane's combined sewer overflows (CSO), Inland Empire Paper and Kaiser. Downstream of the discharge are several City of Spokane CSOs. Significant nearby non-point sources of pollutants include various agricultural discharges and septic tanks. No nearby drinking water intakes surround the outfall. Section IIIE of this fact sheet describes any receiving waterbody impairments.

The ambient background data used for this permit includes the following from Spokane County Environmental Services Receiving Water Studies (2013-2020).

Table 4: Ambient Background Data – Critical Season

Parameter	Value Used	Data Source
Temperature (highest annual 1-DMax) (90th percentile)	16.2°C	County Receiving Water Study
pH (Minimum/Maximum)	6.48/7.88 standard units	County Receiving Water Study
Dissolved Oxygen (10th percentile)	7.76 mg/L	County Receiving Water Study

Parameter	Value Used	Data Source
Total Ammonia-N (90th percentile)	0.01 mg/L (Non Detect)	County Receiving Water Study
Fecal Coliform (90th percentile)	204 cfu/100 mL	EIM Study ID AMS001 Spokane River at Green Street. 2017-2019
Total Phosphorus-P (90th percentile)	0.0097 mg/L	County Receiving Water Study
Nitrite and Nitrate-N (90th percentile)	0.92 mg/L as N	County Receiving Water Study
Hardness (10th percentile)	30.6 mg/L as CaCO3	County Receiving Water Study
Alkalinity (10th percentile)	28.3 mg/L as CaCO3	County Receiving Water Study
Total Cadmium (90th percentile) estimated	0.22 µg/L	County Receiving Water Study
Total Lead (90th percentile)	2.7 µg/L	County Receiving Water Study
Total Zinc (90th percentile)	2.75 µg/L	County Receiving Water Study
PCBs (90th percentile)	50.5 pg/L	April 2019 water quality criteria variance request
PCBs (Geomean)	19.9 pg/L	April 2019 water quality criteria variance request
PCBs (max)	102.1 pg/L	April 2019 water quality criteria variance request

C. Wastewater influent characterization

SCRWRF reported the concentration of influent pollutants in discharge monitoring reports. Additionally, Ecology requested toxics data used to develop the Toxics Management Plan and meet the Permit-required toxics monitoring. SCRWRF collects influent samples from the North Valley Interceptor (NVI) and the Spokane Valley Interceptor (SVI). The concentration for the influent is the flow-weighted concentration for the total influent.

Ecology requested toxics data from Spokane County, sample date range 2016-2021. The PCB concentrations were analyzed using Method 1668 C and are blank corrected and censored. SCRWRF censored the PCB data submitted to Ecology for Table 5 Wastewater Influent Characterization using a 10 times the method blank.

SCRWRF collected 51 samples for Dioxin (TCDD), of those, the NVI and SVI had three and two samples above the method detection limit respectively. For all pollutants reported with values below the method detection limit, Ecology used half the detection limit value reported on the DMR. For all values reported below the quantitation limit, Ecology used the reported estimated value.

The influent wastewater is characterized as follows:

Table 5: Wastewater Influent Characterization

Parameter	Units	# of Samples	Average Value	Maximum Value
Flow	mgd	1,764	7.68	8.92
Carbonaceous Biochemical Oxygen Demand ($CBOD_5$)	mg/L	1,762	136.3	293
Carbonaceous Biochemical Oxygen Demand ($CBOD_5$)	lbs/day	1,762	8,769	19,786
Total Suspended Solids (TSS)	mg/L	1,764	269	606
Total Suspended Solids (TSS)	lbs/day	1,764	17,218	38,754
Phosphorus (as P)	µg/L	1,764	5,640	13,700
Phosphorus (as P)	lbs/day	1,764	361	893
Ammonia	mg/L	876	30.1	52.4
Ammonia	lbs/day	876	1,982	3,520
Nitrite and Nitrate	mg/L	454	0.7	3.07
Total Nitrogen (TKN+NO3+NO2)	mg/L	546	40.7	81.7
Total Nitrogen (TKN+NO3+NO2)	lbs/day	546	2,586	5,283
pH Minimum	Standard Units	1,764	--	2.5
pH Maximum	Standard Units	1,764	--	11.9
Temperature 1-DADMAX	Degrees C	1,764	--	22.3

Parameter	Units	# of Samples	Average Value	Maximum Value
Arsenic	µg/L	129	2.8	4
Cadmium	µg/L	150	0.1	0.77
Copper	µg/L	129	39.3	66.4
Lead	µg/L	129	0.22	6.73
Mercury	µg/L	62	0.046	0.166
Silver	µg/L	64	0.206	1.2
Zinc	µg/L	129	129	209
PCB	pg/L	32	11,462	24,374
PBDEs	pg/L	22	229,035	534,165
TCDD North Valley Interceptor (NVI)	pg/L	3	---	1.03
TCDD Spokane Valley Interceptor (SVI)	pg/L	2	---	1.87

D. Wastewater effluent characterization

SCRWRF 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 2016-2021. The tables below includes a summary of values from the permit application as well as from data collected as required for the delegated pretreatment program. Priority Pollutant PCBs were evaluated using method 608. All values were non-detect. The tables include results for effluent testing for PCBs using Method 1668 as required by toxics management plans. The other toxics identified in Table 6 result from industrial and municipal discharges.

For all pollutants reported with values below the method detection limit, Ecology used half the detection limit value reported on the DMR. For all values reported below the quantitation limit, Ecology used the reported estimated value.

The wastewater effluent is characterized as follows:

Table 6: Wastewater Effluent Characterization

Parameter	Units	# of Samples	Average Value	Maximum Value
Flow	mgd	1,556	7.69	9.15

Parameter	Units	# of Samples	Average Value	Maximum Value
Carbonaceous Biochemical Oxygen Demand ($CBOD_5$)	mg/L	1,556	1.09	9.9
Carbonaceous Biochemical Oxygen Demand ($CBOD_5$)	lbs/day	1,556	69.8	642.7
Total Suspended Solids (TSS)	mg/L	1,764	.51	8.6
Total Suspended Solids (TSS)	lbs/day	1,764	33.3	591.8
Ammonia	mg/L	1,764	0.221	9.21
Ammonia	lbs/day	1,764	14.4	727.4
Nitrate/Nitrite	mg/L	439	18.1	41.2
Nitrate/Nitrite	lbs/day	439	1,172	2,794
Total Nitrogen (TKN+NO3+NO2)	mg/L	439	18.7	41.5
Total Nitrogen (TKN+NO3+NO2)	lbs/day	439	1,218	2,807
Phosphorus	µg/L	1,764	82.6	715
Phosphorus	lbs/day	1,764	5.40	50.7
Dissolved Oxygen	mg/L	1,764	6.85	2.4 (minimum)
Chlorine	µg/L	1,764	3.9	12
Alkalinity	mg/L as CaCO3	756	77.9	130
Hardness	mg/L as CaCO3	254	137	255
Antimony	µg/L	20	3.87	14.4
Arsenic	µg/L	129	0.6	1.4
Cadmium	µg/L	147	.031	0.179
Chromium	µg/L	20	0.311	0.73

Parameter	Units	# of Samples	Average Value	Maximum Value
Copper	µg/L	129	3.0	11.3
Lead	µg/L	129	0.11	0.27
Mercury	µg/L	61	0.00045	0.0032
Molybdenum	µg/L	20	1.72	3.13
Nickel	µg/L	20	3.16	8.01
Selenium	µg/L	20	0.556	1.24
Silver	µg/L	64	0.018	0.290
Thallium	µg/L	20	0.085	.5
Zinc	µg/L	129	26.5	58.5
BHC-Beta	µg/L	5	0.011	0.032
Bis(2-ethylhexyl)phthalate	µg/L	5	0.18	0.30
Chlorodibromomethane	µg/L	5	0.332	1.01
Chloroform	µg/L	5	1.33	2.83
Cyanide	µg/L	20	0.0091	0.03
Dichlorobromomethane	µg/L	5	0.608	2.26
Diethyl phthalate	µg/L	5	0.47	0.90
Dimethyl phthalate	µg/L	5	0.34	0.90
Endosulfan Sulfate	µg/L	5	0.0085	0.019
Tetrachloroethylene	µg/L	5	0.399	1.17
Phenols	µg/L	20	14.38	25
PCBs (Method 1668)	pg/L	21	78	304
PBDEs (Method 1614)	pg/L	21	708	1529
TCDD (Method 1613)	pg/L	36	No samples above MDL	No samples above MDL

Table 7: Wastewater Effluent Characterization – Fecal Coliforms

Parameter	Units	# of Samples	Maximum Monthly Geometric Mean	Maximum Weekly Geometric Mean
Fecal Coliforms	CFU/100 mL	757	2	11

Table 8: Wastewater Effluent Characterization - pH

Parameter	Units	# of Samples	Minimum Value	Maximum Value
pH	standard units	1,764	6.2	10.8

Table 9: Wastewater Effluent Characterization – Temperature July 1-Sept 14

Parameter	Units	# of Samples	1 DADMAX	7-DADMAX
Temperature (95th percentile)	Degrees C	1,764	23.8	23.8

E. Summary of compliance with previous permit issued

The previous permit placed effluent limits on:

- Carbonaceous biochemical oxygen demand (5-day)
- Total Phosphorus
- Ammonia
- Total suspended solids
- PCBs (narrative limits)
- pH
- Fecal Coliform Bacteria
- Cadmium, total
- Lead, total
- Zinc, total
- Total residual chlorine

The Spokane County permit was set up in the Permit and Reporting Information System (PARIS) without considering the reserve capacity at the City of Spokane treatment facility. As a result, PARIS flagged several violations and permit triggers during the first six years of the permit issued November 29, 2011.

SCRWRF reported three cadmium violations in 2012, two cadmium violations in 2013 and did not conduct metals analysis in June of 2015. Ecology identified the permit setup error in late 2017. Ecology corrected erroneous violations and permit triggers going forward. SCRWRF has not had any violation in the last three years.

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

Table 10: Permit Submittals

Submittal Name	Submittal Status	Due Date	Received Date
Annual Toxics Management Report	Approved	4/15/2013	4/15/2013
Annual Toxics Management Report	Received	4/15/2014	4/15/2014
Annual Toxics Management Report	Received	4/15/2015	4/15/2015
Annual Toxics Management Report	Received	4/15/2016	4/15/2016
Annual Toxics Management Report	Received	4/15/2017	4/14/2017
Annual Toxics Management Report	Received	4/15/2018	4/13/2018
Annual Toxics Management Report	Submitted	4/15/2019	4/12/2019
Annual Toxics Management Report	Submitted	4/15/2020	4/14/2020
Annual Toxics Management Report	Submitted	4/15/2021	4/15/2021
Application For Permit Renewal	Received	10/1/2015	10/1/2015
First Acute Toxicity Characterization Data Report	Received	4/30/2014	12/19/2014
First Chronic Toxicity Compliance Monitoring Report	Received	4/30/2014	12/19/2014
First Chronic Toxicity Compliance Monitoring Report	Submitted	4/30/2014	8/7/2019
First Chronic Toxicity Compliance Monitoring Report	Submitted	4/30/2014	12/30/2020
First Chronic Toxicity Compliance Monitoring Report	Submitted	4/30/2014	1/8/2021
First Chronic Toxicity Compliance Monitoring Report	Reviewed	7/30/2017	5/26/2017
Local Limits Update	Received	8/15/2013	8/5/2013
Mercury Abatement and Control Plan	Received	2/15/2016	3/22/2013
O&M - Operation And Maintenance Manual (Update)	Received	4/15/2013	4/10/2013
O&M - Operation And Maintenance Manual (Update)	Received	4/15/2014	4/15/2014
O&M - Operation And Maintenance Manual (Update)	Accepted	4/15/2015	4/15/2015

Submittal Name	Submittal Status	Due Date	Received Date
O&M - Operation And Maintenance Manual (Update)	Received	4/15/2016	4/15/2016
O&M - Operation And Maintenance Manual (Update)	Submitted	4/15/2017	4/14/2017
O&M - Operation And Maintenance Manual (Update)	Submitted	4/15/2018	2/22/2018
O&M - Operation And Maintenance Manual (Update)	Submitted	4/15/2019	4/4/2019
O&M - Operation And Maintenance Manual (Update)	Submitted	4/15/2020	4/15/2020
O&M - Operation And Maintenance Manual (Update)	Submitted	4/15/2021	4/14/2021
Pretreatment - Annual Pretreatment Report	Received	5/1/2012	4/30/2012
Pretreatment - Annual Pretreatment Report	Received	5/1/2013	4/30/2013
Pretreatment - Annual Pretreatment Report	Reviewed	5/1/2014	4/21/2014
Pretreatment - Annual Pretreatment Report	Received	5/1/2015	4/29/2015
Pretreatment - Annual Pretreatment Report	Received	5/1/2016	4/6/2016
Pretreatment - Annual Pretreatment Report	Received	5/1/2017	4/25/2017
Pretreatment - Annual Pretreatment Report	Received	5/1/2018	4/18/2018
Pretreatment - Annual Pretreatment Report	Submitted	5/1/2019	4/30/2019
Pretreatment - Annual Pretreatment Report	Submitted	5/1/2020	4/22/2020
Pretreatment - Annual Pretreatment Report	Submitted	5/1/2021	4/27/2021
QAPP Receiving Water Study Toxic Parameters	Received	3/15/2012	3/15/2012
QAPP Receiving Water Study Toxic Parameters	Received	3/15/2012	11/14/2018
QAPP Receiving Water Study Toxic Parameters	Submitted	3/15/2012	1/27/2020
QAPP Receiving Water Study Toxic Parameters	Received	3/15/2017	10/3/2012
Receiving Water Study	Received	3/1/2012	3/1/2012
Receiving Water Study	Received	3/1/2012	3/1/2012
Receiving Water Study	Received	12/31/2012	12/27/2012
Receiving Water Study	Approved	3/15/2013	3/12/2014
Receiving Water Study	Approved	12/31/2013	1/2/2014
Receiving Water Study	Received	12/31/2014	12/31/2014

Submittal Name	Submittal Status	Due Date	Received Date
Receiving Water Study	Received	12/31/2015	12/30/2015
Receiving Water Study	Received	12/31/2016	12/28/2016
Receiving Water Study	Received	12/31/2017	12/21/2017
Receiving Water Study	Submitted	12/31/2018	12/21/2018
Receiving Water Study	Submitted	12/31/2019	12/19/2019
Receiving Water Study	Submitted	12/31/2020	12/29/2020
Spill Prevention Plan	Received	10/1/2014	4/10/2013
Spill Prevention Plan	Submitted	10/1/2019	9/26/2019
Wasteload Assessment	Received	3/1/2013	12/19/2013
Wasteload Assessment	Received	3/1/2015	2/26/2015
Wasteload Assessment	Received	3/1/2016	2/26/2016
Wasteload Assessment	Submitted	3/1/2017	2/27/2017
Wasteload Assessment	Submitted	3/1/2018	2/12/2018
Wasteload Assessment	Submitted	3/1/2019	2/28/2019
Wasteload Assessment	Submitted	3/1/2019	2/28/2019
Wasteload Assessment	Submitted	3/1/2019	2/28/2019
Wasteload Assessment	Submitted	3/1/2020	1/29/2020
Wasteload Assessment	Submitted	3/1/2021	2/1/2021

F. State environmental policy act (SEPA) compliance

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

III. Proposed Permit Limits

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

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

- Water quality-based limits are calculated so that the effluent will comply with the Surface Water Quality Standards (chapter 173-201A WAC), Ground Water Standards (chapter 173-200 WAC), Sediment Quality Standards (chapter 173-204 WAC), or the Federal Water Quality Criteria Applicable to Washington (40 CFR 131.45)
- Ecology must apply the most stringent of these limits to each parameter of concern. These limits are described below.

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

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

A. Design criteria

Under WAC 173-220-150 (1)(g), flows and waste loadings must not exceed approved design criteria. Ecology approved design criteria for this facility's treatment plant in the facility plan prepared by HDR, Inc. and CH2M in 2010. The table below includes design flows and loading criteria plus the expected BOD and TSS load from septage as taken from Table A6-3 of the referenced report. These values are slightly different from the previous permit. These are the values taken from the approved facility plan.

The facility plan also references the 10 mgd of available capacity at the City of Spokane treatment facility. The proposed permit will require Spokane County to provide an engineering report for expansion of the treatment facility when:

- The maximum month design flow at the SCRWRF is exceeded for three consecutive months or
- The flow redirected to the City of Spokane treatment facility exceeds 85% or 8.5 mgd of the available capacity.

These requirements are in S4 of the permit.

Table 11: Design Criteria for SCRWRF

Parameter	Design Quantity
Maximum Month Design Flow (MMDF)	8.5 mgd
Monthly Average Dry Weather Flow	8.0 mgd
Peak Instantaneous Design Flow (PIDF)	13.8 mgd
Peak Day Design Flow	12.1 mgd

Parameter	Design Quantity
BOD_5 Loading for Maximum Month Plus Septage	18,200 lbs/day
$CBOD_5$ Average Monthly Effluent Concentration	2.0 mg/L
TSS Loading for Maximum Month Plus Septage	20,000 lbs/day
TSS Average Monthly Effluent Concentration	5.0 mg/L
Total Phosphorus for Maximum Month Influent Plus Septage	560 lbs/day
Total Nitrogen for Maximum Month Influent Plus Septage	2,940 lbs/day

B. Technology-based effluent limits

Federal and state regulations define technology-based effluent limits for domestic wastewater treatment plants. These effluent limits are given in 40 CFR Part 133 (federal) and in chapter 173-221 WAC (state). This advanced treatment facility has performance levels that are much more stringent than the technology based limits identified in Chapter 173-221 WAC for $CBOD_5$, BOD_5 and TSS. Chapter 173-220-130 requires that "effluent limitations shall not be less stringent than those based upon the treatment facility design efficiency contained in approved engineering plans and reports." The proposed permit includes technology-based limits based on the approved treatment facility design.

Ecology calculated the monthly and weekly average mass limits for $CBOD_5$ and TSS as follows:

Mass Limit = CL x DF x CF

Where:

CL = Technology-based concentration limits listed in the Table 9

DF = Maximum Monthly Average Design Flow (mgd) = 8.5

CF = Conversion Factor of 8.34

Table 12: $CBOD_5$ Technology-Performance Based Limits

Parameter	Average Monthly Limit	Average Weekly Limit [c]
$CBOD_5$ (concentration) [a]	2.0 mg/L: 142 lbs/day	3.0 mg/L: 213 lbs/day
TSS (concentration) [b]	5 mg/L: 354 lbs/day	7.5 mg/L: 532 lbs/day

Table 12 Footnotes:

[a] $CBOD_5$ (concentration): In addition, the CBOD5 effluent concentration must not exceed 15% of the average influent concentration.

[b] TSS (concentration): In addition, the TSS effluent concentration must not exceed 15% of the average influent concentration.

[c] $CBOD_5$ and TSS Average Weekly Limit are equal to 1.5 times the average monthly limit.

Tables 13 & 14 below identify technology-based limits for fecal coliform, and pH as listed in chapter 173-221 WAC. Section III.F of this fact sheet describes the potential for water quality-based limits.

The existing permit has chlorine limits for average monthly (16.8 µg/L) and daily maximum (33.6 µg/L) and the facility is able to comply with it. The proposed permit includes the same limit.

Table 13: Fecal Coliform Technology-based Limits

Parameter	Monthly Geometric Mean Limit	Weekly Geometric Mean Limit
Fecal Coliform Bacteria	200 organisms/100 mL	400 organisms/100 mL

Table 14: pH Technology-based Limits

Parameter	Daily Minimum	Daily Maximum
pH	6.0 standard units	9.0 standard units

C. Surface water quality-based effluent limits

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

Numeric criteria for the protection of aquatic life and recreation

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

Numeric criteria for the protection of human health

Numeric water quality criteria for the protection of human health are promulgated in Chapter 173-201A WAC and 40 CFR 131.45. These criteria are designed to protect 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.

Ecology submitted a standards revision for 192 new human health criteria for 97 pollutants to EPA on August 1, 2016. In accordance with requirements of CWA section 303(c)(2)(B), EPA finalized 144 new and revised Washington specific human health criteria for priority pollutants, to apply to waters under Washington's jurisdiction. EPA approved 45 human health criteria as submitted by Washington. The EPA took no action on Ecology submitted criteria for arsenic, dioxin, and thallium. The existing criteria for these three pollutants remain in effect and were included in 40 CFR 131.45, Revision of certain Federal Water quality criteria applicable to Washington.

On May 13, 2020, EPA issued a final rule that withdrew the initial action on PCBs changing the criteria for PCBs from seven parts per quadrillion (ppq) back to 170 ppq. On June 30, 2021, EPA filed a motion to stay litigation regarding its May 2020 Rule to provide time for EPA to propose new human health criteria for Washington.

Specifically, EPA proposes to:

- Issue a proposed rule establishing protective federal human health criteria applicable to Washington's surface waters.
- Put that rule out for public comment.
- Finalize a rule for Washington in 18 months.

Until a new federal rule is in place, Ecology based the proposed permit on the current applicable human health criteria, which are listed in WAC 173-201A-240, Toxic Substances Criteria. For PCBs, the current applicable human health criteria is 170 parts per quadrillion (ppq).

General condition G3 of the permit allows Ecology to modify, revoke, reissue or terminate a permit under certain conditions. One of the conditions includes the promulgation of new or amended standards or regulations having a direct bearing upon permit conditions, or requiring permit revision. When EPA finalizes its new rule, Ecology will evaluate the impact to the permit resulting from any changes to the criteria. Ecology will then take appropriate actions, which could include modifying the current permit or including new requirements in the next permit issuance.

Antidegradation

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

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

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

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

- The facility is planning a new or expanded action.
- Ecology regulates or authorizes the action.
- The action is expected to cause measurable degradation to existing water quality.

Facility Specific Requirements — SCRWRF must maintain Tier I requirements.

- Discharger must maintain and protect existing and designated uses. They 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.
- For waters that do not meet assigned criteria, or protect existing or designated uses, Ecology will take appropriate and definitive steps to bring the water quality back into compliance with the water quality standards.
- Whenever the natural conditions of a water body are of a lower quality than the assigned criteria, the natural conditions constitute the water quality criteria. Where water quality criteria are not met because of natural conditions, human actions are not allowed to further lower the water quality, except where explicitly allowed in chapter 173-201A WAC.

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

Mixing zones

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

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

The state's water quality standards allow Ecology to authorize mixing zones for the facility's permitted wastewater discharges only if those discharges already receive 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) or WAC 173-201A-400(7)(b)(ii-iii)].

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

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

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

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

These assumptions include:

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

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

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

The mixing zone evaluation submitted with the 2002 facility planning documents provided the mixing zone analysis and cross section information for the location between the Mission Street Bridge and the Trent Street Bridge. This is not the final location of the outfall.

The proposed permit requires Spokane County to conduct a dye tracer mixing zone evaluation. Ecology will use the mixing zone and dye study to verify the size and location of the mixing zone and to verify that the mixing zone does not exceed the maximum size restriction and has been minimized.

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

   Ecology has determined that the treatment provided at SCRWRF meets the requirements of AKART.

   The AKART definition is at WAC 173-201A-020 (https://apps.leg.wa.gov/WAC/default.aspx?cite=173-218-030)

3. **Ecology must consider critical discharge conditions.**

   Surface water quality-based limits are derived for the water body's critical condition (the receiving water and waste discharge condition with the highest potential for adverse impact on the aquatic biota, human health, and existing or designated waterbody uses). The critical discharge condition is often pollutant-specific or waterbody-specific.

   Critical discharge conditions are those conditions that result in reduced dilution or increased effect of the pollutant. Factors affecting dilution include the depth of water, the density stratification in the water column, the currents, and the rate of discharge. Density stratification is determined by the salinity and temperature of the receiving water.

   Temperatures are warmer in the surface waters in summer. Therefore, density stratification is generally greatest during the summer months. Density stratification affects how far up in the water column a freshwater plume may rise. The rate of mixing is greatest when an effluent is rising. The effluent stops rising when the mixed effluent is the same density as the surrounding water. After the effluent stops rising, the rate of mixing is much more gradual. Water depth can affect dilution when a plume might rise to the surface when there is little or no stratification. Ecology Publication No. 92-109, **Ecology's Permit Writer's Manual,** describes additional guidance on criteria/design conditions for determining dilution factors and is available on Ecology's website at https://apps.ecology.wa.gov/publications/documents/92109.pdf.

   The flows in the Spokane River changed because of the Federal Energy Regulatory Commission (FERC) relicensing issued to the Avista Post Falls Dam on June 18, 2009. The license renewal required Avista to increase the minimum flows in the Spokane River to 600 cfs with a provision to reduce to 500 cfs if Lake Coeur d'Alene levels fall below a defined elevation. This change resulted in higher critical flows at the County of Spokane SCRWRF discharge location.

   The USGS gauge 12422000 was not in use in 2009 when the FERC reissued the Avista license. The USGS recommissioned the gauge in 2017. As a result, there are only 3.5 water years of data available on the USGS site for this Gauge. For two years prior to the USGS recommissioning the gauge, the Spokane Community College used the gauge for one of their watershed classes. This provided an additional two years of data.

However, Ecology's permit writers manual recommends that at least ten years of data be available to calculate the seven-day-average ten year return period (7Q10) low river flow.

The developer of the previous Spokane County Permit WA0093317, issued November 29, 2011, based the flows on the flow analysis completed by Ecology (Pelletier, 1997). This identifies the critical flow as the 7Q20 seven-day average 20 year return flow for summer (573 cfs). These flows did not project the change in critical flow resulting from the FERC relicensing for the 2011 permit. Ecology acknowledges that flow increased during the critical period due to the relicensing.

However, due to the lack of data, it is not possible to calculate a revised critical flow. Ecology is using the 7Q20 flow of 573 cfs combined with 200 cfs identified as additional flow released during the critical season under the FERC relicensing, for a critical season flow of 773 cfs.

Using 773 cfs is a conservative approach. Ecology expects that a higher critical flow will result when there is enough data to calculate the 7Q10 flow at the USGS gauge 12422000. However, at this time, it is not possible to estimate the changes in groundwater contribution at the actual location of the Spokane County Outfall, or the losses resulting as the flow released from the dam proceeds to the Spokane County outfall.

Ecology adjusted critical flow to establish dilution factors. Ecology used three times the estimated low critical flow to calculate the thirty-day low flow with a five-year recurrence (30Q5) to evaluate reasonable potential for the human health criteria. Ecology will calculate the 30Q5 based on the actual data once the data is available.

Table 15: Critical Conditions Used to Model the Discharge

Critical Condition	Value	Source
Estimated critical Spokane River low flow is the previous permit critical flow plus 200 cfs added because of the FERC relicensing.	773 cfs	Green St Gauge plus FERC agreement
The thirty-day low river flow with a recurrence interval of five years (30Q5) estimated using 3 times the estimated critical low flow.	2,319	Three times estimated critical low flow
Maximum average monthly effluent flow for chronic and human health non-carcinogen	8.5 mgd	Facility Plan
Annual average flow for human health carcinogen	8.0 mgd	Facility Plan
Maximum daily flow for acute mixing zone	12.1 mgd	Facility Plan
1-DADMAX receiving water temperature (90^{th} percentile)	16.2 °C	Spokane County Provided Temperature Data

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

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

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

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

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

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

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

Starting on January 1, 2021, the recreational water quality criteria for bacteria changed to *E.coli* for freshwater. No change to the indicator will occur during this permit cycle as a site-specific correlation between fecal coliform and *E.coli* needs developing. The next permit cycle will require SCRWRF to meet the primary contact *E.coli* standard of 100 colonies/100 mL at the point of discharge.

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

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

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

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

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

   Ecology determined that there is not enough information to specify, in the permit, the actual, much more limited volume in which the dilution occurs as the plume mixes and moves with the current. The proposed permit requires Spokane County to conduct a mixing zone and dye tracer evaluation of the discharge. Ecology will use this information to verify that the mixing zone is minimized.

   Ecology minimizes the size of mixing zones by requiring dischargers to install diffusers when they are appropriate for the discharge and the specific receiving waterbody.

   The planning documents for the SCRWRF indicated that the SCRWRF discharge did not need a multiport diffuser to meet this requirement. Due to the change in locations, the mixing zone evaluation will evaluate the need for a diffuser.

   Ecology also minimizes the size of the mixing zone (in the form of the dilution factor) using design criteria with a low probability of occurrence. For example, Ecology uses the expected 95th percentile pollutant concentration, the 90th percentile background concentration, the centerline dilution factor, and the lowest flow occurring once in every ten years to perform the reasonable potential analysis.

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

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

   The change in location and the increase in river flow should result in the discharge meeting the maximum size restriction. Ecology will use the proposed permit required mixing zone and dye study to verify that the mixing zone does not exceed the maximum size restriction.

8. **Acute mixing zone.**

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

   Ecology determined the acute criteria will be met at 10% of the volume fraction of the chronic mixing zone at the estimated 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.

There are three City of Spokane combined sewer overflows (CSO) discharging to the Spokane River near the SCRWRF outfalls. CSO #41 discharges on the north bank of the river in approximately the same locations as the SCRWRF discharge. The SCRWRF outfall may overlap the CSO mixing zones. Additionally, the Inland Empire Paper Company (IEP) discharges upstream of the SCRWRF outfall. The proposed permit requires the County to model the discharge for the SCRWRF. The study must include the effects and possible overlap of the three City of Spokane CSOs near the SCRWRF outfall and IEP's outfall.

The study results must be evaluated to verify that SCRWRF outfall does not exceed the criteria identified in WAC 173-201A-400.

D. Designated uses and surface water quality criteria

Applicable designated uses and surface water quality criteria are defined in chapter 173-201A WAC. The tables included below summarize the criteria applicable to the receiving water's designated uses.

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

The **Aquatic Life Uses** for this receiving water are identified below.

Freshwater Aquatic Life Uses and Associated Criteria

Table 16: Salmonid Spawning, Rearing, and Migration

Criteria	Limit
Temperature Criteria – Highest 1-DAD MAX	20.0°C (68.0°F)
Dissolved Oxygen Criteria – Lowest 1-Day Minimum	8.0 mg/L

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

- The **Recreational uses** for this receiving water are identified in Table 17. The new criteria using *E.coli* as the indicator organism for fecal pollution became effective January 1, 2021. The facility will be assigned a fecal coliform limit based on the 303 (d) listing and will be required to sample for both E.coli and fecal coliform.

  The **Recreational uses** for this receiving water are identified below.

Table 17: Recreational Uses and Associated Criteria

Recreational Use	Criteria
Primary Contact Recreation	*E.coli* organism levels must not exceed a geometric mean value of 100 CFU or MPN per 100 mL, with not more than 10% of all samples (or any single sample when less than ten sample points exist) obtained within the averaging period exceeding 320 CFU or MPN per 100 mL.

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

E. Water quality impairments

Spokane River, WRIA 57 Middle Spokane, is listed on the current 303(d) list and the draft 2018 list for the parameters identified in Table 18. The segment receiving the Spokane County's discharge has a 303 (d) listing for PCBs. The Draft 303(d) list indicates that the Spokane River is impaired for PCBs, Fecal Coliform Bacteria, Methylmercury, and PBDEs in the segment receiving the Spokane County discharge.

Table 18: Spokane River WRIA 57 Middle Spokane 303(d) Category 5 listings

Current (2016) 303(d) listings Category 5	Draft 2018 303(d)listings Category 5
Polychlorinated Biphenyls (Tissue)	Polychlorinated Biphenyls (Tissue)
---	Bacteria- Fecal Coliforms

Current (2016) 303(d) listings Category 5	Draft 2018 303(d)listings Category 5
---	Methylmercury
---	Polybrominated Diphenyl Ethers (PBDEs)

Table 19: Spokane River WRIA 57 Middle Spokane 305(b) Category 4 Listings and Approved TMDLs

Current (2016) 305(b) listings Category 4A,4B, and 4C	Approved TMDLs	URL
Dissolved Oxygen	Spokane River and Lake Spokane Dissolved Oxygen TMDL	https://apps.ecology.wa.gov/publications/documents/0710073.pdf
Lead	Spokane River Dissolved Metals TMDL	https://apps.ecology.wa.gov/publications/documents/9949.pdf
Zinc	Spokane River Dissolved Metals TMDL	https://apps.ecology.wa.gov/publications/documents/9949.pdf

Ecology has completed and published the following TMDLs for the Spokane River:

- Spokane River and Lake Spokane Dissolved Oxygen TMDL (DO TMDL) (2010)
    - The DO TMDL includes waste load allocations (WLA) for ammonia, total phosphorus, and carbonaceous oxygen demand ($CBOD_5$). Ecology's evaluation of the technology performance found that the technology $CBOD_5$ limit is more stringent than the DO TMDL WLA. Ecology used the WLAs supplied in the DO TMDL for total phosphorus and ammonia for the seasonal limits and the technology limit for $CBOD_5$ year round for the limits in the proposed permit.
- Spokane River Metals TMDL (1999)
    - The metals TMDL Submittal Report outlines the approach Ecology must take when developing limits for cadmium, lead and zinc. The permit writer must use the more restrictive of either a performance-based limit + 10%, or a water quality-based limit calculated using effluent hardness and no dilution (end of pipe). The comparison of the limits is provided below.

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

Ecology must consider the narrative criteria described in WAC 173-201A-240 when it determines permit limits and conditions. Narrative water quality criteria limit the toxic, radioactive, or other deleterious material concentrations that the facility may discharge which have the potential to adversely affect designated uses, cause acute or chronic toxicity to biota, impair aesthetic values, or adversely affect human health.

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

The previous permit required sampling for PBDEs. The draft 303(d) water quality assessment indicates that the Spokane River will be listed for PBDEs and methylmercury based on fish tissue. There is no numeric criterion for PBDEs and methylmercury.

Total PBDEs - Polybrominated diphenyl ethers (PBDEs) are a class of recalcitrant and bioaccumulative chemicals that were used as flame retardants. There are no known natural sources of PBDEs, with the exception of a few marine organisms that produce forms of PBDEs that contain higher levels of oxygen (EPA 2017).

There are three groups of PBDEs used in consumer products: penta-BDE, octa-BDE, and deca-BDE (Ecology, 2006). Each group has different uses and different toxicity. The smaller PBDEs have a high affinity for lipids and accumulate in animals and humans (Siddiqi et al, 2003). The National Toxicology Program evaluated PDBEs toxicity in rodents and found PBDEs to cause neurotoxicity, developmental neurotoxicity, reproductive toxicity, pancreas effects (diabetes), and cancer (penta- and decabromodiphenyl ether). There may be differences in the severity of the effects depending on bromination level. There have been studies on animals and humans that show that some PBDEs can act as endocrine system disrupters and tend to deposit in human adipose tissue (EPA, 2017).

In 2006, the State of Washington banned penta-BDE and octa-BDE. In December 2009, the two U.S. producers and the main U.S. importer of deca-BDE committed to end production, import, and sales of the chemical for all consumer, transportation, and military uses by the end of 2013 according to the Environmental Protection Agency (EPA). However, the EPA received comments in 2012 indicating that there may be ongoing uses for deca-BDE.

Research on effective treatment technologies is ongoing. The Spokane County Biological Nutrient Removal Membrane Bioreactor removed approximately 96.7 % based on average values for the influent (229,035 pg/L) and effluent (7,600 pg/L). It is less likely that these were biologically degraded and more likely that the low solubility in water and the presence of organic solids resulted in adsorption to the biosolids during the treatment process. Biodegradation of deca-BDEs is possible under anaerobic conditions but typically takes longer than typical hydraulic residence times in anaerobic digesters. The studies reviewed did not have rates for the occurrence of degradation in wastewater treatment plants. Studies did indicate that biological degradations resulted in formation of smaller (lower halogenated) PBDEs such as penta-BDEs and octa-BDEs.

PBDEs end up in wastewater treatment plants resulting from cleaning processes of chemical containing materials, leachate from landfills, human waste products and industrial processes. PBDEs get into the River through permitted discharges, stormwater, and sediment transported by wind and water.

Wastewater treatment facilities use EPA method 1614 to analyze for PBDEs. The method uses isotope dilution and internal standard high resolution GC (HRGC)/HRMS to detect PBDEs in water, soil, sediment, and tissue. In the last permit cycle, Ecology required the municipal facilities discharging to the Spokane River to sample influent and effluent for PBDEs using EPA method 1614. The 2018 303 (d) list currently includes a listing for PBDEs based on fish tissue in the Spokane River.

The municipal dischargers to the Spokane River will be required to continue testing of influent and effluent for PBDEs and will be required to develop best management plans during the proposed permit cycle to identify sources and potential mechanisms for removing sources of PBDEs before they get to the wastewater treatment plant and the Spokane River. Participation in the Spokane River Regional Toxics Task Force will enable dischargers to the Spokane River to coordinate efforts to find and reduce sources of PBDE to the River.

- PBDEs are bioaccumulative and have a narrative reasonable potential based on the harvest use for the Spokane River. The proposed permit has PBDEs BMP requirements and ongoing monitoring of the influent, collection system as required to assess BMPs, and the effluent. PBDEs will also have a best management plan requirement that will focus on public education and outreach along with source identification and control.

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

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

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

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

The diffuser at Outfall 001 consists of a 36-inch pipe located approximately 75 feet from the south bank. The pipe has a duckbill style Tideflex valve and discharges approximately one foot above the bottom of the riverbed, perpendicular to flow. The crown of the outfall pipe is roughly 15 feet below the ordinary high water mark.

Spokane County conducted a mixing zone study evaluation in 2002 during the planning phase for the facility. HDR Engineering originally thought that Spokane County would place the facility outfall between the Mission Street Bridge and the Trent Street Bridge. Instead, they placed the outfall above the Green Street Bridge in line with Havana Street. The modeled location is approximately three river miles downstream of the actual outfall location.

The 2007 Task G102-Mixing Zone and Water Quality Update Technical Memorandum indicates that this location is similar to the 2002 Rebecca Street location. However, the 2002 study does not appear to include cross section information for the Rebecca Street location. The proposed permit includes a requirement for cross section information for upstream, downstream, and the location of the outfall. The input of groundwater at the originally modeled location would be greater than the groundwater contributed up stream at the actual discharge location. The study must include an estimate of the groundwater contribution at the outfall. Additionally, the FERC relicensing project changed flows in the Spokane River.

The proposed permit requires Spokane County to reevaluate the mixing zone to include the effects of the City of Spokane CSOs discharge, and the change in river flow at the actual discharge location.

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. They also must not 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.

According to the mixing zone evaluation completed in 2004, the flow volume restriction resulted in a smaller chronic dilution factor than the distance downstream. The dilution factors below assume that volume restriction is the limiting factor at the constructed discharge location. Spokane County will verify this in the required mixing zone and dye study.

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. They also must not use greater than 2.5% of the flow and not occupy greater than 25% of the width of the water body. Ecology based the acute dilution factors on flow. Ecology determined the dilution factors that occur within these zones at the critical condition discussed previously.

The dilution factors are in Table 20 below.

Table 20: Dilution Factors (DF)

Criteria	Acute	Chronic
Aquatic Life	2.0	15.7
Human Health, Carcinogen	---	47.8
Human Health, Non-carcinogen	---	21.6

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

Nutrients – $CBOD_5$, Ammonia, and Total Phosphorus

The 5-day Carbonaceous Biochemical Oxygen Demand ($CBOD_5$) of an effluent sample indicates the amount of biodegradable material in the wastewater and estimates the magnitude of oxygen consumption the wastewater will generate in the receiving water. The amount of ammonia-based nitrogen and total phosphorous in the wastewater also provides an indication of oxygen demand potential in the receiving water. Ecology completed the DO TMDL in 2010 evaluating the far field dissolved oxygen effects for the following nutrients: $CBOD_5$, ammonia, and phosphorus.

The DO TMDL established wasteload allocations (WLAs) which Ecology translated into permit limits for $CBOD_5$, ammonia, and total phosphorus. Due to potential issues meeting the total phosphorus and ammonia WLA, Spokane County proposed alternative wasteload allocations to those identified in the DO TMDL. Ecology and LimnoTech modeled the proposed static equivalency WLAs proposed by Spokane County and compared them to the TMDL wasteload allocations. The modeling found that the WLAs proposed provided a slightly better outcome than the wasteload allocations identified in Table 5 of the DO TMDL. The previous discharge permit included static equivalency wasteload allocations.

Ecology evaluated the static equivalency proposed limits and found that the March 1- March 31 season was based on an ammonia concentration of 16 mg/L. This concentrations result in aquatic toxicity when Ecology evaluated ammonia reasonable potential. Ecology recalculated the March 1-March 31 season using the average monthly limit of 1.83 mg/L. The revised seasonal limit for March is 129.7 lbs/day. Ecology carried the remainder of the static equivalent wasteload allocations for oxygen consuming pollutants into the proposed permit. A comparison of the previous permit limits and the proposed limits are available below.

Dissolved Oxygen - Natural decomposition of organic material in wastewater effluent impacts dissolved oxygen in the receiving water at distances far outside of the regulated mixing zone (far field). Ecology discussed these far field nutrient affects above.

Ecology modeled the impact of effluent dissolved oxygen at the chronic mixing zone boundary (near field effects) using the 10^{th} percentile receiving water data collected by Spokane County from 2013-2015 and the 5^{th} percentile data for the discharge. The model based on a daily grab samples indicated that a potential might exist to cause the concentration at the chronic boundary to be slightly lower than the criterion.

However, a single daily grab sample does not reflect the actual minimum dissolved oxygen in the effluent. The data collected for DO in the receiving water was not part of a study designed to reflect the actual receiving water conditions. The proposed permit requires Spokane County to install a continuous dissolved oxygen meter on the effluent. The discharger must report the daily minimum dissolved oxygen concentration. Spokane County must design a study to collect receiving water dissolved oxygen samples that accounts for the seasonal variability in the receiving water and to reflect the actual conditions in the river.

Ecology will use the effluent and receiving water data to evaluate reasonable potential for dissolved oxygen. If reasonable potential exists, Ecology may modify the permit.

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

Under critical conditions, modeling predicts an exceedance of the 0.5 standard units when the low pH is below 6.5 for the discharge. Therefore, the proposed permit includes water quality-based effluent limits for pH of 6.5 to 8.5 standard units. The low pH is less stringent than the limit of 7.0-9.0 than in the permit issued in 2011. The previous permit was developed using receiving water flow prior to the FERC relicensing and did not have facility specific data. New information is available now that the facility is discharging and Spokane County collected receiving water samples above the effluent.

Bacteria - Under critical conditions, modeling predicts possible violations of the previous water quality standard for fecal coliforms for primary contact recreation, based on the technology-based fecal coliform limits in WAC 173-221.

The water quality bacteria criterion has changed from fecal coliform to *E.coli.* Because the transition is a change in bacterial indicator not more or less stringent than the previous standards, the proposed permit includes fecal coliform effluent average monthly geometric mean limit of 100 organisms/100 mL and a weekly geometric mean of 150 organisms/100 mL based on the previous criterion for primary contact recreation. In addition, the Permittee will be required to monitor for both fecal coliform and E.coli in order to develop a site-specific correlation. The proposed permit requires the County to implement the E.coli limit in the permit two years from the effective date of the permit.

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

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

The following aquatic life toxic pollutants are present in the discharge: chlorine, ammonia, metals (arsenic, cadmium, copper, lead, mercury, nickel, selenium, silver, thallium, and zinc), cyanide, and PCBs. Ecology conducted a reasonable potential analysis (See **Appendix D**) on the parameters with water quality-based numeric criteria to determine whether it would require effluent limits in this permit.

Ecology included chlorine in the reasonable potential analysis. For chlorine, Ecology did not find a reasonable potential based on the available data. The existing permit has chlorine limits for average monthly (16.8 μg/L) and daily maximum (33.6 μg/L) and the facility is able to comply with it. The proposed permit includes the same limit.

Ammonia's toxicity depends on that portion which is available in the unionized form. The amount of unionized ammonia depends on the temperature and pH in the receiving freshwater.

To evaluate ammonia toxicity, Ecology used the data submitted by Spokane County collected during the receiving water study. Ecology used the available data and determined that there is a reasonable potential for ammonia toxicity at the concentration that the static equivalency ammonia wasteload allocation is based upon. The reasonable potential calculations for ammonia toxicity are available in Appendix D. The limits for ammonia are:

Average monthly effluent limit: 1.83 mg/L

Maximum daily effluent limit: 8.64 mg/L

Total PCBs - Ecology evaluated the reasonable potential for total PCBs to cause or contribute to an exceedance of the water quality criteria. The discharge does have a reasonable potential as a result, Ecology derived a water quality-based effluent limit for both aquatic life and human health. The human health limit was more stringent. Ecology provides additional information in the Human Health section below.

Metals - Ecology determined that arsenic, copper, mercury, nickel, selenium, silver, and thallium pose no reasonable potential at the critical condition using procedures given in EPA, 1991 (**Appendix D**) and as described above. Ecology's determination assumes that this facility meets the other effluent limits of this permit. The current permit, issued in 2011, required Spokane County to sample the Spokane River for cadmium, lead, and zinc, but did not require river sampling for all the other metals in the SCRWRF discharge. The proposed permit will require Spokane to complete a trace metals and pH study of the river.

Ecology's 1999 Spokane River Metals TMDL Submittal Report outlines the approach Ecology takes when developing limits for cadmium, lead, and zinc. The permit writer uses the more restrictive of either a performance-based limit plus 10% or a limit based on effluent hardness and aquatic life criteria applied at the end of the pipe, without a mixing zone. The prior permit required Spokane County to collect ambient upstream cadmium, lead, and zinc data for the Spokane River for use in the reasonable potential evaluation and to calculate the limits for cadmium, lead and zinc.

Ecology used metals effluent and receiving water data supplied by Spokane County collected during the previous permit cycle for the reasonable potential, end of pipe limits, and performance-based limit plus 10% calculations. The performance-based effluent limits plus 10% is more stringent than the water quality, end of pipe limits. Therefore, the proposed permit implements the performance-based metals limits.

Table 21: Performance Based Effluent Limit Plus 10%

Parameter	Average Monthly (µg/L)	Maximum Day (µg/L)
Cadmium	0.057	0.126
Lead	0.202	0.409
Zinc	38.5	61.3

Table 22: Water Quality Based Effluent Limit at End of Pipe (Hardness Dependent)

Parameter	Average Monthly (µg/L)	Maximum Day (µg/L)
Cadmium	0.88	2.12
Lead	5.34	8.20
Zinc	80.6	125.1

Note: Limits assume one sample per month.

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

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

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

- Annual summer maximum and supplementary spawning/rearing criteria

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

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

  The threshold criteria apply at the edge of the chronic mixing zone. Criteria for the Spokane 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)(ii), WAC 173-201A-210(1)(c)(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.

- Protections for temperature acute effects

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

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

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

Reasonable Potential Analysis

Annual summer maximum and incremental warming criteria: Ecology calculated the reasonable potential for the discharge to exceed the annual summer maximum and the incremental warming criteria (See temperature calculations in **Appendix D**).

The discharge is only allowed to warm the water by a defined increment when the background (ambient) temperature is cooler than the assigned threshold criterion. Ecology allows warming increments only when they do not cause temperatures to exceed the annual maximum criteria.

The incremental increase for this discharge is within the allowable amount. Therefore, the proposed permit does not include a temperature limit.

H. Human health

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

Ecology determined the effluent might contain chemicals of concern for human health, based on:

- The facility's status as an EPA major discharger
- Data or information indicating the discharge contains regulated chemicals, and
- A 303(d) listing (quality impairment) of the receiving waterbody for a regulated chemical that Ecology knows or expects is present in the discharge

Ecology evaluated the discharge's potential to violate the water quality standards as required by 40 CFR 122.44(d) by following the procedures published in EPA Publication PB91-127415, the **Technical Support Document for Water Quality-Based Toxics Control**, and **Ecology's Permit Writer's Manual** to make a reasonable potential determination. The evaluation showed the discharge does not have a reasonable potential to exceed the numeric criterion but does have a reasonable potential to impact the designated use of fish harvest.

Due to the PCB 303 (d) listing the proposed permit includes an end of pipe effluent limit with no dilution for PCBs as follows:

- Average Monthly Effluent Limit 170 pg/L
- Maximum Daily Effluent Limit 414 pg/L

The limit does not include dilution and must be met at the point of discharge. This limit includes both an average monthly limit and a maximum daily limit based on statistics. If the discharger takes only one sample in a given month, then the sample is both the average month and the max day.

Total PCBs - The discharge has a reasonable potential to contribute to violations of the water quality narrative criteria for PCBs, based on the fish harvest usage, because of a Department of Health Fish Advisory and PCBs are known to be present in the effluent.

Ecology used effluent toxics data collected by Spokane County under the previous permit's approved QAPP, with a 10 times blank correction for the reasonable potential evaluation. Receiving water information for the reasonable potential analysis utilized Spokane River data collected by the Spokane River Regional Toxics Task Force at the Post Falls, Idaho gauge. Because PCBs are present in the effluent and the Spokane River is listed for PCBs in fish tissue, Ecology concludes the discharge has a reasonable potential to contribute to excursions above water quality standards for PCBs.

Federal regulations in 40 CFR Part 122.44(k) allows best management practices (BMPs) to control or abate the discharge of pollutants.

Permitting recommendations drafted by the EPA (NPDES Permitting Recommendations for the Spokane River Watershed, 2015) recommend a Best Management Practices (BMP) approach for PCB control. Ecology used this approach in prescribing permit requirements for the Spokane County related to toxics reduction. See Section V.K in this fact sheet for additional detail regarding toxics reduction strategies and the required BMP Implementation Plan submittal. The proposed permit requires the Spokane County to continue to make progress in toxics reduction.

I. Sediment quality

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

Ecology determined that this discharge has potential to cause a violation of the sediment quality standards because of PCBs in the discharge. The proposed permit includes a Special Condition requiring Spokane County to demonstrate either:

- The point of discharge is not an area of deposition, or
- Toxics do not accumulate in the sediments even though the point of discharge is a depositional area.

J. Whole effluent toxicity

The water quality standards for surface waters forbid discharge of effluent that has the potential to cause toxic effects in the receiving waters. Many toxic pollutants cannot be measured by commonly available detection methods. However, laboratory tests can measure toxicity directly by exposing living organisms to the wastewater and measuring their responses.

These tests measure the aggregate toxicity of the whole effluent, so this approach is called whole effluent toxicity (WET) testing. Some WET tests measure acute toxicity and other WET tests measure chronic toxicity.

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

Laboratories accredited by Ecology for WET testing know how to use the proper WET testing protocols, fulfill the data requirements, and submit results in the correct reporting format. Accredited laboratory staff know about WET testing and how to calculate an NOEC, LC50, EC50, IC25, etc.

Ecology gives all accredited labs the most recent version of Ecology Publication No. WQ-R-95-80, **Laboratory Guidance and Whole Effluent Toxicity Test Review Criteria** (https://apps.ecology.wa.gov/ecy/publications/documents/9580.pdf), which is referenced in the permit. Ecology recommends that Spokane County send a copy of the acute or chronic toxicity sections(s) of its NPDES permit to the laboratory.

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). ACEC is the concentration of effluent at the boundary of the acute mixing zone during critical conditions. The ACEC equals 50% 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. Spokane County 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 the previous permit term showed a reasonable potential for the effluent to cause chronic toxicity in the receiving water. The proposed permit will include a chronic toxicity limit. The effluent limit for chronic toxicity is no toxicity detected in a test sample representing the chronic critical effluent concentration (CCEC).

The CCEC is the concentration of effluent at the boundary of the mixing zone during critical conditions. The CCEC equals 6.4% effluent.

Compliance with a chronic toxicity limit is measured by a chronic toxicity test comparing the test organism response in effluent diluted to the CCEC, to test organism response in nontoxic control water. Spokane County is in compliance with the chronic toxicity limit if there is no statistically significant difference in test organism response between the CCEC sample and the control sample.

K. Groundwater quality limits

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

Ecology determined Spokane County's discharge has the potential to cause a violation of the groundwater quality standards. The proposed permit includes the following conditions to protect groundwater:

- Apply irrigation to the onsite vegetation at agronomic rates. The proposed permit will required Spokane County to add a section to the O&M providing the irrigation plan that prevents exceedance of the agronomic capacity of the vegetation irrigated. The plan must include the water balance and nutrient loading for the irrigated area.

L. Comparison of effluent limits with the previous permit issued November 29, 2011

Table 23: Comparison of Previous and Proposed Critical Seasons (March – October) TMDL Wasteload Allocations Outfall #001

Parameter	Basis of Limit	Previous Seasonal Limit	Proposed Seasonal Limit
Carbonaceous Biochemical Oxygen Demand (5-day) ($CBOD_5$)	TMDL	133.4 pounds/Day (lbs/day)	133.4 pounds/Day (lbs/day)
Total Phosphorous	TMDL	3.34 lbs/day	3.34 lbs/day
Total Ammonia (as NH3-N) March 1 – March31	TMDL	1067.5 lbs/day	129.7 lbs/day
Total Ammonia (as NH3-N) April 1 – May 31	TMDL	66.7 lbs/day	66.7 lbs/day
Total Ammonia (as NH3-N) June 1 – September 30	TMDL	16.7 lbs/day	16.7 lbs/day
Total Ammonia (as NH3-N) October 1 – October 31	TMDL	66.7 lbs/day	66.7 lbs/day

The total ammonia wasteload allocation for March 1 – March 31 is based on the toxicity limiting ammonia average concentration of 1.83 mg/L and flow of 8.5 mgd instead of the modeled 16 mg/L and flow of 8.0 mgd in the previous permit. The toxicity limits will apply year round. The flow used to calculate the March seasonal limit is the design flow of 8.5 mgd and is provided below.

Table 24: Comparison of Previous and Proposed Effluent Limits for Outfall # 001 – CBOD5 & TSS

Parameter	Basis of Limit	Previous Average Monthly	Previous Average Weekly	Proposed Average Monthly	Proposed Average Weekly
Carbonaceous Biochemical Oxygen Demand (5-day) ($CBOD_5$) November 1 – February 29	Technology Based Effluent Limit (TBEL)	4.2 mg/L 280 lbs/day	6.3 mg/L 420 lbs/day	2.0 mg/L 142 lbs/day	3.0 mg/L 213 lbs/day
Total Suspended Solids	TBEL	5 mg/L 334 lbs/day	7.5 mg/L 500 lbs/day	5 mg/L 354 lbs/day	7.5 mg/L 532 lbs/day

Ecology based the performance concentration for $CBOD_5$ on the maximum of 2.0 mg/L identified in the facility plan and used a factor of 1.5 to develop the weekly average. This is more stringent than the previous permit. The TSS load was recalculated using the maximum month average of 8.5 mgd. This gives a slightly less stringent TSS load but corrects the calculation error in the previous permit.

The previous permit utilized the $CBOD_5$ concentration used to calculation the wasteload allocation. This is the water quality-based concentration, which is less stringent than the approved design limit established for the technology. Ecology corrected this error in the proposed permit by requiring Spokane County to meet the technology-based concentration.

Table 25: Comparison of Previous and Proposed Effluent Limits for Outfall #001 – Fecal Coliform Bacteria

Parameter	Basis of Limit	Previous Monthly Geometric Mean Limit	Previous Weekly Geometric Mean Limit	Proposed Monthly Geometric Mean Limit	Proposed Weekly Geometric Mean Limit
Fecal Coliform Bacteria	TBEL	200/100 mL	400/100 mL	-	-
Fecal Coliform Bacteria (interim)	Previous Indicator organism	-	-	100/100mL	150/100 mL
E.coli (final)	WQBEL	--	--	100/100mL	150/100 mL

Ecology based the limit on the previous water quality standard indicator organism. The proposed permit requires Spokane County to sample for both fecal coliforms and E.coli. Ecology will implement the water quality-based bacterial indicator of E.coli in the next permit.

Table 26: Comparison of Previous and Proposed Effluent Limits for Outfall #001 - pH

Parameter	Basis of Limit	Previous Limit	Proposed Limit
pH	WQBEL-TBEL[a]	7.0-9.0 standard Units (s.u.)	NA
pH	WQBEL	NA	6.5 – 8.5 s.u.

Table 26 Footnote:
[a] The previous permit calculated a WQBEL for the lower limit and applied the TBEL as the upper limit.

Ecology based the limit for pH on the estimated flow from the FERC relicensing flow increase. The proposed permit requires Spokane County to evaluate the mixing zone and the receiving water pH and alkalinity. Ecology will reevaluate the pH limit in the next permit depending on what the new data shows for the Spokane River pH.

Table 27: Comparison of Previous and Proposed Effluent Limits for Outfall #001 – Chlorine, Cadmium, Lead, Zinc, and PCBs

Parameter	Basis of Limit	Previous Average Monthly	Previous Maximum Daily	Proposed Average Monthly	Proposed Maximum Daily
Chlorine (total residual)	WQBEL	16.8 µg/L	33.6 µg/L	16.8 µg/L	33.6 µg/L
Cadmium [a] (total)	WQBEL/Performance [c]	0.076 µg/L	0.233 µg/L	0.057 µg/L	0.126 µg/L
Lead (total)	WQBEL/Performance [c]	0.772 µg/L	1.34 µg/L	0.202 µg/L	0.409 µg/L
Zinc (total)	WQBEL/Performance [c]	53.8 µg/L	72.6 µg/L	38.5 µg/L	61.3 µg/L
PCB [b]	WQBEL	Narrative	Narrative	170 picogram/L (pg/L) and narrative	414 pg/L and narrative
Total Ammonia (As NH3-N)	WQBEL	16.0 mg/L	--	1.83 mg/L	8.64 mg/L

Table 27 Footnotes:
[a] The performance plus 10% limits for cadmium, lead, and zinc are more stringent than the end of pipe limits. As such, they are the proposed limits for this permit.

[b] For PCBs, the data collected for the new treatment system indicated that the facility does not have a reasonable potential to exceed the numeric criteria. However, the discharge does have a reasonable potential to effect the narrative criteria for PCBs. As a result, the County will have a numeric and narrative limit for PCBs.

[c] The water quality improvement plan, (TMDL), for cadmium, lead, and zinc requires that Ecology compare the performance of the facility plus 10% with the end of pipe water quality requirements. The TMDL implements a water quality based condition for the receiving water. This TMDL implements performance limits that meet water quality based criteria.

IV. Monitoring Requirements

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

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

A. Wastewater monitoring

The monitoring schedule is detailed in the proposed permit under Special Condition S2. Specified monitoring frequencies take into account the quantity and variability of the discharge, the treatment method, past compliance, significance of pollutants, and cost of monitoring. The required monitoring frequency is consistent with agency guidance given in the current version of Ecology's Permit Writer's Manual (Publication Number 92-109) for an activated sludge facility with flow greater than 5 mgd.

Monitoring of sludge quantity and quality is necessary to determine the appropriate uses of the sludge. Biosolids monitoring is required by the current state and local solid waste management program and by EPA under 40 CFR 503.

Ecology updated the water contact recreation bacteria criteria in January 2019. This change was effective January 1, 2021, and eliminated all recreational uses except for primary contact criteria in both fresh and marine waters. Primary contact criteria changed to E.coli for freshwater and to enterococci for marine water. Because Spokane County has an effluent limit based on recreation, this permit requires monitoring of both fecal coliform and E.coli during this permit cycle. Ecology will change to E.coli bacteria limit during the next permit cycle.

As a pretreatment publicly owned treatment works (POTW), Spokane County is required to sample influent, primary clarifier effluent, final effluent, and sludge for toxic pollutants in order to characterize the industrial input. Ecology and Spokane County will also use the sampling to determine if pollutants interfere with the treatment process or pass through the plant to the sludge or the receiving water. Spokane County will use the monitoring data to develop local limits, which commercial and industrial users must meet.

The proposed permit requires Spokane County to monitor for PCBs and PBDEs to further characterize the effluent. These pollutants could have a significant impact on the quality of the surface water.

B. Lab accreditation

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

Table 28: Spokane County Regional WRF Lab, EPA ID# WA01259 Accredited Parameters

Parameter Name	Category	Method Name	Matrix Description
Dissolved Oxygen	General Chemistry	Hach 10360 rev 1.2	Non-Potable Water
Alkalinity	General Chemistry	SM 2320 B-2011	Non-Potable Water
Hardness, Total (as CaCO3)	General Chemistry	SM 2340 C-2011	Non-Potable Water
Solids, Total Suspended	General Chemistry	SM 2540 D-2011	Non-Potable Water
Chlorine (Residual), Total	General Chemistry	SM 4500-Cl G-2011	Non-Potable Water
pH	General Chemistry	SM 4500-H+ B-2011	Non-Potable Water
Dissolved Oxygen	General Chemistry	SM 4500-O G-2011	Non-Potable Water
Carbonaceous BOD (CBOD)	General Chemistry	SM 5210 B-2011	Non-Potable Water

Spokane County also sends samples to:

- Eurofins Frontier Global Sciences, EPA lab ID # WA01273
- Anatek Labs, Inc. Spokane and Moscow, EPA Lab ID# WA00169 and ID00013 respectively
- Eurofins TestAmerica Corvallis, EPA Lab ID# OR00004

C. Effluent limits which are near detection or quantitation levels

The water quality-based effluent concentration limits for total residual chlorine, and total phosphorus are below 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% 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. Ecology requires permitted facilities to report estimated concentrations. When reporting maximum daily effluent concentrations, Ecology 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.

D. Total PCB analytical methods

The selection of the appropriate method for a wastewater PCB analysis relates to the anticipated concentration of the toxic in the sample. Method 608.3, approved by the EPA (40 CFR Part 136) has much higher detection and quantitation limits, DL and QL, respectively, than Method 1668. Method 1668 has not been approved by the EPA for compliance with effluent limits set in NPDES permits.

A comparison between DLs and QLs for Methods 608.3 and 1668 is below:

Table 29: EPA Method Comparison for PCBs

EPA Method/Criteria	Analyte	DL (µg/L)	QL (µg/L)
608.3	Aroclors	0.065	0.095
1628 [a]	Congeners	0.00019-0.00498	0.0005-0.020
1668 [a]	Congeners	0.000007-0.000030	0.00002-0.0002
Human Health Criteria	Sum Total	0.000170	---

Table 29 Footnote:

[a] DL and QL are variable and depend on the congener of interest. The range of values are reported.

Ecology has specified Method 1668 to evaluate BMP effectiveness in this proposed permit to ensure the return of usable data. Method 1668 results will enable Ecology to continue making measurable progress determinations related to reduction of toxicant loading to the Spokane River.

Ecology's Water Quality Program guidance regarding appropriate use of Method 1668 is summarized below. This guidance supports Ecology's decision to include this method for the purpose of BMP effectiveness monitoring in the proposed permit.

Method 1668, a very sensitive analytical method, has the capability of detecting 209 different PCB congeners. Costs for this analysis are significantly higher than Method 608.3.

Water quality standards are based on Total PCBs (the sum of all Aroclors, isomers, homologs, or congeners), and have most frequently been measured as a calculated sum of all or a select group of Aroclors found in a sample. The data generated by Method 1668 is far more complex and extensive than data generated by other methods (608.3 and 8082), and must be carefully managed, assessed and applied.

Data produced from this method must be used in a documented and consistent manner with procedures (e.g. blank correction, calculating total PCBs) specific to the level of certainty required in decision-making. The QA/QC must therefore be rigorous.

For example, when PCB concentrations are very low, background contamination in laboratory blanks may interfere with the calculation of total PCB. To address this, a process known as censoring or blank correction is often applied. The choice of a censoring technique is specific to data and project needs and should be spelled out in a Quality Assurance Project Plan (QAPP).

The most commonly used technique is described in EPA's National Functional Guidelines for the **Contract Laboratory Program** and is available online at https://www.epa.gov/clp/superfund-clp-national-functional-guidelines-data-review.

Ecology will continue to use the most sensitive methods approved by EPA to evaluate compliance with numeric effluent limits. This permit will require the use of method 608.3 as follows:

1. **Required monitoring to complete a permit application -** Use only 40 CFR Part 136 methods. 40 CFR 122.21(e)(3) says the application shall not be considered complete unless 40 CFR Part 136 approved methods are used.
2. **Evaluating compliance with numeric effluent limits -** Use only 40 CFR Part 136 methods. This is currently Method 608. 40 CFR 122.44(i)(1) specifically requires monitoring to assure compliance with permit limitations according to Part 136 approved methods.

Ecology will also use data from Method 1668 in targeted situations as follows:

1. **Evaluating reasonable potential -** Use all valid and applicable data, including data collected using methods not approved under 40 CFR Part 136 (e.g. Method 1668).

   EPA's **Technical Support Document (TSD), Section 3.2** supports the use of all available information when evaluating reasonable potential, including available data and in some cases the lack of data.

2. **Calculating numeric effluent limits** - Use all valid and applicable data, including data collected using methods not approved under 40 CFR Part 136 (e.g. Method 1668). If valid data collected using a more sensitive but non-Part 136 method make it feasible to calculate limits, those data should be used to calculate the numeric effluent limit.

   Effluent limits are required when there is reasonable potential (RP). Numeric effluent limits are required where it is feasible to calculate them.

3. **Conducting analysis for All Known Available and Reasonable Technology (AKART) -** Use methods appropriate for the facility.

   a) As a toxic pollutant, PCBs are subject to WAC 173-220-130 and RCW 90.48.520, which requires the application of all known, available, and reasonable methods to control toxicants in the applicant's wastewater (also known as AKART).

   a) Methods of control for PCBs may include, but are not limited to, treatment technology, source control, or best management practices.

   b) A general discussion about AKART and how it is applied in wastewater discharge permits is provided in Section 3 of Chapter 4 in Ecology's **Water Quality Program Permit Writer's Manual.**

   c) For the purposes of applying AKART, Method 1668 may be required where identification of sources based on congener profile is required, or where expected concentrations are below analytical levels achievable by 608, and where treatment to lower levels is found to be reasonable. Site-specific factors must be considered when choosing the appropriate test method.

4. **Evaluating effectiveness of best management practices -** Use methods appropriate for evaluating the effectiveness of the best management practice (BMP).

   PCB analytical method selection will depend on expected concentrations in the sampled media, the BMPs required or selected, and the potential sources of PCBs on and to the site.

   For example:

   - A PCB Aroclor Method (608 or 8082) would typically be required where it is sufficiently sensitive to evaluate the effectiveness of the BMP. For example, a source-tracing program aimed at finding and addressing PCB sources at individual properties based on PCB concentrations in catch basin solids that are routinely detectable using Method 8082.
   - Method 1668 would typically be required for source identification when the potential sources are likely to have different congener profiles. Where the sources of PCBs on an individual property are not known, PCB congener data may be useful in identifying sources on and to the site.
   - Method 1668 would typically be required when expected concentrations are below analytical levels achievable by an Aroclor method (608 or 8082). The congener method (1668) is needed to characterize influent, effluent, or ambient water quality where PCBs are expected to be below 0.016 µg/L. These data may be used to evaluate trends over time and to quantify reductions in influent, effluent and/or receiving waters.

V. Other Permit Conditions

A. Reporting and record keeping

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

B. Prevention of facility overloading

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

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

Special Condition S4 restricts the amount of flow.

A municipality that intends to apply for Ecology-administered funding for the design or construction of a facility project must comply with chapter 173-98 WAC. Spokane County should contact Ecology's regional office as early as practical before planning a project that may include Ecology-administered funding.

C. Operation and maintenance

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

D. Pretreatment

Duty to enforce discharge prohibitions

This provision prohibits the publicly owned treatment works (POTW) from authorizing or permitting an industrial discharger to discharge certain types of waste into the sanitary sewer.

- The first section of the pretreatment requirements prohibits the POTW from accepting pollutants that cause "pass-through" or "interference". This general prohibition is from 40 CFR §403.5(a). **Appendix C** of this fact sheet defines these terms.
- The second section reinforces a number of specific state and federal pretreatment prohibitions found in WAC 173-216-060 and 40 CFR §403.5(b). These reinforce that the POTW may not accept certain wastes, which:

  a. Are prohibited due to dangerous waste rules

  b. Are explosive or flammable

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

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

  e. Are hot enough to cause a problem

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

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

  h. Create noxious or toxic gases at any point

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

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

  These discharges include:

  a. Cooling water in significant volumes

  b. Stormwater and other direct inflow sources

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

Ecology delegated authority to Spokane County for permitting, monitoring, and enforcement over industrial users discharging to their treatment system to provide more direct and effective control of pollutants. Ecology oversees the delegated Industrial Pretreatment Program to assure compliance with federal pretreatment regulations (40 CFR Part 403) and categorical standards and state regulations (chapter 90.48 RCW and chapter 173-216 WAC).

As sufficient data becomes available, Spokane County must, in consultation with Ecology, reevaluate its local limits in order to prevent pass-through or interference. If any pollutant causes pass-through or interference, or exceeds established sludge standards, Spokane County must establish new local limits or revise existing local limits as required by 40 CFR 403.5. In addition, Ecology may require revision or establishment of local limits for any pollutant that causes a violation of water quality standards or established effluent limits, or that causes whole effluent toxicity.

Ecology may modify this permit to incorporate additional requirements relating to the establishment and enforcement of local limits for pollutants of concern.

E. Solid wastes

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

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

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

F. Spill plan

This facility stores a quantity of chemicals on-site that have the potential to cause water pollution if accidentally released. Ecology 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].

Spokane County developed a plan for preventing the accidental release of pollutants to state waters and for minimizing damages if such a spill occurs. The proposed permit requires the facility to update this plan and submit it to Ecology.

G. Effluent mixing and dye tracer study

Ecology estimated the amount of mixing of the discharge with receiving water and the potential for the mixture to violate the water quality standards for surface waters at the edge of the mixing zone (chapter 173-201A WAC). The proposed permit requires Spokane County to determine more accurately the mixing characteristics of the discharge into the Spokane River (Special Condition S10). The effluent mixing study must measure or model the characteristics of the discharge under conditions specified in the permit.

H. Receiving Water Studies

DO, Temperature, pH, Hardness, Alkalinity and Metals

The previous permit required Spokane County to continuously evaluate temperature June through October. Data was submitted for mid to end of June through October. The proposed permit requires Spokane County to monitor temperature year round to address the variations caused by groundwater influence. They should continue to monitor at the same locations provided that those locations are outside the influence of the effluent. The Spokane River temperature criterion is a 1-DMax of 20 C. The data should provide the daily max temperature and 7-DADMax for the data collected.

Spokane County collected approximately 2.5 years of data including some field parameters DO, pH, temperature and conductivity when they collected the ammonia , phosphorous, cadmium, lead, zinc, alkalinity, and hardness data in 2013-2015. Other than this data, the majority of available ambient ammonia, DO, pH, alkalinity, hardness, and metals monitoring data from the Spokane River comes from the monitoring stations located several miles upstream of the facility outfall or at the Green Street Bridge, downstream of the discharge. Ecology prefers upstream data for the evaluation for NPDES Permit reasonable potential calculations.

The previous permit required cadmium, lead, and zinc sampling. However, there are several trace metals in the effluent and no current data available for the receiving water. Therefore, the proposed permit requires Spokane County to complete a receiving water study for DO, temperature, pH, hardness, alkalinity, and metals during this proposed permit cycle. See Special Conditions S11 & S12in the proposed permit for deliverable dates and study requirements.

I. Toxics Reduction Strategies

Best Management Practices (BMPs) are the actions identified to manage, prevent contamination of, and treat wastewater discharges. 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.

The proposed permit specifies that a Toxics Reduction Best Management Practices Plan (BMP Plan) must be developed and implemented in order to control and abate the discharge of identified toxics.

Analytical method selection depends on the expected concentration in the sampled media. Spokane County must select the analytical method that best identifies the concentration and source of the toxics (PCBs, and PBDEs) removed through use of the BMPs.

BMP effectiveness monitoring does not require use of a Part 136 method, as Ecology does not consider this monitoring to be for compliance purposes. Therefore, the proposed permit requires the Permittee to use high-resolution methods for the BMP effectiveness monitoring. The proposed permit will require the County to submit a quality assurance project plan (QAPP) for PCBs, and PBDEs sampling.

At a minimum, the proposed permit will require implementation and assessment of the following BMPs:

- Submittal of an initial BMP Plan and annual assessments thereafter
- The continuation of source identification and removal actions for PCBs remaining within the Permittee's municipal wastewater sewer system

  The Permittee should refer to the Spokane River Regional Toxics Task Force 2016 Comprehensive Plan to Reduce Polychlorinated Biphenyls (PCBs) in the Spokane River.

  The plan, developed cooperatively with the Spokane River NPDES permitted dischargers including the City of Spokane, Spokane County, Liberty Lake Sewer and Water District, Inland Empire Paper, Kaiser, the environmental community, Tribes, and state and federal agencies, identifies a number of BMPs that may help to reduce PCBs in the Spokane River. The report is available on the SRRTTF website at http://srrttf.org/wp-content/uploads/2016/04/2016_Comp_Plan_Final_Approved.pdf
- The continuation of the public outreach and education efforts
- Identification of track down sampling and source removal actions for PBDEs
- Participation in the Spokane River Regional Toxics Task Force or an equivalent citizen advisory organization or committee

Spokane County's previous discharge permit, issued November 29, 2011, required the facility to reduce toxicant loading to the Spokane River. At the time of permit issuance, toxicants included total PCBs, 2,3,7,8 TCDD, and PBDE. Through the course of the permit cycle, attention primarily shifted to PCB source control and reduction.

The proposed permit Section S16 requires Spokane County to broaden their toxics reduction strategy to include PCBs and PBDEs. The proposed permit will revise the frequency of monitoring for 2,3,7,8 TCDD due to lack of detectable samples.

The proposed permit requires the Toxics Reduction Best Management Practices Plan to identify actions Spokane County will implement based on the previous permit cycle Toxics Management Plans for PCBs. Spokane County conducted influent and effluent sampling for PBDEs in the previous permit cycle. The sampling indicated that PBDEs are being discharged to the facility through the collection system. The evolving BMP plans must include sampling that identifies areas with sources of PBDEs and proposed actions to remove sources of the toxics.

The proposed permit requires Spokane County to assess annually the effectiveness of the BMP Plan through quantitative and qualitative (where appropriate) measures. Ecology understands that Spokane County's BMP implementation method will change throughout the permit cycle and that selected BMPs may be refined, removed, and replaced based on their effectiveness.

The Permittee is encouraged to use The Comprehensive Plan produced in 2016 by the Spokane River Regional Toxics Task Force and found at http://srrttf.org/wp-content/uploads/2016/04/2016_Comp_Plan_Final_Approved.pdf. Spokane County may also propose use of other actions that will provide the most benefit for toxics reduction. The proposed permit requires Spokane County to submit an updated Quality Assurance Project Plan (QAPP) for the BMP effectiveness monitoring for PCBs, and PBDEs.

Semiannual assessment monitoring using an appropriately sensitive method (e.g. PCBs: Method 1668 and PBDEs: Method 1614) may be required to evaluate the effectiveness of the BMPs used by the discharger. The proposed permit requires Spokane County to assess congener patterns for the influent when applicable as part of the effectiveness evaluation of the BMP Plan.

J. General conditions

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

VI. Permit Issuance Procedures

A. Permit modifications

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

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

B. Proposed permit issuance

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

VII. References for Text and Appendices

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

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

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

HDR, 2010 Wastewater Facilities Plan Amendment, Prepared for Spokane County

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2007. Task G101-Outfaqll Design Criteria

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

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

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

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

Permit and Wastewater Related Information

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

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September 1994. Dissolved Oxygen in the Spokane River Downstream from Inland Empire Paper Company with Recommendations for Wasteload Allocations for Biochemical Oxygen Demand. Ecology Publication No. 94-155

Water Pollution Control Federation.

1976. **Chlorination of Wastewater.**

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

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

Appendix A – Public Involvement Information

Ecology proposes to reissue a permit to Spokane County Regional Water Reclamation Facility. The permit includes wastewater discharge limits and other conditions. This fact sheet describes the facility and Ecology's reasons for requiring permit conditions.

Ecology placed a Public Notice of Application on March 29, 2021 and April 5, 2021 in the Spokesman Review to inform the public about the submitted application and to invite comment on the reissuance of this permit.

Ecology will place a Public Notice of Draft on March 18, 2022 in the Spokesman Review to inform the public and to invite comment on the proposed draft National Pollutant Discharge Elimination System permit and fact sheet.

The notice:

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

For frequently asked questions about public comments, Publication #03-07-023, **Effective Public Commenting,** is available on Ecology's website at https://fortress.wa.gov/ecy/publications/documents/0307023.pdf.

For more information, call the Department of Ecology Eastern Regional Office at (509) 329-3400 or visit Ecology's website at www.ecy.wa.gov.

The primary author of this permit and fact sheet is Diana Washington.

Appendix B – Your Right to Appeal

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

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

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

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

Table 30: Address and Location Information

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

Appendix C - Glossary

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

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

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

AKART – The acronym for "all known, available, and reasonable methods of prevention, control and treatment." AKART is a technology-based approach to limiting pollutants from wastewater discharges, which requires an engineering judgment and an economic judgment. AKART must be applied to all wastes and contaminants prior to entry into waters of the state in accordance with RCW 90.48.010 and RCW 90.48.520, WAC 173-200-030(2)(c)(ii), and WAC 173-216-110(1)(a).

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

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

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

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

Average monthly (intermittent) discharge limit – The average of the measured values obtained over a calendar month's 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 (BMP) – Schedules of activities, prohibitions of practices, maintenance procedures, and other physical, structural and/or managerial practices to prevent or reduce the pollution of waters of the state. BMPs include treatment systems, operating procedures, and practices to control: plant site runoff, spillage or leaks, sludge or waste disposal, or drainage from raw material storage. BMPs may be further categorized as operational, source control, erosion and sediment control, and treatment BMPs.

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

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

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

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

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

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

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

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

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

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

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

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

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

Detection limit – The minimum concentration of a substance that can be measured and reported with 99% 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 WAC 173-240-130.

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

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

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

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

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

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

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

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

- Inhibits or disrupts the POTW, its treatment processes or operations, or its sludge processes, use or disposal; and
- Therefore is a cause of a violation of any requirement of the POTW's NPDES permit (including an increase in the magnitude or duration of a violation) or of the prevention of sewage sludge use or disposal in compliance with the following statutory provisions and regulations or permits issued thereunder (or more stringent State or local regulations): Section 405 of the Clean Water Act, the Solid Waste Disposal Act (SWDA) (including title II, more commonly referred to as the Resource Conservation and Recovery Act (RCRA), and including State regulations contained in any State sludge management plan prepared pursuant to subtitle D of the SWDA), sludge regulations appearing in 40 CFR Part 501, the Clean Air Act, the Toxic Substances Control Act, and the Marine Protection, Research and Sanctuaries Act.

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

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

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

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

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

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

Method detection level (MDL) – See Detection Limit.

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

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

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

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

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

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

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

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

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

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

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

Quantitation level (QL) – Also known as Minimum Level of Quantitation (ML) – The lowest level at which the entire analytical system must give a recognizable signal and acceptable calibration point for the analyte. It is equivalent to the concentration of the lowest calibration standard, assuming that the lab has used all method-specified sample weights, volumes, and cleanup procedures. The QL is calculated by multiplying the MDL by 3.18 and rounding the result to the number nearest to (1, 2, or 5) x 10^n, where n is an integer. (64 FR 30417).
ALSO GIVEN AS:
The smallest detectable concentration of analyte greater than the Detection Limit (DL) where the

accuracy (precision & bias) achieves the objectives of the intended purpose. (Report of the Federal Advisory Committee on Detection and Quantitation Approaches and Uses in Clean Water Act Programs Submitted to the US Environmental Protection Agency December 2007).

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

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

Sample Maximum – No sample may exceed this value.

Significant industrial user (SIU) –

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

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

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

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

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

Soil scientist – An individual who is registered as a Certified or Registered Professional Soil Scientist or as a Certified Professional Soil Specialist by the American Registry of Certified Professionals in Agronomy, Crops, and Soils or by the National Society of Consulting Scientists or who has the credentials for membership.

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

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

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

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

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

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

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

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

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

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

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

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

Appendix D – Technical Calculations

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

Simple Mixing:

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

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

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

Reasonable Potential Analysis:

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

Calculation of Water Quality-Based Effluent Limits:

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

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

$$WLA_a = (\text{acute criteria} \times DF_a) - [(\text{background conc.} \times (DF_a - 1)]$$
$$WLA_c = (\text{chronic criteria} \times DF_c) - [(\text{background conc.} \times (DF_c - 1)]$$

where: DF_a = Acute Dilution Factor
DF_c = Chronic Dilution Factor

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

$$LTA_a = WLA_a \times e^{(0.5\sigma^2 - z\sigma)}$$

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

$z = 2.326$

CV = coefficient of variation = std. dev/mean

$$LTA_c = WLA_c \times e^{(0.5\sigma^2 - z\sigma)}$$

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

$z = 2.326$

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

MDL = Maximum Daily Limit

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

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

$z = 2.326$ (99th percentile occurrence)

LTA = Limiting long term average

AML = Average Monthly Limit

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

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

n = number of samples/month

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

LTA = Limiting long term average

Appendix D – Technical Calculations (Continued)

- Table D-1: Dilution Factor Calculations and Receiving Water Critical Conditions
- Table D-2: Freshwater Un-ionized Ammonia Criteria Calculation
- Table D-3: RPA Calculations
- Table D-4: RPA Calculations Continued
- Table D-5: RPA Calculations Continued
- Table D-6: WQBEL with no dilution for PCBs, Cadmium, Lead, and Zinc
- Table D-7: Cadmium Performance Based + 10% Limits
- Table D-8: Lead Performance Based + 10% Limits
- Table D-9: Zinc Performance Based + 10% Limits
- Table D-10: Minimum pH RPA
- Table D-11: Maximum pH RPA
- Table D-12: Dissolved Oxygen at the Chronic Boundary RPA
- Table D-13: Fecal Coliform RPA
- Table D-14: Temperature Reasonable Potential

Table D-1: Dilution Factor Calculations and Receiving Water Critical Conditions

Dilution Factor Calculations and Receiving Water Critical Conditions

Step 1: Enter Waterbody Type

Water Body Type	Freshwater

Facility Name	Spokane County WRF
Receiving Water	Spokane River

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

Do you want to enter dilution factors -or- flow data?	Flow Data

	Annual Average	Max Monthly Average	Daily Max
Facility Flow, MGD	8	8.5	12.1
Facility Flow, cfs (calculated)	12.38	13.15	18.72

	Condition	Receiving Water Flow, cfs	Allowable % of river flow	Max Dilution Factor Allowed
Aquatic Life - Acute	7Q10	773	0.025	**2.0**
Aquatic Life - Chronic	7Q10	773	0.25	**15.7**
HH-Non-Carcinogen	30Q5	1082.2	0.25	**21.6**
HH-Carcinogen	Harmonic Mean	2319	0.25	**47.8**
Whole river at 7Q10	7Q10	773	1	**59.8**

Step 3: Enter Critical Data

	Effluent	Receiving Water
Temp, °C	23.8	16.2
pH, s.u.	8.5	7.88
Alkalinity, mg/L as CaCO3	48	26.9
Hardness, mg/L CaCO3	110.6	30.6
Salinity, psu		
Receiving water TSS, mg/L (leave blank if unknown)		
If TSS is annual data, enter 'A'; if from critical period, enter 'S'; If no TSS, leave blank		

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

	Use 'Mixed Hardness' (Y/N)	Use 'Mixed Max Temp' (Y/N)	Use 'Mixed pH (Y/N)
	Y	Y	Y
Acute Zone Boundary	70.0	19.9	8.2
Chronic Zone Boundary	35.7	16.7	7.9
Whole river at 7Q10	31.9	16.3	7.9

Table D-2: Freshwater Un-ionized Ammonia Criteria Calculation

Freshwater Un-ionized Ammonia Criteria Calculation

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

	Background	mixed @ Acute Boundary	mixed @ Chronic Boundary	mixed @ Whole River
INPUT				
1. Receiving Water Temperature (deg C):	16.2	19.9	16.7	16.3
2. Receiving Water pH:	7.9	8.1	7.9	7.9
3. Is salmonid habitat an existing or designated use?	Yes	Yes	Yes	Yes
4. Are non-salmonid early life stages present or absent?	Absent	Absent	Absent	Absent
OUTPUT				
Using mixed temp and pH at mixing zone boundaries?	yes			
Ratio	13.500	13.500	13.500	13.500
FT	1.400	1.400	1.400	1.400
FPH	1.065	1.000	1.045	1.060
pKa	9.525	9.404	9.509	9.521
Unionized Fraction	0.022	0.052	0.025	0.023
Unionized ammonia NH3 criteria (mg/L as NH_3)				
Acute:	0.189	0.270	0.000	0.192
Chronic:	0.040	0.042	0.040	0.040
RESULTS				
Total ammonia nitrogen criteria (mg/L as N):				
Acute:	7.019	**4.261**		6.908
Chronic:	1.476		**1.347**	1.441

Table D-3: RPA Calculations

Reasonable Potential Calculation

Facility	Spokane County WRF
Water Body Type	Freshwater
Rec. Water Hardness	Acute=70, Chronic=35.7 mg/L

Dilution Factors:	Acute	Chronic
Aquatic Life	2.0	15.7
Human Health Carcinogenic		47.8
Human Health Non-Carcinogenic		21.6

Pollutant, CAS No. & NPDES Application Ref. No.			AMMONIA, Criteria as Total NH3	ANTIMONY (INORGANIC) 7440360 1M	ARSENIC (dissolved) 7440382 2M	BHC - ALPHA 319846 2P	BHC - BETA 319857 3P	BIS(2-ETHYLHEXYL) PHTHALATE 117817 13B	CADMIUM - 7440439 4M Hardness dependent	CHLORODIBROMOMETHANE 124481 8V	CHLOROFORM 67663 11V	CHROMIUM(TRI) -16065831 5M Hardness dependent	COPPER - 744058 6M Hardness dependent
Effluent Data	# of Samples (n)		22834	20	129	5	5	5	146	5	5	20	150
	Coeff of Variation (Cv)		2.23	0.76	0.34	0.6	0.6	0.6	0.89	0.6	0.6	0.595	0.658
	Effluent Concentration, ug/L (Max. or 95th Percentile)		16,000		0.86	0.010	0.027	0.29	0.088	0.858	1.882	0.578	6.69
	Calculated 50th percentile Effluent Conc. (when n>10)			3.33									2.93
Receiving Water Data	90th Percentile Conc., ug/L		15.4		0				0.188			0	0
	Geo Mean, ug/L			0		0	0	0		0	0		0
Water Quality Criteria	Aquatic Life Criteria, ug/L	Acute	4,261	-	360	-	-	-	2.5138	-	-	409.55	12.153
		Chronic	1,347	-	190			-	0.481	-	-	76.566	4.7071
	WQ Criteria for Protection of Human Health, ug/L		-	12	-	0.0005	0.0018	0.23	-	0.65	260	-	1300
	Metal Criteria Translator, decimal	Acute	-	-	1	-	-	-	0.943	-	-	0.316	0.996
		Chronic	-	-	1	-	-	-	0.943	-	-	0.86	0.996
	Carcinogen?		N	N	Y	Y	Y	Y	N	Y	Y	N	N

Aquatic Life Reasonable Potential

Effluent percentile value			0.950	0.950			0.950	0.950	0.950
s	$s^2=\ln(CV^2+1)$		1.337	0.331			0.764	0.551	0.600
Pn	$Pn=(1-\text{confidence level})^{1/n}$		1.000	0.977			0.980	0.861	0.980
Multiplier			1.00	1.00			1.00	1.36	1.00
Max concentration (ug/L) at edge of…		Acute	7,880	0.423			0.136	0.122	3.279
		Chronic	1,034	0.055			0.181	0.043	0.425
Reasonable Potential? Limit Required?			**YES**	**NO**			**NO**	**NO**	**NO**

Aquatic Life Limit Calculation

# of Compliance Samples Expected per month			20						
LTA Coeff. Var. (CV), decimal			2.23						
Permit Limit Coeff. Var. (CV), decimal			2.23						
Waste Load Allocations, ug/L		Acute	8644.3						
		Chronic	20912						
Long Term Averages, ug/L		Acute	942.66						
		Chronic	3871.2						
Limiting LTA, ug/L			942.66						
Metal Translator or 1?			1.00						
Average Monthly Limit (AML), ug/L			**1831.4**						
Maximum Daily Limit (MDL), ug/L			**8644.3**						

Human Health Reasonable Potential

s	$s^2=\ln(CV^2+1)$	0.6752	0.5545	0.5545	0.5545	0.5545	0.5545	0.5998
Pn	Pn=(1-confidence level)1/n	0.861	0.549	0.549	0.549	0.549	0.549	0.980
Multiplier		0.4809	0.9336	0.9336	0.9336	0.9336	0.9336	0.2909
Dilution Factor		21.575	47.845	47.845	47.845	47.845	47.845	21.575
Max Conc. at edge of Chronic Zone, ug/L		0.1543	0.0002	0.0005	5.7E-03	0.0167	0.0367	0.1358
Reasonable Potential? Limit Required?		**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**

Table D-4: RPA Calculations Cont.

Reasonable Potential Calculation - Page 2

Facility	Spokane County WRF
Water Body Type	Freshwater
Rec. Water Hardness	Acute=70, Chronic=35.7 mg/L

Dilution Factors:	Acute	Chronic
Aquatic Life	2.0	15.7
Human Health Carcinogenic		47.8
Human Health Non-Carcinogenic		21.6

Pollutant, CAS No. & NPDES Application Ref. No.			CYANIDE 57125 14M	DICHLOROBROMOMETHANE 75274 12V	DIETHYLPHTHALATE 84662 24E	DIMETHYLPHTHALATE 131113 25B	ENDOSULFAN SULFATE 103107 13P	LEAD - 7439921 7M Dependent on hardness	MERCURY 7439976 8M	NICKEL - 7440020 9M - Dependent on hardness	PHENOL 108952 10A	SELENIUM 7782492 10M	SILVER - 7740224 11M dependent on hardness.
Effluent Data	# of Samples (n)		20	5	5	5	5	129	61	20	20	20	81
	Coeff of Variation (Cv)		0.98	0.6	0.6	0.6	0.6	0.32	0.96	0.41	0.67	0.48	2.88
	Effluent Concentration, ug/L (Max. or 95th Percentile)		0.0291	1.882	0.9	0.77	0.0169	0.146	0.001	4.2		0.955	0.11
	Calculated 50th percentile Effluent Conc. (when n>10)		0.0051						0.00025	3.02	17	0.505	
Receiving Water Data	90th Percentile Conc., ug/L		0					0	0	0		0	0
	Geo Mean, ug/L		0	0	0	0	0		0	0	0	0	
Water Quality Criteria	Aquatic Life Criteria, ug/L	Acute	22	-	-	-	-	43.682	2.1	1046.3	-	20	1.8663
		Chronic	5.2	-	-	-	-	0.8068	0.012	65.759	-	5	-
	WQ Criteria for Protection of Human Health, ug/L		19	0.77	4200	92000	9.7	-	0.14	150	18000	120	-
	Metal Criteria Translator, decimal	Acute	-	-	-	-	-	0.466	0.85	0.998	-	-	0.85
		Chronic	-	-	-	-	-	0.466	-	0.997	-	-	-
	Carcinogen?		N	Y	N	N	N	N	N	N	N	N	N

Aquatic Life Reasonable Potential

Effluent percentile value			0.950					0.950	0.950	0.950		0.950	0.950
s	$s^2=\ln(CV^2+1)$		0.820					0.312	0.808	0.394		0.455	1.493
Pn	$Pn=(1\text{-confidence level})^{1/n}$		0.861					0.977	0.952	0.861		0.861	0.964
Multiplier			1.58					1.00	1.00	1.25		1.29	1.00
Max concentration (ug/L) at edge of…		Acute	0.023					0.033	0.000	2.572		0.607	0.046
		Chronic	0.003					0.004	0.000	0.333		0.079	0.007
Reasonable Potential? Limit Required?			**NO**					**NO**	**NO**	**NO**		**NO**	**NO**

Human Health Reasonable Potential

s	$s^2=\ln(CV^2+1)$	0.8205	0.5545	0.5545	0.5545	0.5545		0.8082	0.3942	0.6089	0.4553	
Pn	Pn=(1-confidence level)1/n	0.861	0.549	0.549	0.549	0.549		0.952	0.861	0.861	0.861	
Multiplier		0.4108	0.9336	0.9336	0.9336	0.9336		0.2603	0.6522	0.5167	0.6103	
Dilution Factor		21.575	47.845	21.575	21.575	21.575		21.575	21.575	21.575	21.575	
Max Conc. at edge of Chronic Zone, ug/L		0.0002	0.0367	0.0389	0.0333	0.0007		1.2E-05	0.14	0.788	0.0234	
Reasonable Potential? Limit Required?		**NO**	**NO**	**NO**	**NO**	**NO**		**NO**	**NO**	**NO**	**NO**	

Table D-5: RPA Calculations Cont.

Reasonable Potential Calculation - Page 3

Facility	Spokane County WRF
Water Body Type	Freshwater
Rec. Water Hardness	Acute=70, Chronic=35.7 mg/L

Dilution Factors:	Acute	Chronic
Aquatic Life	2.0	15.7
Human Health Carcinogenic		47.8
Human Health Non-Carcinogenic		21.6

Pollutant, CAS No. & NPDES Application Ref. No.		TETRACHLOROETHYLENE 127184 24V	THALLIUM 7440280 12M	ZINC- 7440666 13M hardness dependent	CHLORINE (Total Residual) 7782505							
Effluent Data	# of Samples (n)	5	20	129	1764							
	Coeff of Variation (Cv)	0.6	2.06	0.33	0.54	0.6	0.6	0.6	0.6	0.6	0.6	0.6
	Effluent Concentration, ug/L (Max. or 95th Percentile)	0.986		43.68	7.2							
	Calculated 50th percentile Effluent Conc. (when n>10)		0.0125	25.4								
Receiving Water Data	90th Percentile Conc., ug/L			54.88	0							
	Geo Mean, ug/L	0	0	25.59								
Water Quality Criteria	Aquatic Life Criteria, ug/L Acute	-	-	84.559	19							
	Aquatic Life Criteria, ug/L Chronic	-	-	43.661	11							
	WQ Criteria for Protection of Human Health, ug/L	4.9	0.24	2300	-							
	Metal Criteria Translator, decimal Acute	-	-	0.996	-							
	Metal Criteria Translator, decimal Chronic	-	-	0.996	-							
	Carcinogen?	Y	N	N	N							

Aquatic Life Reasonable Potential

Effluent percentile value				0.950	0.950							
s	$s^2=\ln(CV^2+1)$			0.322	0.506							
Pn	$Pn=(1-\text{confidence level})^{1/n}$			0.977	0.998							
Multiplier				1.00	1.00							
Max concentration (ug/L) at edge of...	Acute			49.283	3.543							
	Chronic			54.155	0.459							
Reasonable Potential? Limit Required?				YES	NO							

Aquatic Life Limit Calculation

# of Compliance Samples Expected per month				4								
LTA Coeff. Var. (CV), decimal				0.33								
Permit Limit Coeff. Var. (CV), decimal				0.33								
Waste Load Allocations, ug/L	Acute			115.2								
	Chronic			--								
Long Term Averages, ug/L	Acute			57.427								
	Chronic			--								
Limiting LTA, ug/L				57.427								
Metal Translator or 1?				1.00								
Average Monthly Limit (AML), ug/L				**74.5**								
Maximum Daily Limit (MDL), ug/L				**115.7**								

Human Health Reasonable Potential

s	$s^2=\ln(CV^2+1)$	0.5545	1.2872	0.3215								
Pn	$Pn=(1-\text{confidence level})1/n$	0.549	0.861	0.977								
Multiplier		0.9336	0.2476	0.5263								
Dilution Factor		47.845	21.575	21.575								
Max Conc. at edge of Chronic Zone, ug/L		0.0192	0.0006	25.581								
Reasonable Potential? Limit Required?		**NO**	**NO**	**NO**								

Table D-6: WQBEL with no dilution for PCBs, Cadmium, Lead, and Zinc

Aquatic Life and Human Health Limits Calculations

		Dilution Factors:	Acute	Chronic
Facility	Spokane County	Aquatic Life	1.0	1.0
Water Body Type	Freshwater	Human Health Carcinogenic		1.0
Eff. Water Hardness	110.6	Human Health Non-Carcinogenic		1.0

Pollutant, CAS No. & NPDES Application Ref. No.		CADMIUM - 7440439 4M Hardness dependent	LEAD - 7439921 7M Dependent on hardness	ZINC- 7440666 13M hardness dependent	Polychlorinated Biphenyls (PCB's) 53469219, 11097691, 1104282, 11141165, 12672296, 1096825, 12674112 18P-24P
Effluent Data	Coeff of Variation (Cv)	0.89	0.32	0.33	0.92
Receiving Water Data	90th Percentile Conc., ug/L	0.188	218	54.9	
	Geo Mean, ug/L	0		25.59	1.996E-05
Water Quality Criteria	Aquatic Life Criteria, ug/L Acute	4.1296	72.056	124.646344	2
	Chronic	1.1107	2.7748	113.821015	0.014
	WQ Criteria for Protection of Human Health, ug/L	-	-	2300	0.00017
	Metal Criteria Translator, decimal Acute	0.943	0.466	0.996	-
	Chronic	0.943	0.466	0.996	-
	Carcinogen?	N	N	N	Y

Aquatic Life Limit Calculation

# of Compliance Samples Expected per month		4	4	4	4
LTA Coeff. Var. (CV), decimal		0.89	0.32	0.33	0.92
Permit Limit Coeff. Var. (CV), decimal		0.89	0.32	0.33	0.92
Waste Load Allocations, ug/L	Acute	4.1296	72.056	124.646344	2
	Chronic	1.1107	2.7748	113.821015	0.014
Long Term Averages, ug/L	Acute	0.9355	36.596	62.1364654	0.4396779
	Chronic	0.4523	1.9414	78.794406	0.0055621
Limiting LTA, ug/L		0.4523	1.9414	62.1364654	0.0055621
Metal Translator or 1?		0.94	0.47	1.00	1.00
Average Monthly Limit (AML), ug/L		**0.88**	**5.34**	**80.6**	**0.010389**
Maximum Daily Limit (MDL), ug/L		**2.12**	**8.20**	**125.1**	**0.025301**

Human Health Limit Calculation

# of Compliance Samples Expected per month				4	4
Dilution Factor				1	1
Average Monthly Effluent Limit, ug/L				**2300**	**0.000170**
Maximum Daily Effluent Limit, ug/L				**3571**	**0.000414**

Table D-7: Cadmium Performance Based + 10% Limits

Cadmium Performance-based Effluent Limits Plus 10%

INPUT	
LogNormal Transformed Mean:	-3.7053
LogNormal Transformed Variance:	0.4381
Number of Samples per month for compliance monitoring:	4
Autocorrelation factor (n_e) (use 0 if unknown):	0
OUTPUT	
E(X) =	0.0306
V(X) =	0.001
VARn	0.1288
MEANn=	-3.5506
VAR(Xn)=	0.000
RESULTS	
Maximum Daily Effluent Limit:	**0.126**
Average Monthly Effluent Limit:	**0.057**

Table D-8: Lead Performance Based + 10% Limits

Lead Performance-based Effluent Limits Plus 10%

INPUT	
LogNormal Transformed Mean:	-2.3074
LogNormal Transformed Variance:	0.3212
Number of Samples per month for compliance monitoring:	4
Autocorrelation factor (n_e) (use 0 if unknown):	0
OUTPUT	
E(X) =	0.1169
V(X) =	0.005
VARn	0.0905
MEANn=	-2.1921
VAR(Xn)=	0.001
RESULTS	
Maximum Daily Effluent Limit:	**0.409**
Average Monthly Effluent Limit:	**0.202**

Table D-9: Zinc Performance Based + 10% Limits

Performance-based Effluent Limits Plus 10%

INPUT	
LogNormal Transformed Mean:	3.2236
LogNormal Transformed Variance:	0.1176
Number of Samples per month for compliance monitoring:	4
Autocorrelation factor (n_e) (use 0 if unknown):	0
OUTPUT	
E(X) =	26.6397
V(X) =	88.541
VARn	0.0307
MEANn=	3.2670
VAR(Xn)=	22.135
RESULTS	
Maximum Daily Effluent Limit:	**61.3**
Average Monthly Effluent Limit:	**38.5**

Table D-10: Minimum pH RPA

Calculation of Maximum Effluent pH Limit on Receiving Water Minimum pH

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

INPUT		
	@ Acute Boundary	@ Chronic Boundary
1. Dilution Factor at Mixing Zone Boundary	2.0	15.7
2. Ambient/Upstream/Background Conditions		
Temperature (deg C):	16.20	16.20
pH:	6.48	6.48
Alkalinity (mg CaCO3/L):	28.30	28.30
3. Effluent Characteristics		
Temperature (deg C):	23.80	23.80
pH:	8.50	8.50
Alkalinity (mg CaCO3/L):	48.00	48.00
4. Aquatic Life Use Designation	Other species (salmonid/redband trout/warmwater species)	
OUTPUT		
1. Ionization Constants		
Upstream/Background pKa:	6.41	6.41
Effluent pKa:	6.36	6.36
2. Ionization Fractions		
Upstream/Background Ionization Fraction:	0.54	0.54
Effluent Ionization Fraction:	0.99	0.99
3. Total Inorganic Carbon		
Upstream/Background Total Inorganic Carbon (mg CaCO3/L):	52	52
Effluent Total Inorganic Carbon (mg CaCO3/L):	48	48
4. Condtions at Mixing Zone Boundary		
Temperature (deg C):	20.00	16.68
Alkalinity (mg CaCO3/L):	38.15	29.55
Total Inorganic Carbon (mg CaCO3/L):	50.38	52.15
pKa:	6.38	6.41
5. Allowable pH change	NA	0.50
RESULTS		
pH at Mixing Zone Boundary:	**6.88**	**6.52**
pH change at Mixing Zone Boundary:	0.40	0.04
Is permit limit needed?	NO	NO

Table D-11: Maximum pH RPA

Calculation of Minimum Effluent pH Limit on Receiving Water Maximum pH

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

INPUT		
	@ Acute Boundary	@ Chronic Boundary
1. Dilution Factor at Mixing Zone Boundary	2.0	15.7
2. Ambient/Upstream/Background Conditions		
Temperature (deg C):	16.20	16.20
pH:	7.88	7.88
Alkalinity (mg CaCO3/L):	28.30	28.30
3. Effluent Characteristics		
Temperature (deg C):	21.70	23.80
pH:	6.52	6.50
Alkalinity (mg CaCO3/L):	48.00	48.00
4. Aquatic Life Use Designation	Other species (salmonid/redband trout/warmwater species)	
OUTPUT		
1. Ionization Constants		
Upstream/Background pKa:	6.41	6.41
Effluent pKa:	6.37	6.36
2. Ionization Fractions		
Upstream/Background Ionization Fraction:	0.97	0.97
Effluent Ionization Fraction:	0.59	0.58
3. Total Inorganic Carbon		
Upstream/Background Total Inorganic Carbon (mg CaCO3/L):	29	29
Effluent Total Inorganic Carbon (mg CaCO3/L):	82	83
4. Condtions at Mixing Zone Boundary		
Temperature (deg C):	18.95	16.68
Alkalinity (mg CaCO3/L):	38.15	29.55
Total Inorganic Carbon (mg CaCO3/L):	55.64	32.65
pKa:	6.39	6.41
5. Allowable pH change	NA	0.50
RESULTS		
pH at Mixing Zone Boundary:	**6.73**	**7.39**
pH change at Mixing Zone Boundary:	1.15	0.49
Is permit limit needed?	NO	NO

Table D-12: Dissolved Oxygen at the Chronic Boundary RPA

Calculation of Dissolved Oxygen at Chronic Mixing Zone

INPUT	
Chronic Dilution Factor	15.7
Receiving Water DO Concentration, mg/L	8.0
Effluent DO Concentration, mg/L	5.2
Effluent Immediate DO Demand (IDOD), mg/L	0
Surface Water Criteria, mg/L	*8*
OUTPUT	
DO at Mixing Zone Boundary, mg/L	**7.82**
DO decrease caused by effluent at chronic boundary, mg/L	**0.18**

Conclusion: At design flow, the discharge has a reasonable potential to violate water quality standards for dissolved oxygen.

Table D-13: Fecal Coliform RPA

RPA Calculation of Technology Based Fecal Coliform Limit at Chronic Mixing Zone Boundary

INPUT	
Chronic Dilution Factor	15.7
Receiving Water [Fecal Coliform], #/100 ml	204
Effluent [Fecal Coliform] - worst case, #/100 ml	400
Surface Water Criterion, #/100 ml	*100*
OUTPUT	
[Feal Coliform] at Mixing Zone Boundary, #/100 ml	**216**
Difference between mixed and ambient, #/100 ml	12

Conclusion: At design flow, the discharge has a reasonable potential to violate water quality standards for fecal coliform.

Table D-14: Temperature Reasonable Potential

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.

	Core Summer Critera	Supplemental Criteria
INPUT	July 1-Sept 14	Sept 15-July 1
1. Chronic Dilution Factor at Mixing Zone Boundary	15.7	15.7
2. 1DMax Ambient Temperature (T) (Upstream Background 90th percentile)	16.2 °C	Not available
3. 1DMax Effluent Temperature (95th percentile)	23.8 °C	20.1 °C
4. Aquatic Life Temperature WQ Criterion in Fresh Water	20.0 °C	20.0 °C
OUTPUT		
5. Temperature at Chronic Mixing Zone Boundary:	16.7 °C	
6. Incremental Temperature Increase or decrease:	0.5 °C	
7. Maximum Allowable Incremental Temperature Increase:	1.2 °C	
8. Maximum Allowable Temperature at Mixing Zone Boundary:	17.4 °C	20.0 °C
A. If ambient temp is warmer than WQ criterion		
9. Does temp fall within this warmer temp range?	NO	YES
10. **If YES - Use TMDL-based or performance-based limit - Do Not use this spreadsheet**		
B. If ambient temp is cooler than WQ criterion but within 28/(T_{amb}+7) of the criterion		
11. Does temp fall within this Incremental temp. range?	NO	---
12. Temp increase allowed at mixing zone boundary, if required:	---	---
C. If ambient temp is cooler than (WQ criterion - 28/(T_{amb}+7))		
13. Does temp fall within this Incremental temp. range?	YES	---
14. Temp increase allowed at mixing zone boundary, if required:	NO LIMIT	---
RESULTS		
15. Do any of the above cells show a temp increase?	**NO**	**NO**
16. Temperature Limit if Required?	**NO LIMIT**	**NO LIMIT**

Appendix E – Response to Comments

Ecology received comments on the draft documents following the 60-day public comment period. A summary of the comments and Ecology's responses are located at the end of this fact sheet as Appendix E-1.

Appendix F – Additional Figures

- Figure F-1: Process Flow Diagram

Figure F-1: Process Flow Diagram