

Fact Sheet for NPDES Permit WA0024473

City of Spokane – Riverside Park Water Reclamation Facility (RPWRF) and Pretreatment Program

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 City of Spokane Riverside Park Water Reclamation Facility (RPWRF).

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. Ecology placed a public notice on December 29, 2021 and May 11, 2022 to invite comments on the proposed draft permit and fact sheet. Copies of the fact sheet and draft permit for the City of Spokane NPDES permit WA0024473, were available for two separate comment periods from **December 29, 2021 until February 28, 2022 and May 11, 2022 until June 10, 2022**. For more details on preparing and filing comments about these documents, please see **Appendix A - Public Involvement Information**.

The City of Spokane (City) reviewed the draft permit and fact sheet for factual accuracy. Ecology corrected any errors or omissions regarding the facility's location, history, wastewater discharges, or receiving water prior to publishing this draft fact sheet for public notice.

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

Summary

The City of Spokane (City) owns and operates an activated sludge, wastewater treatment plant with tertiary membrane filtration that discharges to the Spokane River. Additionally, the City has 16 controlled combined sewer overflows (CSOs) that discharge to the Spokane River and one CSO that discharges to Latah Creek. Ecology issued the previous permit for this facility on June 16, 2011, with an effective date of July 1, 2011. Ecology administratively extended the permit in July 2016.

This proposed permit provides revised design criteria for the facility based on process upgrades to meet wasteload allocations (WLAs) set in the 2010 Spokane River Dissolved Oxygen TMDL (DO TMDL). As a result, biochemical oxygen demand and total suspended solids loadings changed slightly as compared to the previous permit. Ecology implemented the DO TMDL seasonal wasteload allocations in this permit.

The proposed permit also includes effluent limit revisions for cadmium, lead, and zinc per guidance in the 1998 Spokane River Metals TMDL. Other changes to effluent limits include water quality-based effluent limits for pH with interim limits and a compliance schedule. The permit requires monitoring of both fecal coliforms and E.coli. The permit has limits for fecal coliforms during the first two years of the permit cycle and E.coli limits become effective two years after the effective date of the permit.

This proposed permit implements numeric limits and narrative requirements for PCBs and includes a compliance schedule for engineering to modify the treatment system to meet PCB limits. It requires the City to continue and expand a toxics management strategy to achieve removal of toxics through implementation of best management practices. The proposed permit requires best management practices for toxics identified in the water quality assessment for the Spokane River. The strategy includes not only additional work on PCBs but also PBDEs and requires monitoring for mercury.

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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)
- Submission of plans and reports for construction and operation of combined sewer overflow reduction facilities (chapter 173-245 WAC)
- US EPA CSO control policy (59 FR 18688)

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

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

II. Background Information

Table 1: Facility Information

Applicant	City of Spokane
Facility Name and Address	Riverside Park Water Reclamation Facility (RPWRF) 4401 N. Aubrey L. White Parkway, Spokane, WA 99205
Contact at Facility	Michael Cannon, RPWRF Plant Manager (509) 625-4642 mcannon@spokanecity.org
Responsible Official	Marlene Feist, Public Works Director 808 W Spokane Falls Blvd, Spokane, WA 99201-3333 (509) 625-6505 mfeist@spokanecity.org
Type of Treatment	Activated Sludge with Membrane Filtration and Chlorination
Facility Location (NAD83/WGS84 reference datum)	Latitude: 47.695278 Longitude: -117.473889
Discharge Waterbody Name and Location (NAD83/WGS84 reference datum)	Spokane River at River Mile 67.4 Latitude: 47.695278 Longitude: -117.473889

Table 2: Permit Status

Renewal Date of Previous Permit	July 1, 2011
Application for Permit Renewal Submittal Date	December 21, 2015 and February 9, 2021
Date of Ecology Acceptance of Application	January 19, 2016 and February 11, 2021

Table 3: Inspection Status

Date of Last Non-sampling Inspection Date	October 25, 2018

Figure 1: Facility Location Map



A. Facility description

History

The City of Spokane (City) owns and operates a major domestic wastewater treatment system receiving wastewater, including a combined sewer overflow system, from the Spokane urban metropolitan area. Contributors to the City system include portions of the Spokane Valley, portions of Airway Heights, Fairchild Air Force Base, and Spokane International Airport. Additionally, Exotic Metals Forming in Airway Heights has an agreement with the City to accept their industrial wastewater instead of discharging to the Airway Heights reclaimed water facility.

In the past, the City also treated wastewater that Airway Heights and Spokane County are now treating at their new facilities. The City has an agreement with Airway Heights and Spokane County providing reserve capacity of 0.68 and 10 million gallons per day (mgd) respectively.

The City constructed the first sewer line in Spokane in 1888. The combined sewer discharged directly to the Spokane River. In the 1890s, the City sewered the downtown area with direct discharge to the river. In 1946, the City began installation of an interceptor system that would convey combined sewer and stormwater to a planned treatment system. The original system was designed to carry 2.3 times the dry weather flow based on a future population of 258,000 and max flow of 125 million gallons per day (mgd) of wastewater. In 1958, the City placed the first phase of the sewage treatment plant in to operation. They expanded the plant in 1961-62. The City increased capacity to 50 mgd during wet weather events; flow in excess of 50 mgd discharged directly to the river via 44-combined sewer overflows (CSOs).

In 1972, five months prior to the passage of the Clean Water Act, the City developed the 1972 Action Plan. The plan recommended upgrading the treatment works adding secondary treatment and disinfection for bypass flows during storm events. In 1977, the Sewer Overflow Abatement Plan laid out several alternatives for reducing the number of overflows including stormwater separation. The City completed the upgrade to secondary treatment in 1977.

In 1994, the City published the Combined Sewer Overflow Reduction Plan. The plan provided a 20-year schedule for reducing CSOs. The 1994 plan called for an integrated approach to CSO pollutant reduction including street cleaning, stormwater catch basin cleaning, infiltration and inflow control, water use reduction, storage facilities, optimization of existing control structures, and additional stormwater separation.

The 2005 Combined Sewer Overflow Reduction Plan Amendment made a recommendation to recalibrate the Stormwater Management Model (SWMM) using historic rain data. The plan also recommended CSO reduction alternatives. Several facilities were constructed and monitored for performance.

In 2008, the City entered into a settlement agreement with the Sierra Club regarding dry weather overflows to the River. They completed all the elements to the agreement by late 2011.

In 2014, Ecology received the CSO Reduction Plan Amendment, the Integrated Clean Water Plan, and NLT (Next Level of Treatment) Engineering Report/Wastewater Facilities Plan Amendment No. 3. Construction on the improvements began in 2015. The Integrated Clean Water Plan identified an integrated approach to the City's public works infrastructure projects to improve the tactics to identifying and addressing stormwater, CSO, and treatment system changes that help eliminate pollutants from the Spokane River. The plan included several recommendations including running the NLT system year round, not just during the TMDL wasteload allocation window, to remove toxic pollutants such as PCBs and to get to a cleaner river faster.

The City completed construction of the last CSO control facility, CSO 26, in August 2020. In October 2020, the City notified Ecology that construction of the NLT was substantially completed. In March of 2021, Ecology issued an Administrative Order, Docket Number 19912, providing the City with approval for intermittent bypass during startup of the tertiary membrane system, aka NLT. Ecology has not yet received the Construction Completion Certification.

Collection system status

The 2020 census indicates that the City's population is 227,579 up from 208,916 at the 2010 census. The City-owned sewage collection system also accepts wastewater from approximately 23,000 County and 9,000 Spokane Valley residents respectively. The total population served by the City is approximately 255,600. The City's system consists of the following:

- Approximately 879 miles of sanitary sewer lines
 - ~479 miles of separated sanitary sewer
 - ~400 miles of combined sewer
- Seventeen active inverted siphons (two inactive inverted siphons)
- Thirty-five sanitary sewer lift stations, six of which are part of the CSO and interceptor overflow (IO) facilities only operating when the tanks are full
- Seventeen controlled CSO outfalls
- One Wastewater Treatment Plant (WWTP) outfall (including treated CSO discharge)

The City completed a large combined sewer separation project in 1993, which separated 186 miles of sewer in the northern part of the City and eliminated an estimated 86 percent of the annual untreated CSO volume discharged to the Spokane River (City of Spokane, 1998). In 1994, Ecology approved the City's plan to eliminate CSOs to meet the State's CSO standard. The CSO regulation, WAC 173-245, requires the City to control CSO outfalls to no more than one discharge per year on average. Ecology is applying a one discharge per outfall per year using a 20-year rolling average. See Appendix D for an example calculation of this rolling average.

In 2014, the City updated their CSO Plan with an Amendment that revised the schedule. This updated CSO plan, in conjunction with the City of Spokane Integrated Plan, prescribes control solutions for each of the City's CSO basins.

The City made a substantial investment in an integrated plan that identified a solid path forward for CSO stormwater and the wastewater tertiary membrane treatment system. They voluntarily engaged in the planning process, demonstrating the City's desire to get to a cleaner river faster. Part of the effort in the resubmittal of the CSO Plan Amendment included revising the design storm used in the calculation of the storage tank volumes used in controlling CSO discharges.

The City completed implementation of the CSO compliance strategy in August 2020. Maps identifying all CSO outfalls and control structures locations are available in Appendix F (Figure F-4 and F-5) respectively. According to the City's 2020 CSO Annual Report, 15 of the 17 CSO outfalls are out of compliance with the 20-year rolling average. The report based compliance on the previous method for calculating compliance, which included overflows prior to control structure implementation. This fact sheet provides an updated method for calculating compliance for the controlled outfalls, based on modeled overflows using historic precipitation data discharging through the new control structures and using the model results to estimate outfalls for the new control structures, in Appendix D.

All but three CSOs, CSO 06, 07, and 24, have averaged one or fewer overflow events per year since achieving a "controlled" state; "controlled" meaning that the new structure has been in operation a full year. Ecology considers CSO 26 controlled as of August 2021. The City is still working out the final regulator setting to achieve compliance on CSO 06, 07, and 24.

The City has ongoing efforts to identify and reduce infiltration and inflow (I&I) to the collection system. This includes an effort to minimize Spokane River I&I into the collection system in areas where parts of the collection system are in the floodplain.

The Spokane County Regional Water Reclamation Facility (SCRWRF) initiated operation in 2011, removing approximately 8 mgd from the City's collection system. As a precautionary measure, the County maintains an agreement with the City of Spokane for 10 mgd of treatment plant and interceptor capacity. Spokane County's wastewater treatment plant discharges under NPDES permit WA0093317.

Treatment processes

A booklet describing basic [information about wastewater treatment processes](https://www.wef.org/resources/for-the-public/public-information/) is available to download at the **Water Environment Federation website** at <https://www.wef.org/resources/for-the-public/public-information/>.

Spokane's Riverside Park Water Reclamation Facility (RPWRF) sits on a 28-acre site in northwest Spokane along the north bank of the Spokane River (Figure 1). The RPWRF, a Class IV facility, currently provides wastewater treatment, which includes conventional secondary treatment plus year-round addition of alum for removal of zinc and other metals, seasonal nitrification of ammonia, and seasonal chemical phosphorus removal followed by tertiary membrane filtration. The City submitted the NLT Engineering Report in March 2014. They completed upgrades for the approved alternative in the prior permit cycle.

Three figures documenting the layout and the components of the treatment system and the flow through the facility are available in Appendix F (Figure F-1, F-2 and F-3).

The Class IV facility requires that a Group IV operator be in charge of the day-to-day activities. The City staffs the facility 24 hours a day, seven days a week. A Group IV operator manages the facility. The City staffs a minimum of five certified operators for each of three shifts. At least two of the operators have a minimum of Group III certification. The City has an incentive plan encouraging all operators to obtain at least a Group III certification. The City fully staffs the lab during the day shift Monday through Friday and has one technician available on Saturday and Sunday.

The treatment system consists of:

- Headworks with flow measurement, aerated grit removal, perforated plate screens with a washer and compactor, and includes excess CSO diversion
- Primary clarification with odor control including chemically enhanced primary treatment (CEPT) using alum (aluminum sulfate) as the coagulant
- Five aeration basins for nitrification and partial denitrification with upstream magnesium hydroxide pH adjustment
- Secondary clarification with upstream alum addition
 - Includes two CSO storage/treatment clarifiers
- Tertiary membranes with upstream alum addition
- Chlorine disinfection followed by dechlorination and discharge to the Spokane River
- Solids treatment via anaerobic digester and belt press

Wet Weather Treatment Process (added in response to comments received)

The treatment system was designed and approved to meet the DO TMDL. The design included managing wet weather flows by bypassing a portion of flow around the tertiary membranes. The effluent was designed to mix the maximum amount of tertiary treated effluent with secondary effluent followed by disinfection during wet weather events. The permit provides the City with an opportunity to optimize the system for managing wet weather flows. The permit requires that the wet weather operations process meet the permit limits in Permit Section S1.

Delegated Pretreatment Program

Ecology delegated pretreatment to the City of Spokane in 1987. Upon delegation, the City of Spokane became responsible for identifying industrial inputs from categorical and significant industrial dischargers to the City's publicly owned treatment works (POTW) as required by 40 CFR Part 403. You can find more information about the City's Pretreatment Program at the [City of Spokane's Industrial Pretreatment Program](https://my.spokanecity.org/publicworks/wastewater/business/) website online at <https://my.spokanecity.org/publicworks/wastewater/business/>.

The City issued industrial discharge agreements to 16 industries, and issued a general permit to 22 wastewater haulers. Additionally, the City has issued permits to the following Categorical Industrial Users (CIU) and Significant Industrial Users (SIU).

Categorical Industrial Users:

- Exotic Metals Forming
- International Aerospace Coatings
- Jubilant HollisterStier Labs
- Spokane Metal Finishing

Significant Industrial Users:

- AlSCO
- Baker Commodities
- Darigold-Spokane
- Fairchild Air Force Base
- Franz Bakery
- Goodrich
- Johanna Beverage
- Dry Fly Distilling

Solid wastes/Residual Solids

The treatment facilities remove solids during the treatment of the wastewater at the headworks (grit and screenings), and at the primary, secondary clarifiers and tertiary membranes in addition to incidental solids (rags, scum, and other debris) removed as part of the routine maintenance of the equipment. The City of Spokane drains grit, rags, scum, and screenings and disposes this solid waste at the local landfill. Solids removed from the primary, secondary clarifiers and tertiary membranes discharge to the gravity belt thickeners followed by anaerobic digestions and then belt filter press. The solids are then land applied under Biosolids Permit BS00000071 issued by Ecology's Solid Waste Management Program. This facility meets 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 via a side stream discharge at approximately river mile (RM) 67.6.

In the event of reaching hydraulic capacity, the City may use the CSO storage available at the treatment plant. Once this storage is at capacity, they bypass a portion of the flow past the secondary treatment portion of the plant. The primary treated effluent then combines with the fully treated waste stream prior to disinfection. The City disinfects the combined discharge, and then discharges to the river. Only one CSO-related bypass occurred at the facility during the last permit cycle, in May 2019.

In addition to the main outfall at the treatment facility, the City operates 17 CSO outfalls from the collection system. 16 CSOs discharge to the Spokane River and one discharges to Latah Creek during significant precipitation events and during system malfunctions in dry weather.

B. Description of the receiving water

The Spokane River basin encompasses over 6,000 square miles in Washington and Idaho. The headwaters begin at the outlet of Lake Coeur d’Alene in Idaho. The river flows west 112 river miles to the Columbia River in Washington. It flows through the cities of Post Falls and Coeur d’Alene in Idaho, and through the large urban areas of Spokane Valley and Spokane in Washington.

The flow regime for the Spokane River is dictated largely by freezing temperatures in the winter followed by spring and summer snowmelt. The annual harmonic mean flow is approximately 2,270 cfs as the river crosses the Idaho border. The harmonic mean flow increases to approximately 2,896 cfs downstream of downtown Spokane as an overall net influx of groundwater through this reach. The harmonic mean flow just upstream of the facility is approximately 3,062 cfs resulting from contribution of Hangman Creek and additional groundwater.

In Idaho, other point source outfalls to the Spokane River include the City of Coeur d’Alene, Hayden Area Regional Sewer Board POTW, and the City of Post Falls POTW. In Washington, point sources include Liberty Lake Sewer & Water District, Kaiser Aluminum Washington, Inland Empire Paper Company, Spokane County Regional Water Reclamation Facility, and the City of Spokane RPWRF and CSOs.

Significant nearby non-point sources of pollutants to the Spokane River include stormwater and agricultural pollution sources from Latah Creek (or Hangman Creek), Little Spokane River, and Coulee/Deep Creeks. The ambient Spokane River background data source is in Table 4. The only metals data available for the Spokane River in the reach adjacent to the City’s treatment plant outfall stems from analyses conducted in the early to mid-1990s as part of the metals assessment prior to the Spokane River Metals TMDL. The proposed permit includes a receiving water study for metals.

Table 4: Ambient Background Data

Parameter	Value Used	Source
Temperature (highest annual 1-DMax) (90 th percentile)	17.90 °C	Data collected by the Permittee during the permit cycle July-September
Temperature (highest annual 7-DADMax) (90 th percentile)	17.79°C	Data collected by the Permittee during the permit cycle
pH (Maximum/Minimum)	8.47/8.36 standard units	EIM Study ID WHM_WAM0 Spokane River at RM 69.6
Dissolved Oxygen (Minimum)	8.8 mg/L	EIM Study ID 54A120 Spokane River at Riverside State Park
Total Ammonia-N (90 th percentile)	0.0182 mg/L	EIM Study ID 54A120 Spokane River at Riverside State Park

Parameter	Value Used	Source
Fecal Coliform (median)	148/100 mL	EIM AMS001 2009-2010 at SPOKANE RIVER AT FORT WRIGHT BRIDGE
Turbidity (90 th percentile)	3.56 NTU	EIM AMS001 2009-2010 at SPOKANE RIVER AT FORT WRIGHT BRIDGE
Hardness (10th percentile)	30.45 mg/L as CaCO ₃	EIM Study ID AJOH0002 1993 metals study
Alkalinity (10 th percentile)	30 mg/L as CaCO ₃	2007-2008 EIM Study ID AMS001E at Riverside State Park
PCBs (90 th percentile and geomean)	110 pg/L and 28 pg/L	Spokane Gage SRRTTF data

C. Wastewater influent characterization

The City of Spokane reported the concentration of influent pollutants in discharge monitoring reports from September 1, 2016 to August 31, 2021. The influent wastewater is characterized as follows:

Table 5: Wastewater Influent Characterization

Parameter	Units	# of Samples	Average Value	Maximum Value
Biochemical Oxygen Demand (BOD ₅)	mg/L	1,579	184	339
Biochemical Oxygen Demand (BOD ₅)	lbs/day	1,583	47,128	111,694
Total Suspended Solids (TSS)	mg/L	1,583	177	500
Total Suspended Solids (TSS)	lbs/day	1,583	45,185	118,011
Flow	mgd	1,583	31.4	74.6
Nitrogen, Ammonia Total (As NH ₄)	mg/L	1,583	17.85	26.7
Nitrogen, Ammonia Total (As NH ₄)	lbs/day	1,583	4552	7,181
Phosphorus	mg/L	1,583	4.04	9.23
Phosphorus	lbs/day	1,538	1,033	2,151
Nitrate & Nitrite as N	mg/L	224	1.49	3.28
Total Nitrogen	mg/L	214	27.2	41.85

Parameter	Units	# of Samples	Average Value	Maximum Value
Temperature 7-DADMax	Degrees C	311	19.38	20.4
Temperature 1-DMax	Degrees C	335	19.36	22
Aluminum, Total	µg/L	112	313	3,070
Arsenic, Total	µg/L	112	3.69	4.38
Cadmium, Total	µg/L	112	0.174	0.438
Copper, Total	µg/L	112	37.5	68.7
Lead, Total	µg/L	112	2.64	10.1
Mercury, Total	µg/L	112	0.0460	0.24
Silver, Total	µg/L	112	0.572	3.21
Zinc, Total	µg/L	112	110	278
PBDE	pg/L	28	185,044	533,024
PCB (10x correction applied)	pg/L	56	10,798	46,959

D. Wastewater effluent characterization

The City of Spokane 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 September 1, 2016 to August 31, 2021. The wastewater effluent is characterized as follows:

Table 6: Wastewater Effluent Characterization

Parameter	Units	# of Samples	Average Value	Maximum Value
Flow	mgd	1,340	31.4	74.6
Biochemical Oxygen Demand (BOD ₅)	mg/L	1,582	7.4	34
Biochemical Oxygen Demand (BOD ₅)	lbs/day	1,582	1,964	9,783
Total Suspended Solids (TSS)	mg/L	1,583	10.0	48
Total Suspended Solids (TSS)	lbs/day	1,583	2,654	14,051
Phosphorus Total	mg/L	1,583	0.35	1.72
Phosphorus Total	lbs/day	1,583	93.7	504

Parameter	Units	# of Samples	Average Value	Maximum Value
Phosphorus Total Reactive	mg/L	1,583	0.21	0.96
Ammonia	mg/L	1,583	0.111	8.067
Ammonia	lbs/day	1,583	28.4	2,045
Nitrate/Nitrite	mg/L	225	19.23	31.42
Nitrogen (TKN+Nitrate+Nitrite)	mg/L	215	20.56	36.02
Oil and Grease	mg/L	15	4.3	8.2
Alkalinity	mg/L	1,583	85.4	152
Total Residual Chlorine	µg/L	4,263	3.05	362
Hardness (as CaCO ₃)	mg/L	93	207.9	280.0
Aluminum, Total	µg/L	112	550	1280
Antimony, Total	µg/L	93	0.243	0.796
Arsenic, Total	µg/L	112	1.68	3.74
Beryllium, Total	µg/L	93	0.011	0.092
Cadmium, Total	µg/L	112	0.0470	0.168
Chromium, Total	µg/L	93	0.248	1.530
Copper, Total	µg/L	112	5.41	18.5
Lead, Total	µg/L	112	0.429	0.715
Mercury, Total	µg/L	111	0.087	6.72
Nickel, Total	µg/L	93	1.37	8.88
Selenium, Total	µg/L	93	0.75	1.81
Silver, Total	µg/L	112	0.058	0.7
Thallium, Total	µg/L	93	0.0098	0.068
Zinc, Total	µg/L	112	40.8	61.4
Temperature 7-DADMax July1-Sept 14	°C	306	NA	21.26
Temperature 1-DADMax July1-Sept 14	°C	335	NA	23.7
Chloroform	µg/L	5	4.37	7.45
Dichlorobromomethane	µg/L	5	1.72	2.53
PBDEs	pg/L	25	10,699	66,474

Parameter	Units	# of Samples	Average Value	Maximum Value
PCBs(10x correction applied)	pg/L	23	285.8	948.8

Parameter	Units	# of Samples	Maximum Monthly Geometric Mean	Maximum Weekly Geometric Mean
Fecal Coliforms	#/100 mL	942	65.7	47.2

Parameter	Units	# of Samples	Minimum Value	Maximum Value
pH	standard units	1,583	6.00	8.92
Dissolved Oxygen	mg/L	1,581	3.9	14.0

E. Summary of compliance with previous permit issued

The previous permit placed effluent limits on:

- Biochemical oxygen demand
- Carbonaceous biochemical oxygen demand
- Total suspended
- Fecal coliform bacteria
- pH
- Total residual Chlorine
- Total Ammonia
- Phosphorous
- Cadmium
- Lead
- Zinc

The City of Spokane has not consistently complied with the effluent limits and permit conditions throughout the duration of the permit issued on June 16, 2011. Ecology assessed compliance based on its review of the facility's discharge monitoring reports (DMRs) and on inspections.

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

Table 7: Violations/Permit Triggers

Begin Date	Parameter	Statistical Base	Units	Value	Limit Min/Max	Violation
10/1/2011	Cadmium, Total	Average Monthly	µg/L	0.079	0.076	Numeric effluent violation
2/1/2012	Cadmium, Total	Average Monthly	µg/L	0.114	0.113	Numeric effluent violation
7/1/2012	Chlorine	Maximum	µg/L	35.9	22.2	Numeric effluent violation
3/1/2014	Chlorine	Average Monthly	µg/L	11.31	8.5	Numeric effluent violation
3/1/2014	Chlorine	Maximum	lbs/day	48.99	4.3	Numeric effluent violation
3/1/2014	Chlorine	Maximum	µg/L	184.9	22.2	Numeric effluent violation
8/1/2014	Cadmium	Average Monthly	µg/L	0.079	0.076	Numeric effluent violation
9/1/2014	Chlorine	Maximum	µg/L	37.6	22.2	Numeric effluent violation
10/1/2014	Cadmium, Total	Average Monthly	µg/L	0.105	0.076	Numeric effluent violation
10/1/2014	Zinc, Total	Average Monthly	µg/L	55.2	53.8	Numeric effluent violation
12/1/2014	Chlorine	Maximum	lbs/day	4.83	4.3	Numeric effluent violation
12/1/2014	Chlorine	Maximum	µg/L	23.5	22.2	Numeric effluent violation
1/1/2015	Cadmium, Total	Average Monthly	µg/L	0.115	0.113	Numeric effluent violation
10/1/2016	Chlorine	Maximum	µg/L	32.9	22.2	Numeric effluent violation
12/1/2016	Chlorine	Maximum	µg/L	35.6	22.2	Numeric effluent violation
6/1/2017	Chlorine	Maximum	µg/L	53.4	22.2	Numeric effluent violation
7/1/2017	Cadmium, Total	Average Monthly	µg/L	0.094	0.076	Numeric effluent violation
1/1/2020	Chlorine	Single Sample	µg/L	210	22.2	Numeric effluent violation

Begin Date	Parameter	Statistical Base	Units	Value	Limit Min/Max	Violation
3/1/2020	Chlorine	Average Monthly	µg/L	9.41	8.5	Numeric effluent violation
3/1/2020	Chlorine	Single Sample	µg/L	362	22.2	Numeric effluent violation
9/1/2020	Nitrogen (calculation)	Single Sample	µg/L	-	-	Analysis not Conducted
5/1/2020	Dissolved Oxygen	Single Sample	µg/L	-	-	Analysis not Conducted
2/1/2020	Dissolved Oxygen	Single Sample	µg/L	-	-	Analysis not Conducted
4/1/2014	Chlorine	Average Monthly	lbs/day	24	-	Analysis not Conducted
4/1/2014	Chlorine	Average Monthly	µg/L	8.5	-	Analysis not Conducted
5/1/2018	Biochemical Oxygen Demand (BOD ₅)	-	Percent	-	-	Frequency of Sampling Violation
5/1/2018	BOD ₅	-	lbs/day	-	-	Frequency of Sampling Violation
7/1/2017	BOD ₅	-	Percent	-	-	Improper/ Incorrect Reporting
7/1/2017	BOD ₅	-	lbs/day	-	-	Improper/ Incorrect Reporting
7/1/2017	BOD ₅	-	mg/L	-	-	Improper/ Incorrect Reporting
7/1/2017	BOD ₅	-	Percent	-	-	Improper/ Incorrect Reporting
7/1/2017	BOD ₅	-	lbs/day	-	-	Improper/ Incorrect Reporting
7/1/2017	BOD ₅	-	mg/L	-	-	Improper/ Incorrect Reporting

Begin Date	Parameter	Statistical Base	Units	Value	Limit Min/Max	Violation
5/19/2018	-	-	-	-	-	Overflow to Dry Land or Building Backup

Table 7 Footnotes:

µg/L – Micrograms per liter

lbs/day – pounds per day

mg/L – Milligrams per liter

Percent – Percent removal

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

Table 8: Permit Submittals

Submittal Name	Submittal Status	Due Date	Received Date
CSO Reporting (Annual)	Submitted	10/1/2021	4/12/2021
CSO Reporting (Annual)	Submitted	10/1/2021	6/8/2021
CSO Maintenance and Inspection Plan	Submitted	10/1/2021	4/1/2021
CSO Maintenance and Inspection Plan	Submitted	10/1/2021	4/6/2021
CSO Maintenance and Inspection Plan	Submitted	10/1/2021	4/6/2021
CSO Maintenance and Inspection Plan	Submitted	10/1/2021	6/8/2021
Pretreatment Report - City of Spokane	Submitted	3/31/2021	3/25/2021
CSO Maintenance and Inspection Report	Submitted	3/1/2021	1/21/2021
Notice of Completion of the Next Level of Treatment Facility	Not Received	11/1/2020	-
CSO Reporting (Annual)	Received	10/1/2020	9/14/2020
CSO Maintenance and Inspection Plan	Submitted	10/1/2020	9/14/2020
Wasteload Assessment	Submitted	7/1/2020	6/25/2020
Pretreatment Report – City of Spokane	Submitted	3/31/2020	3/2/2020
CSO Maintenance and Inspection Report	Submitted	3/1/2020	2/18/2020
O&M - Operation And Maintenance Manual (Update)	Submitted	12/1/2019	11/27/2019
O&M - Operation And Maintenance Manual (Update)	Submitted	12/1/2019	11/27/2019
CSO Reporting (Annual)	Received	10/1/2019	8/30/2019
CSO Maintenance and Inspection Plan	Received	10/1/2019	8/30/2019
Wasteload Assessment	Submitted	7/1/2019	6/28/2019
Pretreatment Report - City of Spokane	Received	3/31/2019	3/26/2019-
CSO Maintenance and Inspection Report	Received	3/1/2019	2/28/2019
CSO Reporting (Annual)	Received	10/1/2018	9/28/2018
CSO Maintenance and Inspection Plan	Received	10/1/2018	9/28/2019
Wasteload Assessment	Submitted	7/1/2018	7/2/2018
Pretreatment Report - City of Spokane	Submitted	3/31/2018	3/28/2018

Submittal Name	Submittal Status	Due Date	Received Date
CSO Maintenance and Inspection Report	Received	3/1/2018	3/1/2018
Cert of Construction & Start Up Completion	Not Received	3/1/2018	-
CSO Reporting (Annual)	Received	10/1/2017	9/28/2017
CSO Maintenance and Inspection Plan	Received	10/1/2017	9/28/2017
Toxics Management Plan	Received	9/15/2017	9/13/2012
Toxics Management Plan	Submitted	9/15/2017	9/13/2017
Toxics Management Plan	Submitted	9/15/2017	9/13/2017
Wasteload Assessment	Submitted	7/1/2017	7/13/2017
Pretreatment Report - City of Spokane	Received	3/31/2017	3/30/2017
CSO Maintenance and Inspection Report	Received	3/1/2017	3/1/2017
Noncompliance Notification (S3) Written Report Within 30 Days	Received	10/5/2016	10/5/2016
CSO Reporting (Annual)	Received	10/1/2016	9/30/2016
CSO Reduction Plan	Received	10/1/2016	9/30/2016
CSO Maintenance and Inspection Plan	Received	10/1/2016	9/30/2016
Wasteload Assessment	Received	7/1/2016	6/29/2016
Pretreatment Report – Spokane County	Received	5/1/2016	4/14/2016
Pretreatment Report - City of Spokane	Received	3/31/2016	3/31/2016
CSO Maintenance and Inspection Report	Received	3/1/2016	10/1/2015
Mercury Control Plan - County	Received	2/15/2016	2/12/2016
Mercury Control Plan - City	Received	2/1/2016	2/12/2016
Application For Permit Renewal	Received	1/1/2016	12/21/2015
CSO Reporting (Annual)	Received	10/1/2015	10/1/2015
CSO Maintenance and Inspection Plan	Received	10/1/2015	10/1/2015
Wasteload Assessment	Received	7/1/2015	6/26/2015
Contract Documents – Phosphorus Removal	Not Received	5/5/2015	-
Pretreatment Report - Spokane County	Received	5/1/2015	4/29/2015
Pretreatment Report - City of Spokane	Received	3/31/2015	3/28/2015
CSO Maintenance and Inspection Report	Received	3/1/2015	10/1/2014
O&M - Operation And Maintenance Manual (Update)	Accepted	12/1/2014	12/1/2014
CSO Reporting (Annual)	Received	10/1/2014	10/1/2014
Accident Spill Plan	Received	10/1/2014	9/29/2014
Spill Prevention Plan	Received	10/1/2014	9/29/2014
CSO Maintenance and Inspection Plan	Received	10/1/2014	10/1/2014
Wasteload Assessment	Accepted	7/1/2014	6/25/2014
Pretreatment Report - Spokane County	Reviewed	5/1/2014	4/21/2014
Pretreatment Report - City of Spokane	Reviewed	3/31/2014	3/31/2014
Integrated Clean Water Plan (Draft)	Received	3/14/2014	3/14/2014
Engineering: Engineering Report	Reviewed	1/7/2014	1/3/2014

Submittal Name	Submittal Status	Due Date	Received Date
CSO Reporting (Annual)	Received	10/1/2013	9/30/2013
CSO Maintenance and Inspection Plan	Received	10/1/2013	9/30/2013
Wasteload Assessment	Received	7/1/2013	6/20/2013
Pretreatment Report - Spokane County	Received	5/1/2013	4/30/2013
Pretreatment Report - City of Spokane	Received	3/31/2013	3/28/2013
CSO Maintenance and Inspection Report	Received	3/1/2013	2/28/2013
Pretreatment Report - City of Spokane	Received	12/31/2012	3/23/2012
Local Limits Update - County	Received	12/15/2012	6/1/2012
Pretreatment Report - Spokane County	Received	12/1/2012	4/30/2012
Wasteload Assessment	Received	12/1/2012	6/15/2012
Local Limits Update - City	Received	10/15/2012	5/31/2011
Local Limits Update - City	Received	10/15/2012	1/2/2020
CSO Reporting (Annual)	Accepted	10/1/2012	10/1/2012
CSO Maintenance and Inspection Plan	Received	10/1/2012	10/1/2012
Toxics Management Plan	Received	9/15/2012	9/13/2012
Toxics Management Plan	Submitted	9/15/2012	9/14/2018
Toxics Management Plan	Submitted	9/15/2012	9/12/2019
Toxics Management Plan	Submitted	9/15/2012	9/10/2020
Quality Assurance Project Plan (QAPP) - FOR PCBS, PBDE, DIOXINS	Reviewed	3/15/2012	5/3/2012
CSO Maintenance and Inspection Report	Received	3/1/2012	10/1/2012
CSO Maintenance and Inspection Report	Received	3/1/2012	5/15/2019
Regional Toxics Task Force Documents	Received	11/30/2011	11/30/2011
CSO Reporting (Annual)	Received	10/1/2011	3/14/2012
CSO Maintenance and Inspection Plan	Reviewed	10/1/2011	10/19/2011
Noncompliance Notification (S3) Written Report Within 30 Days	Submitted	As needed	6/15/2017
Noncompliance Notification (S3) Written Report Within 30 Days	Submitted	As needed	8/15/2017
Noncompliance Notification (S3) Written Report Within 30 Days	Received	As needed	5/15/2019
Noncompliance Notification (S3) Written Report Within 30 Days	Received	As needed	6/14/2019
O&M - Operation And Maintenance Manual Annual Update	Received	As needed	11/30/2016
O&M - Operation And Maintenance Manual Annual Update	Submitted	As needed	12/1/2017
O&M - Operation And Maintenance Manual Annual Update	Received	As needed	11/30/2017
O&M - Operation And Maintenance Manual Annual Update	Submitted	As needed	11/28/2018
Technical Memo	Submitted	As needed	2/9/2018
Signatory Requirements/Signature Delegation	Received	As needed	9/20/2018

Submittal Name	Submittal Status	Due Date	Received Date
Bypass Reporting	Received	As needed	12/7/2018
Technical Memorandum	Received	As needed	12/7/2018
Permit Related - As Needed	Received	As needed	4/4/2019
Permit Related - As Needed	Submitted	As needed	3/12/2020
Permit Related - As Needed	Submitted	As needed	5/22/2020
Permit Related - As Needed	Submitted	As needed	7/30/2020
Permit Related - As Needed	Submitted	As needed	3/25/2021
Noncompliance Notification Sampling and Analysis Results	Received	As needed	5/13/2021
Request for Change in Monitoring	Received	As needed	10/23/2019
CSO Noncompliance Notifications	Received	As needed	2/24/2020
SSO Report	Submitted	As needed	3/12/2021
SSO Report	Submitted	As needed	3/25/2021
SSO Report	Submitted	As needed	5/13/2021
SSO Report	Submitted	As needed	5/19/2021
SSO Report	Submitted	As needed	6/18/2021
Bioassay Results	Received	As needed	10/28/2015
Bioassay Results	Submitted	As needed	11/25/2020
Bioassay Results	Submitted	As needed	12/10/2020
Bioassay Results	Submitted	As needed	1/28/2021
Electronic Signature Agreement Forms	Received	As needed	10/8/2020

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.

- 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 NLT Engineering Report/Wastewater Facilities Plan Amendment No.3 dated March 2014 and prepared by CH2MHILL. The table below includes design criteria from the referenced report.

Table 9: Design Criteria for City of Spokane Riverside Park Water Reclamation Facility (RPWRF)

Parameter	Design Quantity
Maximum Month Critical Season Design Flow	68.1 mgd
Monthly Average Critical Season Flow	43.2 mgd
Maximum 1-day Critical Season Flow	94.6 mgd
Membrane Filters Monthly Average Flow	50.0 mgd
BOD ₅ Loading for Maximum Month	69,164 lbs/day
TSS Loading for Maximum Month	71,067 lbs/day
Ammonia as N Loading for Maximum Month	6,764 lbs/day
Total Phosphorus as P Loading for Maximum Month	1,544 lbs/day

B. Technology-based effluent limits

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

The federal CSO Control Policy (59 FR 18688) also requires entities with Combined Sewer Overflows to implement “Nine Minimum Controls” as technology-based performance standards for CSO discharges. Nine Minimum Controls are discussed in more detail in Section V of this fact sheet.

The table below identifies technology-based limits for pH, fecal coliform, BOD₅, and TSS, as listed in chapter 173-221 WAC. Section III.F of this fact sheet describes the potential for water quality-based limits. Ecology will develop performance based limits for BOD₅, CBOD₅, and TSS for the tertiary membrane system in the next permit cycle.

Table 10: Technology-based Limits

Parameter	Average Monthly Limit	Average Weekly Limit
BOD ₅ (concentration) ^a	30 mg/L	45 mg/L
CBOD ₅ (concentration) ^b	25 mg/L	40 mg/L
TSS (concentration) ^c	30 mg/L	45 mg/L

Table 10 Footnotes:

^a BOD₅ (concentration): In addition, the BOD₅ effluent concentration must not exceed fifteen percent (15%) of the average influent concentration.

^b CBOD₅ (concentration): In addition, the CBOD₅ effluent concentration must not exceed fifteen percent (15%) of the average influent concentration.

^c TSS (concentration): In addition, the TSS effluent concentration must not exceed fifteen percent (15%) of the average influent concentration.

The existing permit has a **chlorine limit** of 8.5 µg/L (average monthly) and 22.2 µg/L (maximum daily). The facility is able to comply with it and these values do not have a reasonable potential. The proposed permit includes the same year round limit.

Table 11: Technology-based Limits for Fecal Coliform

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

Ecology evaluated the technology based limits for fecal coliforms and found them to result in a reasonable potential. Ecology discusses this finding and the approach to the bacterial limits in the reasonable potential section.

Table 12: Technology-based Limits for pH

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

The existing permit has technology based limits of 6 to 9 standard Units. Ecology evaluated these limits for reasonable potential and found that the technology based limits resulted in a reasonable potential. This is discussed in more detail in the reasonable potential section.

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

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

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

Table 13: Technology-based Mass Limits (TSS)

Parameter	Influent Loading (lbs/day)	Mass Limit (lbs/day)
TSS Monthly Average	71,067	10,660
TSS Weekly Average	-	15,990

During the previous permit, the Permittee sampled both CBOD₅ and BOD₅. Ecology will use the CBOD₅ limits calculated below in the permit instead of BOD₅ limits.

Technology-based mass limits for CBOD₅ are based on WAC 173-220-130(3)(b) and WAC 173-221-030(11)(b). Ecology calculated the monthly and weekly average mass limits for CBOD₅ as follows:

Mass Limit = CL x DF x CF

Where:

CL = Technology-based concentration limits listed in the Table 10 above

DF = Maximum Monthly Average Design Flow (mgd) = 68.1

CF = Conversion Factor of 8.34

Table 14: Technology-based Mass Limits (CBOD₅)

Parameter	Concentration Limit (mg/L)	Mass Limit (lbs/day)
CBOD ₅ Monthly Average	25	14,199
CBOD ₅ Weekly Average	40	22,718

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. Recently (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, listed in WAC 173-201A-240, Toxic Substances Criteria. For PCBs, the current applicable human health criteria is 170 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.

Narrative criteria

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

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

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

Antidegradation

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

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

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

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

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

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

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

- 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.

Combined Sewer Overflows

Chapter 173-245 WAC requires that "All CSO sites shall achieve and at least maintain the greatest reasonable reduction, and neither cause violations of applicable water quality standards, nor restrictions to the characteristic uses of the receiving water, nor accumulation of deposits which: (a) Exceed sediment criteria or standards; or (b) have an adverse biological effect." "The greatest reasonable reduction" means control of each CSO outfall such that an average of no more than one untreated discharge may occur per year. Ecology includes specific conditions in the proposed permit to ensure that the City continues to make progress toward meeting water quality goals for each CSO outfall in its system. Section V of this fact sheet contains more detailed information on these CSO requirements.

Mixing zones

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

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

The state's water quality standards allow Ecology to authorize mixing zones for the facility's permitted wastewater discharges only if those discharges already receive 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 is applied at both the acute and chronic mixing zone boundaries; the latter is applied only at the chronic boundary. The concentration of pollutants at the boundaries of any of these mixing zones may not exceed the numerical criteria for that zone.

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

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

These assumptions include:

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

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

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

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

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

Ecology has determined that the treatment provided at The City of Spokane’s RPWRF meets the requirements of AKART.

3. Ecology must consider critical discharge conditions.

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

Critical discharge conditions are those conditions that result in reduced dilution or increased effect of the pollutant. Factors affecting dilution include the depth of water, the density stratification in the water column, the currents, and the rate of discharge. Density stratification is determined by the salinity and temperature of the receiving water. Temperatures are warmer in the surface waters in summer. Therefore, density stratification is generally greatest during the summer months. Density stratification affects how far up in the water column a freshwater plume may rise. The rate of mixing is greatest when an effluent is rising. The effluent stops rising when the mixed effluent is the same density as the surrounding water. After the effluent stops rising, the rate of mixing is much more gradual. Water depth can affect dilution when a plume might rise to the surface when there is little or no stratification. [Ecology’s Permit Writer’s Manual](#) describes additional guidance on criteria/design conditions for determining dilution factors and is available at <https://apps.ecology.wa.gov/publications/documents/92109.pdf>.

Table 15: Critical Conditions Used to Model the Discharge

Critical Season Critical Conditions	Value
The seven-day-average low river flow with a recurrence interval of ten years (7Q10), used for aquatic life acute and chronic reasonable potential analysis (RPA).	1049.5 cfs
The thirty-day low river flow with a recurrence interval of five years (30Q5) used for human health non-carcinogen RPA.	1202.3 cfs
The Harmonic Mean used for human health carcinogen RPA.	3002.4 cfs
1-DAD Max receiving water temperature (90 th percentile)	17.9 degrees C
Maximum average monthly facility effluent flow for chronic and human health non-carcinogen	68.1 mgd
Annual average facility effluent flow for human health carcinogen	43.2mgd
Maximum daily facility effluent flow for acute mixing zone	94.6 mgd
1-DAD Max effluent water temperature (95 th percentile)	21 degrees C

Ecology obtained ambient flow data from USGS gauging station 12422500 located on the Spokane River at the Sandifer Bridge and USGS gauging station 12424000 located on Hangman Creek near the confluence with the Spokane River. Data from a period of 2009 through 2020 was used in the calculation of the instream flows for the Spokane River gauge and 1949-2020 was used for the Hangman Creek gauge. Ecology used the EPA developed software, DFlow, to evaluate flow statistics for the proposed permit. Additionally, the Water Quality program worked with the Water Resources program to evaluate the impact of the newly adopted Spokane River Instream Flow Rule (Chapter 173-577 WAC) on the Spokane River 7Q10. In addition to Hangman Creek, the Spokane River gains flow from the aquifer between the gauging station at the Sandifer Bridge and the treatment plant's discharge outfall.

Evaluations at the Trinity Well in Spokane by Ecology's Eastern Regional Water Resources program have consistently substantiated the additional volumetric flow rate of 300 cfs between the gauging station and the outfall. Ecology calculated the 7Q10, 30Q5, and the harmonic mean flow, by adding the flow for each category for the Spokane River to the flow coming in from Hangman Creek plus 300 cfs to account for the groundwater contribution. The values for each of these flows are available in Table 15. Ecology based the dilution factors on 25 percent of the flow.

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

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

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

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

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

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

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

Ecology determined 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 the City of Spokane to conduct a mixing zone and dye tracer evaluation of the discharge, which will make this information available for the next permit reissuance.

Ecology 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. However, due to surface of water outfall and the changes in the flow characteristics of the Spokane River, the proposed permit requires an updated mixing zone study to verify that the mixing zone is minimized.

7. Maximum size of mixing zone.

Due to changes in flow conditions resulting from the increased flow in the Spokane River due to the FERC relicensing, Ecology does not know the exact physical dimensions of the mixing zone. As a result, Ecology is requiring the dye tracer/mixing zone evaluation.

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 required the City of Spokane to complete a new mixing zone evaluation to verify that the acute criteria meets this requirement.

- **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.**

Due to changes in flow conditions resulting from the increased flow in the Spokane River required by the FERC relicensing, the physical dimensions of the mixing zone are not known. Given that previous permits authorized a mixing zone and an increase in Spokane River flows should result in a smaller mixing zone, Ecology assumes that the mixing zone will comply with the size restrictions.

However, Ecology is requiring the dye tracer/mixing zone evaluation to verify that the size meets the requirements of WAC 173-201A-400.

9. Overlap of mixing zones.

This mixing zone evaluation must identify overlap of mixing zone with other outfalls and verify compliance.

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

WAC 173-201A-602 Table 602 for water resource inventory area (WRIA) 54-Lower Spokane Note 1 indicates that the temperature shall not exceed a 1-DMax of 20 °C thus this substitution has been made in the use table replacing the 7-DAD of 17.5 °C.

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
Turbidity Criteria	<ul style="list-style-type: none"> • 5 NTU over background when the background is 50 NTU or less; or • A 10 percent increase in turbidity when the background turbidity is more than 50 NTU.
Total Dissolved Gas Criteria	Total dissolved gas must not exceed 110 percent of saturation at any point of sample collection.
pH Criteria	The pH must measure within the range of 6.5 to 8.5 with a human-caused variation within the above range of less than 0.5 units.

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

Table 17: Recreational Uses and Associated Criteria

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

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

E. Water quality impairments

Spokane River, WRIA 54 Lower 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 RPWRF discharge has a 303 (d) listing only for fecal coliforms. However, the Lower Spokane segment, following the segment to which the RPWRF discharges, is listed on the current 303(d) list as impaired for metals, dissolved oxygen (DO), Dioxin, and PCBs. The Draft 303(d) list indicates that the Spokane River is impaired for PCBs, Dioxin, Fecal Coliform Bacteria, Methylmercury, and PBDEs in the segment downstream from the segment receiving the RPWRF discharge.

Table 18: Spokane River WRIA 54 Lower Spokane 303(d) and 305(b) listings

Current 303(d) listings Category 5	Draft 2018 303(d)listings Category 5	Current 305(b) listings Category 4A,4B, and 4C	Approved TMDLs
Polychlorinated Biphenyls (Tissue)	Polychlorinated Biphenyls (Tissue)	Total Phosphorus	<u>Spokane River DO TMDL</u>
2,3,7,8-TCDD Dioxin (Tissue)	2,3,7,8-TCDD Dioxin (Tissue)	Dissolved Oxygen	<u>Spokane River DO TMDL</u>
-	Bacteria	Lead	<u>Spokane River Dissolved Metals TMDL</u>
-	Methylmercury	Zinc	<u>Spokane River Dissolved Metals TMDL</u>
-	Polybrominated Diphenyl Ethers (PBDEs)	-	-
-	Fecal Coliforms	-	-

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

- Spokane River Dissolved Oxygen TMDL (2010)
 - The DO TMDL includes waste load allocations (WLA) for ammonia, total phosphorus, and carbonaceous oxygen demand (CBOD₅). Ecology used the WLAs supplied in the DO TMDL for these parameters as seasonal limits in the proposed permit.
- Spokane River Metals TMDL (1999)
 - The metals TMDL Submittal Report outlines the approach Ecology may take when developing limits for cadmium, lead and zinc. The permit writer may use the more restrictive of either a performance-based limit + 10% or a potential limit based on effluent hardness and aquatic life criteria. 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-160 when it determines permit limits and conditions. Narrative water quality criteria limit the toxic, radioactive, or other deleterious material concentrations that the facility may discharge which have the potential to adversely affect designated uses, cause acute or chronic toxicity to biota, impair aesthetic values, or adversely affect human health.

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 only has criteria for marine waters.

- PBDEs listing is based on fish tissue. 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.

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 affects (diabetes), and cancer (penta and deca bromodiphenyl 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 and octaBDE. In December 2009, the two U.S. producers and the main U.S. importer of decaBDE 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 decaBDE.

Research on effective treatment technologies is ongoing. The City of Spokane's activated sludge system removed approximately 94.2 % based on average values for the influent (185,044 pg/L) and effluent (10,699) 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 decaBDEs 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 and octaBDEs.

PBDEs end up in wastewater treatment plants because of dry deposition followed by CSO discharge to the facility, 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 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.

The EPA rule that promulgated methylmercury human health criteria for Washington became effective on December 28, 2016. This new criterion applies only to tissue residue values for methylmercury, a bioaccumulative environmental toxicant. The criterion for methylmercury, as measured in fish tissue, is 0.03 mg/kg (ppm) and applies to organism-only ingestion.

The inability to accurately translate tissue residue values into ambient water concentrations prevents the use of Ecology's PERMIT CALC spreadsheet for conducting a reasonable potential analysis (RPA) at this time. Significant research and waterbody modeling is needed to develop the appropriate translator for site-specific reasonable potential analyses. The lack of appropriate translators prevents the calculation of numeric total recoverable mercury effluent limits from the new methylmercury criteria. EPA also does not have a 40 CFR 136 compliance method for methylmercury, further complicating the feasibility of a numeric effluent limit.

Ecology is using the approach identified under 40 CFR 144(k) to address methylmercury. Until the additional waterbody-specific studies can be developed for the fish tissue translator, Ecology assessed total mercury levels in effluent for the reasonable potential to exceed the chronic aquatic life-based criteria for mercury. The City of Spokane does not discharge into a segment listed for methylmercury (the 303(d) list) so, Ecology ran the reasonable potential calculations for mercury and did not find a reasonable potential exceedance at the edge of the chronic mixing zone. Ecology will require total mercury monitoring.

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.

In addition, 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 (BOD₅) 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.

Outfall 005 releases treated and disinfected effluent into the Spokane River via a side bank discharge. The City does not use an outfall with diffusers to discharge effluent into the Spokane River.

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

The width of the chronic mixing zone is limited to a distance of 50 feet. The length of the chronic mixing zone extends 300 feet downstream of the outfall. The mixing zone extends from the bottom to the top of the water column. The dilution factors were developed using a percentage of flow. The proposed permit requires the City of Spokane conduct a dye test/mixing zone evaluation to verify that the mixing zone under the new flow conditions meet the size restrictions for the chronic mixing zone.

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 toward the upstream and downstream boundaries of the chronic zone, not use greater than 2.5% of the flow and not occupy greater than 25% of the width of the water body.

The width of the acute mixing zone is limited to a distance of 5 feet. The length of the acute mixing zone extends 30 feet downstream of the outfall. The mixing zone extends from the bottom to the top of the water column

Ecology determined the dilution factors that occur within these zones at the critical condition based on percent of flow restriction using the Permit Calculation Spreadsheet included in Appendix D. The dilution factors are in the tables below.

Table 19: Dilution Factors (DF)

Criteria	Acute	Chronic
Aquatic Life	1.2	3.5
Human Health, Carcinogen	-	12.2
Human Health, Non-carcinogen	-	3.9

Ecology determined the impacts of dissolved oxygen deficiency, nutrients, pH, fecal coliforms, 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 seasonally.

Nutrients - Ecology has completed a TMDL, (Section III.E), and established seasonal effluent limits for the following nutrients: total phosphorus, total ammonia and CBOD₅. The proposed permit includes water quality based waste load allocations for total phosphorus, total ammonia and CBOD₅ derived from the completed TMDL. These limits, based on wasteload allocations in the DO TMDL, became effective March 1, 2021 and apply seasonally during the months of March - October. As directed in the TMDL, Ecology will assess compliance with the WLA using the actual flows.

Dissolved Oxygen — BOD₅ and Ammonia Effects — Natural decomposition of organic material in wastewater effluent impacts dissolved oxygen in the receiving water at distances far outside the regulated mixing zone. The 5-day Biochemical Oxygen Demand (BOD₅) of an effluent sample indicates the amount of biodegradable material in the wastewater and estimates the magnitude of oxygen consumption the wastewater will generate in the receiving water.

The amount of ammonia-based nitrogen in the wastewater also provides an indication of oxygen demand potential in the receiving water.

The proposed permit uses technology based CBOD₅ limits rather than BOD₅ during the non-critical season for consistency with the DO TMDL-based limits for the critical season.

Ecology predicted no violation of the surface water quality standards for dissolved oxygen due to the impacts of carbonaceous biochemical oxygen demand (CBOD₅) under non-critical conditions. Therefore, the proposed permit contains technology-based effluent limits for CBOD₅.

The permit does not contain a limit on ammonia based on dissolved oxygen impacts during the non-critical season. Discussion regarding ammonia toxicity during the non-critical season is provided below.

pH — Ecology modeled the impact of the effluent pH on the receiving water using the calculations from EPA, 1988, and the chronic dilution factor tabulated above. Appendix D includes the model results. Ecology collected the data used for the model before the FERC relicensing increased the flows. The model based on the older data predicted a possible violation of the 0.5 standard unit change in pH. This is a violation of the pH criteria for the receiving water. Ecology calculated the water quality based effluent limits of 7.85-8.5 standard units. The permit includes interim limits set at the technology-based limits of 6-9 standard units. The proposed permit includes a compliance schedule requiring the City to complete a receiving water pH evaluation that includes a reasonable potential calculation based on the new receiving water data. They are also required to complete an engineering report update identifying the treatment technology and implementation schedule for meeting the new limits.

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. Additionally, the segment to which RPWRF discharges is on the 303 (d) list for fecal coliforms. As a result, the facility must meet the water quality criteria at the point of discharge and will not receive a mixing zone for bacteria.

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 current 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* for two years in order to develop a site-specific correlation. The final *E.coli* limit will be effective 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 toxic pollutants are present in the discharge: chlorine, ammonia, metals (antimony, arsenic, beryllium, cadmium, copper, lead, mercury, nickel, selenium, silver, thallium, and zinc), 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 a chlorine limit of 8.5 µg/L (average monthly) and 22.2 µg/L (maximum daily).

The facility is able to comply with it and these values do not have a reasonable potential. The proposed permit includes the same year round limit.

Ammonia's toxicity depends on that portion which is available in the unionized form. The amount of unionized ammonia depends on the temperature and pH in the receiving freshwater. To evaluate ammonia toxicity, Ecology used the available receiving water information for ambient station 54A120 and the 95th percentile of the reported ammonia. There is no reasonable potential for aquatic life ammonia toxicity due to the City of Spokane RPWRF discharge.

The previous permit included ammonia limits. The proposed permit does not have ammonia limits. This change does not result in backsliding because there were significant material changes to the treatment system. These changes resulted in much lower ammonia concentrations in the effluent. The previous permit had 95th percentile maximum effluent concentration of 5.394 mg/L. The upgraded system had a 95th percentile effluent concentration of 0.429 mg/L. These changes resulted in much lower ammonia concentrations in the effluent.

Ecology will impose the wasteload allocations for ammonia from the TMDL in the critical season.

Total PCBs – Ecology evaluated the reasonable potential for Total PCBs to cause or contribute to an exceedance of the water quality criteria. Ecology derived a water quality based effluent limit for both aquatic life and human health. The human health limit was more stringent. More information is provided in the Human Health section below.

Metals -- Ecology determined that antimony, arsenic, beryllium, 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.

Ecology's 1999 Spokane River Metals TMDL Submittal Report outlines the approach Ecology permit writers take when developing limits for cadmium, lead, and zinc. The permit writer uses the more restrictive of either a performance-based limit plus ten percent or a limit based on effluent hardness and aquatic life criteria applied at the end of the pipe, without a mixing zone. Current ambient upstream metals data for the Spokane River were not available for use in the reasonable potential evaluation. The proposed permit requires a trace metals receiving water study that Ecology will use for a reasonable potential evaluation in the next permit reissuance.

Ecology used metals effluent data supplied by the City from the previous permit cycle for the performance-based limit calculations. The performance-based effluent limits plus ten percent is more stringent than the water quality, end of pipe limits. Therefore, the proposed permit uses the performance-based metals limits.

Table 20: Performance Based Effluent Limit Plus Ten Percent.

Parameter	Average Monthly (µg/L)	Maximum Day (µg/L)
Cadmium	0.066	0.099
Lead	0.583	0.876
Zinc	46.7	59.5

Table 21: Water Quality Based Effluent Limit at End of Pipe (Hardness Dependent).

Parameter	Average Monthly (µg/L)	Maximum Day (µg/L)
Cadmium	0.66	1.08
Lead	8.20	16.83
Zinc	33.0	42.0

Note: Limits assume four samples 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
- Guidelines on preventing acute lethality and barriers to migration of salmonids

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

- Annual summer maximum and supplementary spawning/rearing criteria

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

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

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

- Incremental warming criteria

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

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

- Guidelines to prevent acute lethality or barriers to migration of salmonids. These site-level considerations do not override the temperature criteria listed above.
 1. 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.
 2. General lethality and migration blockage: Temperatures at the edge of a chronic mixing zone must not exceed either a 1DMax of 23°C or a 7DADMax of 22°C. When adjacent downstream temperatures are 3°C or more cooler, the 1DMax at the edge of the chronic mixing zone must not exceed 22°C.
 3. Lethality to incubating fish: The temperature must not exceed 17.5°C at locations where eggs are incubating.

Reasonable Potential Analysis

Annual summer maximum, supplementary spawning criterion and incremental warming criteria: Ecology evaluated the reasonable potential for the discharge to exceed the annual summer maximum, the supplementary spawning criterion and the incremental warming criteria at the edge of the chronic mixing zone during critical condition(s). No reasonable potential exists to exceed the temperature criterion where:

$(\text{Teffluent}_{95} - \text{Criterion})/\text{DF} < 0.3.$

Teffluent95 = 95th percentile 7-DADMax or 1DMax temperature of the effluent

DF = chronic dilution factor

A temperature difference of less than 0.3°C at the edge of the mixing zone is lower than the definition of a “measurable change” as defined in WAC 173-201A-320(3).

$(21.0^{\circ}\text{C} - 20^{\circ}\text{C})/3.5 = 0.286^{\circ}\text{C}$

H. Human health

In October 2011, the Sierra Club brought a citizen suit under provisions of the Clean Water Act against EPA (Sierra Club, et al. v. McLerran, No. 11-CV-1759-BJR), claiming EPA failed to perform a nondiscretionary duty of establishing a TMDL for PCBs in the Spokane River.

In an Order issued by the U.S. District Court on March 16, 2015, the Court directed EPA to consult with Ecology and file a schedule for the measuring and completion of the work of the Task Force, including quantifiable benchmarks, plans for acquiring missing scientific information, deadlines for completed scientific studies, concrete permitting recommendations for the interim, specific standards upon which to judge the Task Force's effectiveness, and a definite endpoint at which time Ecology must pursue and finalize its TMDL.

EPA submitted its [Plan for Addressing PCBs in the Spokane River](http://srtrtf.org/wp-content/uploads/2015/07/EPA-plan-for-PCBs-in-response-to-court-order.pdf) (<http://srtrtf.org/wp-content/uploads/2015/07/EPA-plan-for-PCBs-in-response-to-court-order.pdf>) to the Court on July 14, 2015. EPA's plan included a December 15, 2020, date for meeting an instream concentration of PCBs in the Spokane River of 200 pg/L; and a December 15, 2024, date for meeting an instream concentration of PCBs of 170 pg/L.

In October 2020, the Sierra Club moved to amend its complaint to challenge EPA's plan and to renew its claim that EPA had a nondiscretionary duty to develop a TMDL for PCBs in the Spokane River. EPA is now seeking public input on a proposed consent decree with the plaintiffs to settle this litigation, with an EPA obligation to issue a TMDL for PCBs by September 30, 2024 for PCB-impaired waters in the Spokane River, the Little Spokane River, and Lake Spokane (Long Lake).

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

Ecology determined the effluent may contain chemicals of concern for human health, based on a 303(d) listing (quality impairment) of the receiving waterbody for a regulated chemical that Ecology knows or expects is present in the discharge. The following pollutants that are toxic to human health are present in the effluent: antimony, chloroform, copper, dichlorobromomethane, mercury, nickel, selenium, thallium, zinc, methylmercury, PBDEs, and PCBs.

To make a reasonable potential determination, 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](#), **Technical Support Document for Water Quality-Based Toxics Control** available online at <https://www3.epa.gov/npdes/pubs/owm0264.pdf>; and
- Ecology [Publication Number 92-109](#), **Permit Writer' Manual**, available online at <https://apps.ecology.wa.gov/publications/documents/92109.pdf>.

The evaluation showed that the discharge has no reasonable potential to cause a violation of human health-based water quality standards for antimony, chloroform, copper, dichlorobromomethane, mercury, nickel, selenium, thallium, and zinc, and effluent limits are not needed for protection of human health.

Total PCBs – The discharge has a reasonable potential to cause a violation of water quality criteria for Total PCBs.

Ecology used effluent toxics data collected by the City 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 Spokane gauge. Because PCBs are present in the effluent and the Spokane River upstream and downstream segments are 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 CFR Part 122.44(d) require this permit to contain limits to control PCBs. Federal regulations in 40 CFR Part 122.43(k) allows best management practices (BMPs) to control or abate the discharge of pollutants.

Ecology must require 40 CFR Part 136 approved testing methods in permits to determine compliance with effluent limits. The 40 CFR Part 136 approved test method for PCBs (EPA Method 608) will not detect PCBs below about 250,000 pg/L. This value exceeds the water quality criteria of 170 pg/L by three orders of magnitude. It exceeds the maximum (blank corrected) levels measured by the City in the effluent of 1,352 pg/L by two orders of magnitude (measured using EPA Method 1668, not approved under 40 CFR Part 136 for compliance monitoring).

The proposed permit includes water quality-based limits, and Ecology will assess compliance at the method detection limit for the compliance monitoring method, Method 608. Any detection using the compliance method would signal an exceedance of the water quality-based effluent limits for PCBs.

The proposed permit requires the City to continue to make progress in toxics reduction. 40 C.F.R. § 122.44(k) authorizes the use of BMPs where numeric effluent limits are infeasible or when BMPs are reasonably necessary to achieve effluent limits or to carry out the purposes of the Clean Water Act. 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 City 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 includes effluent limits for PCBs as follows:

- Total PCBs: 170 pg/L average monthly; 392 pg/L maximum daily.
- Any exceedance of the MDL for the 40 CFR Part 136 Method 608 will constitute a violation of the permit effluent limit.

The City's facility began discharging in March 2020 and is still in the startup phase. After the system is optimized, it is likely that the tertiary membrane filtration treatment system will be able to meet the end of pipe limits for PCBs. However, the City designed the tertiary membrane treatment system to meet the DO TMDL. The system only has an average of 50 mgd capacity. During storm events, flows may exceed 90 mgd. This results in a bypass of the tertiary membranes during high flow events.

This means that 50 mgd is treated through the membranes and the rest of the flow is treated through the secondary treatment then flows are combined and disinfected prior to discharge.

The City of Spokane will have performance based limits for PCBs and a compliance schedule. The interim limits for PCBs are:

- Total PCBs: 720 pg/L average monthly; 1,994 pg/L maximum daily and a monthly average of 50 mgd treated through the tertiary membranes.

The compliance schedule gives the City 3 years to optimize the tertiary membranes for PCB removal. During this time, the City will assess whether it is possible to manage the flows during storm events to achieve treatment of all flows through the tertiary membrane units. If not, the proposed permit requires the City to submit an engineering report update for meeting AKART for the PCB limits. The City will also be required to submit a timeline for construction of the recommended treatment system.

Arsenic - In 1992, EPA adopted risk-based inorganic arsenic criteria for the protection of human health for the State of Washington of 0.018 µg/L (freshwater) and 0.14 µg/L (marine water), based on exposure from fish and shellfish tissue and water ingestion. In 2015, the State proposed revised human health based criteria for arsenic of 10 µg/L of total arsenic based on the drinking water maximum contaminant level (MCL).

Ultimately, EPA disapproved the State's proposed arsenic criterion of 10 µg/L of total arsenic. EPA, in 40 CFR Part 131.45, promulgated a human health freshwater criterion value of 0.018 µg/L of inorganic arsenic, unchanged from the 1992 criteria.

Natural background concentrations of arsenic in surface and groundwater often exceed the human health criterion value.

NPDES-approved analytical test methods for arsenic listed in 40 CFR Part 136 measure only the total recoverable portion of metal, and not the inorganic portion. Without an approved analytical method for measuring inorganic arsenic, or an approved translator for determining inorganic-to-total recoverable arsenic ratios, Ecology is unable to determine an effluent limitation for discharges to surface waters. Ecology will not require BMPs for Arsenic at this time as data does not exist that demonstrates a reasonable potential.

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). [More information](https://ecology.wa.gov/Spills-Cleanup/Contamination-cleanup/Sediment-cleanups) on sediments is available at the **Aquatic Lands Cleanup Unit website** available online 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 the potential for the discharge of toxic bioaccumulative chemicals to the receiving water, which may affect the sediment and benthic biota.

The proposed permit includes a Special Condition requiring City of Spokane to demonstrate either:

- That 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.

If this is a sediment depositional area, the proposed permit requires the City of Spokane to submit a sampling plan and conduct baseline sampling of the sediment in the area downstream of the discharge.

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](https://apps.ecology.wa.gov/publications/documents/9580.pdf), **Laboratory Guidance and Whole Effluent Toxicity Test Review Criteria** available online at <https://apps.ecology.wa.gov/publications/documents/9580.pdf> and is referenced in the permit. Ecology recommends that City of Spokane send a copy of the acute or chronic toxicity sections(s) of its NPDES permit to the laboratory.

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

- If this facility makes process or material changes which, in Ecology's opinion, increase the potential for effluent toxicity, then Ecology may (in a regulatory order, by permit modification, or in the permit renewal) require the facility to conduct additional effluent characterization. The City of Spokane may demonstrate to Ecology that effluent toxicity has not increased by performing additional WET testing and/or chemical analyses after the process or material changes have been made. Ecology recommends that the Permittee check with Ecology first to make sure that Ecology will consider the demonstration adequate to support a decision to not require an additional effluent characterization.
- If WET testing conducted for submittal with a permit application fails to meet the performance standards in WAC 173-205-020, Ecology will assume that effluent toxicity has increased.

K. Groundwater quality limits

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

The City of Spokane does not discharge wastewater to the ground. No permit limits are required to protect groundwater.

L. Comparison of effluent limits with the previous permit issued on June 16, 2011

Table 22: Comparison of Previous and Proposed Effluent Limits for Phosphorus, CBOD, & Ammonia Wasteload Allocations from the DO TMDL Critical Season (March – October)

		Previous Effluent Limits: Outfall # 005	Proposed Effluent Limits: Outfall # 005
Parameter	Basis of Limit	Seasonal Average	Seasonal Average
Total Phosphorus (as P)	TMDL	17.8 lbs/day	17.81 lbs/day
Carbonaceous Oxygen Demand (CBOD ₅)	TMDL	1,778 lbs/day	1,780.6 lbs/day ^a
Total Ammonia	TMDL	March-May: 351 lbs/day June-September: 89 lbs/day October: 351 lbs/day	March-May, October: 299 lbs/day ^b June-September: 75.6 lbs/day ^b

Table 22 Footnotes:

^a An error was made in the previous permit, the WLA for CBOD₅ from the DO TMDL is 1,780.6 lbs/day.

^b More stringent load is due to use of updated design flow for NLT.

Table 23: Comparison of Previous and Proposed Effluent Limits for BOD₅ & TSS year round, and CBOD₅ November through February.

		Previous Effluent Limits	Outfall #005	Proposed Effluent Limits	Outfall #005
Parameter	Basis of Limit	Average Monthly	Average Weekly	Average Monthly	Average Weekly
Biochemical Oxygen Demand (5-day)	Technology	30 mg/L 10,759 lbs/day 85% Removal of influent BOD	45 mg/L, 16,138 lbs/day	NA ^a	NA
Total Suspended Solids	Technology	30 mg/L 10,759 lbs/day 85% Removal of influent TSS	45 mg/L 16,138 lbs/day	30 mg/L 10,660 lbs/day ^b 85% Removal of influent TSS	45 mg/L, 15,990 lbs/day ^b
Carbonaceous Oxygen Demand (CBOD ₅)	Technology	25 mg/L 8,966 lbs/day	40 mg/L 14,345 lbs/day	25 mg/L 14,199 lbs/day 85% removal	40 mg/L 22,718 lbs/day ^c

Table 23 Footnotes:

^a NA means not applicable.^b More stringent total suspended and CBOD₅ load is due to use of updated design flow.^c The previous permit used the dry weather flow to calculate the load limits. The maximum month average flow should have been used; this flow was updated in the 2014 Facility Plan and used here to calculate the load.**Table 24: Comparison of Previous and Proposed Effluent Limits for Chlorine, Metals, Ammonia & PCBs**

Parameter	Basis of Limit	Previous Average Monthly	Previous Maximum Daily	Proposed Average Monthly	Proposed Maximum Daily
Total Residual Chlorine	WQBEL	8.5 µg/L 4.31 lbs/day	22.2 µg/L 24.0 lbs/day	8.5 µg/L 3.06 lbs/day ^a	22.2 µg/L 17.5 lbs/day ^a
Ammonia ^c	WQBEL	3.1 mg/L	7.5 mg/L	--	--
Cadmium (Total) ^b	TMDL	0.076 µg/L	0.233 µg/L	0.066 µg/L	0.099 µg/L

Parameter	Basis of Limit	Previous Average Monthly	Previous Maximum Daily	Proposed Average Monthly	Proposed Maximum Daily
Lead (Total) ^b	TMDL	0.772 µg/L	1.34 µg/L	0.583 µg/L	0.876 µg/L
Zinc (Total) ^b	TMDL	53.8 µg/L	72.6 µg/L	46.7 µg/L	59.5 µg/L
PCBs ^d	WQBEL	NA	NA	170 pg/L 40CFR Part 136 Method 608 Detection Limit	392 pg/L 40CFR Part 136 Method 608 Detection Limit
PCBs Interim limits	Performance	-	-	720 pg/L 40CFR Part 136 Method 608 Detection Limit	1,994 pg/L 40CFR Part 136 Method 608 Detection Limit

Table 24 Footnote:

^a Ecology based the total residual chlorine load limits on the updated design flow provided in the approved engineering report.

^b Performance based limits for Cadmium, Lead, and Zinc limits are more stringent than previous permit due to change to performance plus 10 percent as required by the Metals TMDL.

^c There is not reasonable potential for ammonia due to the upgrades to the treatment system.

^d Interim limits are based on the 10x censoring of the reported effluent PCB data.

Table 25: Comparison of Previous and Proposed Effluent Limits for pH

Parameter	Basis of Limit	Previous Limit	Proposed Limit
pH	Technology	$6 \leq x \leq 9$	NA
pH	WQBEL	NA	$7.85 \leq x \leq 8.5$
pH interim limit	Technology	NA	$6 \leq x \leq 9$

As discussed above, the pH has changed due to reasonable potential finding. The proposed permit will require compliance schedule.

Table 26: Comparison of Previous and Proposed Effluent Limits for Fecal Coliform

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	200CFU/100 mL	400CFU/100 mL	NA	NA

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 (interim)	WQBEL	NA	NA	100CFU/100 mL	150CFU/100 mL
E.coli Effective 2 years from effective date of the permit.	WQBEL	-	-	100CFU/100 mL	150CFU/100 mL

As discussed above, the bacterial indicator organism changed from fecal coliform to E.coli in January 2021. Modeling found that the TBEL resulted in a reasonable potential to exceed the old criteria. Ecology used the old criteria to set an interim limit while they test for both E.coli and Fecal coliform.

Table 27: Comparison of Previous and Proposed Effluent Limits CSO Critical Season (March - October) (Total for all outfalls)

		Previous Effluent Limits:	Proposed Effluent Limits:
Parameter	Basis of Limit	Seasonal Average	Seasonal Average
Total Phosphorus (as P)	TMDL	NA	0.95 lbs/day
Carbonaceous Oxygen Demand (CBOD ₅)	TMDL	NA	30 lbs/day
Total Ammonia	TMDL	NA	1 lbs/day

The Spokane River DO TMDL provided wasteload allocations for the City's CSOs. These limits apply to the total for all CSO outfalls.

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 Activated Sludge Plant > 5.0 mgd average design flow.

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 became 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. Because RPWRF has an effluent limit based on recreation, this permit requires monitoring of both fecal coliform and *E.coli* during the first two years of the permit cycle.

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

The proposed permit requires the City of Spokane to monitor for PCBs PBDEs to characterize the effluent using high resolution methods 1668 and 1614 respectively. These pollutants are listed (in the proposed 303(d) list) in the Spokane River below the City's discharge and 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 for the parameters in Table 28.

Table 28: Onsite Laboratory Accredited Parameters

Parameter Name	Category	Method Name	Matrix Description
Non-Polar Extractable Material (TPH)	General Chemistry	EPA 1664A (SGT-HEM)	Non-Potable Water
n-Hexane Extractable Material (O&G)	General Chemistry	EPA 1664A_1_1999	Non-Potable Water
Nitrate + Nitrite	General Chemistry	EPA 353.2_2_1993	Non-Potable Water

Parameter Name	Category	Method Name	Matrix Description
Nitrite	General Chemistry	EPA 353.2_2_1993	Non-Potable Water
Orthophosphate	General Chemistry	EPA 365.3_1978	Non-Potable Water
Phosphorus, Total	General Chemistry	EPA 365.3_1978	Non-Potable Water
Dissolved Oxygen	General Chemistry	Hach 10360 Rev 1.1	Non-Potable Water
Alkalinity	General Chemistry	SM 2320 B-2011	Non-Potable Water
Hardness (calc.)	General Chemistry	SM 2340 B-2011	Non-Potable Water
Solids, Total	General Chemistry	SM 2540 B-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
Ammonia	General Chemistry	SM 4500-NH3 G-2011	Non-Potable Water
Orthophosphate	General Chemistry	SM 4500-P E-2011	Non-Potable Water
Phosphorus, Total	General Chemistry	SM 4500-P E-2011	Non-Potable Water
Biochemical Oxygen Demand (BOD), Carbonaceous BOD (CBOD)	General Chemistry	SM 5210 B-2011	Non-Potable Water
Aluminum	Metals	EPA 200.7_4.4_1994	Non-Potable Water
Antimony	Metals	EPA 200.7_4.4_1994	Non-Potable Water
Arsenic	Metals	EPA 200.7_4.4_1994	Non-Potable Water
Barium	Metals	EPA 200.7_4.4_1994	Non-Potable Water
Beryllium	Metals	EPA 200.7_4.4_1994	Non-Potable Water
Cadmium	Metals	EPA 200.7_4.4_1994	Non-Potable Water
Calcium	Metals	EPA 200.7_4.4_1994	Non-Potable Water
Chromium	Metals	EPA 200.7_4.4_1994	Non-Potable Water
Cobalt	Metals	EPA 200.7_4.4_1994	Non-Potable Water
Copper	Metals	EPA 200.7_4.4_1994	Non-Potable Water
Iron	Metals	EPA 200.7_4.4_1994	Non-Potable Water
Lead	Metals	EPA 200.7_4.4_1994	Non-Potable Water
Magnesium	Metals	EPA 200.7_4.4_1994	Non-Potable Water

Parameter Name	Category	Method Name	Matrix Description
Manganese	Metals	EPA 200.7_4.4_1994	Non-Potable Water
Molybdenum	Metals	EPA 200.7_4.4_1994	Non-Potable Water
Nickel	Metals	EPA 200.7_4.4_1994	Non-Potable Water
Selenium	Metals	EPA 200.7_4.4_1994	Non-Potable Water
Silver	Metals	EPA 200.7_4.4_1994	Non-Potable Water
Thallium	Metals	EPA 200.7_4.4_1994	Non-Potable Water
Vanadium	Metals	EPA 200.7_4.4_1994	Non-Potable Water
Zinc	Metals	EPA 200.7_4.4_1994	Non-Potable Water
Fecal coliform-count	Microbiology	SM 9221 E2+C (A1-MPN)	Non-Potable Water
E.coli-count	Microbiology	SM 9223 B Colilert® 24 QTray®	Non-Potable Water
Total coliforms-count	Microbiology	SM 9223 B Colilert® 24 QTray®	Non-Potable Water
Nitrate + Nitrite	General Chemistry	EPA 353.2_2_1993	Solid and Chemical Materials
Solids, Total	General Chemistry	SM 2540 G-2011	Solid and Chemical Materials
pH	General Chemistry	SM 4500-H+ B-2011	Solid and Chemical Materials
Ammonia	General Chemistry	SM 4500-NH3 G-2011	Solid and Chemical Materials
Phosphorus, Total	General Chemistry	SM 4500-P E-2011	Solid and Chemical Materials
Aluminum	Metals	EPA 200.7_4.4_1994	Solid and Chemical Materials
Antimony	Metals	EPA 200.7_4.4_1994	Solid and Chemical Materials
Arsenic	Metals	EPA 200.7_4.4_1994	Solid and Chemical Materials
Barium	Metals	EPA 200.7_4.4_1994	Solid and Chemical Materials
Beryllium	Metals	EPA 200.7_4.4_1994	Solid and Chemical Materials
Cadmium	Metals	EPA 200.7_4.4_1994	Solid and Chemical Materials

Parameter Name	Category	Method Name	Matrix Description
Calcium	Metals	EPA 200.7_4.4_1994	Solid and Chemical Materials
Chromium	Metals	EPA 200.7_4.4_1994	Solid and Chemical Materials
Copper	Metals	EPA 200.7_4.4_1994	Solid and Chemical Materials
Iron	Metals	EPA 200.7_4.4_1994	Solid and Chemical Materials
Lead	Metals	EPA 200.7_4.4_1994	Solid and Chemical Materials
Magnesium	Metals	EPA 200.7_4.4_1994	Solid and Chemical Materials
Manganese	Metals	EPA 200.7_4.4_1994	Solid and Chemical Materials
Molybdenum	Metals	EPA 200.7_4.4_1994	Solid and Chemical Materials
Nickel	Metals	EPA 200.7_4.4_1994	Solid and Chemical Materials
Selenium	Metals	EPA 200.7_4.4_1994	Solid and Chemical Materials
Silver	Metals	EPA 200.7_4.4_1994	Solid and Chemical Materials
Thallium	Metals	EPA 200.7_4.4_1994	Solid and Chemical Materials
Vanadium	Metals	EPA 200.7_4.4_1994	Solid and Chemical Materials
Zinc	Metals	EPA 200.7_4.4_1994	Solid and Chemical Materials
Fecal coliform-count	Microbiology	SM 9221 E2+C (A1-MPN)	Solid and Chemical Materials

C. Effluent limits which are near detection or quantitation levels

The water quality-based effluent concentration limits for total residual arsenic, arsenic (V), chlorine, PCBs, and total phosphorus are near the limits of current analytical methods to detect or accurately quantify. The method detection level (MDL) also known as detection level (DL) is the minimum concentration of a pollutant that a laboratory can measure and report with a 99 percent confidence that its concentration is greater than zero (as determined by a specific laboratory method).

The quantitation level (QL) is the level at which a laboratory can reliably report concentrations with a specified level of error. Estimated concentrations are the values between the DL and the QL. 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) for compliance assessment has much higher detection limits and quantitation levels than Method 1628 or 1668. EPA approved Method 1668 for use but EPA has not approved it for compliance purposes. Method 1628 is not an approved method.

A comparison between method detection limit (DLs) and the quantitation levels (QLs) for Methods 608.3, 1628 and 1668 are below. The DLs and QLs for the congener methods depend on the congener. These are the DLs and QLs provided in the EPA method:

Table 29: EPA Method Comparison for PCBs

EPA Method/Criteria	Analyte	DL (µg/L)	QL (µg/L)
608.3	Aroclors	0.065	0.195
1628	Congeners	0.00019-0.00498	0.0005-0.020
1668	Congeners	0.00005	0.0001
Human Health Criteria	Sum Total	0.000170	0.000170

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 more sensitive than Method 1628. The data generated by Methods such as 1668 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 explained in a Quality Assurance Project Plan (QAPP). The most commonly used technique is described in EPA's [National Functional Guidelines](https://www.epa.gov/clp/superfund-clp-national-functional-guidelines-data-review) for the **Superfund 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 which 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 unknown, 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 or 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 City of Spokane 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 applies for Ecology-administered funding for the design or construction of a facility project must comply with chapter 173-98 WAC. City of Spokane 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 the City of Spokane takes adequate safeguards so that it uses constructed facilities to their optimum potential in terms of pollutant capture and treatment.

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

D. Pretreatment

Duty to enforce discharge prohibitions

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

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

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].

City of Spokane 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 the City of Spokane to more accurately determine the mixing characteristics of the discharge into the Spokane River (Special Condition S12). The effluent dye tracer and mixing study must measure or model the characteristics of the discharge under conditions specified in the permit to ensure the receiving water quality is protected outside the mixing zone boundary.

H. Combined sewer overflows

Combined sewer systems are sewers that are designed to collect rainwater runoff, domestic sewage, and industrial wastewater in the same piping system. Most of the time, combined sewer systems transport all wastewater to a sewage treatment plant, where it is treated and then discharged to a water body. During periods of heavy rainfall or snowmelt, however, the wastewater volume in a combined sewer system may exceed the capacity of the combined sewer system or treatment plant. For this reason, combined sewer systems are designed to overflow occasionally and discharge excess wastewater directly to nearby streams, rivers, or other water bodies. Chapter 173-245 WAC and EPA's CSO control policy (59 FR 18688) identify the required measures for control of overflows from combined sewer systems.

CSO Reduction Plan/Long-Term Control Plan and CSO Reduction Plan Amendments

Ecology requires municipalities to develop combined sewer overflow (CSO) reduction plans per chapter 173-245 WAC requirements. These plans are significantly equivalent to the long-term control plan (LTCP) as defined by EPA's CSO control policy (59 FR 18688).

WAC 173-245-015(1) requires that “All CSO sites shall achieve and at least maintain the greatest reasonable reduction, and neither cause violations of applicable water quality standards, nor restrictions to the characteristic uses of the receiving water, nor accumulation of deposits which: (a) Exceed sediment criteria or standards; or (b) have an adverse biological effect.” “The greatest reasonable reduction” means control of each CSO outfall such that on a 20-year average; no more than one untreated discharge may occur per year.

Under EPA’s CSO control policy’s (59 FR 18688) presumption approach, CSO controls are presumed to attain WQS if certain performance criteria are met. Ecology presumes that a program that meets the criteria specified in chapter 173-245 WAC and EPA’s CSO control policy (59 FR 18688) provides an adequate level of control to meet the water quality-based requirements of the Clean Water Act. This presumption must be verified via a post-construction monitoring program by characterization, monitoring, and modeling of the system, including consideration of sensitive areas.

Ecology originally received the CSO Sewer Overflow Abatement Plan Report from the City in 1979. They submitted the CSO Reduction System Wide Alternative Report in 2005 and the integrated plan with the final control structure plan and schedule in 2014. The City completed construction of the final control structure in August 2020.

Nine Minimum Controls

Municipalities with combined sewer overflow outfalls must implement nine minimum controls as technology-based standards for CSO discharges. The nine minimum controls are largely programmatic policies and practices designed to minimize the impacts untreated CSOs have on human health and the environment. It is not possible with current knowledge and technology to calculate numeric water quality-based effluent limits for CSOs.

Ecology may include numeric water quality-based effluent limits in future permits only after the long-term control plan is in place and after collection of sufficient water quality data.

The nine minimum controls include:

1. Use proper operations and maintenance practices within the combined collection system to reduce the magnitude, frequency and duration of CSOs.
2. Implement procedures that maximize storage capacity of the combined collection system.
3. Minimize pollution from non-domestic wastewater sources through close management of a pretreatment program.
4. Maximize treatable flow to the wastewater treatment plant during wet weather.
5. Prevent CSO discharges during dry weather and properly report any dry weather CSO discharges immediately to Ecology.

6. Implement procedures to control solid and floatable materials in CSOs.
7. Implement and maintain a pollution prevention program designed to keep pollutants from entering the combined sewer system.
8. Establish a process to notify the public when and where CSOs occur.
9. Monitor CSO outfalls to characterize CSO impacts and the efficacy of CSO controls, including event-based monitoring of all CSO flow quantity, frequency and duration.

CSO Monitoring

The proposed permit requires the City of Spokane to monitor the volume, duration and precipitation associated with each CSO discharge event at each identified outfall. Additionally, the City will be required to monitor for pollutants with a wasteload allocation.

Annual CSO Report

The City of Spokane must submit annual reports according to the requirements of WAC 173-245-090(1).

This report:

- details the past year's frequency and volume of combined sewage discharge from each CSO site,
- explains the previous year's CSO reduction accomplishments, and
- lists the projects planned for the next year.

The report must indicate whether a CSO site has increased over the baseline annual condition. If an increase has occurred, the Permittee must propose a project and/or schedule to reduce that site below its baseline conditions.

The report must document implementation of the nine minimum controls, and wet weather operation (flow blending) at the treatment plant.

City of Spokane must also assess, in its annual reports and CSO reduction plan amendment, whether identified outfalls meet the state standard of one untreated discharge per year per CSO. The City will base the assessment on a 20-year averaging period. An example for calculating the 20-year average using model precipitation data until each outfall is 20 years old is available in Appendix D.

Post-Construction Monitoring Program

The federal CSO control policy (59 FR 18688) requires post-construction monitoring to verify implemented CSO control strategies comply with water quality standards. Post-construction monitoring applies to any CSO outfall that is controlled to meet the "greatest reasonable reduction" of combined sewer overflows, as defined in WAC 173-245020(22). Implementation requires development of a monitoring plan and completion of a data report that documents compliance.

The proposed permit requires City of Spokane to develop a post-construction monitoring plan. The permit also requires City of Spokane to implement the monitoring plan and to report monitoring data in the CSO Annual Report. EPA is currently developing guidance on post-construction monitoring plans. The plan must include the pollutants with wasteload allocations from the Spokane River DO TMDL.

Permit Section S2.B Table 13 defines “per event” as a unique flow event as defined in the Permit Writer's Manual, Chapter 3, Section 3.4.4. Ecology defines the minimum inter-event period (MIET) as 24 hours. Ecology considers a CSO event to have ended only after at least 24-hours has elapsed since the last measured occurrence of an overflow. The manual is available online at <https://apps.ecology.wa.gov/publications/documents/92109.pdf>. It may be necessary to discuss with Ecology how to apply the “per event” definition in Permit Section S2.B Table 13 when completing the compliance assessment for the annual report. The City should discuss with Ecology at the time of the occurrence of a multiple event CSO.

Outfall evaluation

The proposed permit requires City of Spokane to conduct an outfall inspection for each CSO and submit the findings of that inspection (Special Condition S14) in the CSO Annual Report. The inspection must evaluate the physical condition of the discharge pipe and diffusers, and evaluate the extent of sediment accumulations near the outfall.

I. Receiving Water Studies – Temperature, pH and Metals

The proposed permit requires the City of Spokane to continue their continuous temperature monitoring of the receiving water body.

The majority of available ambient monitoring data from the Spokane River comes from the monitoring station 54A120 located in the Riverside State Park.

This monitoring location falls below the outfall of the City of Spokane’s wastewater treatment facility. Effluent from the treatment facility is assumed to completely mix with the river in the distance between the side bank effluent discharge and monitoring locations. However, Ecology prefers upstream data in the NPDES Permit reasonable potential calculations.

The majority of metals data available to permit writers comes from assessments taken prior to the approval of the 1999 Spokane River Metals TMDL. The majority of pH and alkalinity data was taken before the FERC relicensing and does not reflect the current conditions.

Therefore, the City of Spokane must complete a receiving water study for temperature, pH, and metals during this proposed permit cycle. See Special Conditions S13 & S14 in the proposed permit for deliverable dates and study requirements.

J. 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 BMP Implementation Plan be developed and implemented in order to control and abate the discharge of identified toxics.

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 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 Implementation 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, 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://srtrtf.org/wp-content/uploads/2016/04/2016_Comp_Plan_Final_Approved.pdf.

- Year round operation of the NLT upgrade following initiation of operation
- The continuation of the public outreach and education efforts
- Identification of track down sampling and source removal actions for PBDEs
- Ongoing support of and participation in the Spokane River Regional Toxics Task Force

The City of Spokane's previous discharge permit issued June 16, 2011, required the facility to make measurable progress toward reducing toxicant loading to the Spokane River to the maximum extent practicable. 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 S18 requires the City of Spokane 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 BMP Implementation Plan to identify actions the City will identify and implement based on the previous permit cycle Toxics Management Plans for PCBs. The City conducted influent and effluent sampling for PBDEs in the previous permit cycle. The sampling indicated that significant PBDEs are discharged to the facility through the collection system. A PBDEs track-down sampling plan must be part of the initial BMP Plan. 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 the City of Spokane to assess annually the effectiveness of the BMP Implementation Plan through quantitative and qualitative (where appropriate) measures. Ecology understands that the City'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](http://srrttf.org/wp-content/uploads/2016/04/2016_Comp_Plan_Final_Approved.pdf) 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. The City may also propose use of other actions that will provide the most benefit for toxics reduction. The proposed permit requires the City of Spokane to submit a Quality Assurance Project Plan (QAPP) for the BMP effectiveness monitoring.

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

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

K. Compliance schedule

The proposed permit includes a compliance schedule for pH and PCBs. The City must submit an engineering report identifying AKART along with the plans and construction schedule required to meet the pH limits.

The proposed compliance schedule for PCBs requires the City to optimize the NLT treatment system and evaluate the system's capacity for treating PCBs. The City must submit a technical memorandum stamped by an engineer identifying the design capacity of the existing system. If the existing system does not have capacity to treat the flow for PCBs, then the proposed permit requires the City to complete an engineering report update identifying an engineering solution for meeting PCB limits. They must also submit a construction timeline and engineering plans for the identified alternative.

L. 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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- [Water Quality Individual Permit Guidance](https://ecology.wa.gov/Regulations-Permits/Guidance-technical-assistance/Water-quality-permits-guidance) <https://ecology.wa.gov/Regulations-Permits/Guidance-technical-assistance/Water-quality-permits-guidance>

Water Pollution Control Federation.

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

- 1979. In-stream Deoxygenation Rate Prediction. Journal Environmental Engineering Division, ASCE. 105(E2). (Cited in EPA 1985 op.cit.)

Appendix A - Public Involvement Information

Ecology proposes to reissue a permit to the City of Spokane. 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 placed a Public Notice of Draft Permit on December 29, 2021 and May 11, 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 fairer conditions, limits, and requirements for the permit.
- Invites comments on Ecology's determination of compliance with antidegradation rules.
- Urges people to submit their comments, in writing, before the end of the comment period.
- Tells how to request a public hearing about the proposed NPDES permit.
- Explains the next step(s) in the permitting process.

Ecology has published a document entitled [Frequently Asked Questions about Effective Public Commenting](https://apps.ecology.wa.gov/publications/documents/0307023.pdf), which is available online at <https://apps.ecology.wa.gov/publications/documents/0307023.pdf>.

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

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

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 months-time taking into account zero discharge days.

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

Background water quality – The concentrations of chemical, physical, biological or radiological constituents or other characteristics in or of groundwater at a particular point in time upgradient of an activity that has not been affected by that activity, [WAC 173-200-020(3)].

Background water quality for any parameter is statistically defined as the 95% upper tolerance interval with a 95% confidence based on at least eight hydraulically upgradient water quality samples. The eight samples are collected over a period of at least one year, with no more than one sample collected during any month in a single calendar year.

Best management practices (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 BOD₅ is not a specific compound, it is defined as a conventional pollutant under the federal Clean Water Act.

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

Engineering report – A document that thoroughly examines the engineering and administrative aspects of a particular domestic or industrial wastewater facility. The report must contain the appropriate information required in WAC 173-240-060 or 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 $(1, 2, \text{ or } 5) \times 10^n$, where n is an integer. (64 FR 30417).

ALSO GIVEN AS:

The smallest detectable concentration of analyte greater than the Detection Limit (DL) where the accuracy (precision & bias) achieves the objectives of the intended purpose. (Report of the Federal Advisory Committee on Detection and Quantitation Approaches and Uses in Clean Water Act Programs Submitted to the US Environmental Protection Agency December 2007).

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

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

Sample Maximum – No sample may exceed this value.

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 percent or more of the average dry weather hydraulic or organic capacity of the POTW treatment plant; or is designated as such by the Control Authority* on the basis that the industrial user has a reasonable potential for adversely affecting the POTW's operation or for violating any pretreatment standard or requirement [in accordance with 40 CFR 403.8(f)(6)].

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

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

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

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

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

Soluble BOD₅ – 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 BOD₅ 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 BOD₅ 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 are the particulate material in an effluent. Large quantities of TSS discharged to a receiving water may result in solids accumulation. Apart from any toxic effects attributable to substances leached out by water, suspended solids may kill fish, shellfish, and other aquatic organisms by causing abrasive injuries and by clogging the gills and respiratory passages of various aquatic fauna. Indirectly, suspended solids can screen out light and can promote and maintain the development of noxious conditions through oxygen depletion.

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

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

Appendix D - Technical Calculations

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

Simple Mixing:

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

$$C_{mz} = C_a + \frac{(C_e - C_a)}{DF}$$

where: C_e = Effluent Concentration
 C_a = 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 .

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

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

$$z = 2.326$$

CV = coefficient of variation = std. dev/mean

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

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

$$z = 2.326$$

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

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

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

$$z = 2.326 \text{ (99th percentile occurrence)}$$

LTA = Limiting long term average

AML = Average Monthly Limit

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

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

n = number of samples/month

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

LTA = Limiting long term average

Appendix D - Technical Calculations (Continued)

Calculation of 20 Year Rolling Average

The following example for calculation of 20-year rolling average for controlled CSO assuming control for less than 20 years. The 5-year rolling average uses the same process. However, most of the CSO outfalls should be based on real time data by the end of the permit cycle. The example below may be helpful for the permit required reporting.

Table D-1: Example Calculation of 20-Year Rolling Average for Controlled CSO

Year	Overflows based model using actual precipitation data	Overflow based on real time data	20 year rolling average	5 year rolling average	Comments
2003	0		0		Model used based on real precipitation data and new control structure
2004	1		1overflow/2yr s=0.5		"
2005	0		1overflow/3yr s=0.33		"
2006	0		1overflow/4yr s=0.25		"
2007	1		2overflow/5yr s=0.4		"
2008	1		3overflow/6yr s=0.5		"
2009	0		3overflow/7yr s=0.43		"
2010	0		3overflow/8yr s=0.38		"
2011	0		3overflow/9yr s=0.33		"
2012	0		3overflow/10 yrs=0.3		"
2013	0		3overflow/11 yrs=0.27		"
2014	1		4overflow/12 yrs=0.33		"
2015	2		6overflow/13 yrs=0.46		"
2016	2		8overflow/14 yrs=0.57		"
2017	1		9overflow/15 yrs=0.6		"
2018	2		11overflow/16 yrs=0.68	2overflow/1 yrs=2.	"

Year	Overflows based model using actual precipitation data	Overflow based on real time data	20 year rolling average	5 year rolling average	Comments
2019	3		14overflow/17yrs=0.82	5overflow/2yrs=2.5	"
2020	1	0	15overflow/18yrs=0.83	6overflow/3yrs=2	Outfall controlled; actual data used
2021		1	16overflow/19yrs=0.84	7overflow/4yrs=1.75	5-year average is over 1 so should review O&M verify weir settings
2022		0	16overflow/20yrs=0.80	7overflow/5yrs=1.4	5-year average is decreasing from previous year continue to evaluate O&M
2023		0	15overflow/20yrs=0.75	5overflow/5yrs=1.0	5-year average is 1 outfall. No additional cations needed.
2024		0	15overflow/20yrs=0.75	4overflow/5yrs=0.8	
AVERAGE					

Ecology based compliance annually on the 20-year rolling average that is required in the CSO annual Report. Eventually, all the data used in the average will be real time overflows i.e. 20 years after CSO is controlled.

Appendix D - Technical Calculations (Continued)

- Table D-2: RPA Inputs
- Table D-3: RPA Calculations Part A
- Table D-4: RPA Calculations Part B
- Table D-5: RPA No Dilution PCB, Cadmium, Lead, Zinc
- Table D-6: Metals TMDL End of Pipe Limit Calculations
- Table D-7: PCB Performance Based Limits
- Table D-8: Cadmium Performance Based + 10% Limits
- Table D-9: Lead Performance Based + 10% Limits
- Table D-10: Zinc Performance Based + 10% Limits
- Table D-11: Minimum pH RPA and Limit Calculation
- Table D-12: Maximum pH RPA and Limit Calculation
- Table D-13: Fecal Coliform RPA Evaluation
- Table D-14: Dissolved Oxygen at the Chronic Boundary RPA

Reasonable Potential Figures

Table D-2: RPA Inputs

Dilution Factor Calculations and Receiving Water Critical Conditions

Step 1: Enter Waterbody Type

Water Body Type	Freshwater
-----------------	------------

Facility Name	City of Spokane Riverside 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	43.2	68.1	94.6
Facility Flow, cfs (calculated)	66.83	105.35	146.35

	Condition	Receiving Water Flow, cfs	Allowable % of river flow	Max Dilution Factor Allowed
<u>Aquatic Life - Acute</u>	7Q10	1049.5	0.025	1.2
<u>Aquatic Life - Chronic</u>	7Q10	1049.5	0.25	3.5
<u>HH-Non-Carcinogen</u>	30Q5	1202.3	0.25	3.9
<u>HH-Carcinogen</u>	Harmonic Mean	3002.4	0.25	12.2
<u>Whole river at 7Q10</u>	7Q10	1049.5	1	11.0

Step 3: Enter Critical Data

	Effluent	Receiving Water
Temp, °C	21	17.9
pH, s.u.	8.5	8.6
Alkalinity, mg/L as CaCO ₃	61.5	30.5
Hardness, mg/L CaCO ₃	187.2	30.5
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: Specify 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	163.4	20.5	8.5
Chronic Zone Boundary	75.4	18.8	8.6
Whole river at 7Q10	44.8	18.2	8.6

Table D-3: RPA Calculations Part A

Reasonable Potential Calculation

Facility		Dilution Factors:										Acute	Chronic
City of Spokane Riverside WRF		Aquatic Life										1.2	3.5
Water Body Type		Human Health Carcinogenic											12.2
Rec. Water Hardness		Human Health Non-Carcinogenic											3.9
Acute=163.4, Chronic=75.4 mg/L													

Pollutant, CAS No. & NPDES Application Ref. No.		AMMONIA, Criteria as Total NH3	ARSENIC (dissolved) 7440382 2M	BERYLLIUM 7440417 3M	CADMIUM - 7440439 4M Hardness dependent	CHLOROFORM 67663 11V	CHROMIUM(HEX) 18540299 - Dissolved	COPPER - 744058 6M Hardness dependent	DICHLOROBROMOMETHANE 75274 12V	LEAD - 7439921 7M Dependent on hardness	NICKEL - 7440020 9M - Dependent on hardness
Effluent Data	# of Samples (n)	1583	93	93	93	5	93	112	5	93	93
	Coeff of Variation (Cv)	3.4	0.32	0.99	0.28	0.6	0.64	4.3	0.6	0.22	0.69
	Effluent Concentration, ug/L (Max. or 95th Percentile)	429	3.12	0.0204	0.0716	7.45	0.334	8.67	2.53	0.5614	2.768
	Calculated 50th percentile Effluent Conc. (when n>10)							5.05			1.14
Receiving Water Data	90th Percentile Conc., ug/L	18	0		0		0	0		0	0
	Geo Mean, ug/L					0		0	0		0
Water Quality Criteria	Aquatic Life Criteria, Acute ug/L	2,103	360	-	6.3012	-	15	27.023	-	109.73	2144.1
	Chronic	302	190	-	0.8367	-	10	8.9168	-	1.848	123.78
	WQ Criteria for Protection of Human Health, ug/L	-	-	-	-	260	-	1300	0.77	-	150
	Metal Criteria Acute	-	1	-	0.943	-	-	0.996	-	0.466	0.998
	Translator, decimal Chronic	-	1	-	0.943	-	-	0.996	-	0.466	0.997
	Carcinogen?	N	Y	Y	N	Y	N	N	Y	N	N

Aquatic Life Reasonable Potential											
Effluent percentile value		0.950	0.950		0.950		0.950	0.950		0.950	0.950
s $s^2 = \ln(CV^2 + 1)$		1.591	0.312		0.275		0.586	1.723		0.217	0.624
Pn $Pn = (1 - \text{confidence level})^{1/n}$		0.998	0.968		0.968		0.968	0.974		0.968	0.968
Multiplier		1.00	1.00		1.00		1.00	1.00		1.00	1.00
Max concentration (ug/L) at edge of...	Acute	367	2.646		0.057		0.283	7.323		0.222	2.342
	Chronic	136	0.894		0.019		0.096	2.474		0.075	0.791
Reasonable Potential? Limit Required?		NO	NO		NO		NO	NO		NO	NO

Human Health Reasonable Potential											
s $s^2 = \ln(CV^2 + 1)$					0.5545		1.7233	0.5545			0.624
Pn $Pn = (1 - \text{confidence level})^{1/n}$					0.549		0.974	0.549			0.968
Multiplier					0.9336		0.0355	0.9336			0.314
Dilution Factor					12.231		3.8531	12.231			3.8531
Max Conc. at edge of Chronic Zone, ug/L					0.5687		1.3E+00	0.1931			0.2959
Reasonable Potential? Limit Required?					NO		NO	NO			NO

Table D-4 : RPA Calculations Part B

Reasonable Potential Calculation - Page 2

Facility	City of Spokane Riverside WRF
Water Body Type	Freshwater
Rec. Water Hardness	Acute=163.4, Chronic=75.4 mg/L

Dilution Factors:	Acute	Chronic
Aquatic Life	1.2	3.5
Human Health Carcinogenic		12.2
Human Health Non-Carcinogenic		3.9

Pollutant, CAS No. & NPDES Application Ref. No.		SELENIUM 7782492 10M	SILVER - 7740224 11M dependent on hardness.	THALLIUM 7440280 12M	ZINC- 7440666 13M hardness dependent	ANTIMONY (INORGANIC) 744036 1M						
<u>Effluent Data</u>	# of Samples (n)	93	93	93	95	93						
	Coeff of Variation (Cv)	0.47	0.85	1	0.16	0.39	0.6	0.6	0.6	0.6	0.6	0.6
	Effluent Concentration, ug/L (Max. or 95th Percentile)	1.41	0.181		53.43							
	Calculated 50th percentile Effluent Conc. (when n>10)	0.72		0.006	41.7	0.386						
<u>Receiving Water Data</u>	90th Percentile Conc., ug/L	0	0		0							
	Geo Mean, ug/L	0		0	0	0						
<u>Water Quality Criteria</u>	Aquatic Life Criteria, Acute ug/L	20	8.0262	-	173.48	-						
	Chronic	5	-	-	82.265	-						
	WQ Criteria for Protection of Human Health, ug/L	120	-	0.24	2300	12						
	Metal Criteria Acute	-	0.85	-	0.996	-						
	Translator, decimal Chronic	-	-	-	0.996	-						
	Carcinogen?	N	N	N	N	N						

Aquatic Life Reasonable Potential

Effluent percentile value		0.950	0.950	0.950								
s	$s^2 = \ln(CV^2 + 1)$	0.447	0.737	0.159								
Pn	$Pn = (1 - \text{confidence level})^{1/n}$	0.968	0.968	0.969								
Multiplier		1.00	1.00	1.00								
Max concentration (ug/L) at edge of...	Acute	1.196	0.130	45.126								
	Chronic	0.404	0.052	15.246								
Reasonable Potential? Limit Required?		NO	NO	NO								

Human Health Reasonable Potential

s	$s^2 = \ln(CV^2 + 1)$	0.4468	0.8326	0.159	0.3763							
Pn	$Pn = (1 - \text{confidence level})^{1/n}$	0.968	0.968	0.969	0.968							
Multiplier		0.4363	0.2132	0.7433	0.4973							
Dilution Factor		3.8531	3.8531	3.8531	3.8531							
Max Conc. at edge of Chronic Zone, ug/L		0.1869	0.0016	10.822	0.1002							
Reasonable Potential? Limit Required?		NO	NO	NO	NO							

Table D-5: RPA No Dilution PCB, Mercury, Cadmium, Lead, Zinc**Reasonable Potential Calculation**

		Dilution Factors:					Acute	Chronic
Facility	City of Spokane Riverside WRF	Aquatic Life					1.0	1.0
Water Body Type	Freshwater	Human Health Carcinogenic						1.0
Effluent Hardness	187.2	Human Health Non-Carcinogenic						1.0
Pollutant, CAS No. & NPDES Application Ref. No.		Polychlorinated Biphenyls (PCBs) 53469219, 11097691, 1104282, 11141165, 12672296, 11096825, 12674112 18P-24P	MERCURY 7439976 8M	CADMIUM - 7440439 4M Hardness dependent	LEAD - 7439921 7M Dependent on hardness	ZINC- 7440666 13M hardness dependent		
Effluent Data	# of Samples (n)	23	92	112	112	112		
	Coeff of Variation (Cv)	0.81	0.76	0.38	0.67	0.17		0.6
	Effluent Concentration, ug/L (Max. or 95th Percentile)	0.000643	0.0034	0.069	0.57	53.3		
	Calculated 50th percentile Effluent Conc. (when n>10)	0.000265	0.0016			40.2		
Receiving Water Data	90th Percentile Conc., ug/L	0.000111	0	0	0	0		
	Geo Mean, ug/L	0.000028	0			0		
Water Quality Criteria	Aquatic Life Criteria, Acute	2	2.1	1.0211	17.359	41.846		
	ug/L Chronic	0.014	0.012	1.6382	4.774	177.78		
	WQ Criteria for Protection of Human Health, ug/L	0.00017	0.14	-	-	2300		
	Metal Criteria Acute	-	0.85	0.943	0.466	0.996		
	Translator, decimal Chronic	-	-	0.943	0.466	0.996		
	Carcinogen?	Y	N	N	N	N		

Aquatic Life Reasonable Potential

Effluent percentile value		0.950	0.950	0.950	0.950	0.950
s	$s^2 = \ln(CV^2 + 1)$	0.710	0.675	0.367	0.609	0.169
Pn	$Pn = (1 - \text{confidence level})^{1/n}$	0.878	0.968	0.974	0.974	0.974
Multiplier		1.00	1.00	1.00	1.00	1.00
Max concentration (ug/L) at edge of...	Acute	0.001	0.003	0.065	0.266	53.087
	Chronic	0.001	0.003	0.065	0.266	53.087
Reasonable Potential? Limit Required?		NO	NO	NO	NO	YES

Aquatic Life Limit Calculation

# of Compliance Samples Expected per month						4
LTA Coeff. Var. (CV), decimal						0.17
Permit Limit Coeff. Var. (CV), decimal						0.17
Waste Load Allocations, ug/L	Acute					41.846
	Chronic					177.78
Long Term Averages, ug/L	Acute					28.664
	Chronic					146.46
Limiting LTA, ug/L						28.664
Metal Translator or 1?						1.00
Average Monthly Limit (AML), ug/L						33.0
Maximum Daily Limit (MDL), ug/L						42.0

Human Health Reasonable Potential

s	$s^2 = \ln(CV^2 + 1)$	0.710257306	0.675207		0.1688
Pn	$Pn = (1 - \text{confidence level})^{1/n}$	0.878	0.968		0.974
Multiplier		0.43733744	0.286433		0.7212
Dilution Factor		1	1		1
Max Conc. at edge of Chronic Zone, ug/L		2.7E-04	1.6E-03		40.2
Reasonable Potential? Limit Required?		YES	NO		NO

Table D-6: PCB Metals TMDL End of Pipe Limit Calculations

Aquatic Life and Human Health Limits Calculations

		Dilution Factors:		Acute	Chronic
Facility	City of Spokane Riverside WRF	Aquatic Life		1.0	1.0
Water Body Type	Freshwater	Human Health Carcinogenic			1.0
Rec. Water Hardness	187.2	Human Health Non-Carcinogenic			1.0

Pollutant, CAS No. & NPDES Application Ref. No.		Polychlorinated Biphenyls (PCB's) 53469219, 11097691, 1104282, 11141165, 12672296, 11096825, 12674112 18P-24P		CADMIUM - 7440439 4M Hardness dependent	LEAD - 7439921 7M Dependent on hardness	ZINC- 7440666 13M hardness dependent	
Effluent Data	Coeff of Variation (Cv)	0.81	0.6	0.38	0.67	0.17	0.6
Receiving Water Data	90th Percentile Conc., ug/L	0					
	Geo Mean, ug/L	0					
Water Quality Criteria	Aquatic Life Criteria, Acute ug/L	2		1.0211	17.359	41.846	
	Chronic	0.014		1.6382	4.774	177.78	
	WQ Criteria for Protection of Human Health, ug/L	0.00017		-	-	2300	
	Metal Criteria Acute	-		0.943	0.466	0.996	
	Translator, decimal Chronic	-		0.943	0.466	0.996	
	Carcinogen?	Y		N	N	N	

Aquatic Life Limit Calculation

# of Compliance Samples Expected per month		4		4	4	4
LTA Coeff. Var. (CV), decimal		0.81		0.38	0.67	0.17
Permit Limit Coeff. Var. (CV), decimal		0.81		0.38	0.67	0.17
Waste Load Allocations, ug/L	Acute	2		1.0211	17.359	41.846
	Chronic	0.014		1.6382	4.774	177.78
Long Term Averages, ug/L	Acute	0.493279863		0.4649	5.069	28.664
	Chronic	0.006101314		1.0761	2.3579	146.46
Limiting LTA, ug/L		0.006101314		0.4649	2.3579	28.664
Metal Translator or 1?		1.00		0.94	0.47	1.00
Average Monthly Limit (AML), ug/L		0.011		0.66	8.20	33.0
Maximum Daily Limit (MDL), ug/L		0.025		1.08	17.33	42.0

Human Health Limit Calculation

# of Compliance Samples Expected per month		4				4
Dilution Factor		1				1
Average Monthly Effluent Limit, ug/L		0.000170				2300
Maximum Daily Effluent Limit, ug/L		0.000392				2930.9

Table D-7: PCB Performance Based Limits**PCB Performance-based Effluent Limits**

INPUT	
LogNormal Transformed Mean:	-8.5318
LogNormal Transformed Variance:	0.9897
Number of Samples per month for compliance monitoring:	4
Autocorrelation factor (n_e) (use 0 if unknown):	0
OUTPUT	
$E(X) =$	0.0003
$V(X) =$	0.000
$VARn$	0.3525
$MEANn=$	-8.2132
$VAR(Xn)=$	0.000
RESULTS	
Maximum Daily Effluent Limit pg/L:	1994
Average Monthly Effluent Limit pg/L:	720

Table D-8: Cadmium Performance Based + 10% Limits**Cadmium Performance-based Plus 10 % Effluent Limits**

INPUT	
LogNormal Transformed Mean:	-3.1064
LogNormal Transformed Variance:	0.0915
Number of Samples per month for compliance monitoring:	4
Autocorrelation factor (n_e) (use 0 if unknown):	0
OUTPUT	
$E(X) =$	0.0469
$V(X) =$	0.000
$VARn$	0.0237
$MEANn=$	-3.0725
$VAR(Xn)=$	0.000
RESULTS	
Maximum Daily Effluent Limit (ug/L):	0.099
Average Monthly Effluent Limit (ug/L):	0.066

Table D-9: Lead Performance Based + 10% Limits**Lead Performance-based Plus 10% Effluent Limits**

INPUT	
LogNormal Transformed Mean:	-0.9125
LogNormal Transformed Variance:	0.0866
Number of Samples per month for compliance monitoring:	4
Autocorrelation factor (n_e) (use 0 if unknown):	0
OUTPUT	
$E(X) =$	0.4193
$V(X) =$	0.016
$VARn$	0.0224
$MEANn=$	-0.8804
$VAR(Xn)=$	0.004
RESULTS	
Maximum Daily Effluent Limit (ug/L):	0.876
Average Monthly Effluent Limit (ug/L):	0.583

Table D-10: Zinc Performance Based + 10% Limits**Performance-based Effluent Limits**

INPUT	
LogNormal Transformed Mean:	3.6941
LogNormal Transformed Variance:	0.0283
Number of Samples per month for compliance monitoring:	4
Autocorrelation factor (n_e) (use 0 if unknown):	0
OUTPUT	
$E(X) =$	40.7839
$V(X) =$	47.711
$VARn$	0.0071
$MEANn=$	3.7047
$VAR(Xn)=$	11.928
RESULTS	
Maximum Daily Effluent Limit (ug/L):	59.5
Average Monthly Effluent Limit (ug/L):	46.7

Table D-11: Minimum pH RPA and Limit Calculation**Calculation of Low pH limit with a Mixture of Two Flows**

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

INPUT		
	@ Chronic Boundary	@ Chronic Boundary
1. Dilution Factor at Mixing Zone Boundary	3.5	3.5
2. Ambient/Upstream/Background Conditions		
Temperature (deg C):	17.90	17.90
pH:	8.47	8.47
Alkalinity (mg CaCO ₃ /L):	30.50	30.50
3. Effluent Characteristics		
Temperature (deg C):	21.00	21.00
pH:	6.00	7.85
Alkalinity (mg CaCO ₃ /L):	182.70	182.70
4. Aquatic Life Use Designation	Other species (salmonid/redband trout/warmwater species)	Other species (salmonid/redband trout/warmwater species)
OUTPUT		
1. Ionization Constants		
Upstream/Background pKa:	6.40	6.40
Effluent pKa:	6.38	6.38
2. Ionization Fractions		
Upstream/Background Ionization Fraction:	0.99	0.99
Effluent Ionization Fraction:	0.30	0.97
3. Total Inorganic Carbon		
Upstream/Background Total Inorganic Carbon (mg CaCO ₃ /L):	31	31
Effluent Total Inorganic Carbon (mg CaCO ₃ /L):	616	189
4. Conditions at Mixing Zone Boundary		
Temperature (deg C):	18.79	18.79
Alkalinity (mg CaCO ₃ /L):	73.99	73.99
Total Inorganic Carbon (mg CaCO ₃ /L):	197.99	75.92
pKa:	6.39	6.39
5. Allowable pH change	0.50	0.50
RESULTS		
pH at Mixing Zone Boundary:	6.17	7.97
pH change at Mixing Zone Boundary:	2.30	0.50
Is permit limit needed?	YES	NO

Table D-12: Maximum pH RPA**Calculation of Upper pH limit with a Mixture of Two Flows**

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

INPUT		
	@ Chronic Boundary	@ Chronic Boundary
1. Dilution Factor at Mixing Zone Boundary	3.5	3.5
2. Ambient/Upstream/Background Conditions		
Temperature (deg C):	17.90	17.90
pH:	8.36	8.36
Alkalinity (mg CaCO ₃ /L):	30.50	30.50
3. Effluent Characteristics		
Temperature (deg C):	21.00	21.00
pH:	9.00	8.50
Alkalinity (mg CaCO ₃ /L):	182.70	182.70
4. Aquatic Life Use Designation	Other species (salmonid/redband trout/warmwater species)	Other species (salmonid/redband trout/warmwater species)
OUTPUT		
1. Ionization Constants		
Upstream/Background pKa:	6.40	6.40
Effluent pKa:	6.38	6.38
2. Ionization Fractions		
Upstream/Background Ionization Fraction:	0.99	0.99
Effluent Ionization Fraction:	1.00	0.99
3. Total Inorganic Carbon		
Upstream/Background Total Inorganic Carbon (mg CaCO ₃ /L):	31	31
Effluent Total Inorganic Carbon (mg CaCO ₃ /L):	183	184
4. Conditions at Mixing Zone Boundary		
Temperature (deg C):	18.79	18.79
Alkalinity (mg CaCO ₃ /L):	73.99	73.99
Total Inorganic Carbon (mg CaCO ₃ /L):	74.35	74.61
pKa:	6.39	6.39
5. Allowable pH change	0.50	0.50
RESULTS		
pH at Mixing Zone Boundary:	8.70	8.46
pH change at Mixing Zone Boundary:	0.34	0.10
Is permit limit needed?	YES	NO

Table D-13: Fecal Coliform RPA Evaluation

Calculation of Fecal Coliform at Chronic Mixing Zone

INPUT	
Chronic Dilution Factor	3.5
Receiving Water [Fecal Coliform], #/100 ml	148
Effluent [Fecal Coliform] - worst case, #/100 ml	400
Surface Water Criterion, #/100 ml	14
OUTPUT	
Fecal coliform at Mixing Zone Boundary, #/100 ml	220
Difference between mixed and ambient, #/100 ml	72
Conclusion: At design flow, the discharge has a reasonable potential to violate water quality standards for fecal coliform.	

Table D-14: Dissolved Oxygen at the Chronic Boundary RPA

Calculation of Dissolved Oxygen at Chronic Mixing Zone

INPUT	
Chronic Dilution Factor	3.5
Receiving Water DO Concentration, mg/L	9.5
Effluent DO Concentration, mg/L	7.2
Effluent Immediate DO Demand (IDOD), mg/L	0
Surface Water Criteria, mg/L	8
OUTPUT	
DO at Mixing Zone Boundary, mg/L	8.84
DO decrease caused by effluent at chronic boundary, mg/L	0.66
Conclusion: At design flow, the discharge has no reasonable potential to violate water quality standards for dissolved oxygen.	

Appendix E - Response to Comments

Public Comment Period 1 – December 29, 2011 – February

Ecology received comments on the draft documents following the 60-day public comment period.

Public Comment Period 2 – May 11, 2022 – June 10, 2022

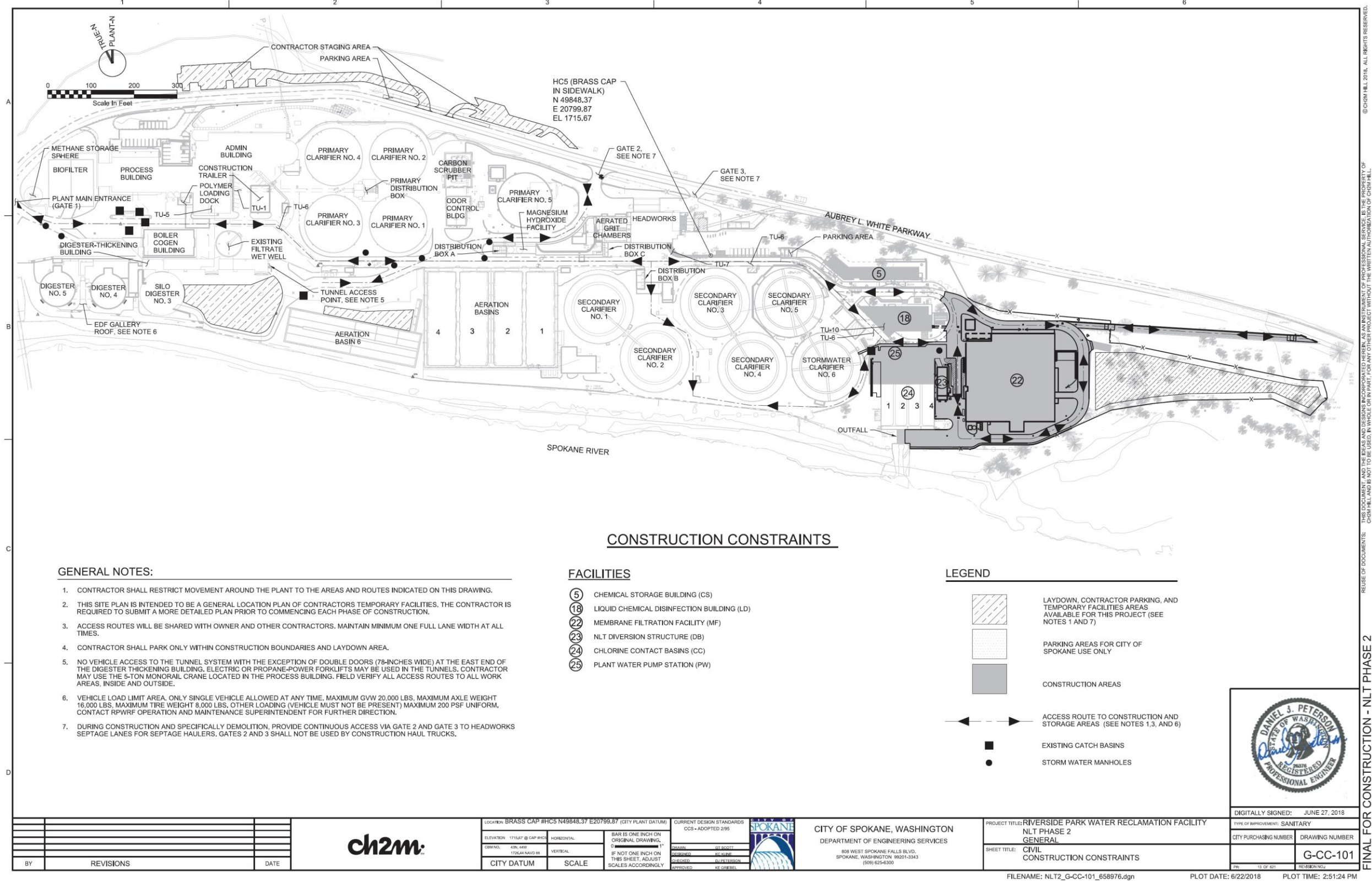
Ecology received comments on the draft documents following the 30-day public comment period.

A summary of the comments and Ecology's responses are located at the end of this fact sheet as Appendix E-1.

Appendix F - Process Flow Diagram and CSO Location Maps

- Figure F-1: NLT Process Location Map
- Figure F-2: Process Flow Diagram for Headworks, Primary Clarifiers, and Activated Sludge Process
- Figure F-3: Process Flow Diagram for NLT and Disinfection PART A
- Figure F-4: CSO Outfalls PART B
- Figure F-5: CSO Location Map

Figure F-1: NLT Process Location Map



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FINAL FOR CONSTRUCTION - NLT PHASE 2

Figure F-2: Process Flow Diagram for Headworks, Primary Clarifiers, and Activated Sludge Process

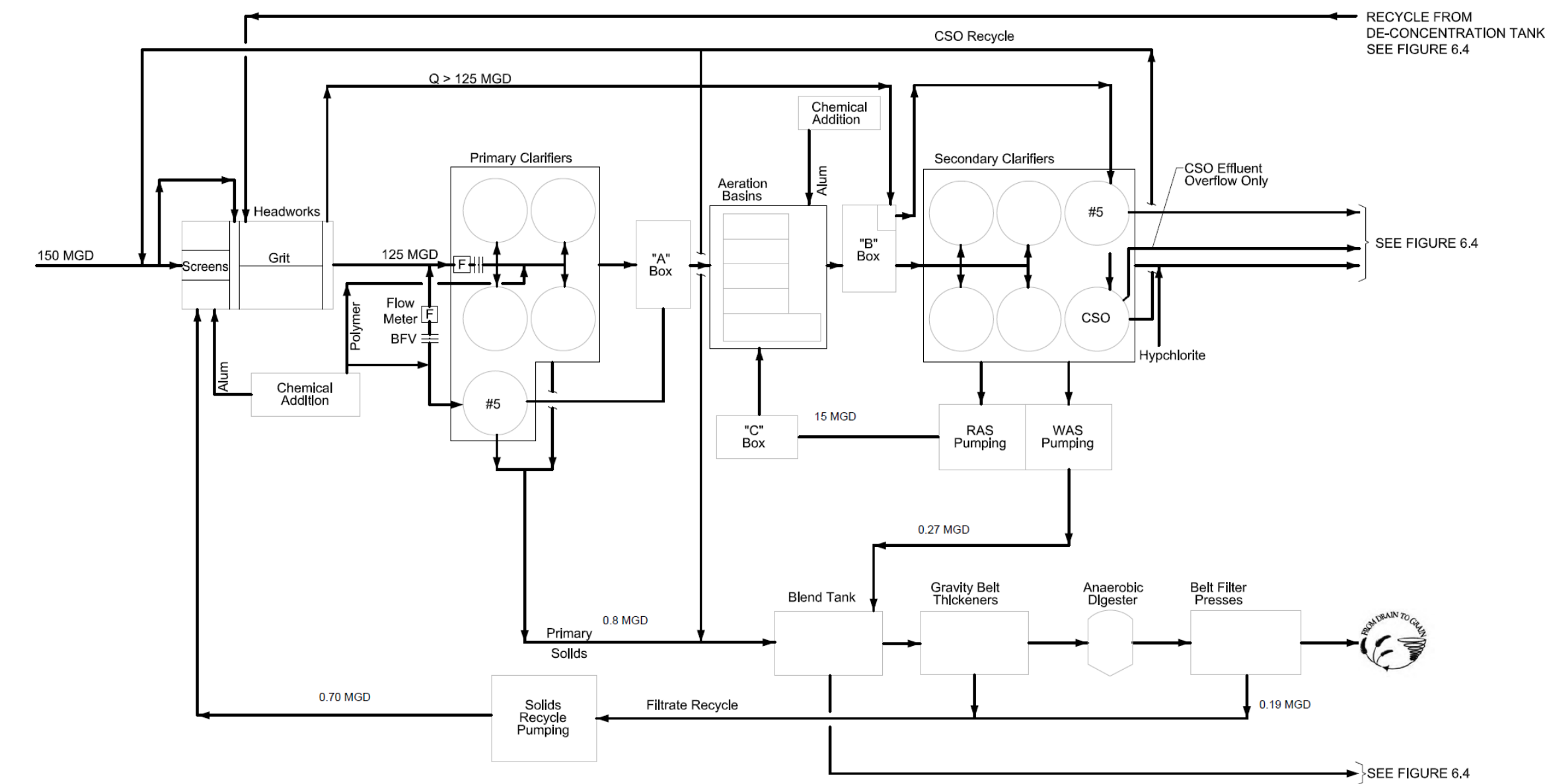


FIGURE 6-3
Process Flow Diagram for Headworks,
Primary Clarifiers, and Activated Sludge Process

Figure F-3: Process Flow Diagram for NLT and Disinfection Part A

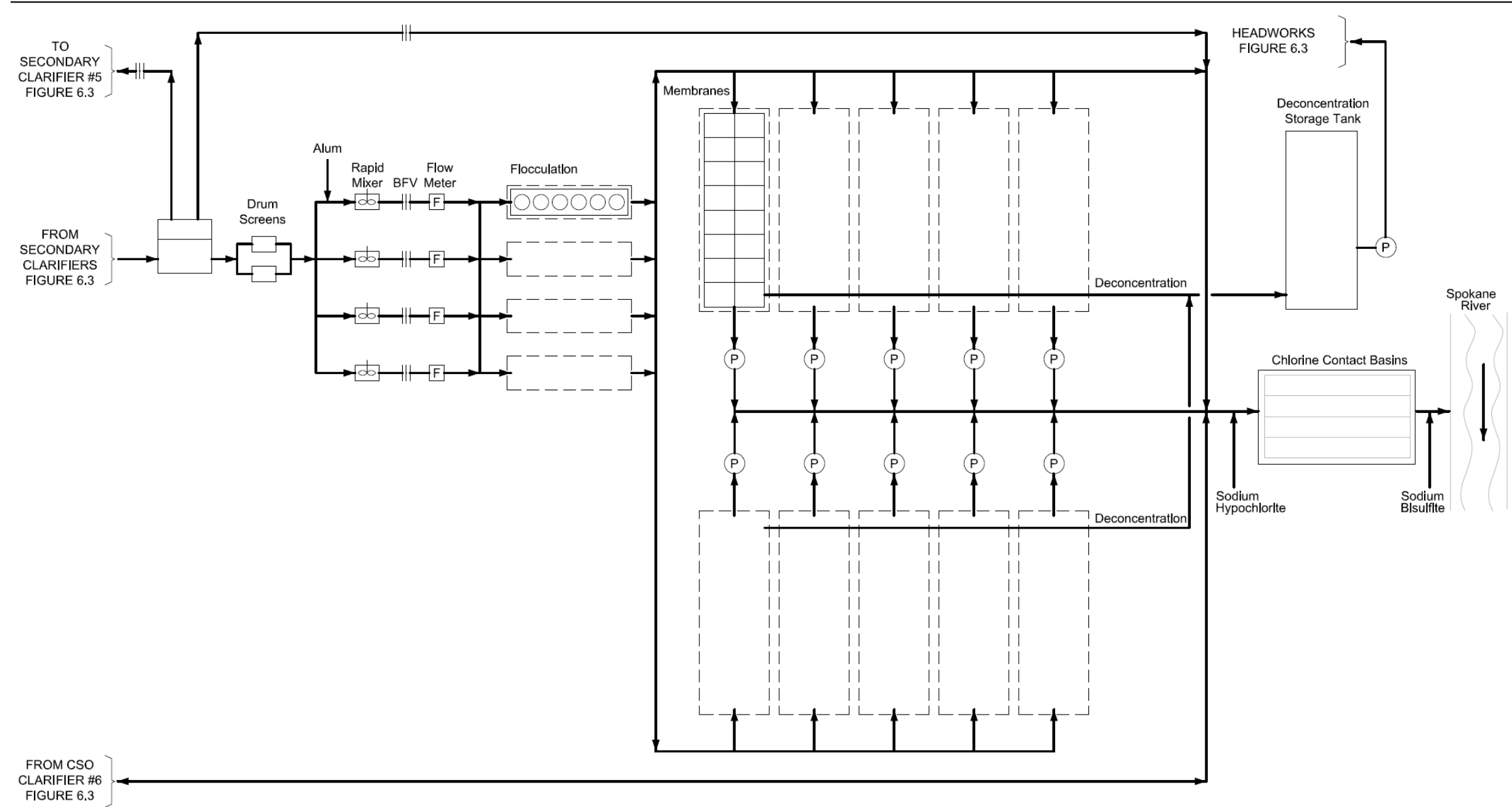
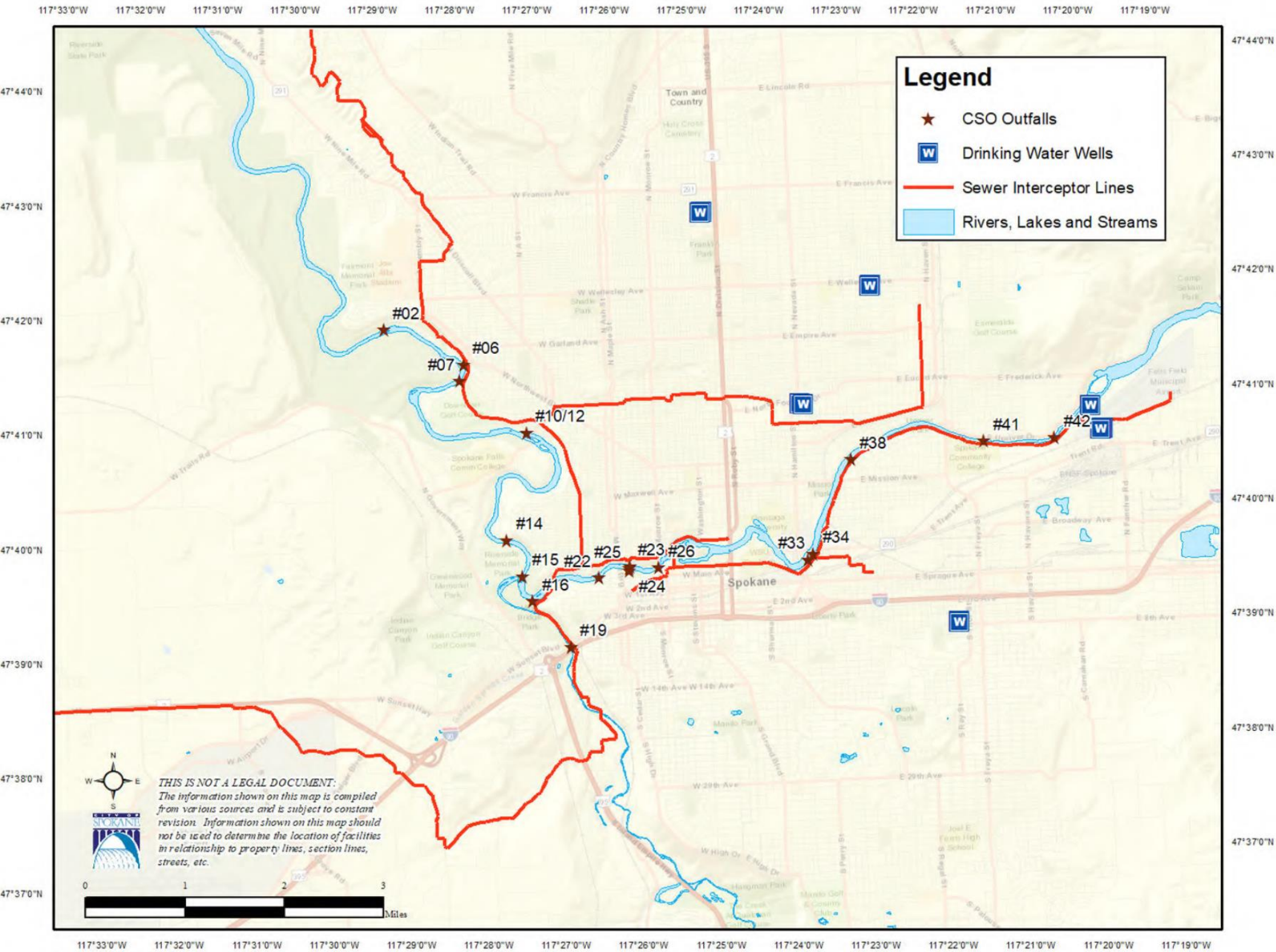


FIGURE 6-4
Process Flow Diagram for NLT and Disinfection

Figure F-4: CSO Outfalls Part B



Print date: 12/23/2020

Figure F-5: CSO Location Map

