

Fact Sheet for NPDES Permit WA0045144

Liberty Lake Sewer and Water District

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 Liberty Lake Sewer and Water District (the District).

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

Ecology makes the draft permit and fact sheet available for public review and comment at least 30-days before issuing the final permit. Copies of the fact sheet and draft permit for the District, NPDES permit WA0045144, are available for public review and comment from March 18, 2022 to May 3, 2022. For more details on preparing and filing comments about these documents, please see Appendix A - Public Involvement Information.

The District 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 Liberty Lake Sewer and Water District (the District) owns and operates a biological nutrient removal, membrane filtration treatment facility. The wastewater facility has a design flow of 2 million gallons per day (MGD) which Ecology approved after the submission and approval of the 2012 Phase II Engineering Report. TMDL development based loadings on a flow of 1.5 MGD.

The District discharges UV-disinfected effluent to the Spokane River approximately 3.5 miles downstream from the Washington/Idaho border. The system collects and treats the sanitary wastewater from approximately 4,018 ERUs (Equivalent Residential Units) as well as commercial and light industrial dischargers.

Fecal coliform limits were revised to reflect the performance of the upgraded technology. Effluent limits for cadmium, lead and zinc were revised based on guidance in the 1999 Spokane River Metals TMDL. The receiving water is listed for temperature. The permit contains a performance-based limit for temperature and a final water quality based effluent limit with a compliance schedule. The permit requires two years of quarterly sampling for cyanide. The permit requires the District to continue to meet end of pipe limits and narrative criteria based on the fish tissue listing for PCBs. The proposed permit requires the District to conduct an effluent mixing zone/tracer study to verify the size of the mixing zone. This proposed permit also requires the District to complete a receiving water study for temperature, trace metals, pH, alkalinity, and dissolved oxygen.

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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 groundwater (chapter 173-200 WAC)
- Whole effluent toxicity testing and limits (chapter 173-205 WAC)
- Sediment management standards (chapter 173-204 WAC)
- Submission of plans and reports for construction of wastewater facilities (chapter 173-240 WAC)

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

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

II. Background Information

Table 1: Facility Information

Facility Name and Address	Liberty Lake Water Reclamation Facility N. 2218 Harvard Rd., Liberty Lake, WA 99019
Contact at Facility	Dan Grogg, Chief WRF Operator (509) 922-5443 ext. 236 dangrogg@libertylake.org
Responsible Official	BiJay Adams, General Manager (509) 922-5443 bijay@libertylake.org
Type of Treatment	Biological nutrient removal with membrane filtration followed by UV disinfection
Facility Location (NAD83/WGS84 reference datum)	Latitude: 47.677 Longitude: -117.109
Discharge Waterbody Name and Location (NAD83/WGS84 reference datum)	Spokane River (River Mile 92.3) Latitude: 47.67833 Longitude: -117.1167

Table 2: Permit Status

Renewal Date of Previous Permit	June 23, 2011
Application for Permit Renewal Submittal Date	December 22, 2015 and June 10, 2021
Date of Ecology Acceptance of Application	March 2, 2016 and July 9, 2021

Table 3: Inspection Status

Date of Last Non-sampling Inspection Date	November 29, 2018
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Figure 1: Facility Location Map



A. Facility description

History

The community around Liberty Lake formed the Liberty Lake Sewer and Water District (the District) in 1973 to address water quality issues in the lake. In 1975, Entranco Engineers completed a facility plan for a wastewater treatment system. The District's goal was to improve the water quality of Liberty Lake by eliminating septic system use from seasonal and permanent homes in the vicinity of the lake. In 1978, Kennedy Consulting Engineers amended the facility plan.

The District built the treatment facility identified in the facility plan amendment in 1982. The facility discharged secondary-treated, chlorine-disinfected effluent to the Spokane River. The District switched to UV disinfection in 2002.

In 2000, the District began planning to accommodate growth in the District and to evaluate options for nitrogen and phosphorus removal. The District began construction of the recommended Phase I upgrades at the facility in 2004 and completed them in 2006.

The Phase I upgrades consisted of:

- conversion of an existing anaerobic basin to an equalization basin,
- modification to the existing aeration basin and installation of fine bubble aeration,
- new mixed liquor recycle pump stations,
- new anaerobic and anoxic basins,
- a new blower building,
- new secondary clarifiers,
- new return activated sludge pumps,
- a new coarse bubble diffuser aeration system in the existing digester tanks,
- a new sludge dewatering building with new belt filter press,
- a polymer system,
- a dewatered sludge conveyor

Many of these changes were to help the District prepare for the anticipated Spokane River and Lake Spokane Dissolved Oxygen Total Maximum Daily Load (DO TMDL) Water Quality Improvement Report.

In 2012, the District began planning for the Phase II upgrades needed to meet the critical season wasteload allocation for carbonaceous biochemical oxygen demand, ammonia, and total phosphorous. The District completed construction on the Phase II upgrades adding chemically enhanced solids removal and membrane filtration to meet the DO TMDL nutrient removal requirements. The upgrades went on line in January 2018. The District has been operating the newly constructed membrane filtration facility for about three years.

Collection system status

Most of the District's collection system was installed in the late 1970s and early 1980s and consists of PVC pipe. Some of the collection system in the vicinity of the Lake is older and consists of clay service lines with older brick-lined manholes. The collection system discharges to the treatment facility through a 21-inch asbestos concrete gravity pipeline.

Treatment processes

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

The "Liberty Lake Sewer and Water District (LLSWD) - Water Reclamation Facility Engineering Report Update for Phosphorus Removal and Reclamation NPDES Permit WA0045144" was approved on December 31, 2012. The selected alternative was designed to meet the Spokane River Lake Spokane Dissolved Oxygen Total Maximum Daily Load (DO TMDL) Water Quality Improvement Report (2010). Appendix F contains the process flow schematics and Figure 2 below is a simplified flow diagram.

The District's facility is a biological nutrient removal, activated sludge treatment process followed by membrane filtration and ultraviolet light disinfection.

The treatment consists of:

- Fine screens at the headworks
- Anaerobic equalization basin
- Anaerobic/anoxic basin
- Aeration basins
- Secondary clarifier
- Membrane filtration
- UV disinfection
- Aerobic sludge holding tanks
- Sludge dewatering

The District's facility has a maximum month design capacity of two million gallons per day (mgd). As a result, the facility requires a Class III operator. The Chief Operator is a certified Class III, the Assistant Chief Operator is a Class IV. The facility has two additional staff, a Class II Operator with a Class IV certification and a Class I Operator. The proposed permit requires that a Class III Operator is in charge of the facility during all regularly scheduled shifts. The facility is staffed five days per week, Monday through Friday, 8 a.m. to 5 p.m. except holidays. The District has operators on call during unstaffed hours and weekends. The collection system has three staff: a Chief Operator, a Maintenance Superintendent, and a Sewer Collections Operator. The staffing, positions, and titles may change depending on the needs of the District. The proposed permit requires the District to notify Ecology if they reduce staffing. The proposed permit also requires the District to update the O&M with a staffing analysis indicating the recommended staffing levels for the size of the facility and collection system.

The proposed permit requires the District to submit a list of industrial and commercial dischargers. The permit application indicates that they do not receive wastewater from significant industrial users or non-significant categorical industrial users.

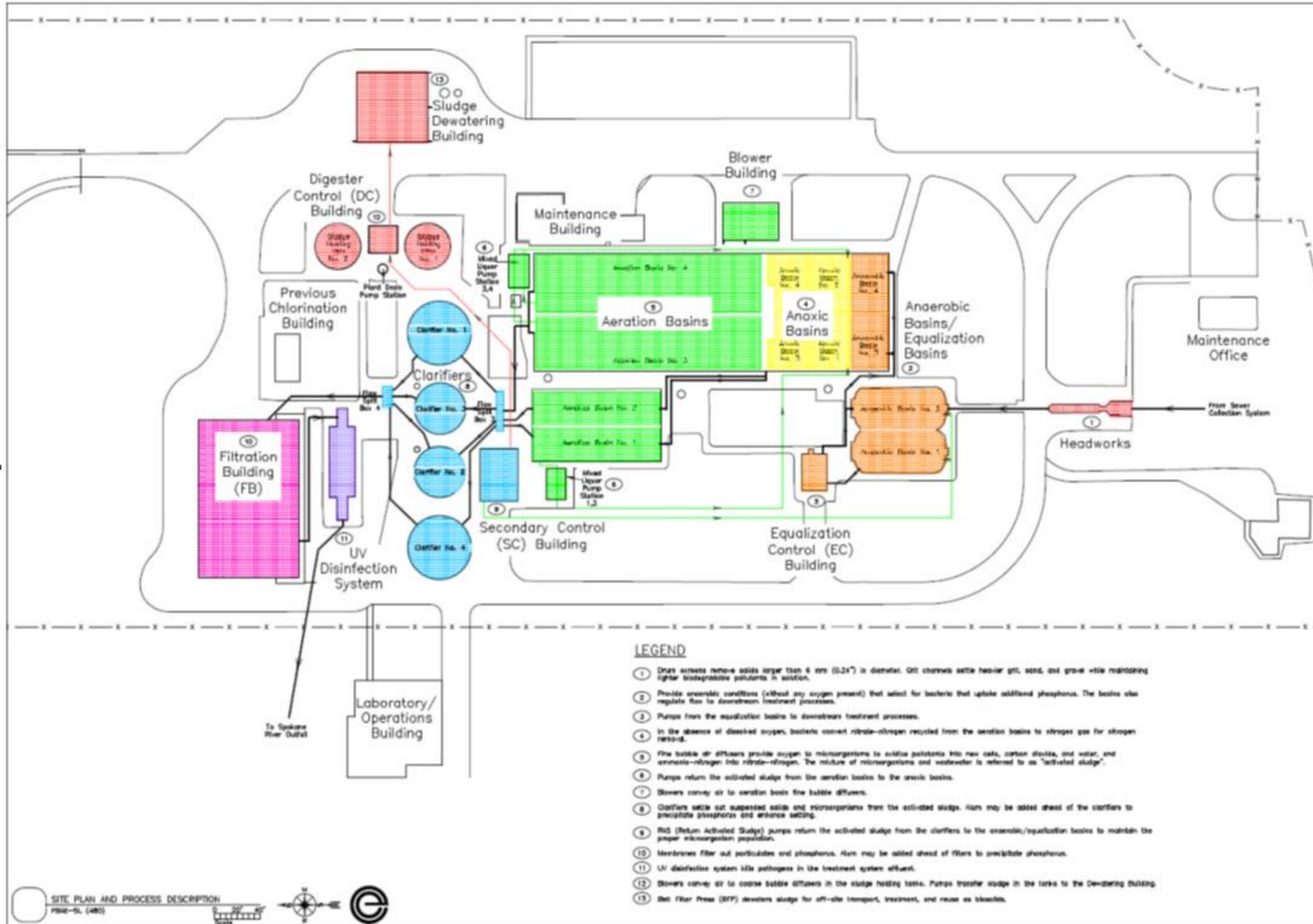
Solid wastes/Residual Solids

The treatment facilities remove solids during the treatment of the wastewater at the headworks (grit and screenings), and at the secondary clarifiers, in addition to incidental solids (rags, scum, and other debris) removed as part of the routine maintenance of the equipment. The District drains grit, rags, scum, and screenings and disposes this solid waste at the local waste to energy facility. Solids removed from the secondary clarifiers are dewatering as required by Biosolids Permit BA-0045144 and are currently sent to Barr-Tech. The District also maintains a contract with Boulder Park. This facility has met the solid waste requirements for screening, as required by WAC 173-308-205, by implementing a fine screen at the influent of the facility.

Discharge outfall

The treated and disinfected effluent flows into the Spokane River via gravity through a submerged single-port 16-inch discharge pipe that extends 30 feet from the south bank attached to the bottom of the river with discharge perpendicular to river flow.

Figure 2: Simplified Flow Diagram



B. Description of the receiving water

The District discharges to the Spokane River. Other downstream point source outfalls include Kaiser Aluminum, Inland Empire Paper, Spokane County, and City of Spokane. Significant nearby non-point sources of pollutants include agricultural lands. There are no nearby drinking water intakes. Section III E of this fact sheet describes any receiving waterbody impairments.

The ambient background data used for this permit includes the following from the Ecology Environmental Information Management (EIM) database, Study ID AMS001 and AMS001-2. The date range of the data used depends upon the parameter. The PCB data is from a study conducted by the Spokane River Regional Toxics Task Force in 2014 and 2016 at the Post Falls Idaho USGS gauge.

Table 4: Ambient Background Data

Parameter	Value Used	Date Range
Temperature (highest annual 1-DMax) (90 th Percentile)	22.3°C	1/2010-9/2021
pH (Minimum/Maximum)	6.55/8.68 standard units	1/2010-9/2021
Dissolved Oxygen (10 th Percentile)	8.0 mg/L	1/2010-9/2021
Total Ammonia-N (90 th Percentile)	0.026 mg/L	1/2010-9/2021
Fecal Coliform (90 th Percentile)	14 CFU/100 mL	1/2010-9/2021
<i>E.coli</i> (90 th Percentile)	23 CFU/100 mL	11/2018-9/2021
Total Suspended Solids	2 mg/L	1/2010-9/2021
Hardness (90 th Percentile)	23 mg/L as CaCO ₃	2/2010-8/2021
Alkalinity (90 th Percentile)	21 mg/L as CaCO ₃	10/2007-8/2008
Arsenic (90 th Percentile)	0.5 µg/L	2/2010-8/2021
Cadmium (90 th Percentile)	0.248 µg/L	2/2010-8/2021
Chromium (90 th Percentile)	0.25 µg/L	2/2010-8/2021
Copper (90 th Percentile)/(Geomean)	0.73/0.54 µg/L	2/2010-8/2021
Lead (90 th Percentile)	3.47 µg/L	2/2010-8/2021
Mercury (90 th Percentile)/(Geomean)	0.002/0.0011 µg/L	2/2010-8/2021
Nickle (90 th Percentile)/(Geomean)	0.48/0.28 µg/L	2/2010-8/2021

Parameter	Value Used	Date Range
Silver (90 th Percentile)	All sample Non-detect	2/2010-8/2021
Zinc (90 th Percentile)/(Geomean)	57.25/38.8 µg/L	2/2010-8/2021
PCBs (90 th Percentile)/(Geomean)	1.40E-08/5.40E-9	2014 and 2016

C. Wastewater influent characterization

The District reported the concentration of influent pollutants in discharge monitoring reports. Ecology used the data range that corresponded to the startup of the upgraded facility January 2018 - October 2021 for development of the proposed permit. The same data range was used for the influent. The influent wastewater is characterized as follows:

Table 5: Wastewater Influent Characterization

Parameter	Units	Average Value	95 th Percentile
Biochemical Oxygen Demand (BOD ₅)	mg/L	201	304
Biochemical Oxygen Demand (BOD ₅)	lbs/day	1,305	1,989
Total Suspended Solids (TSS)	mg/L	306	472
Total Suspended Solids (TSS)	lbs/day	2,011	3,168
Ammonia	mg/L	40.1	44.7
Total Organic Nitrogen	mg/L	47.8	59.4
Total Phosphorous	mg/L	6.29	7.62
Total Phosphorous	lbs/day	41.4	50.5
Arsenic	µg/L	1.95	2.7
Cadmium	µg/L	0.67	1.0
Copper	µg/L	29.8	44
Lead	µg/L	2.67	4.19
Mercury	µg/L	0.063	0.259
Zinc	µg/L	124	210
PCBs	pg/L	2,725	4,646

D. Wastewater effluent characterization

The District 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 January 2018 – October 2021. Because the permit was modified in 2013 there is no data is available for dioxin. The operator made an error and stopped collecting PBDE data so no PBDE data is available for the new facility. The wastewater effluent is characterized as follows:

Table 6: Wastewater Effluent Characterization

Parameter	Units	Average Value	95 th Percentile
Biochemical Oxygen Demand (BOD ₅)	mg/L	1.43	2.75
Biochemical Oxygen Demand (BOD ₅)	lbs/day	15.13	20.75
Total Suspended Solids (TSS)	mg/L	0.43	1.2
Total Suspended Solids (TSS)	lbs/day	2.86	8.13
Nitrate	mg/L	6.03	8.36
Ammonia	mg/L	0.84	2.88
Ammonia	lbs/day	5.70	19.3
Phosphorous Total	mg/L	.091	0.41
Phosphorous Total	lbs/day	0.53	2.4
Phosphorous Dissolved	mg/L	0.071	0.41
Alkalinity	mg/L	92.3	51.6 (5 th percentile)
Hardness	mg/L	118	97.8 (5 th percentile)
Dissolved Oxygen (5 th Percentile)	mg/L	6.15	4.8
Temperature Critical Season July 1- Sept 14 (1-DMAX 95 th Percentile)	Degrees C	--	23.6
Temperature Spawning Season April 1- June 15 (1-DMAX 95 th Percentile)	Degrees C	--	20.0
Antimony	µg/L	1.08	1.08

Parameter	Units	Average Value	95 th Percentile
Arsenic	µg/L	0.86	1.38
Acetone	µg/L	17.4	17.4
Cadmium	µg/L	0.34	0.5
Chloroform	µg/L	8.88	8.88
Chloromethane	µg/L	1.59	1.59
Copper	µg/L	3.71	10.35
Cyanide	µg/L	51.1? ^a	51.1? ^a
Lead	µg/L	0.68	1.49
Mercury	µg/L	0.0012	0.0027
Nickel	µg/L	1.38	1.38
Trichloroethylene	µg/L	0.66	0.66
Tetrachloroethylene	µg/L	0.660	0.660
Bis(2-ethylhexyl) phthalate	µg/L	9.57	9.57
Zinc	µg/L	63.0	90.3
PCBs	pg/L	81.4	127

Note: ^a Liberty Lake indicated that this is not reliable data. The permit requires two years of quarterly sampling for cyanide.

Table 7: Wastewater Effluent Characterization – Fecal Coliform

Parameter	Units	Monthly Geomean	Weekly Geomean
Fecal Coliforms	#/100 mL	1.39	1.65

Table 8: Wastewater Effluent Characterization - pH

Parameter	Units	Minimum Value	Maximum Value
pH	standard units	6.59	9.31

E. Summary of compliance with previous permit issued

The previous permit placed effluent limits on design flow, BOD₅, CBOD₅, TSS, fecal coliform, pH, total phosphorus, lead, zinc, cadmium, and total ammonia.

The District has not consistently complied with the effluent limits and permit conditions throughout the duration of the permit issued on June 23, 2011. Ecology assessed compliance based on its review of the facility's discharge monitoring reports (DMRs).

Ecology made changes to address the permit issues that result in incorrectly reported violations. Table 9 contains the violations of the permit that occurred after the amended permit was issued on October 30, 2013.

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. Additionally, the operator stopped collecting PBDE data and those missed samples are also violations.

Table 9: Violations/Permit Triggers

Begin Date	Parameter Type	Statistical Base Type	Unit Type	Value	Limit Min/Max	Violation
9/1/2014	Phosphorus	Seasonal Average	Milligrams/L (mg/L)	0.64		85% Design Criteria Warning
10/1/2014	Phosphorus	Seasonal Average	Milligrams/L (mg/L)	0.68	0.612	Numeric effluent violation
4/1/2016	pH Daily Min	Single Sample	Standard Units	6.36	6.8	Numeric effluent violation
4/1/2016	pH Daily Min	Single Sample	Standard Units	6.38	6.8	Numeric effluent violation
4/1/2016	pH Daily Min	Single Sample	Standard Units	6.44	6.8	Numeric effluent violation
4/1/2016	pH Daily Min	Single Sample	Standard Units	6.5	6.8	Numeric effluent violation
2/1/2020	pH Daily Max	Single Sample	Standard Units	9.31	8.5	Numeric effluent violation
2/1/2020	pH Daily Min	Single Sample	Standard Units	6.59	6.8	Numeric effluent violation

Begin Date	Parameter Type	Statistical Base Type	Unit Type	Value	Limit Min/Max	Violation
2/1/2020	pH Daily Min	Single Sample	Standard Units	6.69	6.8	Numeric effluent violation
4/1/2020	Ammonia	Seasonal Average	lbs/day	27.6	---	Exceedance of Design Criteria
4/1/2020	Ammonia	Seasonal Average	Milligrams/L (mg/L)	4.2	---	Exceedance of Design Criteria
5/1/2020	Ammonia	Seasonal Average	lbs/day	21.8	---	Exceedance of Design Criteria
5/1/2020	Ammonia	Seasonal Average	Milligrams/L (mg/L)	3.36	---	Exceedance of Design Criteria
3/1/2021	Zinc	Average Monthly	Micrograms/L (µg/L)	87.65	80.8	Numeric effluent violation
3/1/2021	pH Daily Max	---	Standard Units	---	---	Frequency of Sampling Violation
4/1/2021	Zinc	Average Monthly	Micrograms/L (µg/L)	91.95	80.8	Numeric effluent violation
4/1/2021	Zinc	Maximum	Micrograms/L (µg/L)	124	117.8	Numeric effluent violation
5/1/2021	Zinc	Maximum	Micrograms/L (µg/L)	121	117.8	Numeric effluent violation

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

Table 10: Permit Submittals

Submittal Name	Submittal Status	Due Date	Received Date
PCBS, 2,3,7,8 TCDDS AND PBDE QAPP/QAPP FOR TEMP	Received	10/15/2011	10/12/2011
REGIONAL TOXICS TASK FORCE DOCUMENTS	Received	11/30/2011	11/30/2011
LOCAL LIMIT DEVELOPMENT	Received	1/15/2012	---
INDUSTRIAL USER SURVEY UPDATE	Received	2/15/2012	2/9/2012---
WASTELOAD ASSESSMENT	Received	3/15/2012	1/23/2013
OPERATION AND MAINTENANCE MANUAL (UPDATE) LETTER OF COMPLETION	Received	3/15/2012	3/15/2012
TOXICS MANAGEMENT PLAN	Received	9/15/2012	3/8/2013
LOCAL SEWER ORDINANCE UPDATE	Reviewed	10/15/2012	5/17/2012
LOCAL SEWER ORDINANCE UPDATE	Received	10/15/2012	1/23/2013
UPDATED ENGINEERING REPORT - PHOS REMOVAL & REUSE	Received	10/30/2012	1/18/2013
ACUTE TOXICITY CHARACTERIZATION	Received	12/15/2012	11/29/2012
CHRONIC TOXICITY CHARACTERIZATION	Received	12/15/2012	11/29/2012
WASTELOAD ASSESSMENT	Reviewed	3/15/2013	2/7/2013
WASTELOAD ASSESSMENT	Accepted	3/15/2014	2/6/2014
TOXICS MANAGEMENT PLAN UPDATE	Received	3/31/2014	3/31/2014
CONTRACT DOCUMENTS	Received	10/1/2014	9/6/2014
WASTELOAD ASSESSMENT	Received	3/15/2015	2/2/2015
TOXICS MANAGEMENT PLAN UPDATE	Received	3/31/2015	3/30/2015

Submittal Name	Submittal Status	Due Date	Received Date
ACUTE TOXICITY CHARACTERIZATION	Received	6/15/2015	2/13/2015
CHRONIC TOXICITY CHARACTERIZATION	Received	6/15/2015	2/13/2015
APPLICATION FOR PERMIT RENEWAL	Received	1/1/2016	12/22/2015
APPLICATION FOR PERMIT RENEWAL	Received	1/1/2016	2/25/2021
WASTELOAD ASSESSMENT	Received	3/15/2016	3/1/2016
TOXICS MANAGEMENT PLAN UPDATE	Received	3/31/2016	3/18/2016
WASTELOAD ASSESSMENT	Received	3/15/2017	2/17/2017
TOXICS MANAGEMENT PLAN UPDATE	Received	3/31/2017	3/22/2017
CERTIFICATE OF CONSTRUCTION	Submitted	3/1/2018	3/23/2018
CERTIFICATE OF CONSTRUCTION	Received	3/1/2018	1/4/2019
WASTELOAD ASSESSMENT	Submitted	3/15/2018	3/5/2018
TOXICS MANAGEMENT PLAN UPDATE	Submitted	3/31/2018	3/29/2018
WASTELOAD ASSESSMENT	Submitted	3/15/2019	3/13/2019
TOXICS MANAGEMENT PLAN UPDATE	Submitted	3/31/2019	3/19/2019
WASTELOAD ASSESSMENT	Submitted	3/15/2020	2/24/2020
TOXICS MANAGEMENT PLAN UPDATE	Submitted	3/31/2020	3/30/2020
WASTELOAD ASSESSMENT	Submitted	3/15/2021	3/11/2021
TOXICS MANAGEMENT PLAN UPDATE	Submitted	3/31/2021	2/26/2021

F. State environmental policy act (SEPA) compliance

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

III. Proposed Permit Limits

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

- Technology-based limits are based upon the treatment methods available to treat specific pollutants. Technology-based limits are set by the EPA and published as a regulation, or Ecology develops the limit on a case-by-case basis (40 CFR 125.3, and chapter 173-220 WAC).
- Water quality-based limits are calculated so that the effluent will comply with the Surface Water Quality Standards (chapter 173-201A WAC), Ground Water Standards (chapter 173-200 WAC), Sediment Quality Standards (chapter 173-204 WAC), or the Federal Water Quality Criteria Applicable to Washington (40 CFR 131.45).
- Ecology must apply the most stringent of these limits to each parameter of concern. These limits are described below.

The limits in this permit reflect information received in the application and from supporting reports (engineering, hydrogeology, etc.). Ecology evaluated the permit application and determined the limits needed to comply with the rules adopted by the state of Washington. Ecology does not develop effluent limits for all reported pollutants.

Some pollutants are not treatable at the concentrations reported, are not controllable at the source, are not listed in regulation, and do not have a reasonable potential to cause a water quality violation.

Ecology does not usually develop limits for pollutants not reported in the permit application but that 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 "Liberty Lake Sewer and Water District – Water Reclamation Facility Engineering Report, updated for Phosphorous removal and Reclamation, dated January 2013" and prepared by Century West and Esvelt Environmental Engineering, LLC. The design criteria in the table below include design criteria from the as built table provided with the Permit Application submitted June 2021.

Table 11: Design Criteria for the District’s Water Reclamation Facility

Parameter	Design Quantity
Maximum Month Design Flow (MMDF)	2.00 MGD
Monthly Average annual Flow	1.80 MGD
Peak Instantaneous Design Flow (PIDF)	4.00 MGD
BOD ₅ Loading for Maximum Month (Influent)	6,294 lbs/day
TSS Loading for Maximum Month (Influent)	6,322 lbs/day
BOD ₅ Loading for Max Month (Effluent)	83.4 lbs/day
TSS Loading for Maximum Month (Effluent)	83.4 lbs/day

B. Technology-based effluent limits

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

The table below identifies technology-based limits for, fecal coliform, CBOD₅, BOD₅ and TSS, as identified in the Design Criteria Phase 2 upgrade As-built Drawings Page 5 of 205 for the tertiary treatment system provided with the permit application for renewal. These limits are more stringent than the secondary treatment technology-based limits in chapter 173-221 WAC. Chapter 173-220-130 requires that “effluent limitations shall not be less stringent than those based upon the treatment facility design efficiency contained in approved engineering plans and reports.”

The proposed permit includes technology-based limits based on the approved treatment facility design. Section III.F of this fact sheet describes the potential for water quality-based limits.

Table 12: Technology-based Limits – BOD₅

Parameter	Average Monthly Limit	Average Weekly Limit
BOD ₅ (concentration)	5 mg/L	7 mg/L

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

Table 13: Technology-based Limits - TSS

Parameter	Average Monthly Limit	Average Weekly Limit
TSS (concentration)	5 mg/L	7 mg/L

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

Table 14: Technology-based Limits – Fecal Coliform Bacteria

Parameter	Monthly Geometric Mean Limit	Weekly Geometric Mean Limit
Fecal Coliform Bacteria	18 organisms/100 mL	27 organisms/100 mL

Note: These are the performance based technology limits for the tertiary membranes. Because the most of the results were below detection, Ecology used the maximum of the three years of data as the Monthly Geometric Mean Limit and 1.5 times this value as the Weekly Geometric Mean Limit.

Table 15: Technology-based Limits - pH

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

Ecology calculated the monthly and weekly average mass limits for BOD₅, and Total Suspended Solids as follows:

$$\text{Mass Limit} = \text{CL} \times \text{DF} \times \text{CF}$$

Where :

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

DF = Maximum Monthly Average Design flow (MGD) 2.00 mgd

CF = Conversion factor of 8.34

Table 16: Technology-based Mass Limits

Parameter	Concentration Limit (mg/L)	Mass Limit (lbs/day)
BOD ₅ Monthly Average	5	83.4
BOD ₅ Weekly Average	7	116.8
TSS Monthly Average	5	8.34
TSS Weekly Average	7	116.8

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 criteria for the protection of human health are promulgated in Chapter 173-201A WAC and 40 CFR 131.45. These criteria are designed to protect human health from exposure to pollutants linked to cancer and other diseases, based on consuming fish and shellfish and drinking contaminated surface waters. The water quality standards also include radionuclide criteria to protect humans from the effects of radioactive substances.

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

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

Specifically, EPA proposes to:

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

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

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

Narrative criteria

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

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

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

Antidegradation

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

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

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

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

- The facility is planning a new or expanded action.
- Ecology regulates or authorizes the action.

- The action has the potential to cause measurable degradation to existing water quality at the edge of a chronic mixing zone.

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

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

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

Mixing zones

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

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

The state's water quality standards allow Ecology to authorize mixing zones for the facility's permitted wastewater discharges only if those discharges already receive all known, available, and reasonable methods of prevention, control, and treatment (AKART). Mixing zones typically require compliance with water quality criteria within a specified distance from the point of discharge and must not use more than 25% of the available width of the water body for dilution [WAC 173-201A-400 (7)(a)(ii-iii) or WAC 173-201A-400(7)(b)(ii-iii)].

Ecology uses modeling to estimate the amount of mixing within the mixing zone. Through modeling Ecology determines the potential for violating the water quality standards at the edge of the mixing zone and derives any necessary effluent limits. Steady-state models are the most frequently used tools for conducting mixing zone analyses.

Ecology chooses values for each effluent and for receiving water variables that correspond to the time period when the most critical condition is likely to occur (see [Publication No. 92-109, Ecology's Permit Writer's Manual](#) available online at <https://apps.ecology.wa.gov/publications/documents/92109.pdf>). Each critical condition parameter, by itself, has a low probability of occurrence and the resulting dilution factor is conservative. The term "reasonable worst-case" applies to these values.

The mixing zone analysis produces a numeric value called a dilution factor (DF). A dilution factor represents the amount of mixing of effluent and receiving water that occurs at the boundary of the mixing zone. For example, a dilution factor of 4 means the effluent is 25% and the receiving water is 75% of the total volume of water at the boundary of the mixing zone. Ecology uses dilution factors with the water quality criteria to calculate reasonable potentials and effluent limits.

Water quality standards include both aquatic life-based criteria and human health-based criteria. The former are applied at both the acute and chronic mixing zone boundaries; the latter are applied only at the chronic boundary. The concentration of pollutants at the boundaries of any of these mixing zones may not exceed the numeric criteria for that zone.

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

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

These assumptions include:

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

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

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

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

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

Ecology has determined that the treatment provided at The District’s Water Reclamation Facility meets the requirements of AKART.

3. Ecology must consider critical discharge conditions.

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

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

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

Table 17: Critical Conditions Used to Model the Discharge

Critical Condition	Value
The seven-day-average low river flow with a recurrence interval of ten years (7Q10)	500 CFS
The thirty-day low river flow with a recurrence interval of five years (30Q5)	700 CFS
Maximum average monthly effluent flow for chronic and human health non-carcinogen	2.0 MGD
Annual average flow for human health carcinogen	1.8 MGD
Maximum daily flow for acute mixing zone	3.0 MGD
1D _{MAX} Effluent temperature	22.8 °C

Ecology based instream conditions on the 2009 FERC relicensing agreement that requires Avista to maintain a minimum flow of 500 CFS at the Post Falls Dam. The proposed permit requires Liberty Lake to complete a mixing zone dye tracer study to verify the 7Q10 flows and the mixing zone dimensions.

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

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

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

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

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

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

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

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

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

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

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

Ecology minimizes the size of mixing zones by requiring dischargers to install diffusers when they are appropriate for the discharge and the specific receiving waterbody. When a diffuser is installed, the discharge is more completely mixed with the receiving water in a shorter time. Ecology also minimizes the size of the mixing zone (in the form of the dilution factor) using design criteria with a low probability of occurrence. For example, Ecology uses the expected 95th percentile pollutant concentration, the 90th percentile background concentration, the centerline dilution factor, and the lowest flow occurring once in every ten years to perform the reasonable potential analysis.

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

7. Maximum size of mixing zone.

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

8. Acute mixing zone.

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

Ecology determined the acute criteria will be met at 10% of the volume fraction of the chronic mixing zone at the ten year low flow.

- **The pollutant concentration, duration, and frequency of exposure to the discharge will not create a barrier to migration or translocation of indigenous organisms to a degree that has the potential to cause damage to the ecosystem.**

As described above, the toxicity of any pollutant depends upon the exposure, the pollutant concentration, and the time the organism is exposed to that concentration. Authorizing a limited acute mixing zone for this discharge assures that it will not create a barrier to migration. The effluent from this discharge will rise as it enters the receiving water, assuring that the rising effluent will not cause translocation of indigenous organisms near the point of discharge (below the rising effluent).

- **Comply with size restrictions.**

The mixing zone authorized for this discharge complies with the size restrictions published in chapter 173-201A WAC.

9. Overlap of mixing zones.

This mixing zone does not overlap another mixing zone.

D. Designated uses and surface water quality criteria

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

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

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

Freshwater Aquatic Life Uses and Associated Criteria

Table 18: Salmonid Spawning, Rearing, and Migration

Criteria	Limit
Temperature Criteria – Highest 1 DMAX	20°C (68°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% increase in turbidity when the background turbidity is more than 50 NTU.
Total Dissolved Gas Criteria	Total dissolved gas must not exceed 110% of saturation at any point of sample collection.
pH Criteria	The pH must measure within the range of 6.5 to 8.5 with a human-caused variation within the above range of less than 0.5 units.

- The **recreational uses** for this receiving water are identified in Table 19.

Table 19: Recreational Uses and Associated Criteria

Recreational Use	Criteria
Primary Contact Recreation (effective 1/1/2021)	<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% of all samples (or any single

Recreational Use	Criteria
	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

The Spokane River in WRIA57-Middle Spokane is listed on the current and candidate 303(d) list. The segment receiving Liberty Lake’s discharge has a 303 (d) listing for PCBs, dioxin, and temperature.

The Draft 303(d) list indicates that the Spokane River is impaired for PCBs, Fecal Coliform Bacteria, Methylmercury, and PBDEs in the segment downstream the Liberty Lake’s discharge.

Table 20: Spokane River WRIA 57 Middle Spokane 303(d) Category 5 listings

Current (2016) 303(d) listings Category 5	Candidate 2018 303(d)listings Category 5
Polychlorinated Biphenyls (Tissue)	Polychlorinated Biphenyls (Tissue)
2,3,7,8,-TCDD (Dioxin)	2,3,7,8,-TCDD (Dioxin)
Temperature	Temperature

Ecology has completed a Total Maximum Daily Load (TMDL) Analysis for the list in Table 21.

Table 21: Spokane River WRIA 57 Middle Spokane 305(b) Category 4 Listings and Approved TMDLs

Current (2016) 305(b) listings Category 4A,4B, and 4C	Approved TMDLs	URL
Dissolved Oxygen	Spokane River and Lake Spokane Dissolved Oxygen TMDL	https://apps.ecology.wa.gov/publications/documents/0710073.pdf
Lead	Spokane River Dissolved Metals TMDL	https://apps.ecology.wa.gov/publications/documents/98329.pdf
Zinc	Spokane River Dissolved Metals TMDL	https://apps.ecology.wa.gov/publications/documents/98329.pdf

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

- Spokane River and Lake Spokane Dissolved Oxygen TMDL (DO TMDL) (2010)
The DO TMDL includes waste load allocations (WLA) for ammonia, total phosphorus, and carbonaceous oxygen demand (CBOD₅).
- Spokane River Metals TMDL (1998)
The metals TMDL Submittal Report outlines the approach Ecology must take when developing limits for cadmium, lead and zinc. The permit writer must use the more restrictive of either a performance-based limit + 10%, or a water quality-based limit calculated using effluent hardness and 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.

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.

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 25% flow volume restriction resulted in a smaller chronic dilution factor than the distance downstream. The dilution factor below results from the volume restriction.

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

The flow volume restriction resulted in a smaller acute dilution factor than the distance downstream. The dilution factor below results from the volume restriction.

Ecology determined the dilution factors that occur within these zones at the critical condition using TSDCalc spread sheets. Ecology will verify assumptions when the proposed permit required mixing zone study is submitted. The dilution factors are listed below.

Table 22: Dilution Factors (DF)

Criteria	Acute	Chronic
Aquatic Life	3.7	41.4
Human Health, Carcinogen	---	135.7
Human Health, Non-carcinogen	---	57.6

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

Nutrients - Ecology has completed a TMDL, referenced above, and established effluent limits for the following nutrients: CBOD₅, total phosphorous, and ammonia. The proposed permit includes effluent limits for CBOD₅, total phosphorous, and ammonia derived from the completed TMDL.

Dissolved Oxygen — Oxygen Demanding Wastes - Natural decomposition of organic material in wastewater effluent impacts dissolved oxygen in the receiving water at distances far outside of the regulated mixing zone.

The 5-day Carbonaceous 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 total phosphorous and ammonia-based nitrogen in the wastewater also provides an indication of oxygen demand potential in the receiving water.

Ecology modeled the impact of dissolved oxygen concentration at the chronic mixing zone boundary using the 10th percentile receiving water data and the 5th percentile effluent data. This assessment looks at the dissolved oxygen remaining at the edge of the chronic mixing zone boundary. The analysis identified a reasonable potential at the chronic boundary. The proposed permit includes the following final and interim limits for dissolved oxygen in the effluent.

Final WQBEL:

Average Monthly Effluent Limit: 6.5 mg/L

Minimum Daily Effluent Limit 4.9 mg/L

The proposed permit includes performance based limits and a compliance schedule to enable Liberty Lake the time required to meet the Water Quality based limits.

Interim Performance Based Limits:

Average Monthly Effluent Limit: 6.1 mg/L

Minimum Daily Effluent Limit 4.4 mg/L

To address the far field effects, Ecology completed a dissolved oxygen TMDL, referenced above, and established wasteload allocations for oxygen demanding wastes in the discharge. The proposed permit includes effluent limits for CBOD₅, total phosphorous, and ammonia derived from the completed TMDL. These limits account for the far field effects of nutrients in the discharge.

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

Under critical conditions, modeling predicts a violation of the pH criteria for the receiving water. Therefore, the proposed permit continues the water quality-based effluent limits established in the previous permit for pH of 6.8 to 8.5.

Bacteria - Under critical conditions, modeling of the technology based fecal coliform limits do not result in reasonable potential.

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 the surface water quality criteria.

Ecology does not exempt facilities with technology-based effluent limits from meeting the surface water quality standards.

The following aquatic life toxic pollutants are present in the discharge: ammonia, arsenic, cadmium, copper, lead, mercury, nickel, zinc, cyanide, and PCBs. Ecology conducted a reasonable potential analysis (See Appendix D) on these parameters to determine whether it would require effluent limits in this permit.

Ammonia's toxicity depends on that portion which is available in the unionized form. The amount of unionized ammonia depends on the temperature and pH in the receiving freshwater. To evaluate ammonia toxicity, Ecology used the available receiving water information for ambient station Study ID AMS001 with Location ID 57A150 and Ecology spreadsheet tools.

Valid ambient background data were available for ammonia and metals. Ecology used all applicable data to evaluate reasonable potential for this discharge to cause a violation of water quality standards. Only cyanide, lead, and zinc had an aquatic life reasonable potential. However, the data for cyanide is questionable. The proposed permit requires two years of quarterly sampling for cyanide. Ecology will use this data to reassess the reasonable potential for cyanide and set a limit if required.

The metals cadmium, lead and zinc also indicated that they have a reasonable potential to exceed aquatic life water quality criteria. Ecology set the limits using the TMDL method.

Metals - Ecology determined that arsenic, copper, mercury, nickel, pose no reasonable potential at the critical condition using procedures given in EPA, 1991 (**Appendix D**) and as described above.

Ecology's 1999 Spokane River Metals TMDL Submittal Report outlines the approach Ecology takes when developing limits for cadmium, lead, and zinc. The permit writer uses the more restrictive of either a performance-based limit plus 10% or a limit based on effluent hardness and aquatic life criteria applied at the end of the pipe, without a mixing zone.

Ecology could not calculate a performance based limit for cadmium as all values reported were below the detection limit. As a result, Ecology set the average performance plus 10 percent at the detection limit plus 10 percent. This would make the cadmium average performance limit at 1.1 µg/L. Ecology used a factor of 1.5 to calculate the maximum day concentration of 1.65 mg/L for cadmium.

The District reported 43 values for lead. Of those values, only 10 were above the detection limit as reported on the DMR. Ecology used the values above the detection limit to calculate the performance plus 10 percent monthly average and daily maximum limits. Ecology used metals effluent and receiving water from the previous permit cycle for the reasonable potential, end of pipe limits, and performance-based limit calculations for zinc.

The performance plus 10% were more stringent for the cadmium maximum daily and for lead. The end of pipe water based limit calculations in Table 24 are more stringent than the performance-based limits in Table 23 for zinc. The facility will have a compliance schedule for zinc.

The proposed permit will use the actual performance to set interim performance based limits except for average monthly limit. The end of pipe limit will be used for the interim and final lead average monthly limit.

Liberty Lake will need to complete an assessment of the treatment system to identify whether or not operational changes will meet the final limits. This will take time to implement and evaluate. If operational changes will not meet the final water quality limits then they will need to develop an engineering report to assess the option available to upgrade the plant to meet the limits. Once a technology is identified, they will need to develop plans and specifications and complete construction. These actions and securing funding will take from three to ten years. The permit will have a ten year compliance schedule to meet the final end of pipe limits.

Table 23: Performance Based Effluent Limit Plus 10%

Parameter	Average Monthly (µg/L)	Maximum Day (µg/L)
Cadmium (Total Recoverable)	1.1	1.65
Lead (Total Recoverable)	1.6	2.2
Zinc (Total Recoverable)	91.8	145.6

Notes:

- Set cadmium performance at the detection limit as report of 1.0 mg/L plus 10% or 1.1 µg/L average and 1.5 times average to set maximum day is 1.65 µg/L.
- Set Lead performance based limit using the values reported above the detection limit plus 10%.

Table 24: Water Quality Based Effluent Limit at End of Pipe (Hardness Dependent)

Parameter	Average Monthly (µg/L)	Maximum Day (µg/L)
Cadmium (Total Recoverable)	0.89	1.75
Lead (Total Recoverable)	2.1	3.7
Zinc (Total Recoverable)	77.9	112.8

Notes:

- Cadmium and zinc WQBEL assume four sample per month and 5th percentile of effluent hardness.
- Lead used the method in cadmium, lead, and zinc in the Spokane River TMDL using the equation for the line tangent to calculate the Lead criteria used for limit development.

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

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

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

- Annual summer maximum and supplementary spawning/rearing criteria:

Each water body has an annual maximum temperature criterion [WAC 173-201A-200(1)(c), 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 seven-day average of daily maximum temperature (7-DADMax).

The 7-DADMax temperature is the arithmetic average of seven consecutive measures of daily maximum temperatures. Criteria for some fresh waters are expressed as the highest one-day annual maximum temperature (1-DMax).

- Incremental warming criteria:

The water quality standards limit the amount of warming human sources can cause under specific situations [WAC 173-201A-200(1)(c)(ii)]. 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 mortality 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.
 3. Lethality to incubating fish: The temperature must not exceed 17.5°C at locations where eggs are incubating.

Reasonable Potential Analysis

The 90th percentile ambient temperature exceeds the criterion. Ecology will set the final limit at the criteria until the TMDL is prepared. Ecology set a performance based interim limit. The calculation is in Appendix D. The calculation used the data for the warm season of July through September.

Performance based Temperature Limit:

Average Monthly Effluent Limit: 21.6 degrees C

Maximum Daily Effluent Limit: 24.8 degrees C

The final water quality based effluent limit will be the criteria at the end of pipe with no dilution.

Final Limit:

Maximum Daily Effluent Limit: 20.0 degrees C

H. Human health

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

Ecology determined the effluent may contain chemicals of concern for human health, based on data indicating the discharge contains regulated chemicals, including antimony, chloroform, copper, cyanide, mercury, nickel, trichloroethylene, tetrachloroethylene, bis(2-ethylhexyl) phthalate, and PCBs.

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 the [Technical Support Document for Water Quality-Based Toxics Control \(EPA/505/2-90-001\)](https://www3.epa.gov/npdes/pubs/owm0264.pdf) (<https://www3.epa.gov/npdes/pubs/owm0264.pdf>) and Ecology's [Permit Writer's Manual](https://apps.ecology.wa.gov/publications/documents/92109.pdf) (<https://apps.ecology.wa.gov/publications/documents/92109.pdf>) to make a reasonable potential determination.

The evaluation showed the discharge does not have a reasonable potential to exceed the numeric criterion for any of these pollutants but PCB does have a reasonable potential to impact the designated use of fish harvest. Due to the PCB 303 (d) listing the proposed permit includes an end of pipe effluent limit with no dilution for PCBs as follows:

Average Monthly Effluent Limit: 170 pg/L

Maximum Daily Effluent Limit: 341 pg/L

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

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

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

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

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

I. Sediment quality

The aquatic sediment standards (chapter 173-204 WAC) protect aquatic biota and human health. Under these standards Ecology may require a facility to evaluate the potential for its discharge to cause a violation of sediment standards (WAC 173-204-400). Information about sediments is available on the [Aquatic Lands Cleanup Unit website](https://ecology.wa.gov/Spills-Cleanup/Contamination-cleanup/Sediment-cleanups) online at <https://ecology.wa.gov/Spills-Cleanup/Contamination-cleanup/Sediment-cleanups>.

Through a review of the discharger characteristics and of the effluent characteristics, Ecology determined that this discharge has no reasonable potential to violate the sediment management standards.

J. Whole effluent toxicity

The water quality standards for surface waters forbid discharge of effluent that has the potential to cause toxic effects in the receiving waters. Many toxic pollutants cannot be measured by commonly available detection methods. However, laboratory tests can measure toxicity directly by exposing living organisms to the wastewater and measuring their responses. These tests measure the aggregate toxicity of the whole effluent, so this approach is called whole effluent toxicity (WET) testing. Some WET tests measure acute toxicity and other WET tests measure chronic toxicity.

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

Laboratories accredited by Ecology for WET testing know how to use the proper WET testing protocols, fulfill the data requirements, and submit results in the correct reporting format. Accredited laboratory staff know about WET testing and how to calculate an NOEC, LC50, EC50, IC25, etc. Ecology gives all accredited labs the most recent version of Ecology Publication No. WQ-R-95-80, [Laboratory Guidance and Whole Effluent Toxicity Test Review Criteria](https://apps.ecology.wa.gov/publications/documents/9580.pdf) (<https://apps.ecology.wa.gov/publications/documents/9580.pdf>), which is referenced in the permit. Ecology recommends that the District 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 WET limit. The District 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 District 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 the permit manager 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).

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

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

L. Comparison of effluent limits with the previous permit modified on October 30, 2013

Table 25: Comparison of Previous and Proposed Effluent Limits – BOD, TSS, & Flow

		Previous Effluent Limits	Outfall #001	Proposed Effluent Limits	Outfall #001
Parameter	Basis of Limit	Average Monthly	Average Weekly	Average Monthly	Average Weekly
Biochemical Oxygen Demand (5-day) (BOD ₅)	Technology	5 mg/L, 83.4 lbs/day	7 mg/L, 116.8 lbs/day	5 mg/L, 83.4 lbs/day	7 mg/L, 116.8 lbs/day
Total Suspended Solids	Technology	5 mg/L, 83.4 lbs/day	7 mg/L, 116.8 lbs/day	5 mg/L, 83.4 lbs/day	7 mg/L, 116.8 lbs/day
Flow	Technology	2.0 mgd	--	2.0 mgd	--

Table 26: Comparison of Previous and Proposed Effluent Limits – Fecal Coliform & E.coli

		Previous Effluent Limits	Outfall #001	Proposed Effluent Limits	Outfall #001
Parameter	Basis of Limit	Monthly Geometric Mean Limit	Weekly Geometric Mean Limit	Monthly Geometric Mean Limit	Weekly Geometric Mean Limit
Fecal Coliform Bacteria	Performance Based	200 cfu /100mL	400 cfu /100mL	18 cfu /100mL	27 cfu /100mL

Table 27: Comparison of Previous and Proposed Effluent Limits - pH

		Previous Effluent Limits: Outfall # 001	Proposed Effluent Limits: Outfall # 001
Parameter	Basis of Limit	Limit	Limit
pH	WQBEL	6.8 to 8.5 s.u.	6.8 to 8.5 s.u.

Table 28: Comparison of Previous and Proposed Effluent Limits – Metals, PCBs, & Temperature

		Previous Effluent Limits	Outfall #001	Proposed Effluent Limits	Outfall #001
Parameter	Basis of Limits	Average Monthly	Maximum Daily	Average Monthly	Maximum Daily
Cadmium (Final)	WQBEL and Performance	76 µg/L	396 µg/L	0.89 µg/L	1.65 µg/L
Lead (Final)	Performance	3.7 µg/L	5.4 µg/L	1.6 µg/L	2.2 µg/L
Zinc (Final)	WQBEL	80.8 µg/L	117.8 µg/L	77.9 µg/L	128 µg/L
Zinc (Interim)	Performance	--	--	83.5	132.4
PCBs	WQBEL	Narrative	--	170 pg/L	341 pg/L
Temperature (Interim)	Performance	--	--	21.6 Degrees C	24.8 Degrees C
Temperature (Final)	WQBEL	--	--	--	20 Degrees C

Notes:

- The cadmium limit is end of pipe for the average month and uses 1.65 times the detection limit as reported by the District for the maximum day.
- The lead limit is based on the performance values reported above the detection limit. The performance plus 10% is the more stringent so are used as the limits.
- The zinc WQBEL are the more stringent limits so are the final limits for zinc. The permit will have interim permit limit for zinc based on the performance. The proposed permit will have a compliance schedule for planning and implementation for meeting the end of pipe limits for zinc. The final limit for zinc is less stringent than the limit for the previous permit. This is due to an error in the calculation of the limits in the previous permit. The facility had a number of exceedances of the final zinc limit in the previous permit. As a result, the correctly calculated limit will be the final water quality based limit in the proposed permit.

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

Table 29: Comparison of Previous and Proposed Effluent Limits – Dissolved Oxygen

		Previous Effluent Limits	Outfall #001	Proposed Effluent Limits	Outfall #001
Parameter	Basis of Limit	Average Monthly	Maximum Daily	Average Monthly	Minimum Daily
Dissolved Oxygen	Performance	--	--	6.1 mg/L	4.4 mg/L
Dissolved Oxygen	WQBEL	--	--	6.5 mg/L	4.9 mg/L

Note: The discussion of limit development is in the RPA discussion section: **Dissolved Oxygen — Oxygen Demanding Wastes.**

Table 30: Critical Season Wasteload Allocation

Parameter	Basis of Limit	Previous Seasonal Average	Proposed Seasonal Average
CBOD ₅	TMDL	45.0 lbs/day	45.0 lbs/day
Total phosphorus	TMDL	0.45 lbs/day	0.45 lbs/day
Total Ammonia (as NH ₃ -N)	--	--	--
March 1 through May 31	TMDL	8.94 lbs/day	11.8 lbs/day
June 1 through Sept. 30	TMDL	2.27 lbs/day	3.0 lbs/day
Oct. 1 through Oct. 31	TMDL	8.94 lbs/day	11.8 lbs/day

Note: The ammonia wasteload allocation is less stringent based on the updated design flow of 2.0 mgd. The concentrations used to calculate the updated WLA are from the TMDL and remained the same.

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 a biological nutrient removal, membrane filtration facility.

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

B. Lab accreditation

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

Table 31: Accredited Parameters

Parameter Name	Category	Method Name	Matrix Description
Ammonia	General Chemistry	EPA 350.1_2_1993	Non-Potable Water
Biochemical Oxygen Demand (BOD)	General Chemistry	SM 5210 B-2011	Non-Potable Water
Dissolved Oxygen	General Chemistry	Hach 10360 rev 1.2	Non-Potable Water
Fecal coliform-count	Microbiology	SM 9222 D (mFC)-06	Non-Potable Water
Nitrate as N	General Chemistry	HACH 10206	Non-Potable Water
Orthophosphate	General Chemistry	EPA 365.1_2_1993	Non-Potable Water
pH	General Chemistry	SM 4500-H+ B-2011	Non-Potable Water
Phosphorus, Total	General Chemistry	EPA 365.1_2_1993	Non-Potable Water
Solids, Total Suspended	General Chemistry	SM 2540 D-2011	Non-Potable Water

C. Effluent limits which are near detection or quantitation levels

The water quality-based effluent concentration limits for arsenic, cadmium, lead, and PCB 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% confidence that its concentration is greater than zero (as determined by a specific laboratory method). The quantitation level (QL) is the level at which a laboratory can reliably report concentrations with a specified level of error. Estimated concentrations are the values between the DL and the QL. Ecology requires permitted facilities to report estimated concentrations. When reporting maximum daily effluent concentrations, Ecology requires the facility to report “less than X” where X is the required detection level if the measured effluent concentration falls below the detection level.

D. Total PCB analytical methods

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

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

Table 32: EPA Method Comparison for PCBs

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

Note: DL and QL are variable and depend on the congener of interest. The range of values are reported.

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

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

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

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

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

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

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

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

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

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

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

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

2. **Calculating numeric effluent limits** - Use all valid and applicable data, including data collected using methods not approved under 40 CFR Part 136 (e.g. Method 1668).

If valid data collected using a more sensitive but non-Part 136 method make it feasible to calculate limits, those data should be used to calculate the numeric effluent limit.

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

3. **Conducting analysis for All Known Available and Reasonable Technology (AKART)** - Use methods appropriate for the facility.
 - a. As a toxic pollutant, PCBs are subject to WAC 173-220-130 and RCW 90.48.520, which requires the application of all known, available, and reasonable methods to control toxicants in the applicant's wastewater (also known as AKART).
 - b. Methods of control for PCBs may include, but are not limited to, treatment technology, source control, or best management practices.
 - c. 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**.
 - d. For the purposes of applying AKART, Method 1668 may be required where identification of sources based on congener profile is required, or where expected concentrations are below analytical levels achievable by 608, and where treatment to lower levels is found to be reasonable. Site-specific factors must be considered when choosing the appropriate test method.
4. **Evaluating effectiveness of best management practices** - Use methods appropriate for evaluating the effectiveness of the best management practice (BMP).

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

For example:

- A PCB Aroclor Method (608 or 8082) would typically be required where it is sufficiently sensitive to evaluate the effectiveness of the BMP. For example, a source-tracing program aimed at finding and addressing PCB sources at individual properties based on PCB concentrations in catch basin solids that are routinely detectable using Method 8082.
- Method 1668 would typically be required for source identification when the potential sources are likely to have different congener profiles. Where the sources of PCBs on an individual property are not known, PCB congener data may be useful in identifying sources on and to the site.

Method 1668 would typically be required when expected concentrations are below analytical levels achievable by an Aroclor method (608 or 8082). The congener method (1668) is needed to characterize influent, effluent, or ambient water quality where PCBs are expected to be below 0.016 µg/L. These data may be used to evaluate trends over time and to quantify reductions in influent, effluent and/or receiving waters.

V. Other Permit Conditions

A. Reporting and record keeping

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

B. Prevention of facility overloading

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

If a municipality intends to apply for Ecology-administered funding for the design or construction of a facility project, the plan must meet the standard of a “Facility Plan”, as defined in WAC 173-98-030. A complete “Facility Plan” includes all elements of an “Engineering Report” along with State Environmental Review Process (SERP) documentation to demonstrate compliance with 40 CFR 35.3140 and 40 CFR 35.3145, and a cost effectiveness analysis as required by WAC 173-98-730. The municipality 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 S.5 as authorized under RCW 90.48.110, WAC 173-220-150, chapter 173-230 WAC, and WAC 173-240-080. Ecology included it to ensure proper operation and regular maintenance of equipment, and to ensure that the District takes adequate safeguards so that it uses constructed facilities to their optimum potential in terms of pollutant capture and treatment.

D. Pretreatment

Duty to enforce discharge prohibitions

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

- The first section of the pretreatment requirements prohibits the POTW from accepting pollutants 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

Requirements for performing an industrial user survey

This POTW has the potential to serve significant industrial or commercial users and must conduct an industrial user (IU) survey. The purpose of the IU survey is to identify all facilities that may be subject to pretreatment standards or requirements so that Ecology can take appropriate measures to control these discharges.

The POTW should identify each such user, and require them to apply for a permit before allowing their discharge to the POTW to commence. For significant industrial users (SIUs), the POTW must require they actually are issued a permit prior to accepting their discharge. The steps the POTW must document in their IU survey submittal include:

1. The POTW must develop a master list of businesses that may be subject to pretreatment standards and requirements and show their disposition. This list must be based on several sources of information including business licenses, and water and sewer billing records.
2. The POTW must canvas all the potential sources, having them either complete a survey form or ruling them out by confirming they only generate domestic wastewater.

3. The POTW must develop a list of the SIUs and potential SIUs in all areas served by the POTW. The list must contain sufficient information on each to allow Ecology to decide which discharges merit further controls such as a state waste discharge permit.

Ecology describes the information needed in IU survey submittals to allow Ecology to make permitting decision in the manual "Performing an Industrial User Survey". Properly completing an Industrial User Survey helps Ecology control discharges that may otherwise harm the POTW including its collection system, processes, and receiving waters. Where surveys are incomplete, Ecology may take such enforcement as appropriate and/or require the POTW to develop a fully delegated pretreatment program.

The proposed permit requires the District to conduct an industrial user survey to determine the extent of compliance of all industrial users of the sanitary sewer and wastewater treatment facility with federal pretreatment regulations [40 CFR Part 403 and CWA Sections 307(b) and CWA Section 308)], with state regulations (chapter 90.48 RCW and chapter 173-216 WAC), and with local ordinances.

E. Solid wastes

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

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

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

F. Spill plan

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

The proposed permit requires this facility to develop and implement a plan for preventing the accidental release of pollutants to state waters and for minimizing damages if such a spill occurs.

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 District to more accurately determine the mixing characteristics of the discharge (Special Condition S12).

The effluent mixing study must measure or model the characteristics of the discharge under conditions specified in the permit to assess whether the receiving water quality is protected outside the mixing zone boundary.

H. Compliance schedule

The proposed permit includes a compliance schedule for Temperature, DO, cadmium, lead, and zinc. The compliance schedule requires Liberty Lake to complete operational evaluation to meet the temperature, metals and DO final limits within the first three years. Liberty Lake will complete an engineering report identifying engineered solution by year five of the permit if operational changes will not meet final limits. The next permit cycle will be used to complete designs and specifications and construction of identified facilities required to meet the final effluent limits. The compliance schedule will be from 3-10 years depending on the ability of the facility to identify operational changes that will meet the final limits for temperature, metals, and DO.

I. Toxics Reduction Strategies

Best Management Practices (BMPs) are the actions identified to manage, prevent contamination of, and treat wastewater discharges. BMPs include schedules of activities, prohibitions of practices, maintenance procedures, and other physical, structural, and/or managerial practices to prevent or reduce the pollution of waters of the state. BMPs also include treatment systems, operating procedures and practices used to control plant site runoff, spillage or leaks, sludge or waste disposal, and drainage from raw material storage.

The proposed permit specifies that a Toxics 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 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://srrttf.org/wp-content/uploads/2016/04/2016_Comp_Plan_Final_Approved.pdf.

- Year-round operation of the biological nutrient removal, membrane filtration facility
- The continuation of the public outreach and education efforts
- Ongoing support of and participation in the Spokane River Regional Toxics Task Force

The District's previous discharge permit issued June 23, 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 District 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 District will identify and implement based on the previous permit cycle Toxics Management Plans for PCBs. The District conducted influent and effluent sampling for PBDEs in the previous permit cycle. The sampling indicated that PBDEs are discharged to the treatment 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 District to assess annually the effectiveness of the BMP Implementation Plan through quantitative and qualitative (where appropriate) measures. Ecology understands that the District'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 District may also propose use of other actions that will provide the most benefit for toxics reduction. The proposed permit requires the District to submit a Quality Assurance Project Plan (QAPP) for the BMP effectiveness monitoring.

Annual assessment monitoring using an appropriately sensitive method (e.g. PCBs: Method 1668 and PBDEs: Method 1614) may be required to evaluate the effectiveness of the BMPs used by the discharger. The proposed permit requires the District 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 District must select the analytical method that best identifies the concentration and source of the toxics (PCBs, PBDEs) removed through use of the BMPs.

J. Receiving water sampling for alkalinity, pH, and DO

The proposed permit will require the District to develop a sampling site upstream of the discharge to sample the receiving water for alkalinity, pH, and dissolved oxygen. This information will be used to verify the need for a DO limit or a change in the pH limits for the effluent.

K. General conditions

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

VI. Permit Issuance Procedures

A. Permit modifications

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

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

B. Proposed permit issuance

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

VII. References for Text and Appendices

Century West

2013. Liberty Lake Sewer and Water District Water Reclamation Facility Engineering Report Update

2013. Liberty Lake Water Reclamation Facility Pre-Design Report

Environmental Protection Agency (EPA)

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

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

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

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

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

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

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

Washington State Department of Ecology.

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

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

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

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

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Water Pollution Control Federation.

1976. Chlorination of Wastewater.

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

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

Appendix A - Public Involvement Information

Ecology proposes to reissue a permit to Liberty Lake Sewer & Water District. 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 July 23, 2021 and July 30, 2021 in the Spokesman Review to inform the public about the submitted application and to invite comment on the reissuance of this permit.

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

The notice:

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

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

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

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

Appendix B - Your Right to Appeal

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

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

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

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

Table 33: Address and Location Information

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

Appendix C - Glossary

- 1-DMax or 1-day maximum temperature** - The highest water temperature reached on any given day. This measure can be obtained using calibrated maximum/minimum thermometers or continuous monitoring probes having sampling intervals of thirty minutes or less.
- 7-DADMax or 7-day average of the daily maximum temperatures** – The arithmetic average of seven consecutive measures of daily maximum temperatures. The 7-DADMax for any individual day is calculated by averaging that day's daily maximum temperature with the daily maximum temperatures of the three days prior and the three days after that date.
- Acute toxicity** – The lethal effect of a compound on an organism that occurs in a short time period, usually 48 to 96 hours.
- AKART** – The acronym for “all known, available, and reasonable methods of prevention, control and treatment.” AKART is a technology-based approach to limiting pollutants from wastewater discharges, which requires an engineering judgment and an economic judgment. AKART must be applied to all wastes and contaminants prior to entry into waters of the state in accordance with RCW 90.48.010 and RCW 90.48.520, WAC 173-200-030(2)(c)(ii), and WAC 173-216-110(1)(a).
- Alternate point of compliance** – An alternative location in the groundwater from the point of compliance where compliance with the groundwater standards is measured. It may be established in the groundwater at locations some distance from the discharge source, up to, but not exceeding the property boundary and is determined on a site specific basis following an AKART analysis. An “early warning value” must be used when an alternate point is established. An alternate point of compliance must be determined and approved in accordance with WAC 173-200-060(2).
- Ambient water quality** – The existing environmental condition of the water in a receiving water body.
- Ammonia** – Ammonia is produced by the breakdown of nitrogenous materials in wastewater. Ammonia is toxic to aquatic organisms, exerts an oxygen demand, and contributes to eutrophication. It also increases the amount of chlorine needed to disinfect wastewater.
- Annual average design flow (AADF)** – average of the daily flow volumes anticipated to occur over a calendar year.
- Average monthly (intermittent) discharge limit** – The average of the measured values obtained over a calendar month’s time taking into account zero discharge days.
- Average monthly discharge limit** – The average of the measured values obtained over a calendar month's time.
- Background water quality** – The concentrations of chemical, physical, biological or radiological constituents or other characteristics in or of groundwater at a particular point in time upgradient of an activity that has not been affected by that activity, [WAC 173-200-020(3)]. Background water quality for any parameter is statistically defined as the 95% upper tolerance interval with a 95% confidence based on at least eight hydraulically upgradient water quality samples.

The eight samples are collected over a period of at least one year, with no more than one sample collected during any month in a single calendar year.

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

BOD5 – Determining the five-day Biochemical Oxygen Demand of an effluent is an indirect way of measuring the quantity of organic material present in an effluent that is utilized by bacteria. The BOD5 is used in modeling to measure the reduction of dissolved oxygen in receiving waters after effluent is discharged. Stress caused by reduced dissolved oxygen levels makes organisms less competitive and less able to sustain their species in the aquatic environment. Although 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 feed lots, poultry houses, or dairies. The term includes contaminated stormwater and, also, leachate from solid waste facilities.

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

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

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

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

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

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

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

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

Method detection level (MDL) – See Detection Limit.

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

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

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

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

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

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

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

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

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

- a. Exceeds 0.5 % 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 or contribute to a water quality violation, or loss of sensitive and/or important habitat.

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

Sample Maximum – No sample may exceed this value.

Significant industrial user (SIU) –

- 1) All industrial users subject to Categorical Pretreatment Standards under 40 CFR 403.6 and 40 CFR Chapter I, Subchapter N and;
- 2) Any other industrial user that: discharges an average of 25,000 gallons per day or more of process wastewater to the POTW (excluding sanitary, noncontact cooling, and boiler blow-down wastewater); contributes a process wastestream that makes up 5 percent or more of the average dry weather hydraulic or organic capacity of the POTW treatment plant; or is designated as such by the Control Authority* on the basis that the industrial user has a reasonable potential for adversely affecting the POTW's operation or for violating any pretreatment standard or requirement [in accordance with 40 CFR 403.8(f)(6)].

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

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

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

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

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

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

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

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

Appendix D - Technical Calculations

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

Simple Mixing:

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

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

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

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

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

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

$z = 2.326$

CV = coefficient of variation = std. dev/mean

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

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

$z = 2.326$

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

MDL = Maximum Daily Limit

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

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

$z = 2.326$ (99th percentile occurrence)

LTA = Limiting long term average

AML = Average Monthly Limit

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

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

n = number of samples/month

$z = 1.645$ (95th % occurrence probability)

LTA = Limiting long term average

Appendix D - Technical Calculations (Continued)

Reasonable Potential Figures

- Table D-1: RPA Inputs
- Table D-2: Freshwater Un-ionized Ammonia Criteria Calculation
- Table D-3: RPA Calculations
- Table D-4: PCB Cadmium, Lead and Zinc RPA Calculations No Dilution
- Table D-5: WQBEL with no dilution for Cadmium, Lead, Zinc and PCBs
- Table D-6: Lead Performance Based + 10% Limits
- Table D-7: Zinc Performance Based + 10% Limits
- Table D-8: Temperature Performance Based Limits
- Table D-9: Calculation of Maximum Effluent pH Limit on Receiving Water Minimum pH
- Table D-10: Calculation of Minimum Effluent pH Limit on Receiving Water Maximum pH
- Table D-11: Dissolved Oxygen at the Chronic Boundary RPA
- Table D-12: Dissolved Oxygen Performance-based Effluent Limit
- Table D-23: Dissolved Oxygen WQBEL

Reasonable Potential Figures

Table D-3: RPA Inputs

Dilution Factor Calculations and Receiving Water Critical Conditions

Step 1: Enter Waterbody Type

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

Facility Name	LibertyLake
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	1.8	2	3
Facility Flow, cfs (calculated)	2.78	3.09	4.64

	Condition	Receiving Water Flow, cfs	Allowable % of river flow	Max Dilution Factor Allowed
Aquatic Life - Acute	7Q10	500	0.025	3.7
Aquatic Life - Chronic	7Q10	500	0.25	41.4
HH-Non-Carcinogen	30Q5	554.9	0.25	45.8
HH-Carcinogen	Harmonic Mean	2005.2	0.25	181.0
Whole river at 7Q10	7Q10	500	1	162.6

Step 3: Enter Critical Data

	Effluent	Receiving Water
Temp, °C	22.8	24.3
pH, s.u.	9.31	8
Alkalinity, mg/L as CaCO3	51.6	16.5
Hardness, mg/L CaCO3	97.8	18
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	39.6	23.9	8.3
Chronic Zone Boundary	19.9	24.3	8.0
Whole river at 7Q10	18.5	24.3	8.0

Table D-4: Freshwater Un-ionized Ammonia Criteria Calculation

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

	Background	mixed @ Acute Boundary	mixed @ Chronic Boundary	mixed @ Whole River
INPUT				
1. Receiving Water Temperature (deg C):	24.3	23.9	24.3	24.3
2. Receiving Water pH:	8.0	8.3	8.0	8.0
3. Is salmonid habitat an existing or designated use?	Yes	Yes	Yes	Yes
4. Are non-salmonid early life stages present or absent?	Present	Present	Present	Present
OUTPUT				
Using mixed temp and pH at mixing zone boundaries?	yes			
Ratio	13.500	13.500	13.500	13.500
FT	1.400	1.400	1.400	1.400
FPH	1.001	1.000	1.000	1.000
pKa	9.268	9.280	9.269	9.268
Unionized Fraction	0.051	0.097	0.055	0.052
Unionized ammonia NH3 criteria (mg/L as NH ₃)				
Acute:	0.350	0.363	0.000	0.350
Chronic:	0.042	0.042	0.042	0.042
RESULTS				
Total ammonia nitrogen criteria (mg/L as N):				
Acute:	5.615	3.073		5.531
Chronic:	0.679		0.637	0.669

Table D-4: PCB Cadmium, Lead and Zinc RPA Calculations No Dilution

Reasonable Potential Calculation - Page 3

Facility		Dilution Factors:				Acute	Chronic
Liberty Lake		Aquatic Life				1.0	1.0
Water Body Type		Human Health Carcinogenic					1.0
Rec. Water Hardness		Human Health Non-Carcinogenic					1.0
Acute=39.6, Chronic=19.9 mg/L							

Pollutant, CAS No. & NPDES Application Ref. No.		Polychlorinated Biphenyls (PCB's) 53469219, 11097691, 1104282, 11141165, 12672296, 11096825, 12674112 18P-24P		LEAD - 7439921 7M Dependent on hardness	ZINC- 7440666 13M hardness dependent	CADMIUM - 7440439 4M Hardness dependent			
		13	45						
Effluent Data	# of Samples (n)	13	45	72	45				
	Coeff of Variation (Cv)	0.6	0.45	0.27	0.6	0.6	0.6	0.6	0.6
	Effluent Concentration, ug/L (Max. or 95th Percentile)	1.27E-04	1.486	90.3	0.5				
	Calculated 50th percentile Effluent Conc. (when n>10)	9.01E-05		62.3					
Receiving Water Data	90th Percentile Conc., ug/L	1.40E-08	3.427	57.25	0.248				
	Geo Mean, ug/L	5.40E-09		38.5					
Water Quality Criteria	Aquatic Life	2	23.25271	52.21442815	1.355941				
	Acute	0.014	0.418807	26.6425082	0.312111				
	Chronic	0.00017	-	2300	-				
	WQ Criteria for Protection of Human Health, ug/L								
	Metal Criteria	-	0.466	0.996	0.943				
	Acute	-	0.466	0.996	0.943				
Chronic									
Carcinogen?		Y	N	N	N				

Aquatic Life Reasonable Potential									
Effluent percentile value		0.950	0.950	0.950	0.950				
s	$s^2 = \ln(CV^2 + 1)$	0.555	0.429	0.265	0.555				
Pn	$Pn = (1 - \text{confidence level})^{1/n}$	0.794	0.936	0.959	0.936				
Multiplier		1.58	1.00	1.00	1.00				
Max concentration (ug/L) at edge of...	Acute	2.01E-04	0.692	89.939	0.472				
	Chronic	2.01E-04	0.692	89.939	0.472				
Reasonable Potential? Limit Required?		NO	YES	YES	YES				

Human Health Reasonable Potential									
s	$s^2 = \ln(CV^2 + 1)$	0.554513029	0.265264515						
Pn	$Pn = (1 - \text{confidence level})^{1/n}$	0.794	0.959						
Multiplier		0.63427809	0.629964123						
Dilution Factor		1	45.83678087						
Max Conc. at edge of Chronic Zone, ug/L		0.0000901	3.9E+01						
Reasonable Potential? Limit Required?		NO	NO						

Table D-5: WQBEL with no dilution for Cadmium, Lead, Zinc and PCBs

Aquatic Life and Human Health Limits Calculations

Facility		Dilution Factors:			Acute	Chronic
Liberty Lake		Aquatic Life			1.0	1.0
Water Body Type		Human Health Carcinogenic				1.0
Rec. Water Hardness		Human Health Non-Carcinogenic				1.0
97.8						

Pollutant, CAS No. & NPDES Application Ref. No.		CADMIUM - 7440439 4M	ZINC- 7440666	LEAD - 7439921	Polychlorinated Biphenyls (PCB's) 53469219, 11097691, 1104282, 11141165, 12672296, 11096825, 12674112 18P-24P				
		Hardness dependent	13M hardness dependent	7M Dependent on hardness					
Effluent Data	Coeff of Variation (Cv)	0.58	0.27	0.46	0.6	0.6	0.6	0.6	0.6
Receiving Water Data	90th Percentile Conc., ug/L	0.248	57.25	0					
	Geo Mean, ug/L		38.8						
Water Quality Criteria	Aquatic Life Criteria, Acute ug/L	3.61429	112.31	63.035	2				
	Chronic	1.01423	102.556	2.4407	0.014				
	WQ Criteria for Protection of Human Health, ug/L	-	2300	-	0.00017				
	Metal Criteria Acute	0.943	0.996	0.47	-				
	Translator, decimal	0.943	0.996	1	-				
	Carcinogen?	N	N	N	Y				

Aquatic Life Limit Calculation									
# of Compliance Samples Expected per month		4	4	4		4			
LTA Coeff. Var. (CV), decimal		0.58	0.27	0.46		0.6			
Permit Limit Coeff. Var. (CV), decimal		0.58	0.27	0.46		0.6			
Waste Load Allocations, ug/L	Acute	3.61429	112.31	63.035		2			
	Chronic	1.01423	102.556	2.4407		0.014			
Long Term Averages, ug/L	Acute	1.19404	62.7679	25.044		0.642166428			
	Chronic	0.54527	75.7055	1.4769		0.007384068			
Limiting LTA, ug/L		0.54527	62.7679	1.4769		0.007384068			
Metal Translator or 1?		0.94	0.996	1.00		1.00			
Average Monthly Limit (AML), ug/L		0.89	10.0	2.1		0.0			
Maximum Daily Limit (MDL), ug/L		1.75	112.8	3.7		0.0			

Human Health Limit Calculation									
# of Compliance Samples Expected per month			1			4			
Dilution Factor			1			1			
Average Monthly Effluent Limit, ug/L			2300			0.000170			
Maximum Daily Effluent Limit, ug/L			2755.38			0.000341			

Table D-6: Lead Performance Based + 10% Limits

Lead Performance-based Effluent Limits Plus 10%

INPUT	
LogNormal Transformed Mean:	0.2221
LogNormal Transformed Variance:	0.0376
Number of Samples per month for compliance monitoring:	4
Autocorrelation factor (n_e) (use 0 if unknown):	0
OUTPUT	
$E(X) =$	1.2724
$V(X) =$	0.062
$VARn$	0.0095
$MEANn=$	0.2361
$VAR(Xn)=$	0.016
RESULTS	
Maximum Daily Effluent Limit:	2.2
Average Monthly Effluent Limit:	1.6

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

Zinc Performance-based Effluent Limits Plus 10%

INPUT	
LogNormal Transformed Mean:	4.0968
LogNormal Transformed Variance:	0.1150
Number of Samples per month for compliance monitoring:	4
Autocorrelation factor (n_e) (use 0 if unknown):	0
OUTPUT	
$E(X) =$	63.7076
$V(X) =$	494.645
$VARn$	0.0300
$MEANn=$	4.1393
$VAR(Xn)=$	123.661
RESULTS	
Maximum Daily Effluent Limit:	145.6
Average Monthly Effluent Limit:	91.8

Table D-8: Temperature Performance Based Limits

Temperature Performance-based Effluent Limits

INPUT	
LogNormal Transformed Mean:	3.0497
LogNormal Transformed Variance:	0.0048
Number of Samples per month for compliance monitoring:	30
Autocorrelation factor (n_e) (use 0 if unknown):	0
OUTPUT	
$E(X) =$	21.1593
$V(X) =$	2.143
$VARn$	0.0002
$MEANn=$	3.0520
$VAR(Xn)=$	0.071
RESULTS	
Maximum Daily Effluent Limit:	24.8
Average Monthly Effluent Limit:	21.6

Table D-9: Calculation of Maximum Effluent pH Limit on Receiving Water Minimum pH

Calculation of Maximum Effluent pH Limit on Receiving Water Minimum pH

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

INPUT		
	@ Acute Boundary	@ Chronic Boundary
1. Dilution Factor at Mixing Zone Boundary	3.7	41.4
2. Ambient/Upstream/Background Conditions		
Temperature (deg C):	24.30	24.30
pH:	6.55	6.55
Alkalinity (mg CaCO3/L):	16.50	16.50
3. Effluent Characteristics		
Temperature (deg C):	23.50	23.50
pH:	8.50	8.50
Alkalinity (mg CaCO3/L):	97.80	97.80
4. Aquatic Life Use Designation	Other species (salmonid/redband trout/warmwater species)	
OUTPUT		
1. Ionization Constants		
Upstream/Background pKa:	6.35	6.35
Effluent pKa:	6.36	6.36
2. Ionization Fractions		
Upstream/Background Ionization Fraction:	0.61	0.61
Effluent Ionization Fraction:	0.99	0.99
3. Total Inorganic Carbon		
Upstream/Background Total Inorganic Carbon (mg CaCO3/L):	27	27
Effluent Total Inorganic Carbon (mg CaCO3/L):	99	99
4. Conditions at Mixing Zone Boundary		
Temperature (deg C):	24.08	24.28
Alkalinity (mg CaCO3/L):	38.47	18.46
Total Inorganic Carbon (mg CaCO3/L):	46.33	28.74
pKa:	6.36	6.35
5. Allowable pH change	NA	0.50
RESULTS		
pH at Mixing Zone Boundary:	7.05	6.61
pH change at Mixing Zone Boundary:	0.50	0.06
Is permit limit needed?	NO	NO

Table D-10: Calculation of Minimum Effluent pH Limit on Receiving Water Maximum pH

Calculation of Minimum Effluent pH Limit on Receiving Water Maximum pH

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

INPUT		
	@ Acute Boundary	@ Chronic Boundary
1. Dilution Factor at Mixing Zone Boundary	3.7	41.4
2. Ambient/Upstream/Background Conditions		
Temperature (deg C):	24.30	24.30
pH:	8.00	8.00
Alkalinity (mg CaCO3/L):	16.50	16.50
3. Effluent Characteristics		
Temperature (deg C):	23.50	23.50
pH:	6.80	6.80
Alkalinity (mg CaCO3/L):	97.80	97.80
4. Aquatic Life Use Designation	Other species (salmonid/redband trout/warmwater species)	
OUTPUT		
1. Ionization Constants		
Upstream/Background pKa:	6.35	6.35
Effluent pKa:	6.36	6.36
2. Ionization Fractions		
Upstream/Background Ionization Fraction:	0.98	0.98
Effluent Ionization Fraction:	0.73	0.73
3. Total Inorganic Carbon		
Upstream/Background Total Inorganic Carbon (mg CaCO3/L):	17	17
Effluent Total Inorganic Carbon (mg CaCO3/L):	133	133
4. Conditions at Mixing Zone Boundary		
Temperature (deg C):	24.08	24.28
Alkalinity (mg CaCO3/L):	38.47	18.46
Total Inorganic Carbon (mg CaCO3/L):	48.32	19.68
pKa:	6.36	6.35
5. Allowable pH change	NA	0.50
RESULTS		
pH at Mixing Zone Boundary:	6.95	7.53
pH change at Mixing Zone Boundary:	1.05	0.47
Is permit limit needed?	NO	NO

Table D-6: Dissolved Oxygen at the Chronic Boundary RPA

Calculation of Dissolved Oxygen at Chronic Mixing Zone

INPUT	
Chronic Dilution Factor	41.4
Receiving Water DO Concentration, mg/L	8.0
Effluent DO Concentration, mg/L	4.8
Effluent Immediate DO Demand (IDOD), mg/L	
Surface Water Criteria, mg/L	8
OUTPUT	
DO at Mixing Zone Boundary, mg/L	7.92
DO decrease caused by effluent at chronic boundary, mg/L	0.08

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

Table D-12: Dissolved Oxygen Performance-based Effluent Limit

Dissolved Oxygen Performance-based Effluent Limits

INPUT	
LogNormal Transformed Mean:	1.8070
LogNormal Transformed Variance:	0.0204
Number of Samples per month for compliance monitoring:	30
Autocorrelation factor (n_e) (use 0 if unknown):	0
OUTPUT	
$E(X) =$	5.8102
$V(X) =$	0.780
VARn	0.0008
MEANn=	1.7596
VAR(X_n)=	0.026
RESULTS	
minimum Daily Effluent Limit:	4.4
Average Monthly Effluent Limit:	6.1

Table D-13: Dissolved Oxygen WQBEL

Dissolved Oxygen Average Monthly and Minimum Daily Limit Calculations

WLA_c = Chronic Wasteload Allocation
 WLA_c = (chronic Criterion*dilution factor)-(background *(DF-1))
 chronic criterion = 8.0
 background = 8.0
 DF = 41.4 chronic dilution factor
 WLA_c = (8*41.4)-(8*40.4)
 WLA_c = 8.0 mg/L
 C_v = 0.14
 $\sigma^2 = 0.00488803$
 LTA_c = WLA_c*(e^(z*s -0.5s²))
 z = -2.326 (1st percentile z value)
 $\sigma^2 = \ln((C_v^2 /4)+1)$
 $\sigma^2 = 0.00488803$
 $\sigma = 0.06991448$
 LTA_c = 6.78

MDL = Minimum Daily Limit
 MDL = LTA*(e^(zs-0.5s²))
 $\sigma^2 = \ln((C_v^2)+1)$
 $\sigma^2 = 0.01941039$
 $\sigma = 0.13932119$
 MDL = 4.9 mg/L

AML = Average Monthly Limit
 AML = LTA*(e^(z*s_n -0.5s_n²))
 $\sigma_n^2 = \ln((C_v^2/n)+1)$
 n = number of samples per month
 n = 30
 $\sigma_n^2 = 0.00065312$
 $\sigma_n^2 = 0.02555621$
 z = -1.645 (5th percentile z value)
 AML = 6.5 mg/L

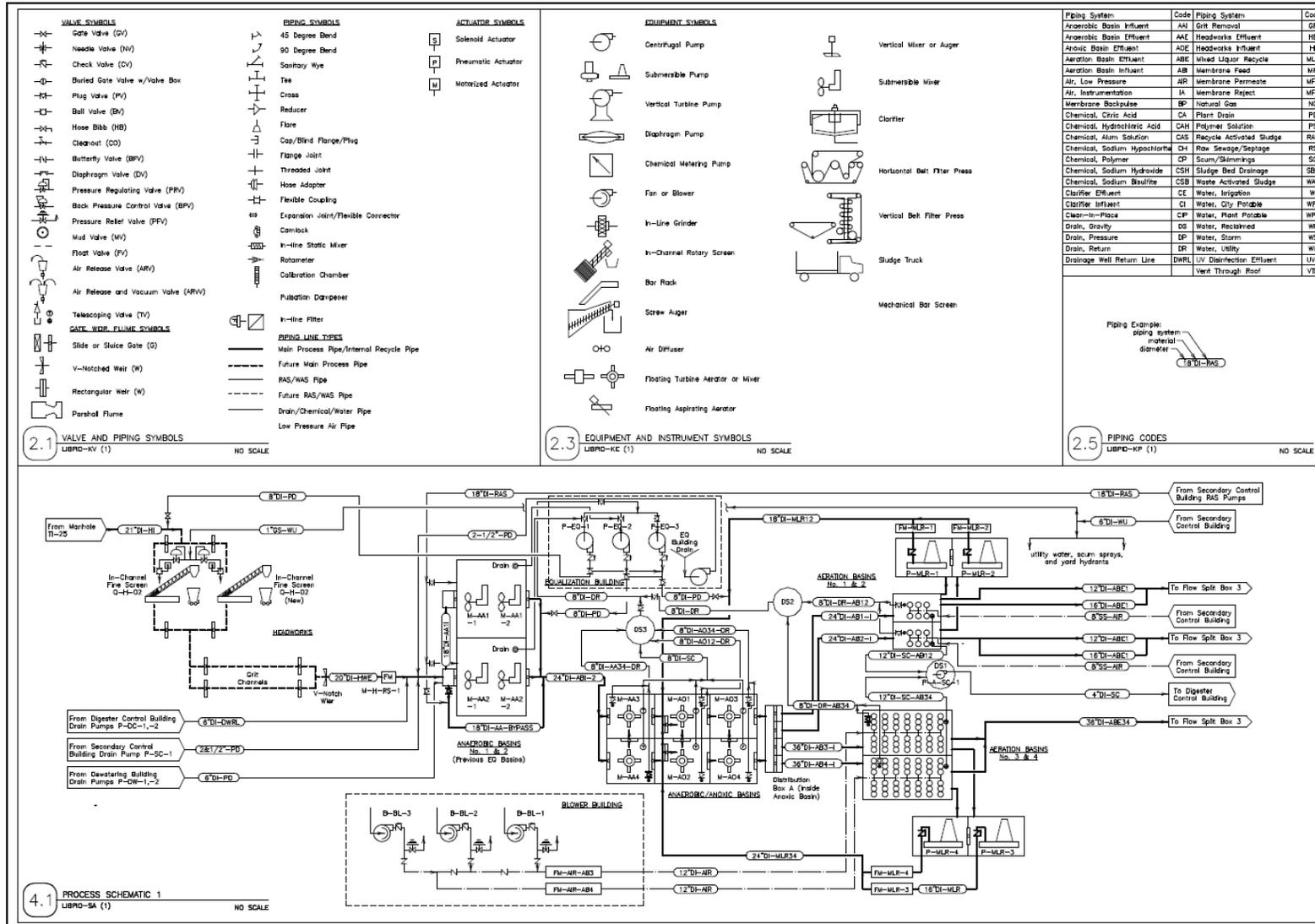
Appendix E - Response to Comments

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

Appendix F - Process Flow Schematics

- Figure F-1: Process Flow Headworks through Aeration Basins
- Figure F-2: Secondary Clarifiers through Disinfection
- Figure F-3: Sludge Recycle and Biosolids

Figure F-1: Process Flow Headworks through Aeration Basins

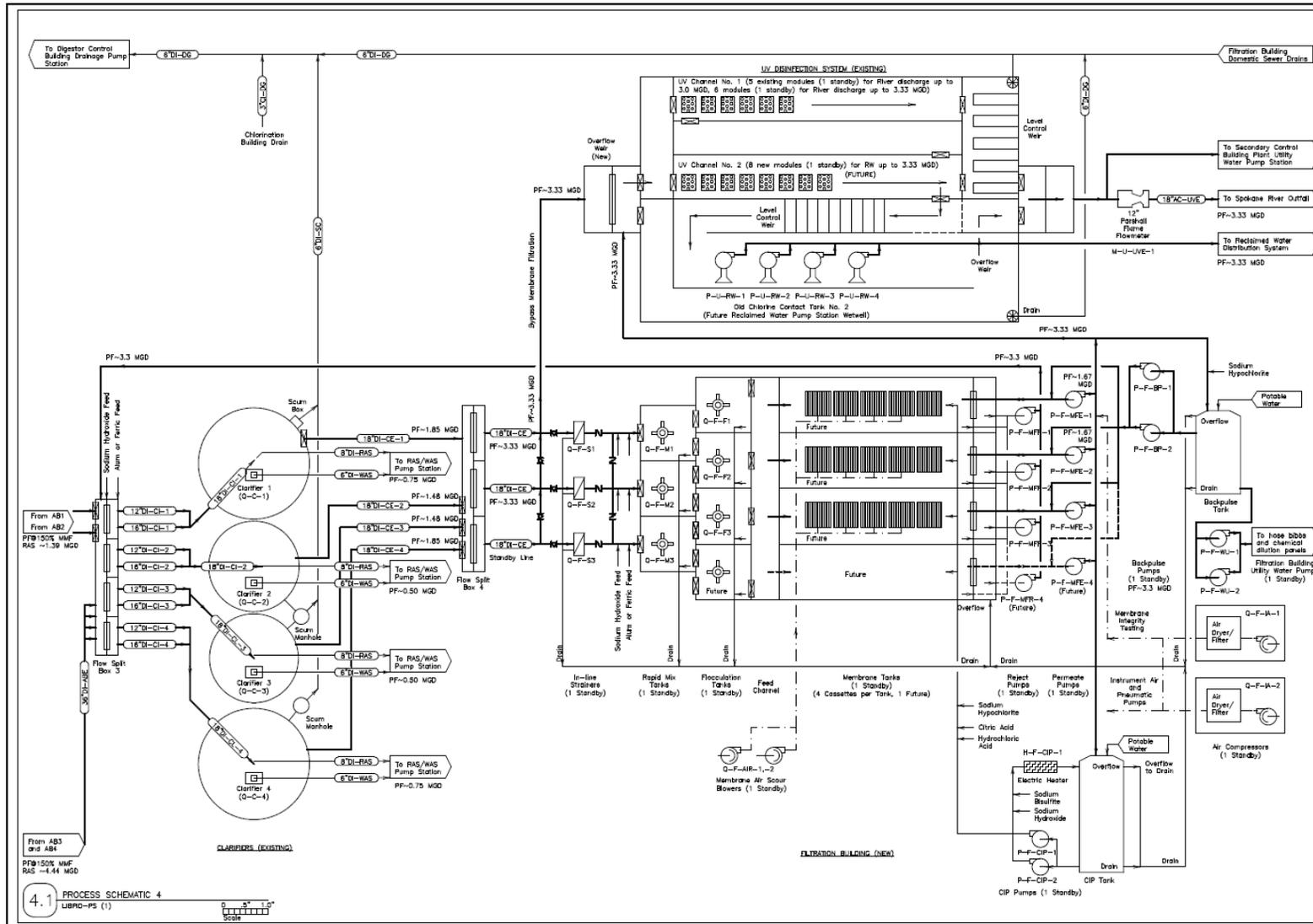


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PROCESS SCHEMATIC EXISTING FACILITIES
 Water Reclamation Facility Phase 2 Upgrade
 Liberty Lake Sewer and Water District
 Liberty Lake, WA
 revision:
 drawing status:
 released for:
 release date:
 3/1/2018
 sheet:
OP3
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Figure F-2: Secondary Clarifiers through Disinfection



3/1/2018

ESVELT ENVIRONMENTAL ENGINEERING LLC

Project Engineer: **CENTURY WEST ENGINEERING CORPORATION**

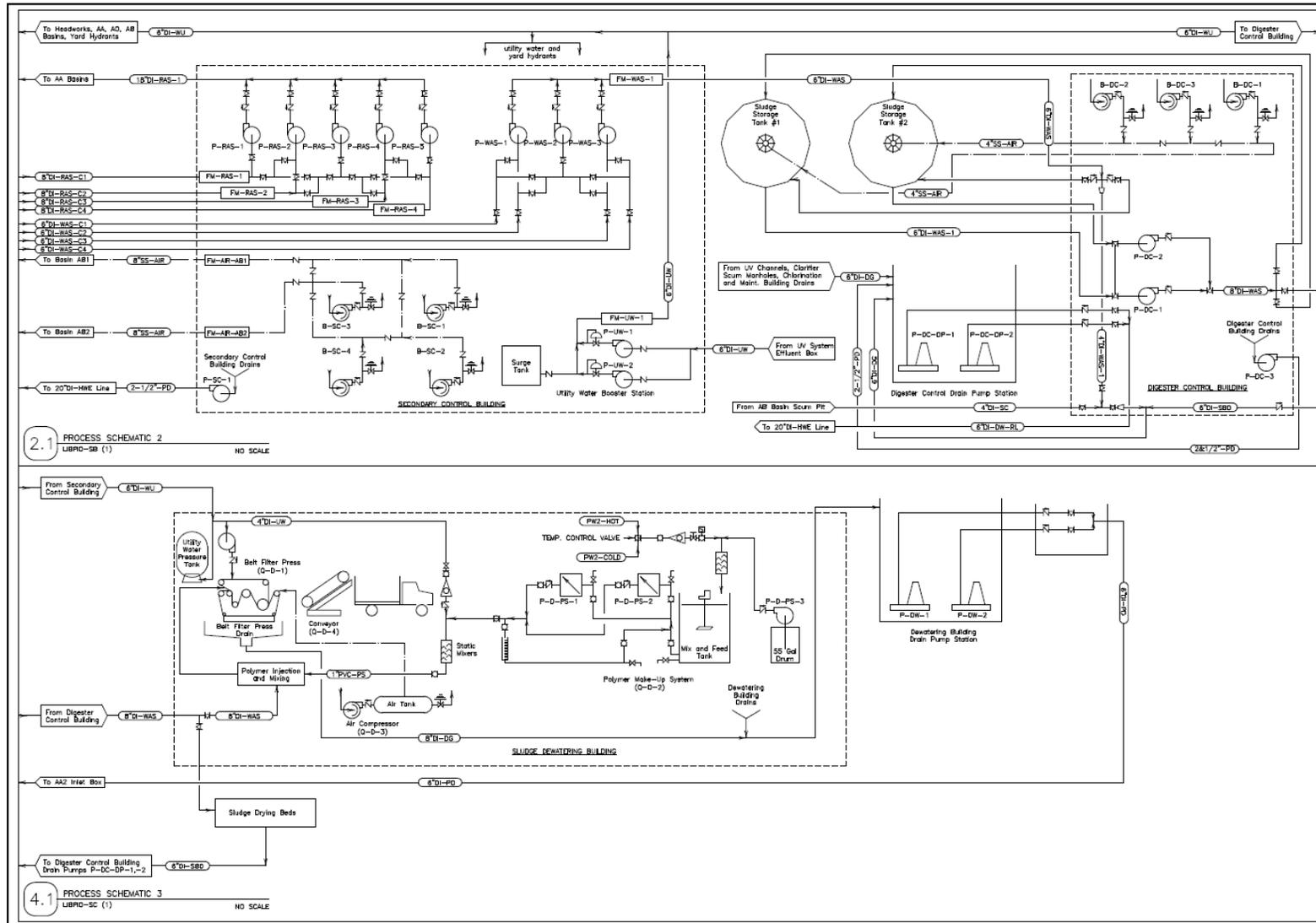
11707 East Montgomery Drive
 Spokane, Washington 99205

Water Reclamation Facility Phase 2 Upgrade
 Liberty Lake Sewer and Water District
 Liberty Lake, WA

drawing status: Final
 released for: 3/1/2018
 release date: 3/1/2018

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Figure F-3: Sludge Recycle and Biosolids




 3/1/2018

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 11707 East Montgomery Drive
 Spokane, Washington 99208
 PH: (509) 342-3049

CENTURY WEST ENGINEERING CORPORATION
 11707 East Montgomery Drive
 Spokane, Washington 99208

PROCESS SCHEMATIC EXISTING FACILITIES

Water Reclamation Facility Phase 2 Upgrades
 Liberty Lake Sewer and Water District
 Liberty Lake, WA

revision	drawing status
released for	release date
3/1/2018	3/1/2018
sheet	sheet
OP4	OP4

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