Fact Sheet for NPDES Permit No. WA0029289

Bremerton Wastewater Treatment Plant

Public Notice of Draft date: September 12, 2018

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 Bremerton Wastewater Treatment Plant (WWTP).

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 thirty (30) days before issuing the final permit. Copies of the fact sheet and draft permit for Bremerton WWTP, NPDES Permit No. WA0029289, are available for public review and comment from September 12, 2018, until October 12, 2018. For more details on preparing and filing comments about these documents, please see **Appendix A - Public Involvement Information.**

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

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

Summary

The City of Bremerton owns, operates, and maintains the following two wastewater treatment plants: West Plant and East Combined Sewer Overflow (CSO) Treatment Plant. The West Plant is a secondary wastewater treatment plant that operates year round and treats wastewater from the entire City's sewer service area. During wet weather periods, the West Plant receives and treats combined sewage (sanitary sewage combined with storm water). The East Plant operates only during wet weather periods and treats combined sewage from East Bremerton. During wet weather periods, combined sewage from East Bremerton that exceeds the capacity of the conveyance system to the West Plant diverts to the East Plant.

Ecology issued the previous permit for this facility on June 21, 2013, and issued a permit modification of the previous permit on October 1, 2015, which changed from the 5-day biological oxygen demand (BOD5) effluent limit parameter to a carbonaceous biological oxygen demand (CBOD5) limit. The proposed permit contains the same effluent limits as for the previous modified permit for CBOD5, Total Suspended Solids (TSS), pH, Fecal Coliform Bacteria, Acute Whole Effluent Toxicity, and Total Residual Chlorine for West Plant. The proposed permit contains the same effluent limits as for the previous modified permit for TSS, Settleable Solids, pH, and Fecal Coliform Bacteria for East Plant.

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I. Introduction

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

The following regulations apply to domestic wastewater NPDES permits:

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

The following additional regulations apply to communities operating collection systems with Combined Sewer Overflows:

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

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

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

II. Background Information

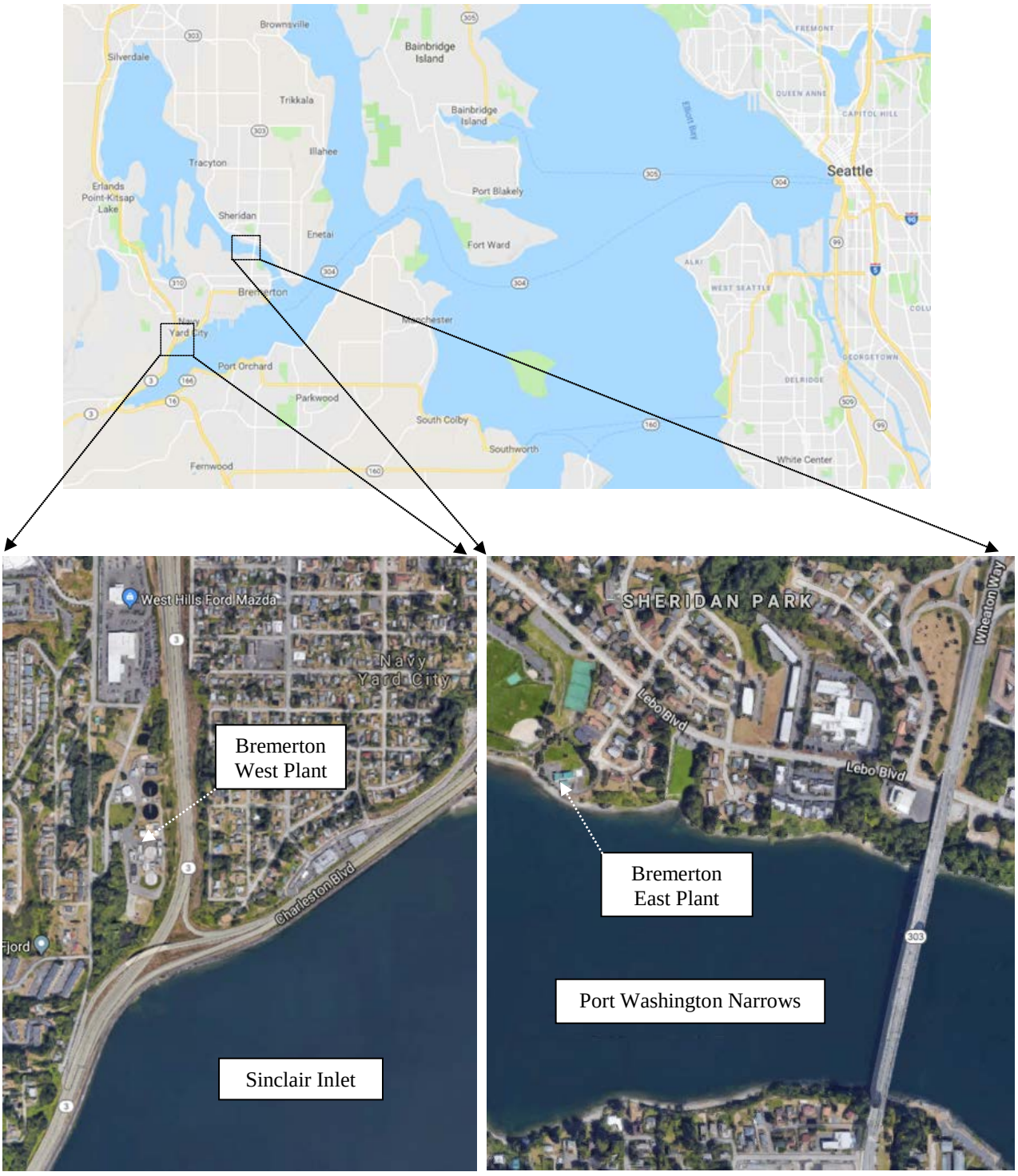
Table 1. General Facility Information

Facility Information		
Applicant	City of Bremerton	
Facility Name and Address	West Plant 1600 Oyster Bay Avenue South Bremerton, WA 98312	East Plant 2475 Stephenson Avenue Bremerton, WA 98310
Contact at Facility	Pat Coxon, Plant Manager Phone: 360-473-5448	
Responsible Official	Greg Wheeler, Mayor City of Bremerton 345 6th Street, Suite 600 Bremerton, WA 98337 Phone: 360-473-5266	
Type of Treatment	Activated Sludge	High Rate Clarification
Facility Location (NAD83/WGS84 reference datum)	Latitude: 47.550288° Longitude: -122.672677°	Latitude: 47.582537° Longitude: -122.638847°
Discharge Waterbody Name and Location (NAD83/WGS84 reference datum)	Sinclair Inlet, Puget Sound Latitude: 47.54633055° Longitude: -122.6696500°	Port Washington Narrows, Puget Sound Latitude: 47.58108385° Longitude: -122.639268°

Permit Status	
Issuance Date of Previous Permit	June 21, 2013 (October 1, 2015 Modification)
Application for Permit Renewal Submittal Date	February 1, 2018 (Due) December 7, 2017 (Received)
Date of Ecology Acceptance of Application	March 8, 2018

Inspection Status	
Date of Last Non-sampling Inspection Date	February 28, 2018

Figure 1. Facility Location Map



(Illustration only, not to scale)

A. Facility description

History

The City of Bremerton (City) has owned, operated, and maintained a secondary wastewater treatment plant (West Plant) in west Bremerton since June 1985. Approximately 60% of Bremerton's sewer system consists of a combined sewage system that conveys a mixture of sanitary sewage and stormwater to the West Plant for treatment. When the combined sewage flow exceeds the collection system capacity, untreated combined sewage discharges from combined sewer overflow (CSO) outfalls located along the Port Washington Narrows and Sinclair Inlet.

State regulations (WAC 173-245) require communities with combined systems to reduce the frequency of untreated CSO discharges to no more than one discharge per year, on average. In an effort to comply with this regulation, the City modified its collection system to increase conveyance of its combined sewage to the West Plant for treatment prior to discharge. The City upgraded the West Plant in 2009 to increase the amount of combined sewage it can treat and, in turn, further reduce the potential for CSO discharges.

The City's CSOs Reduction Program also included construction of a combined sewage treatment plant (East Plant) in East Bremerton. The East Plant operates intermittently when combined sewage flow from East Bremerton exceeds the capacity of the conveyance system to the West Plant. The East Plant operates only during wet weather periods and provides advanced primary treatment of combined sewage using a high rate clarification system.

Collection system status

The City constructed the wastewater collection system in various phases over the course of nearly 100 years in response to changing regulations, occasional rapid population growth, and new development. Approximately 60% of the system operates as a combined sewage and stormwater collection system; the remaining areas operate as a separate sanitary system. The system includes 40 sewer lift stations and 15 CSO outfalls. Gravity sewer lines range in size from 6 to 42 inches in diameter, and force mains range from 4 to 36 inches. The sewers were constructed with a variety of materials including clay, concrete, PVC, asbestos cement, cast iron, ductile iron, and HDPE.

Sewage in East Bremerton flows from six sewer basins through a series of pump stations, gravity pipelines, and pressure mains that discharge to the East Bremerton beach main. The beach main gravity sewer discharges through 16-inch and 24-inch siphons under the Port Washington Narrows to pump station CE-1. Pump station CE-1 pumps the sewage to the West Plant via the Cross-town Pipeline. During wet weather periods, East Bremerton combined sewage exceeding the capacity of the conveyance system to the West Plant diverts to the East Plant for enhanced primary treatment. Separate and combined sewage systems in East Bremerton flow from various basins into the central Cross-town Pipeline for conveyance to the West Plant.

A map of Bremerton CSO sites is shown in **Appendix D**.

Treatment processes

West Plant:

The West Plant receives domestic sewage from residential and light commercial activities in Bremerton. The plant also receives domestic and industrial wastewater from Puget Sound Naval Shipyard (PSNS). Domestic wastewater from PSNS includes wastewater from onshore chemical toilet facilities and saline wastewater from toilet facilities on ships. Industrial wastewater from PSNS includes pretreated wastewater from the industrial wastewater treatment facility. The Ecology regulates discharges from the PSNS wastewater treatment facility under State Waste Discharge Permit No. ST0007374. The West Plant receives and treats combined sewage during wet weather periods.

The West Plant operates as a conventional activated sludge secondary treatment system. The liquid stream treatment components include three mechanical bar screens, two aerated grit chambers, two Parshall flumes for flow measurement, two primary clarifiers, a biofilter, two aeration basins with fine bubble diffusers, two secondary clarifiers, two chlorine contact basins for disinfection with sodium hypochlorite solution, and a sodium bisulfite solution dechlorination system.

The solids stream treatment system includes two rotating drum thickeners (RDTs), two anaerobic digesters, and two centrifuges. The plant also has a gravity thickener that is currently not in use. Pumps transfer primary sludge from the primary clarifiers directly to the anaerobic digesters for stabilization. Waste activated sludge pumps direct secondary sludge to the RDTs for thickening. The thickened secondary sludge is then pumped to the anaerobic digesters. The centrifuge dewaters the digested sludge before it is shipped out as a Class B biosolids to city-owned forest lands for silviculture purposes. Water removed from solids by the RDT and the centrifuge, along with supernatant decanted from the digesters, return to the head of the plant for treatment. The facility uses vertical packed bed absorption towers to remove odors generated by various treatment units, including the headworks (bar screens and grit removal units), primary clarifiers, gravity thickener, digester complex, centrifuge area, biofilter, return activated sludge wet well and primary and secondary scum boxes.

Wet Weather Operation - West Plant:

Flows from Bremerton's combined sewer service areas can exceed the secondary treatment capacity of the West Plant during wet weather. The secondary treatment units at the West Plant are designed to treat flows up to 22.8 MGD peak hour flow. However, Bremerton generally provides treatment to flows up to 32.5 MGD peak hour flow. During severe wet weather conditions, flows to the treatment plant above the instantaneous flow of 22.8 MGD are given primary treatment and are then bypassed around the secondary treatment process through the plant's secondary diversion pipeline. The diverted flow is then blended together with the secondary treated flows prior to disinfection and discharge from the plant. Ecology approved the original facility plan for the West Plant in the mid 1980s with the understanding that the plant would bypass some primary-treated wastewater around secondary treatment components during wet weather. This strategy is recognized as a good engineering practice and an acceptable solution for treating a significant portion of the combined sewage flow that occurs in the system during periods of rainfall. The West Plant has operated in this manner since construction of the secondary treatment system in 1985.

EPA's 1994 Combined Sewer Overflow Control Policy allows NPDES permit writers to authorize a "CSO-related bypass" during wet weather under certain conditions, EPA's *Combined Sewer Overflow Guidance for Permit Writers* (EPA 1995) states that a "CSO-related bypass" at a wastewater treatment plant can only occur when there is no other feasible alternative. A permittee can meet the "no feasible alternative" criteria if the record demonstrates that they consistently operate and maintain the secondary treatment system properly, that the system design meets secondary limits for flows greater than the peak dry weather flow plus an appropriate wet weather flow; and that it is either technically or financially infeasible to provide secondary treatment for greater amounts of flow. Bremerton demonstrated technical and financially infeasibility to provide secondary treatment for greater amounts of flow, in a technical memorandum *Westside WWTP No Feasible Alternatives Treatment Analysis*, Parametrix, March 21, 2013.

Based on this analysis, Ecology has determined that Bremerton's West Plant meets the "no feasible alternative" criteria and that CSO-related bypass can be authorized as allowed under EPA's *Combined Sewer Overflow Guidance for Permit Writers.* The proposed permit Condition S9, *Wet Weather Operation – West Plant,* authorizes CSO-related bypass of the secondary treatment portion of the plant when the instantaneous influent flow rate during rain events exceeds 22.8 MGD. This condition also requires Bremerton to report all bypasses of secondary treatment on a monthly and annual basis.

Bremerton's West Plant process flow diagram is shown in **Appendix D**.

East Plant:

The East Plant operates intermittently during wet weather periods to treat combined sewage from East Bremerton that exceeds the capacity of the conveyance system to the West Plant. On average, the East Plant operates less than ten days a year. The treatment system consists of a High Rate Clarification (HRC) system that provides advanced primary treatment. Treatment components include a 100,000-gallon storage tank, a bar screen, a Parshall flume for influent flow measurement, a Ballasted Sand High Rate Clarification (HRC) system, and an ultraviolet (UV) light disinfection system.

Bremerton's East Plant process flow diagram is shown in **Appendix D**.

Solid wastes/Residual solids

West Plant:

The treatment plant removes solids during the treatment of the wastewater at the headworks (grit and screenings), and at the primary and secondary clarifiers, in addition to incidental solids (rags, scum, and other debris) removed as part of the routine maintenance of the equipment. Plant staff drain grit, rags, scum, and screenings prior to placing the material in a dumpster for disposal as solid waste.

As authorized by the Washington General Biosolids Permit and the Kitsap Public Health District, Bremerton applies Class B biosolids over city-owned forest lands for silviculture purposes.

East Plant:

Screenings and sludge removed at the East Plant are conveyed to the West Plant for treatment.

Discharge outfall

West Plant:

Bremerton discharges secondary treated and disinfected effluent from the West Plant to Sinclair Inlet, an arm of Puget Sound, at a location west of the Puget Sound Naval Shipyard (PSNS), through a 36-inch diameter outfall, which extends 568 feet offshore. The terminal portion of the outfall consists of a 20-port diffuser with 6.5-inch diameter openings at 6-foot spacing. The diffuser ports discharge horizontally in alternating directions at a depth of approximately 29 feet below Mean Lower Low Water (MLLW).

East Plant:

Bremerton intermittently discharges advanced primary treated and disinfected combined sewage effluent from the East plant to the Port Washington Narrows, a tidal strait connecting the Sinclair and Dyes Inlet arms of Puget Sound. The discharge outfall is approximately 480 feet long. The first 200 feet of the outfall consists of a 20-inch diameter cast iron pipe and the remaining outfall and diffuser consist of a 36-inch diameter reinforced concrete pipe. The diffuser portion of the outfall is equipped with twenty-six 5.75-inch diameter ports per a recent inspection (April 2017). The ports are located on alternating sides of the pipe at 4-foot spacing. Discharge into Port Washington Narrows is at a depth of approximately 24 feet below MLLW per a recent bathymetric survey (October 2016).

The permittee is currently planning an outfall improvements project. A section of the 20" pipe is undersized and will be replaced with a 36" pipe and the existing multi-port diffuser will be replaced with a new single-port diffuser.

Staff

In accordance with WAC 173-230-140, this is a Class IV plant. A Class IV operator must be in responsible charge of the plant, and the operator in charge of each shift must be certified at a level of Class III or higher. Staff include full-time certified operators (Group IV, Group II, and Group I). This facility is attended daily. On holidays and off-hours there is always someone on call.

B. Description of the receiving water

West Plant:

Treated effluent from the West Plant discharges to Sinclair Inlet, Puget Sound. Although the Port Orchard WWTP also discharges to Sinclair Inlet at a location approximately 3 miles to the southeast, no other point-source discharges are located close enough to Bremerton's West Plant to cause dilution zones to overlap.

The closest data available is from Ecology's EAP marine water monitoring location No. SIN001 (Sinclair Inlet – Naval Shipyards) (https://fortress.wa.gov/ecy/eap/marinewq/mwdataset.asp). The ambient background data used for this permit is listed below.

Table 2. Ambient Background Data (West Plant)

Parameter	Value Used
Temperature (highest annual 1-DADMax) Temperature (90th percentile)	18.9 °C 14.8 °C
pH (Minimum / Maximum / 90th percentile)	6.8 / 8.6 / 8.2 standard units
Fecal Coliform (90th percentile)	4/100 mL
Salinity (90th percentile)	29.8 psu

East Plant:

Treated effluent from the East Plant discharges to Port Washington Narrows, Puget Sound. There are no nearby outfalls with overlapping dilution zones.

The closest data available are from Ecology's EAP marine water monitoring location No. DYE004 (Dyes Inlet – NE of Chico Bay) and POD006 (Port Orchard – Liberty Bay/Virginia Point) (https://fortress.wa.gov/ecy/eap/marinewq/mwdataset.asp). The ambient background data used for this permit is listed below.

Table 3. Ambient Background Data (East Plant)

Parameter	Value Used
Temperature (highest annual 1-DADMax) Temperature (90th percentile) (Wet Weather Months Oct.-Apr.)	13.3 °C 11.2 °C
pH (Minimum / Maximum / 90th percentile)	8.0 / 8.3 / 8.2 standard units
Fecal Coliform (90th percentile)	3/100 mL
Salinity (90th percentile)	30.2 psu

C. Wastewater influent characterization

The City of Bremerton reported the concentration of influent pollutants in discharge monitoring reports. The tabulated data represents the quality of the wastewater influent from August 2013 to May 2018. The influent wastewater (West Plant) is characterized as follows:

Table 4. Wastewater Influent Characterization

Parameter	Units	Monthly Average Value	Max. Day Value
BOD_5	mg/L	215	365
BOD_5	lbs/day	8,721	17,070
$CBOD_5$	mg/L	174	442
$CBOD_5$	lbs/day	7,398	33,131
TSS	mg/L	206	549
TSS	lbs/day	8,759	75,455

Parameter	Units	Monthly Average Value	Maximum Day Value
Flow	MGD	5.5	28.6

During the previous permit term, the influent monitoring data of the East Plant were shown in **Appendix D**.

D. Wastewater effluent characterization

The City of Bremerton 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 August 2013 to May 2018. The wastewater effluent (West Plant) is characterized as follows:

Table 5. Wastewater Effluent Characterization

Parameter	Units	Monthly Average Value	Weekly Avg. Value
BOD_5	mg/L	12	20
BOD_5	lbs/day	475	783
$CBOD_5$	mg/L	9	11
$CBOD_5$	lbs/day	469	708
TSS	mg/L	7	9
TSS	lbs/day	372	585

Parameter	Units	Maximum Monthly Geometric Mean	Maximum Weekly Geometric Mean
Fecal Coliforms	#/100 mL	164	241

Parameter	Units	Minimum Value	Maximum Value
pH	Standard units	6.4	7.9

Parameter	Units	Monthly Average Value	Maximum Day Value
Ammonia	mg/L as N	30.7	39
Nitrate + Nitrite	mg/L as N	1.36	2.2
TKN	mg/L as N	33	36
TP	mg/L as P	2.73	3.9
SRP	mg/L as P	2.54	4.8

Parameter	Units	Average Value	Maximum Day Value
Temperature (Winter)	°C	13	14
Temperature (Summer)		21	22

Parameter	Units	Average Value	Maximum Day Value
Dissolved Oxygen	mg/L	9.84	11.3
Total Residual Chlorine	mg/L	0.03	0.28

During the previous permit term, the effluent monitoring data (West Plant and East Plant) of the priority pollutants were shown in **Appendix D**.

During the previous permit term, the effluent monitoring data of the East Plant were shown in **Appendix D**.

E. Summary of compliance with previous permit issued on June 21, 2013 (modified on October 1, 2015)

The previous permit placed effluent limits on BOD_5, $CBOD_5$, TSS, fecal coliform, pH and residual chlorine.

The Bremerton WWTP has mostly complied with the effluent limits and permit conditions throughout the duration of the permit issued on June 21, 2013 and modified on October 1, 2015. Ecology assessed compliance based on its review of the facility's information in the Ecology

Permitting and Reporting Information System (PARIS), discharge monitoring reports (DMRs), and on inspections.

Table 6. Permit Triggers

Date	Parameter	Unit	Value	Design Limit 100% (85%)	Category	Note
2/1/18	Influent BOD_5	Lbs/day	17,070	18,100 (15,385)	Permit Trigger	85% Design Criteria Warning

Table 7. Permit Violations

Date	Parameter	Unit	Value	Permit Limit	Category
3/1/15	Effluent BOD_5	mg/L	78*	45 (Weekly Avg.)	Permit Violation
4/1/15	Effluent BOD_5	mg/L	33*	30 (Monthly Avg.)	Permit Violation

* Possible unknown toxics in influent affecting BOD_5 analysis.

Submittal Name	Due Date	Received Date	Category	Note
2017 September DMR	October 15, 2017	October 16, 2017	Permit Violation	Late DMR

Table 8. Permit Submittals

Submittal Name	Due Date	Received Date
CSO Post Construction Monitoring Plan	October 1, 2014	July 31, 2014
CSO Post Construction Monitoring Data Report	February 1, 2018	January 30, 2018
CSO Annual Report (2013)	May 31, 2014	May 9, 2014
CSO Annual Report (2014)	May 31, 2015	April 30, 2015
CSO Annual Report (2015)	May 31, 2016	May 9, 2016
CSO Annual Report (2016)	May 31, 2017	May 3, 2017
CSO Annual Report (2017)	May 31, 2018	May 21, 2018
Sediment Sampling and Analysis Plan	October 1, 2014	July 23, 2014
Sediment Data Report	February 1, 2018	January 26, 2016
Industrial User Survey	February 1, 2018	December 7, 2017
Application for Permit Renewal	February 1, 2018	December 7, 2017

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 National Toxics Rule (40 CFR 131.36).
- Ecology must apply the most stringent of these limits to each parameter of concern. These limits are described below.

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

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

A. Design criteria

Under WAC 173-220-150 (1)(g), flows and waste loadings must not exceed approved design criteria. Ecology originally approved design criteria for the West Plant in the plans and specifications dated April 1983, prepared by CH2M Hill. Subsequently, Ecology approved higher flow design criteria for this plant in the *Westside Wastewater Treatment Plant Rerating Study* dated December 2009, prepared by Richwine Environmental. The table below includes design criteria from the referenced reports.

Table 9. Design Criteria for Bremerton WWTP (West Plant)

Parameter	Design Quantity
Maximum Month Design Flow (MMDF)(May-Sep.)	11.0 MGD
Maximum Month Design Flow (MMDF)(Oct.-Apr.)	15.5 MGD
BOD_5 Loading for Maximum Month	18,100 lbs/day
TSS Loading for Maximum Month	22,600 lbs/day

B. Technology-based effluent limits (West Plant)

Federal and state regulations define technology-based effluent limits for domestic wastewater treatment plants. These effluent limits are given in 40 CFR Part 133 (federal) and in chapter 173-221 WAC (state). These regulations are performance standards that constitute all known, available, and reasonable methods of prevention, control, and treatment (AKART) for domestic wastewater.

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

The table below identifies technology-based limits for pH, fecal coliform, $CBOD_5$, and TSS, as listed in chapter 173-221 WAC. The technology limits apply only to discharges of treated effluent from the wastewater treatment plant. Section III.H of this fact sheet describes the potential for water quality-based limits.

Table 10. Technology-based Limits (West Plant)

Parameter	Average Monthly Limit	Average Weekly Limit
$CBOD_5$ (concentration)	25 mg/L	40 mg/L
$CBOD_5$ (concentration)	In addition, the $CBOD_5$ effluent concentration must not exceed fifteen percent (15%) of the average influent concentration. For domestic wastewater facilities which receive flows from combined sewer, Ecology shall decide on a case-by-case basis whether any attainable percent removal can be defined during wet weather.	
TSS (concentration)	30 mg/L	45 mg/L
TSS (concentration)	In addition, the TSS effluent concentration must not exceed fifteen percent (15%) of the average influent concentration. For domestic wastewater facilities which receive flows from combined sewer, Ecology shall decide on a case-by-case basis whether any attainable percent removal can be defined during wet weather.	

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

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

Technology-based mass limits are based on WAC 173-220-130(3)(b) and 173-221-030(11)(b). Ecology calculated the monthly and weekly average mass limits for $CBOD_5$ and Total Suspended Solids as follows:

Mass Limit = CL x DF x CF
where:

CL = Technology-based concentration limits listed in the above table
DF = Maximum Monthly Average Design flow (MGD)
CF = Conversion factor of 8.34

Table 11. Technology-based Mass Limits (West Plant)

Parameter	Concentration Limit (mg/L)	Mass Limit (lbs/day)	Mass Limit (lbs/day)
		May-September	October-April
$CBOD_5$ Monthly Average	25	2,294	3,232
$CBOD_5$ Weekly Average	40	3,670	5,171
TSS Monthly Average	30	2,752	3,878
TSS Weekly Average	45	4,128	5,817

WAC 173-221-050 subsection (3) states that, "for domestic wastewater facilities which receive flows from combined sewers, Ecology shall decide on a case-by-case basis whether any attainable percent removal can be defined during wet weather." The West Plant receives a more dilute influent during wet weather due to a collection system that combines both sanitary sewage and storm water. A dilute influent can make the 85% removal criteria for $CBOD_5$ and TSS difficult to achieve. As part of the recently completed CSO reduction program, Bremerton is conveying a significant portion of its stormwater to the West Plant for treatment. As a result, the plant influent is expected to be more diluted, especially during heavy storm events.

Ecology has determined that the percent removal requirements for $CBOD_5$ and TSS will remain at 65% during wet weather months (October through April) when the influent is likely to have lower than normal concentrations of both BOD_5 and TSS.

C. Technology-based effluent limits (East Plant)

Washington state regulations (chapter 173-245 WAC) define technology-based effluent limits for combined sewer overflow treatment plants. The table below identifies these technology-based limits for TSS removal and settleable solids. Section III.H of this fact sheet reviews the potential for water quality-based limits.

Table 12. Technology-based Mass Limits (East Plant)

Parameter	Limit
TSS Removal [a]	Minimum 50%
Settleable Solids [a]	Less than 0.3 mL/L/hr
Fecal Coliform [b]	400/100 mL

[a] WAC 173-245-020(16)
[b] Washington State Department of Ecology, Criteria for Sewage Works *Design*, 2008, page C3-21.

D. Surface water quality-based effluent limits

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

Numerical criteria for the protection of aquatic life and recreation

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

Numerical criteria for the protection of human health

In 1992, U.S. EPA published 91 numeric water quality criteria for the protection of human health that are applicable to dischargers in Washington State in its National Toxics Rule [40 CFR (EPA, 1992)]. 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 as adopted in the National Toxics Rule (40 CFR 131.36) remain in effect.

These newly adopted criteria, located in WAC 173-201A-240, are designed to protect humans from exposure to pollutants linked to cancer and other diseases, based on consuming fish and shellfish and drinking contaminated surface waters. The water quality standards also include radionuclide criteria to protect humans from the effects of radioactive substances.

Narrative criteria

Narrative water quality criteria (e.g., WAC 173-201A-240(1); 2006) limit the toxic, radioactive, or other deleterious material concentrations that the facility may discharge to levels below those which have the potential to:

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

Narrative criteria protect the specific designated uses of all fresh waters (WAC 173-201A-200, 2006) and of all marine waters (WAC 173-201A-210, 2006) in the state of Washington.

Antidegradation

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

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

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

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

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

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

Combined Sewer Overflows

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

Mixing zones

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

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

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

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

the most frequently used tools for conducting mixing zone analyses. Ecology chooses values for each effluent and for receiving water variables that correspond to the time period when the most critical condition is likely to occur (see Ecology's *Permit Writer's Manual*). Each critical condition parameter, by itself, has a low probability of occurrence and the resulting dilution factor is conservative. The term "reasonable worst-case" applies to these values.

The mixing zone analysis produces a numerical value called a dilution factor (DF). A dilution factor represents the amount of mixing of effluent and receiving water that occurs at the boundary of the mixing zone. For example, a dilution factor of 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 numerical criteria for that zone.

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

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

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

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

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

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

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

   Ecology has determined that the treatment provided at Bremerton WWTP meets the requirements of AKART (see "Technology-based Limits").

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 uses the water depth at mean lower low water (MLLW) for marine waters. Ecology's *Permit Writer's Manual* describes additional guidance on criteria/design conditions for determining dilution factors. The manual can be obtained from Ecology's website at: https://fortress.wa.gov/ecy/publications/documents/92109.pdf

Table 13. Critical Conditions Used to Model the West Plant Discharge

Critical Condition		Value
Water Depth at MLLW		29 feet
10th percentile current speed for acute mixing zone		1.3 cm/sec
50th percentile current speed for chronic and human health mixing zones		3.4 cm/sec
Maximum average monthly effluent flow for chronic and human health non-carcinogen	May through September	11.0 MGD
	October through April	15.5 MGD
Maximum daily flow for acute mixing zone	May through September	15.0 MGD
	October through April	30.7 MGD
1 DAD MAX effluent temperature		24 ˚C

(Source: *Mixing Zone Study Update Re-Rating Analysis Report*, Cosmopolitan Engineering, April 2010)

Table 14. Critical Conditions Used to Model the East Plant Discharge

Critical Condition	Value
Water Depth at MLLW	24 feet
10th percentile current speed for acute mixing zone	0.1 m/sec
50th percentile current speed for chronic and human health mixing zones	0.5 m/sec
Ambient Temperature	9 ˚C
Ambient Salinity	29 ppt
Effluent Temperature	15.7 ˚C
Maximum Daily Flow for Acute Mixing Zone	6,500 gpm (9.4 MGD)
4-day Maximum Flow for Chronic and Human Health Non-carcinogen	4,000 gpm (5.8 MGD)

(Source: *Eastside Treatment Plant Outfall Replacement Engineering Report*, Murraysmith, March 2018)

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

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

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

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

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

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

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. Because tidal currents change direction, the plume orientation within the mixing zone changes. 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 to the discharge and the specific receiving waterbody. When a diffuser is installed, the discharge is more completely mixed with the receiving water in a shorter time. 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 distance of the chronic mixing zone.

- **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.

E. Designated uses and surface water quality criteria

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

- Aquatic life uses are designated using the following general categories. All indigenous fish and non-fish aquatic species must be protected in waters of the state.
  a. Extraordinary quality salmonid and other fish migration, rearing, and spawning; clam, oyster, and mussel rearing and spawning; crustaceans and other shellfish (crabs, shrimp, crayfish, scallops, etc.) rearing and spawning.
  b. Excellent quality salmonid and other fish migration, rearing, and spawning; clam, oyster, and mussel rearing and spawning; crustaceans and other shellfish (crabs, shrimp, crayfish, scallops, etc.) rearing and spawning.
  c. Good quality salmonid migration and rearing; other fish migration, rearing, and spawning; clam, oyster, and mussel rearing and spawning; crustaceans and other shellfish (crabs, shrimp, crayfish, scallops, etc.) rearing and spawning.
  d. Fair quality salmonid and other fish migration.

The *Aquatic Life Uses* and the associated criteria for this receiving water are identified below.

Table 15. Marine Aquatic Life Uses and Associated Criteria for Sinclair Inlet and Port Washington Narrows

Excellent Quality	
Temperature Criteria – Highest 1D MAX	16°C (60.8°F)
Dissolved Oxygen Criteria – Lowest 1-Day Minimum	6.0 mg/L
Turbidity Criteria	• 5 NTU over background when the background is 50 NTU or less; or • A 10 percent increase in turbidity when the background turbidity is more than 50 NTU.
pH Criteria	pH must be within the range of 7.0 to 8.5 with a human-caused variation within the above range of less than 0.5 units.

- To protect shellfish harvesting, fecal coliform organism levels must not exceed a geometric mean value of 14 colonies/100 mL, and not have more than 10 percent of all samples (or any single sample when less than ten sample points exist) obtained for calculating the geometric mean value exceeding 43 colonies/100 mL.
- The *recreational uses* for Sinclair Inlet and Port Washington Narrows are primary contact recreation as identified below.

Table 16. Recreational Uses for Sinclair Inlet and Port Washington Narrows

Recreational Use	Criteria
Primary Contact Recreation	Fecal coliform organism levels must not exceed a geometric mean value of 14 colonies/100 mL, with not more than 10 percent of all samples (or any single sample when less than ten sample points exist) obtained for calculating the geometric mean value exceeding 43 colonies /100 mL.

- The *miscellaneous marine water uses* are wildlife habitat, harvesting, commerce and navigation, boating, and aesthetics.

F. Water quality impairments

West Plant – Sinlair Inlet

Treated wastewater from the West Plant discharges into Sinclair Inlet, Puget Sound. Ecology has not documented any water quality impairments in the receiving water in the vicinity of the outfall.

East Plant – Port Washington Narrows

Treated wastewater from the East Plant discharges into Port Washington Narrows, Puget Sound. Ecology has not documented any water quality impairments in the receiving water in the vicinity of the outfall in the 2012 303(d) list. However, it is currently listed for bacteria as Category 4a. This designation is for the quadrant the outfall is in.

This category is defined as follows:

Category 4: Impaired waters that do not require a TMDL

Category 4a - already has an EPA-approved TMDL plan in place and implemented.

Ecology conducted a total maximum daily load (TMDL) study to address the non-attainment of fecal coliform water quality standards in Sinclair and Dyes Inlets. The study indicated that the existing (technology-based) limits for fecal coliform bacteria in the NPDES permits for the three WWTPs in this water segment, including Bremerton's West Plant, are adequate to protect marine waters. The results of this study are presented in *Sinclair and Dyes Inlets Fecal Coliform Bacteria Total Maximum Daily Load - TMDL and Water Quality Implementation Plan* (Ecology, 2012).

Ecology is also working on a Puget Sound Nutrient Source Reduction Project which helps us work collaboratively with communities, stakeholders, and those already working to manage Puget Sound to address human sources of nutrients. This work focuses regional investments to control nutrients from point and non-point sources to help Puget Sound meet dissolved oxygen water quality criteria.

G. 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.

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

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

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

West Plant:

The diffuser for the West Plant at Outfall 001 is 120 feet long with a diameter of 36 inches. The diffuser has a total of 20 6.5-inch diameter ports. The distance between ports is 6 feet. The diffuser depth is 29 feet below mean lower low water (MLLW). Ecology obtained this information from the *Mixing Zone Study Upgrade Re-Rating Analysis Report*, April 2010, Cosmopolitan Engineering. The mixing zone analysis was approved by Ecology on February 17, 2011.

Chronic Mixing Zone -- WAC 173-201A-400(7)(b) specifies that mixing zones must not extend in any horizontal direction from the discharge ports for a distance greater than 200 feet plus the depth of water over the discharge ports and may not occupy more than 25% of the width of the water body as measured during MLLW.

The horizontal distance along the semi-major axis of the chronic mixing zone is 678 feet. The horizontal distance along the semi-minor axis of the chronic mixing zone is 458 feet. The mixing zone extends from the bottom to the top of the water column.

Acute Mixing Zone -- WAC 173-201A-400(8)(b) specifies that in estuarine waters a zone where acute criteria may be exceeded must not extend beyond 10% of the distance established for the chronic zone. The acute mixing zone for Outfall 001 extends 22.9 feet in any direction from any discharge port.

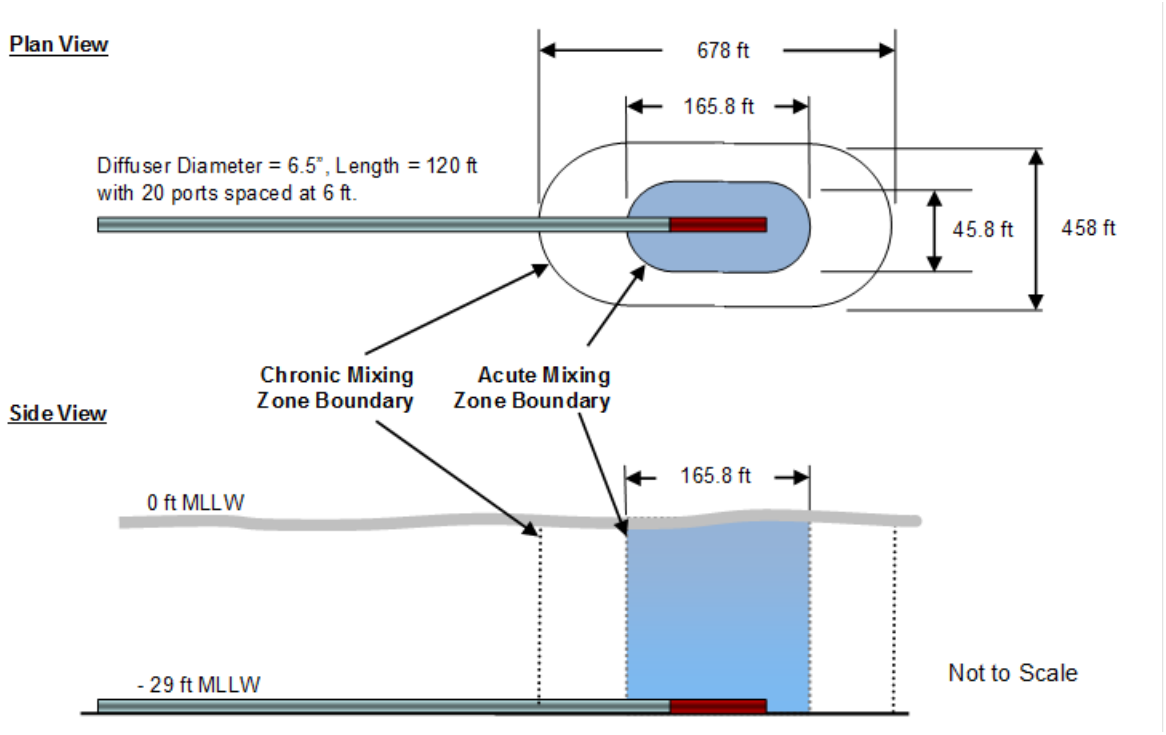


Figure 2. Outfall Mixing Zone Depiction (West Plant)

East Plant:

The diffuser for the East Plant at Outfall 002 is 100 feet long with a diameter of 36 inches. The diffuser has a total of 26 5.75-inch diameter ports. The distance between ports is 4 feet. The diffuser depth is 24 feet below MLLW. Ecology obtained this information from the *Eastside Treatment Plant Outfall Replacement Engineering Report*, March 2018, Murraysmith. The mixing zone analysis was approved by Ecology on March 15, 2018.

Chronic Mixing Zone -- WAC 173-201A-400(7)(b) specifies that mixing zones must not extend in any horizontal direction from the discharge ports for a distance greater than 200 feet plus the depth of water over the discharge ports and may not occupy more than 25% of the width of the water body as measured during MLLW.

The horizontal distance along the semi-major axis of the chronic mixing zone is 548 feet. The horizontal distance along the semi-minor axis of the chronic mixing zone is 448 feet. The mixing zone extends from the bottom to the top of the water column.

Acute Mixing Zone -- WAC 173-201A-400(8)(b) specifies that in estuarine waters a zone where acute criteria may be exceeded must not extend beyond 10% of the distance established for the chronic zone. The acute mixing zone for Outfall 002 extends 22.4 feet in any direction from any discharge port.

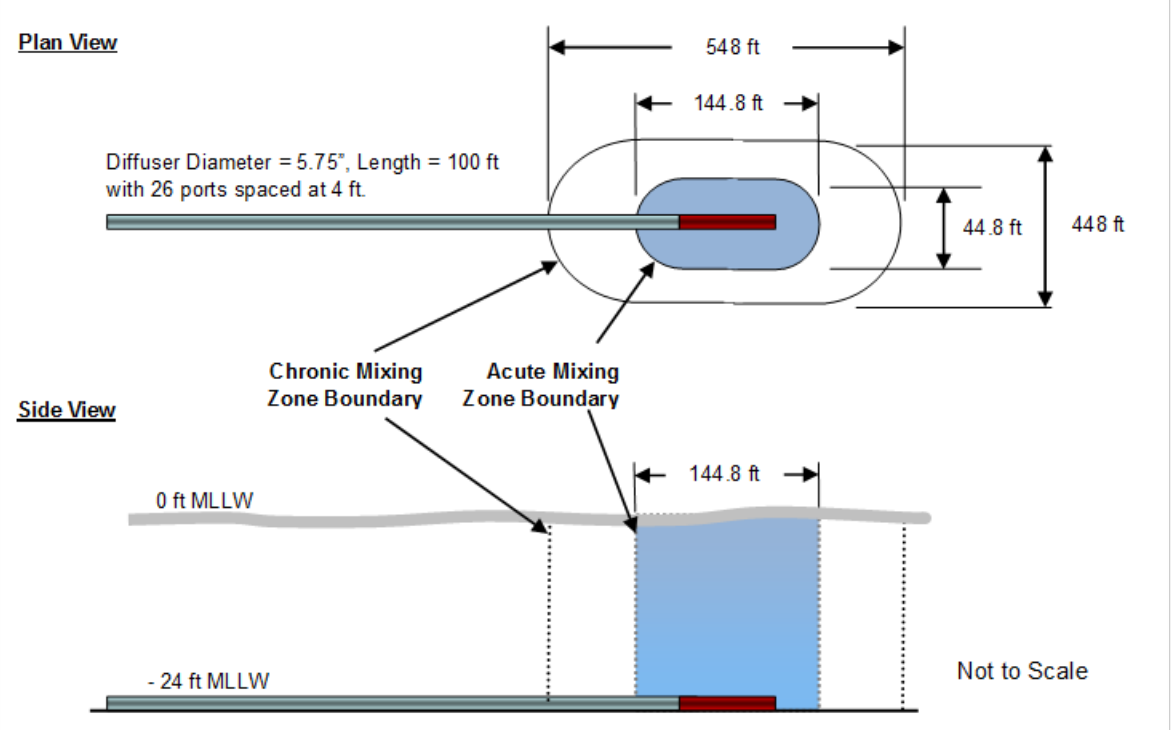


Figure 3. Outfall Mixing Zone Depiction (East Plant)

Ecology determined the dilution factors that occur within these zones at the critical conditions are taken from the mixing zone analyses for the respective plants. The dilution factors are listed below.

Table 17. Dilution Factors

Criteria	Dilution Factors		
	Outfall 001 (West Plant)		Outfall 002 (East Plant)
	May – Sep.	Oct. – Apr.	
Acute Aquatic Life Criteria	37	20	66
Chronic Aquatic Life Criteria	141	127	444
Human Health Criteria – Carcinogen	141	127	444
Human Health Criteria – Non-carcinogen	141	127	444

Evaluation of Surface Water Quality-based Effluent Limits for Numeric Criteria for the West Plant

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

Dissolved Oxygen -- BOD_5 and Ammonia Effects -- 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 Biochemical Oxygen Demand (BOD_5) of an effluent sample indicates the amount of biodegradable material in the wastewater and estimates the magnitude of oxygen consumption the wastewater will generate in the receiving water. The amount of ammonia-based nitrogen in the wastewater also provides an indication of oxygen demand potential in the receiving water.

With technology-based limits, this discharge results in a small amount of biochemical oxygen demand (BOD_5) relative to the large amount of dilution in the receiving water at critical conditions. Technology-based limits will ensure that dissolved oxygen criteria are met in the receiving water.

pH -- Compliance with the technology-based limits of 6.0 to 9.0 will assure compliance with the water quality standards of surface waters because of the high buffering capacity of marine water.

Fecal Coliform -- Ecology modeled the numbers of fecal coliform by simple mixing analysis using the technology-based limit of 400 organisms per 100 mL and a dilution factor of 127.

Under critical conditions, modeling predicts no violation of the water quality criterion for fecal coliform. Therefore, the proposed permit includes the technology-based effluent limit for fecal coliform bacteria.

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.

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 toxic pollutants are present in the discharge: ammonia, antimony, bromoform, bromodichloromethane, buty benzyl phthalate, chlorine, chloroform, cadmium, copper, di-n-butylphthalate, 2,6-dinitrotoluene, 1,2-diphenylhydazine, iron, lead, mercury, nickel, phenol, pyrene, toluene, and zinc.

Ammonia's toxicity depends on that portion which is available in the unionized form. The amount of unionized ammonia depends on the temperature, pH, and salinity of the receiving marine water. To evaluate ammonia toxicity, Ecology used the available receiving water information for ambient station in Section II.B (Description of the receiving water) and Ecology spreadsheet tools.

No valid ambient background data were available for other pollutants listed above. Ecology used zero for background.

Ecology determined that the pollutants above, pose no reasonable potential to exceed the water quality criteria at the critical condition using procedures given in EPA, 1991 (**Appendix D**) and as described above. Ecology's determination assumes that this facility meets the other effluent limits of this permit.

Ecology determined that chlorine poses no reasonable potential to exceed the water quality criteria at the critical condition using procedures given in EPA, 1991 (**Appendix D**). To avoid backsliding, the previous chlorine permit limits remain the same.

Ecology's determination assumes that this facility meets the other effluent limits of this permit.

Evaluation of Surface Water Quality-based Effluent Limits for Numeric Criteria for the East Plant

East plant is a CSO plant and discharges infrequently for short durations only during wet weather months as a result of precipitation.

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

pH -- Compliance with the technology-based limits of 6.0 to 9.0 will assure compliance with the water quality standards of surface waters because of the high buffering capacity of marine water.

Fecal Coliform -- Ecology modeled the numbers of fecal coliform for the East Plant by simple mixing analysis using the (secondary treatment) technology-based limit of 400 organisms/100 mL, receiving water concentration of 3 organisms/100 mL, and a dilution factor of 444.

Under critical conditions, modeling predicts no violation of the water quality criterion for fecal coliform. Therefore, the proposed permit includes the (secondary treatment) technology-based effluent limit for fecal coliform bacteria.

Toxic Pollutants -- The following toxic pollutants are present in the discharge: ammonia, acenaphthylene, anthracene, antimony, arsenic, benzo(a)anthracene, benzo(a)pyrene, benzofluroacene, bromodichloromethane, chloroform, chromium, chrysene, copper, 2-chloronaphyhalene, dibeno(a,h)anthracene, 1,2 dichloroethane, diethyl phthalate, di-n-butyl phthalate, n-decane, ethylbenzene, fluoranthene, fluorine, lead, mercury, 2-nitrophenol, phenol, pyrene, toluene, and zinc.

Ammonia's toxicity depends on that portion which is available in the unionized form. The amount of unionized ammonia depends on the temperature, pH, and salinity of the receiving marine water. To evaluate ammonia toxicity, Ecology used the available receiving water information for ambient station in section II.B (Description of the receiving water) and Ecology spreadsheet tools. No valid ambient background data were available for ammonia. Ecology used zero for background. Ecology determined that the ammonia poses no reasonable potential to exceed the water quality criteria at the critical condition using procedures given in EPA, 1991 (**Appendix D**) and as described above. Ecology's determination assumes that this facility meets the other effluent limits of this permit.

For these pollutants, acenaphthylene, anthracene, antimony, arsenic, benzo(a)anthracene, benzo(a)pyrene, benzofluroacene, bromodichloromethane, chloroform, chromium, chrysene, copper, 2-chloronaphyhalene, dibeno(a,h)anthracene, 1,2 dichloroethane, diethyl phthalate, di-n-butyl phthalate, n-decane, ethylbenzene, fluoranthene, fluorine, lead, mercury, 2-nitrophenol, phenol, pyrene, toluene, and zinc, Ecology conducted an evaluation (see information later this fact sheet) on these parameters to determine that it would not require effluent limits in this permit. Ecology's determination assumes that this facility meets the other effluent limits of this permit.

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

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

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), 210(1)(c), and Table 602]. These threshold criteria (e.g., 12, 16, 17.5, 20°C) protect specific categories of aquatic life by controlling the effect of human actions on summer temperatures.

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

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

- Incremental warming criteria

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

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

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

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

- Protections for temperature acute effects

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

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

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

Reasonable Potential Analysis

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

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

West Plant: (16 + 0.3) > (16 + (22 – 16)/127) => 16.3 > 16

East Plant: (16 + 0.3) > (16 + (16.6 – 16)/444) => 16.3 > 16

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

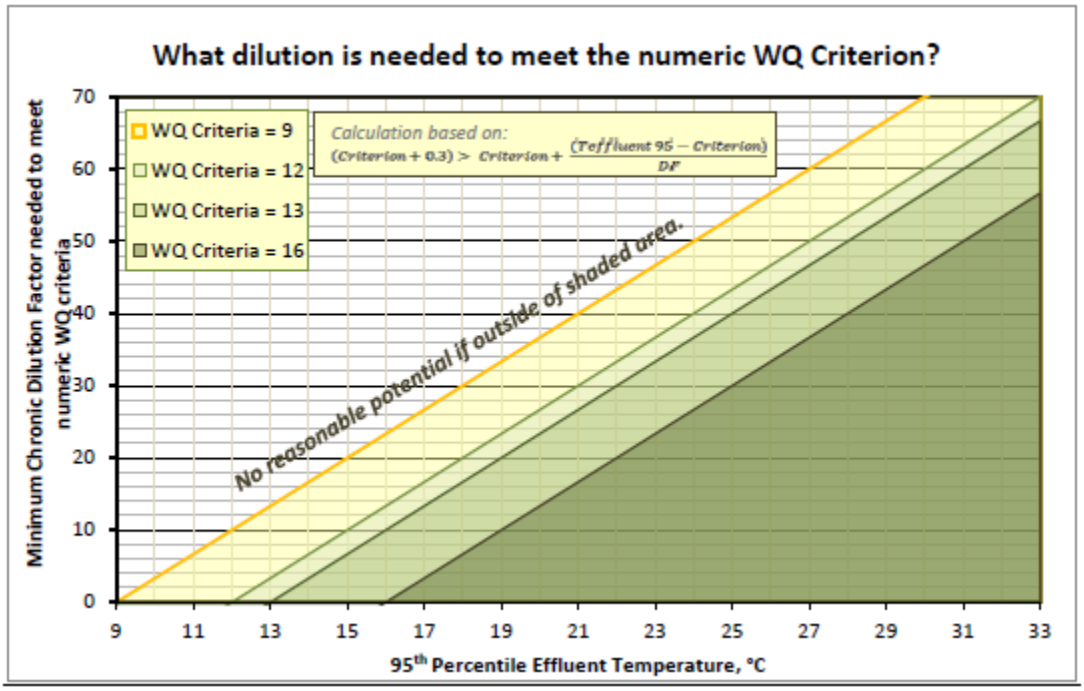


Figure 4. Dilution Necessary to Meet Criteria at Edge of Mixing Zone

Therefore, the proposed permit does not include a temperature limit. The permit requires additional monitoring of effluent temperatures for West Plant and East Plant. Ecology will reevaluate the reasonable potential during the next permit renewal.

I. Human health

Washington's water quality standards include numeric human health-based criteria that Ecology must consider when writing NPDES permits. In accordance with the requirements of CWA section 303(c)(2)(B), EPA has finalized 144 new and revised Washington-specific human health criteria for priority toxic pollutants, to apply to waters under Washington's jurisdiction, and has approved 45 new human health criteria submitted by Washington. For arsenic, dioxin, and thallium, the existing criteria from the National Toxics Rule (40 CFR 131.36) remain in effect.

West Plant:

Ecology determined the effluent contains chemicals of concern for human health, based on data or information reported in priority pollutant testing that indicate regulated chemicals occur in the discharge. A list of the pollutants of concern for human health is listed in **Appendix D**.

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) and Ecology's *Permit Writer's Manual* to make a reasonable potential determination. The evaluation showed that the discharge has no reasonable potential to cause a violation of water quality standards for these pollutants. Effluent limits are not needed for the pollutants listed above. Ecology will reevaluate this discharge for impacts to human health at the next permit reissuance.

The new criteria for bis(2-ethylhexyl) phthalate (DEHP) significantly changed from the previously adopted standard. DEHP, a known carcinogen, is frequently detected in wastewater effluent. Phthalates are plasticizers that are commonly used in hundreds of common consumer and building products. The ubiquitous chemical has also been identified as a common sampling and laboratory contaminant. If phthalates are detected in a facility's effluent, permittees are required to re-sample their effluent using clean sampling techniques to confirm that the detection is not a result of either sampling or laboratory contamination. The proposed permit includes additional sampling requirements for this pollutant.

The permittee should work with an accredited laboratory on specific clean sampling requirements. At a minimum, samples should be collected in clean glass bottles with polytetrafluoroethylene (PFTE or Teflon™) lids. Standard practice may also include an equipment rinse with a non-polar solvent to remove possible organics. Accidental sample contamination from safety equipment (e.g. gloves) is also possible. All samples must be kept from directly contacting plastics of any kind.

To help assess the sample contamination potential, permittees may opt to collect a field blank for comparison with the effluent sample so that field collection contamination may be quantified. It is the laboratory's responsibility to analyze method blanks and laboratory control samples when analyzing batches consisting of 20 or less discrete samples. These laboratory QA results must be submitted with the laboratory report.

East Plant:

Ecology determined the effluent contains chemicals of concern for human health, based on data or information reported in priority pollutant testing that indicate regulated chemicals occur in the discharge. A list of the pollutants of concern for human health is listed in **Appendix D**.

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) and Ecology's *Permit Writer's Manual* to make a reasonable potential determination. The influent to this CSO facility is highly variable in frequency, volume, duration, and pollutant concentration, both between storms and during a single storm event. Therefore, deriving numeric effluent limits for human health criteria is infeasible. The permittee should implement best management practice to control or abate human health pollutants from these discharges. Therefore, effluent limits are not needed for the pollutants listed above. Ecology will reevaluate this discharge for impacts to human health at the next permit reissuance.

The above discussions of the DEHP at the West Plant apply to the monitoring at the East Plant.

J. Sediment quality

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

The previous permit, issued in 2013, required the submittals of a sediment analysis plan and analysis and sediment monitoring data report. The submitted sediment report did have Sediment Management Standard (SMS) chemical exceedances. The proposed permit includes a Special Condition requiring sediment sampling requirements to further define the extent of contamination shown by the 2015 sampling results.

K. Whole effluent toxicity (West Plant)

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://fortress.wa.gov/ecy/publications/documents/9580.pdf), which is referenced in the permit. Ecology recommends that the City of Bremerton send a copy of the acute or chronic toxicity sections(s) of its NPDES permit to the laboratory.

WET testing conducted during the previous permit term showed the facility's effluent has a reasonable potential to cause acute toxicity in the receiving water. The proposed permit will include an acute toxicity limit. **The effluent limit for acute toxicity is: No acute toxicity detected in a test sample representing the acute critical effluent concentration (ACEC).** The acute critical effluent concentration is the concentration of effluent at the boundary of the acute mixing zone during critical conditions.

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

WET testing conducted during effluent characterization showed no reasonable potential for effluent discharges to cause receiving water chronic toxicity. The proposed permit will not include a chronic WET limit. The City of Bremerton 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
- 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. The City of Bremerton may demonstrate to Ecology that effluent toxicity has not increased by performing additional WET testing after the process or material changes have been made.

L. Groundwater quality limits

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

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

M. Comparison of effluent limits with the previous permit issued on June 21, 2013 (modified on October 1, 2015)

Table 18. Comparison of Previous and Proposed Effluent Limits (West Plant)

			Previous Effluent Limits: Outfall No. 001		Proposed Effluent Limits: Outfall No. 001	
Parameter		**Basis of Limit**	**Average Monthly**	**Average Weekly**	**Average Monthly**	**Average Weekly**
$CBOD_5$	May–Sep.	Technology	25 mg/L 2,294 lbs/day 85% removal	40 mg/L 3,670 lbs/day	No change	No change
$CBOD_5$	Oct.-Apr.	Technology	25 mg/L 3,232 lbs/day 65% removal	40 mg/L 5,171 lbs/day	No change	No change
TSS	May–Sep.	Technology	30 mg/L 2,752 lbs/day 85% removal	45 mg/L 4,128 lbs/day	No change	No change
TSS	Oct.-Apr.	Technology	30 mg/L 3,878 lbs/day 65% removal	45 mg/L 5,817 lbs/day	No change	No change

Parameter	Basis of Limit	Monthly Geometric Mean Limit	Weekly Geometric Mean Limit	Monthly Geometric Mean Limit	Weekly Geometric Mean Limit
Fecal Coliform Bacteria	Technology	200/100 mL	400/100 mL	No change	No change

Parameter	Basis of Limit	Limit	Limit
pH	Technology	6.0 – 9.0 Standard Units	No change

Parameter	Basis of Limit	Average Monthly	Maximum Daily	Average Monthly	Maximum Daily
Total Residual Chlorine	Water Quality	0.1 mg/L	0.3 mg/L	No change	No change

Parameter	Basis of Limit	Previous Effluent Limits: Outfall No. 001	Proposed Effluent Limits: Outfall No. 001
Acute Toxicity	Aquatic Life	No acute toxicity in a whole effluent toxicity test concentration representing the acute critical effluent concentration (ACEC) of 2.7% effluent (May–Sep.) and 5% effluent (Oct.-Apr.).	No change

Table 19. Comparison of Previous and Proposed Effluent Limits (East Plant)

		Previous Effluent Limits: Outfall No. 002	Proposed Effluent Limits: Outfall No. 002
Parameter	**Basis of Limit**	**Average Yearly**	**Average Yearly**
TSS Removal Efficiency	Technology	Equal to or greater than 50% removal of influent TSS	No change
Settleable Solids	Technology	0.3 mL/L/hour	No change

Parameter	Basis of Limit	Monthly Geometric Mean Limit	Monthly Geometric Mean Limit
Fecal Coliform Bacteria	Treatment Technology	400/100 mL	No change

Parameter	Basis of Limit	Limit	Limit
pH	Technology	6.0 – 9.0 Standard Units	No change

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 S.2. Specified monitoring frequencies take into account the quantity and variability of the discharge, the treatment method, past compliance, significance of pollutants, and cost of monitoring. The agency guidance for required monitoring frequency given in the current version of Ecology's *Permit Writer's Manual* (Publication Number 92-09) for activated sludge plants with greater than 5 MGD average design flow is: 5/week for BOD_5 and TSS, and daily for fecal coliform.

Bremerton's previous modified permit required monitoring frequency of 3/week for $CBOD_5$ and TSS, and 5/week for fecal coliform, for the West Plant.

An evaluation of the DMR data submitted during the permit term indicated that the facility's monthly average effluent concentrations were only 30% and 27% of the monthly average permit requirements for CBOD5 and TSS respectively (percentages represent [Long Term Average, mg/L] ÷ [Average Monthly Limit, mg/L]). The facility's monitoring program also produces data with relatively low coefficients of variance (CV, the standard deviation over the mean) for CBOD5 and TSS: 0.16 for CBOD5 and 0.20 for TSS showing consistent performance. Retaining the monitoring reduction decision in the new permit is consistent with Ecology's monitoring reduction guidance.

Ecology has included some additional monitoring of nutrients in the proposed permit to establish a baseline for this discharger. It will use this data in the future as it develops TMDLs for dissolved oxygen and establishes WLAs for nutrients.

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 the parameters listed below.

Table 20. Accredited Parameters

General Chemistry				
Parameter name	**Analyte code**	**Method description**	**NELAC code**	**Matrix ***
Ammonia	1515	EPA 350.1_2_1993	10063602	N
Total Suspended Solids	1960	SM 2540 D-97	20051201	N
Total Residual Chlorine	1940	SM 4500-Cl G-00	20081612	N
pH	1900	SM 4500-H+ B-00	20105219	N
BOD, CBOD	1532	SM 5210 B-01	20135006	N
Microbiology				
Parameter name	**Analyte code**	**Method description**	**NELAC code**	**Matrix ***
Fecal Coliform-Count	2530	SM 9222 D (m-FC)-97	20210008	N
* Matrix key: N = non-potable water				

V. Other Permit Conditions

A. Reporting and record keeping

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

B. Prevention of facility overloading

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

- Take the actions detailed in proposed permit Special Condition S.4.
- 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 S.4 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 planning documents must meet the requirements of WAC 173-98. 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 permittee 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.

Federal and state pretreatment program requirements

Ecology administers the Pretreatment Program under the terms of the addendum to the "Memorandum of Understanding between Washington Department of Ecology and the United States Environmental Protection Agency, Region 10" (1986) and 40 CFR, part 403. Under this delegation of authority, Ecology issues wastewater discharge permits for significant industrial users (SIUs) discharging to POTWs which have not been delegated authority to issue wastewater discharge permits. Ecology must approve, condition, or deny new discharges or a significant increase in the discharge for existing significant industrial users (SIUs) [40 CFR 403.8 (f)(1)(i) and(iii)].

Industrial dischargers must obtain a permit from Ecology before discharging waste to the Bremerton WWTP [WAC 173-216-110(5)]. Industries discharging wastewater that is similar in character to domestic wastewater do not require a permit.

Routine identification and reporting of industrial users

The permit requires non-delegated POTWs to take "continuous, routine measures to identify all existing, new, and proposed significant industrial users (SIUs) and potential significant industrial users (PSIUs)" discharging to their sewer system. Examples of such routine measures include regular review of water and sewer billing records, business license and building permit applications, advertisements, and personal reconnaissance. System maintenance personnel should be trained on what to look for so they can identify and report new industrial dischargers in the course of performing their jobs. The POTW may not allow SIUs to discharge prior to receiving a permit, and must notify all industrial dischargers (significant or not) in writing of their responsibility to apply for a State Waste Discharge Permit. The POTW must send a copy of this notification to Ecology.

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 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 City of Bremerton 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 Sections 307(b) and 308 of the Clean Water Act)], 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 Kitsap Public Health District.

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

F. Combined sewer overflows

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

Bremerton's combined sewage collection and conveyance system has 15 CSO outfalls, which are shown in **Appendix D**.

CSO reduction plan/long-term control plan and CSO reduction plan amendments

Ecology requires municipalities to develop combined sewer overflow (CSO) reduction plans per chapter 173-245 WAC requirements. These plans are substantially equivalent to the long-term control plan (LTCP) as defined by EPA in its CSO control policy. Chapter 173-245 WAC requires that "All CSO sites shall achieve and at least maintain the greatest reasonable reduction, and neither cause violations of applicable water quality standards, nor restrictions to the characteristic uses of the receiving water, nor accumulation of deposits which: (a) Exceed sediment criteria or standards; or (b) have an adverse biological effect." "The greatest reasonable reduction" means control of each CSO outfall such that an average of no more than one untreated discharge may occur per year.

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

The City of Bremerton identified that all of its 15 CSO outfalls are controlled to the state standard of one untreated discharge per year per CSO, the City of Bremerton is not required to submit an amendment to the CSO reduction plan as described in WAC 173-245-090(2) for this permit term.

If there are substantial changes or updates to the plan the Permittee must submit the updated plan to Ecology for review and approval.

Bremerton identified that all of its 15 CSO outfalls meet the requirement of "greatest reasonable reduction" as defined in WAC 173-245-020(22). Frequency of overflow events at these CSO outfalls, as a result of precipitation events, must continue to meet the performance standard.

Nine minimum controls

Municipalities with combined sewer overflow outfalls must implement nine minimum controls as technology-based standards for CSO discharges. The nine minimum controls are largely programmatic policies and practices designed to minimize the impacts untreated CSOs have on human health and the environment. It is not possible with current knowledge and technology to calculate numeric water quality-based effluent limits for CSOs. Ecology may include numeric water quality-based effluent limits in the future permits only after the long-term control plan is in place and after collection of sufficient water quality data.

The nine minimum controls include:

1. Use proper operations and maintenance practices within the combined collection system to reduce the magnitude, frequency and duration of CSOs.
2. Implement procedures that maximize storage capacity of the combined collection system.
3. Minimize pollution from non-domestic wastewater sources through close management of a pretreatment program.
4. Maximize treatable flow to the wastewater treatment plant during wet weather.
5. Prevent CSO discharges during dry weather and properly report any dry weather CSO discharges immediately to Ecology.
6. Implement procedures to control solid and floatable materials in CSOs.
7. Implement and maintain a pollution prevention program designed to keep pollutants from entering the combined sewer system.
8. Establish a process to notify the public when and where CSOs occur.
9. Monitor CSO outfalls to characterize CSO impacts and the efficacy of CSO controls, including event-based monitoring of all CSO flow quantity, frequency and duration.

CSO monitoring

The proposed permit requires the City of Bremerton to monitor the volume, duration and precipitation associated with each CSO discharge event at each identified outfall.

Annual CSO report

The City of Bremerton must submit annual reports according to the requirements of WAC 173-245-090(1). This report: (a) details the past year's frequency and volume of combined sewage discharge from each CSO site, (b) explains the previous year's CSO reduction accomplishments, and (c) lists the projects planned for the next year. The report must indicate whether a CSO site has increased over the baseline annual condition. If an increase has occurred, the Permittee must propose a project and/or schedule to reduce that site below its

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

The City of Bremerton must also assess in its annual reports CSO reduction plan whether identified outfalls meet the state standard of one untreated discharge per year per CSO. Assessment may be based on a long-term average which is currently based on a 20-year moving average.

Post-construction monitoring program

The federal CSO control policy (59 FR 18688) requires post-construction monitoring to verify implemented CSO control strategies comply with water quality standards. Post-construction monitoring applies to any CSO outfall that is controlled to meet the "greatest reasonable reduction" of combined sewer overflows, as defined in chapter 173-245 WAC. Implementation requires development of a monitoring plan and completion of a data report that documents compliance. The City of Bremerton submitted a post-construction monitoring plan to Ecology in 2014. The proposed permit requires the City to implement the monitoring plan and to report monitoring data in the annual CSO report.

Ecology originally approved Bremerton's CSO Reduction Plan on November 20, 1992. Subsequently Bremerton updated its CSO reduction plan, which Ecology approved on February 15, 2001. Bremerton's updated CSO reduction plan recommended a combination of various CSO reduction alternatives, including storm drainage separation as well as storage of combined sewage and subsequent conveyance to one of Bremerton's two treatment plants. Bremerton completed its entire CSO reduction program and identified all its 15 CSO outfalls as meeting the requirement of "greatest reasonable reduction" as defined in WAC 173-245-020(22). The City's CSO Annual reports verify compliance with the "controlled" standard.

G. Wet weather operation – West Plant

The Bremerton WWTP has a larger primary treatment capacity than secondary treatment capacity. The design flow through the headworks, primary clarifiers, chlorine contact basin, and outfall is 32.5 MGD. Design peak flow for secondary treatment is 22.8 MGD. The proposed permit authorizes bypass of the secondary treatment portion of the Bremerton WWTP only when the instantaneous flow rate to the WWTP exceeds 22.8 MGD as a result of precipitation events. The bypass flows receive primary treatment, and are mixed with the secondary treated effluent before disinfection and final discharge. The mixed final effluent must meet the permit limits at all times. The City of Bremerton must report CSO-related bypass events in the monthly discharge monitoring reports and in the annual CSO report.

One effective strategy to abate pollution resulting from CSOs is to maximize the delivery of flows during wet weather to the treatment plant. This practice is consistent with EPA's Nine Minimum Control #4, eliminates or minimizes overflows, and it provides at least primary treatment to combined sewer flows. Under EPA regulations, the intentional diversion of waste streams from any portion of a treatment facility, including secondary treatment, is a bypass. A bypass is allowed only under specific limited circumstances. EPA's *Combined Sewer Overflow Guidance for Permit Writers* states that a CSO-related bypass at a wastewater treatment plant can only occur if there is no feasible alternative. The no feasible alternative analysis requirement can be met if the record demonstrates that the secondary treatment system is properly operated and maintained, that the system has been designed to

meet secondary limits for flows greater than the peak dry weather flow plus an appropriate wet weather flow, and that it is either technically or financially infeasible to provide secondary treatment for greater amounts of flow.

- Inspections and monitoring records demonstrate that the secondary treatment system is properly operated and maintained.
- The City of Bremerton completed planning, design, and construction of secondary treatment and CSO correction. Sewer separation projects reduced inflow substantially prior to construction of the secondary treatment facility. Peak flows up to 22.8 MGD are treated in the secondary aeration basins and clarifiers; the primary treatment system and outfall can handle peak flows up to 32.5 MGD. Since the WWTP has been designed to treat flows to meet secondary limits and well in excess of the future maximum monthly average flow, the WWTP meets the criteria for treating the peak dry weather flow plus an appropriate amount of wet weather flow. Flows higher than 22.8 MGD to the secondary treatment units would cause substantial physical damage by washing out the biological system. The quality of the blended effluent meets all permit limits based on secondary treatment technology.
- The administrative record includes extensive documentation of the engineering decisions, cost-effectiveness analyses, and environmental impacts review done during the design phase, as these projects were financially supported by the state and federal agencies.
- The City of Bremerton is continuing to implement projects to improve the capacity of the collection system and to reduce inflow and CSOs, as documented in the post-construction monitoring plan in 2014. At this time, it is not technically or financially feasible to provide additional secondary treatment for peak wet weather flows at the treatment plant.

H. Outfall evaluation

The proposed permit requires the City of Bremerton to conduct an outfall inspection (West Plant Outfall 001) and submit a report detailing the findings of that inspection (Special Condition S.13). The inspection must evaluate the physical condition of the discharge pipe and diffusers, and evaluate the extent of sediment accumulations in the vicinity of the outfall.

I. General conditions

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

VI. Permit Issuance Procedures

A. Permit modifications

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

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

B. Proposed permit issuance

This proposed permit meets all statutory requirements for Ecology to authorize a wastewater discharge. The permit includes limits and conditions to protect human health and aquatic life, and the beneficial uses of waters of the state of Washington. Ecology proposes to issue this permit for a term of 5 years.

VII. References for Text and Appendices

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.

1995. *Combined Sewer Overflow Guidance for Permit Writers*, EPA, August 1995, pp. 4-34.

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.

January 2015. *Permit Writer's Manual*. Publication Number 92-109 (https://fortress.wa.gov/ecy/publications/documents/92109.pdf)

September 2011. *Water Quality Program Guidance Manual – Supplemental Guidance on Implementing Tier II Antidegradation*. Publication Number 11-10-073 (https://fortress.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://fortress.wa.gov/ecy/publications/summarypages/0610100.html)

Laws and Regulations (https://ecology.wa.gov/Regulations-Permits)

Permit and Wastewater Related Information (https://ecology.wa.gov/Regulations-Permits/Guidance-technical-assistance/Water-quality-permits-guidance)

Water Pollution Control Federation.

1976. *Chlorination of Wastewater*.

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

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

Appendix A -- Public Involvement Information

Ecology proposes to reissue a permit to Bremerton WWTP. The permit includes wastewater discharge limits and other conditions. This fact sheet describes the facility and Ecology's reasons for requiring permit conditions.

Ecology will place a Public Notice of Draft on September 12, 2018, in the *Kitsap Sun* to inform the public and to invite comment on the proposed draft National Pollutant Discharge Elimination System permit and fact sheet.

The notice:

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

Ecology has published a document entitled *Frequently Asked Questions about Effective Public Commenting*, which is available on our website at https://fortress.wa.gov/ecy/publications/documents/0307023.pdf

You may obtain further information from Ecology by telephone, 425-649-7000, or by writing to the address listed below.

Water Quality Permit Coordinator
Department of Ecology
Northwest Regional Office
3190 160th Avenue SE
Bellevue, WA 98008-5452

The primary author of this permit and fact sheet is Kevin Leung.

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.

ADDRESS AND LOCATION INFORMATION

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

Appendix C -- Glossary

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

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

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

AKART -- The acronym for "all known, available, and reasonable methods of prevention, control and treatment." AKART is a technology-based approach to limiting pollutants from wastewater discharges, which requires an engineering judgment and an economic judgment. AKART must be applied to all wastes and contaminants prior to entry into waters of the state in accordance with RCW 90.48.010 and 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) -- The 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 (BMPs) -- Schedules of activities, prohibitions of practices, maintenance procedures, and other physical, structural and/or managerial practices to prevent or reduce the pollution of waters of the state. BMPs include treatment systems, operating procedures, and practices to control: plant site runoff, spillage or leaks, sludge or waste disposal, or drainage from raw material storage. BMPs may be further categorized as operational, source control, erosion and sediment control, and treatment BMPs.

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

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

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

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

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

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

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

Compliance inspection-with sampling -- A site visit for the purpose of determining the compliance of a facility with the terms and conditions of its permit or with applicable statutes and regulations. In addition it includes as a minimum, sampling and analysis for all parameters with limits in the permit to ascertain compliance with those limits; and, for municipal facilities, sampling of influent to ascertain compliance with the 85 percent removal requirement. 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 173-240-130.

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

b. Is a member of a group of similar industrial users which, taken together, have the potential to cause pass through or interference at the POTW (e.g. facilities which develop photographic film or paper, and car washes).

Ecology may determine that a discharger initially classified as a potential significant industrial user should be managed as a significant industrial user.

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

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

Reasonable potential -- A reasonable potential to cause 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 year(s), respectively, of professional experience working in the area of agronomy, crops, or soils.

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

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

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

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

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

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

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

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

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

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

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

Appendix D -- Technical Calculations

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

Simple Mixing:

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

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

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

Reasonable Potential Analysis:

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

Calculation of Water Quality-Based Effluent Limits:

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

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

WLA_a = (acute criteria x DF_a) – [(background conc. x (DF_a - 1)]
WLA_c = (chronic criteria x DF_c) – [(background conc. x (DF_c -1)]
where: DF_a = Acute Dilution Factor
DF_c = Chronic Dilution Factor

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

$LTA_a = WLA_a \times e^{[0.5\sigma^2 - z\sigma]}$

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

$z = 2.326$

CV = coefficient of variation = std. dev/mean

$LTA_c = WLA_c \times e^{[0.5\sigma^2 - z\sigma]}$

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

$z = 2.326$

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

MDL = Maximum Daily Limit

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

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

$z = 2.326$ (99th percentile occurrence)

LTA = Limiting long term average

AML = Average Monthly Limit

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

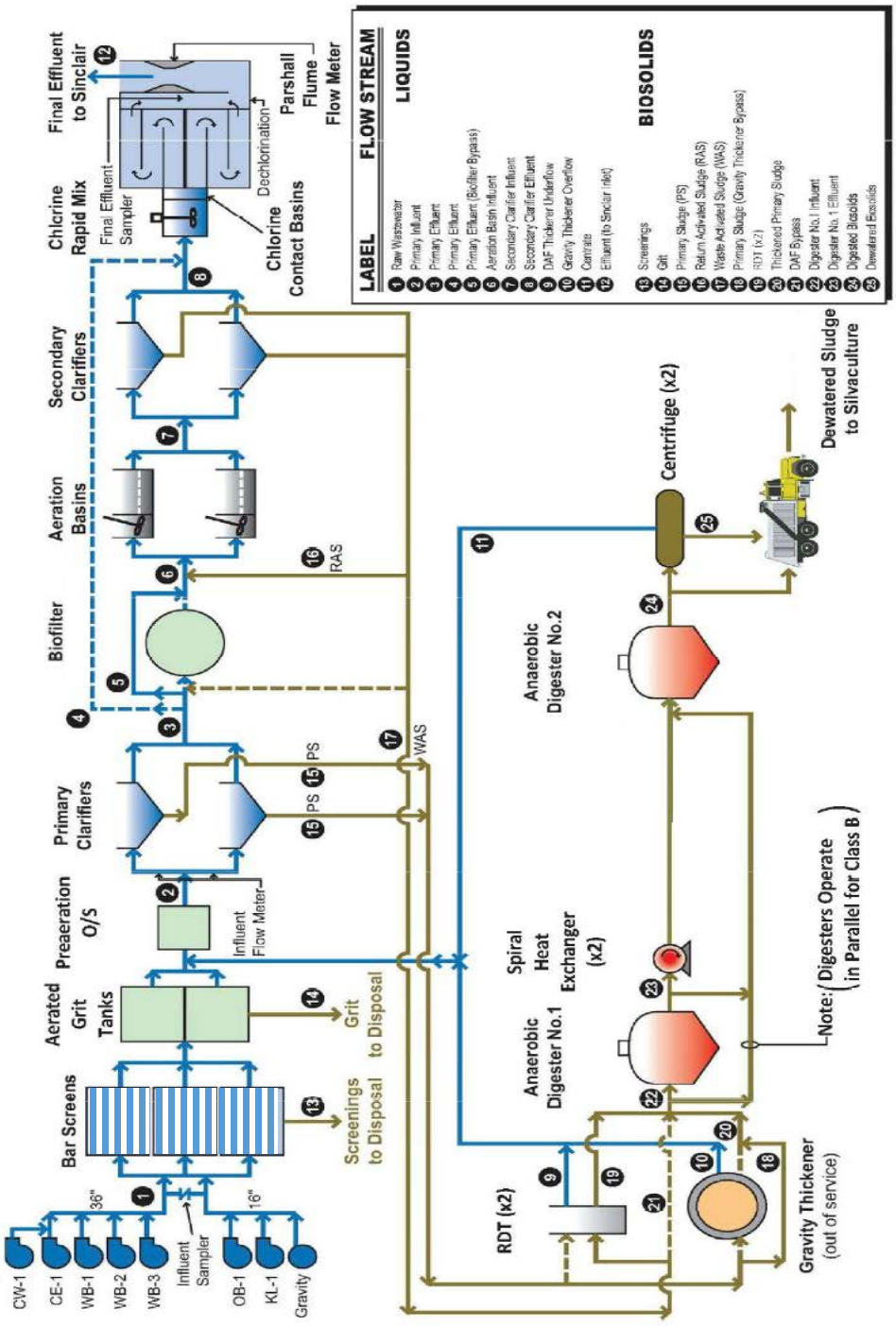
where: $\sigma^2 = \ln[(CV^2 \div n) + 1]$

n = number of samples/month

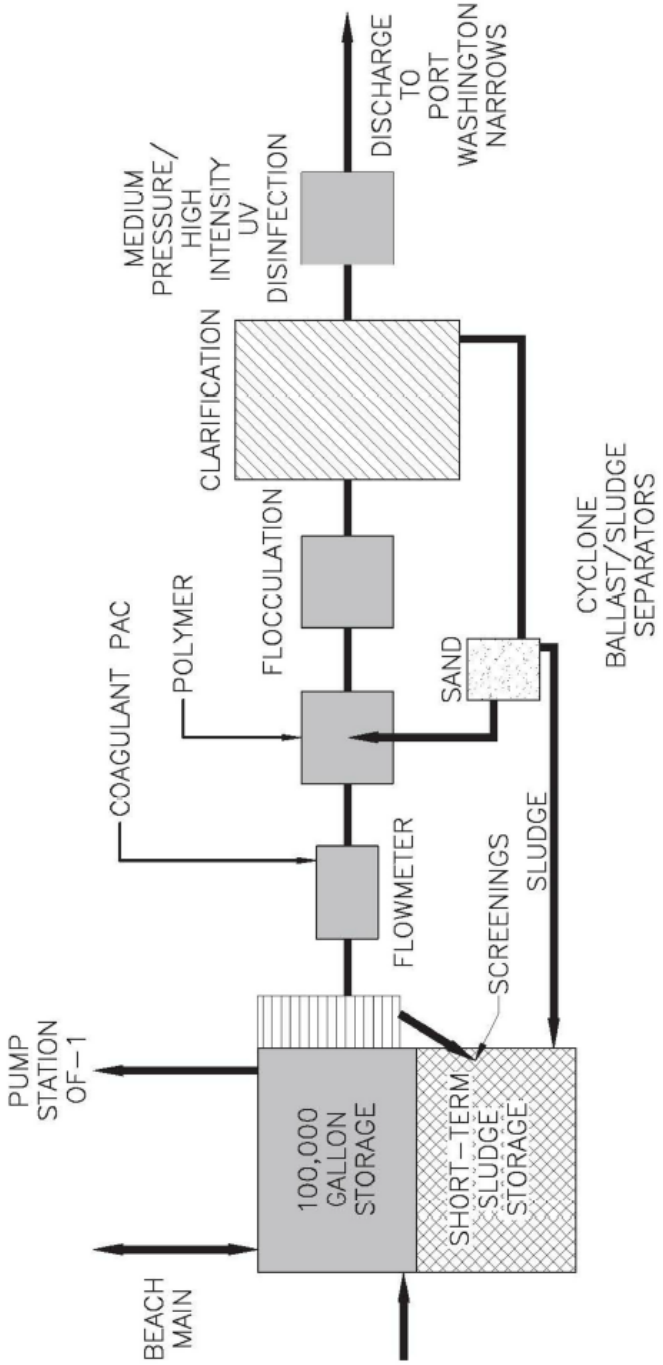
$z = 1.645$ (95^{th} % occurrence probability)

LTA = Limiting long term average

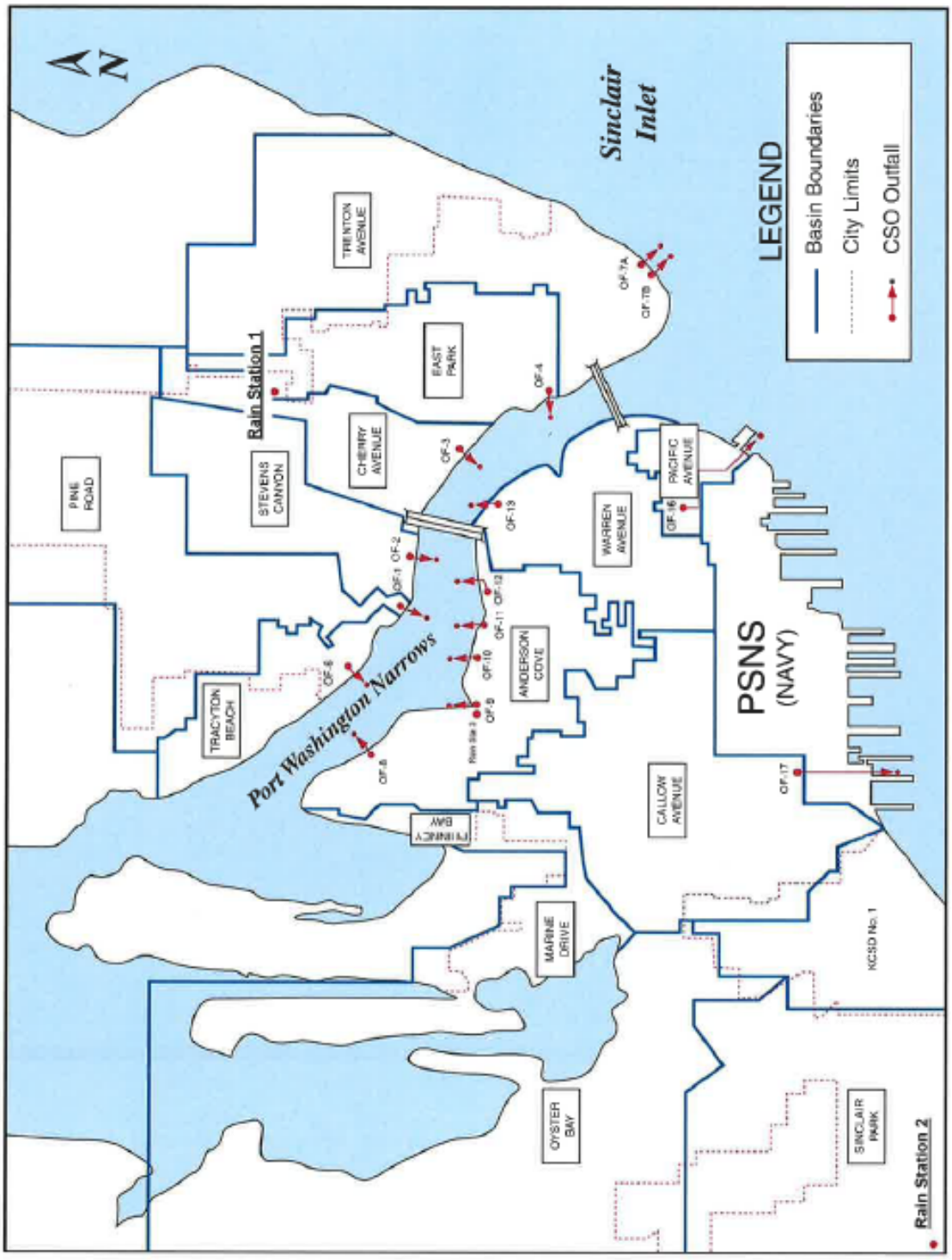
Bremerton West Plant - Process Flow Diagram



Bremerton East Plant - Process Flow Diagram



Map of Bremerton CSO Sites



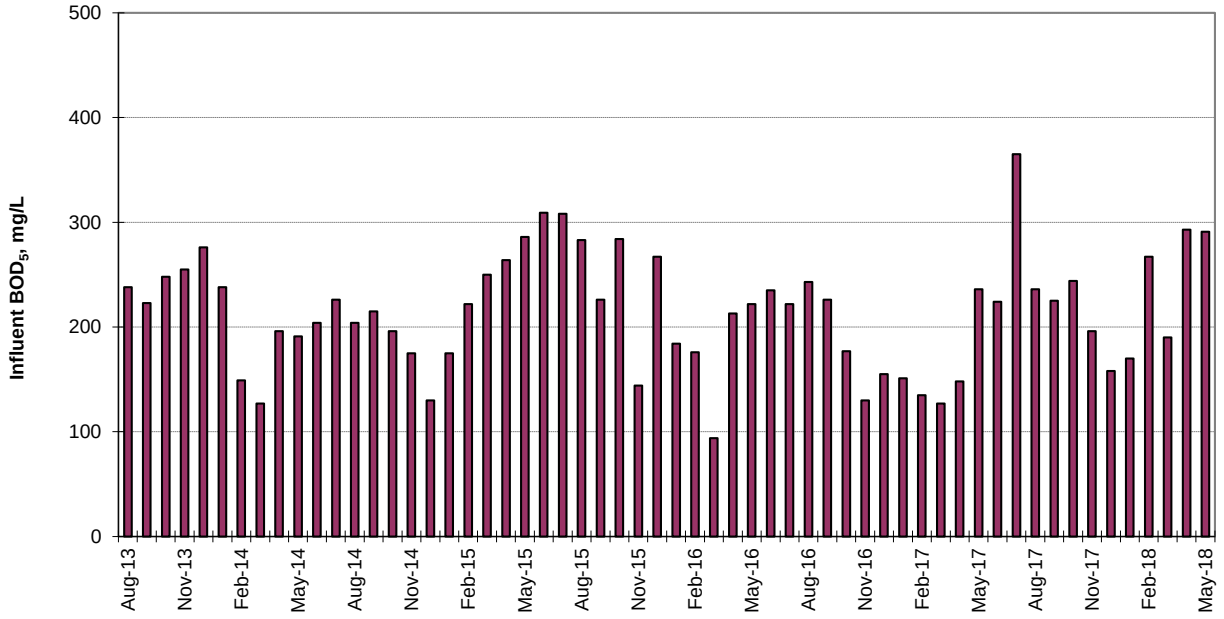
Bremerton West Plant Data (2013-2018)

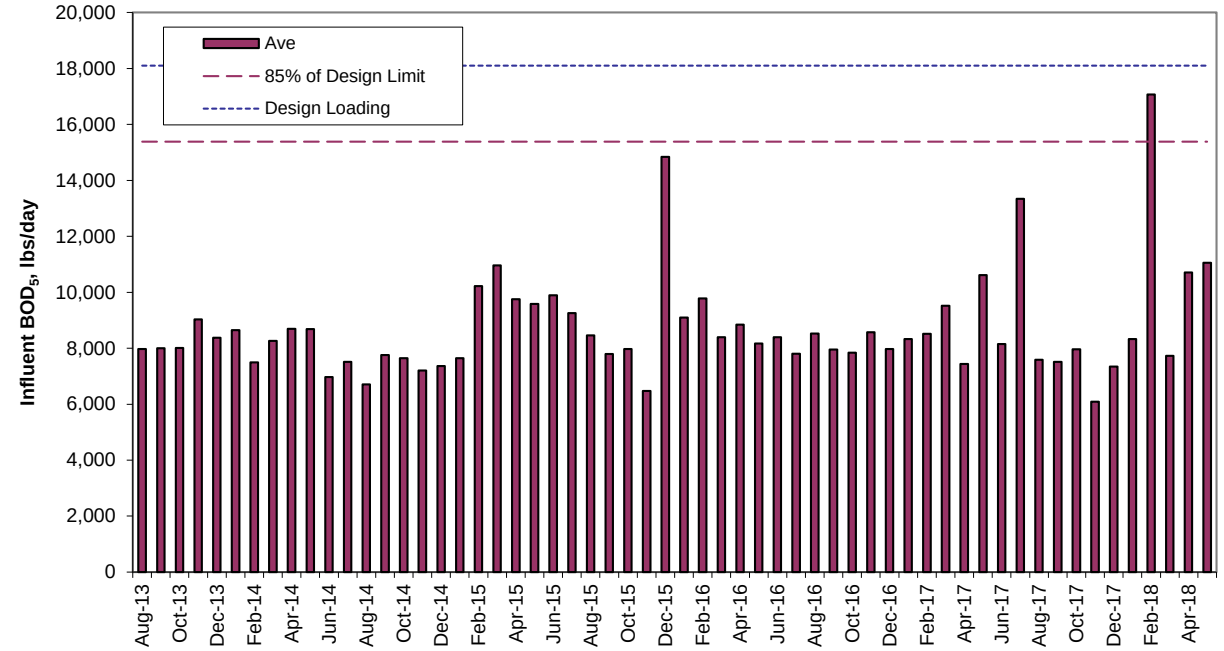
	Influent													
Date	Flow, MGD	Flow, MGD	BOD5, mg/L	BOD5, mg/L	BOD5, ppd	BOD5, ppd	CBOD5, mg/L	CBOD5, mg/L	CBOD, ppd	CBOD, ppd	TSS, mg/L	TSS, mg/L	TSS, ppd	TSS, ppd
	Ave	Max Day	Ave	Max	Ave	Max	Ave	Max	Ave	Max	Ave	Max	Ave	Max
Aug-13	4.0	6.0	238	250	7976	8245					270	285	9125	9584
Sep-13	4.5	11.7	223	255	8000	8383					232	254	8480	9787
Oct-13	3.9	6.4	248	266	8014	8468					227	245	7356	7795
Nov-13	4.1	9.0	255	292	9032	9612					237	303	8103	9604
Dec-13	3.7	4.1	276	307	8375	9481					237	248	7287	7778
Jan-14	4.7	10.7	238	280	8643	9984					210	224	8074	10588
Feb-14	6.9	16.6	149	221	7491	8412					160	210	8372	9840
Mar-14	8.6	19.6	127	185	8260	10415					150	188	9706	12971
Apr-14	5.4	8.3	196	224	8696	10347					202	238	9117	11909
May-14	5.2	10.3	191	219	8682	9760					189	207	8166	8755
Jun-14	4.0	5.0	204	210	6966	7157					222	231	7504	7647
Jul-14	3.9	4.5	226	242	7510	8481					229	242	7424	7819
Aug-14	3.9	6.5	204	229	6705	7185					228	234	7380	8525
Sep-14	4.1	10.6	215	237	7760	10832					240	306	8488	13278
Oct-14	4.7	7.8	196	232	7641	8743					213	238	8313	9403
Nov-14	5.6	16.0	175	213	7201	7763					189	218	8629	10611
Dec-14	7.3	13.0	130	157	7366	9342					145	173	8300	9450
Jan-15	5.7	14.1	175	241	7649	9137					179	203	8213	10263
Feb-15	6.7	14.3	222	267	10224	11012					174	202	8934	10265
Mar-15	5.5	16.6	250	292	10966	11475					181	205	8066	8912
Apr-15	4.4	5.9	264	321	9755	11835					208	229	7637	8761
May-15	4.0	4.5	286	300	9587	10737					264	379	8587	11680
Jun-15	3.8	4.6	309	329	9894	10589					257	264	8144	8987
Jul-15	3.6	4.8	308	317	9260	9663					242	251	7267	7939
Aug-15	3.9	7.0	283	320	8459	9613					244	280	7989	10137
Sep-15	4.1	6.2	226	262	7793	8960					225	238	7621	7951
Oct-15	4.3	8.8	284	284	7973	7973	200	214	6611	7530	245	254	8737	10637
Nov-15	5.9	14.2	144	144	6477	6477	155	180	6842	8013	197	230	8834	9824
Dec-15	9.6	18.9	267	267	14841	14841	106	188	7694	9780	165	230	11979	13976
Jan-16	9.3	28.6	184	304	9100	11782	136	184	8599	9681	195	276	12864	14704
Feb-16	7.4	11.5	176	176	9785	9785	129	140	7768	9303	178	190	10905	12576
Mar-16	8.7	20.3	94	94	8392	8392	108	123	7250	8531	151	194	10339	7399
Apr-16	4.7	5.7	213	265	8845	11159	178	203	7284	7712	238	250	9294	9785
May-16	4.3	5.7	222	261	8171	10284	209	223	7633	8118	255	279	9113	10449
Jun-16	4.0	5.8	235	253	8393	9113	203	217	7123	7702	258	283	8776	9218
Jul-16	4.2	6.0	222	233	7804	8447	190	233	6595	8119	242	263	8368	9067
Aug-16	4.0	4.6	243	272	8527	9725	221	247	7557	8749	253	282	8404	10540
Sep-16	4.1	5.1	226	277	7951	9035	229	240	8000	8720	254	266	8807	9247
Oct-16	6.7	12.1	177	213	7842	8327	163	200	7842	8687	204	235	11018	12961
Nov-16	8.3	20.0	130	155	8573	9339	120	150	7636	8551	157	195	9981	10902
Dec-16	6.0	9.2	155	166	7971	8637	150	175	7365	8155	165	177	8210	8958
Jan-17	6.7	18.9	151	201	8331	12460	147	165	7929	9599	162	187	8718	11530
Feb-17	8.7	21.2	135	152	8518	9976	120	144	8360	11023	140	209	9632	11708
Mar-17	8.8	14.6	127	156	9516	11884	115	125	8150	9226	137	132	9692	10201
Apr-17	6.8	10.1	148	148	7436	7436	138	143	8051	9087	159	182	8915	9442
May-17	5.1	6.4	236	236	10612	10612	182	201	7700	8087	219	225	9393	10084
Jun-17	4.3	7.8	224	224	8149	8149	200	219	7211	7778	235	277	8587	10012
Jul-17	4.3	7.5	365	365	13345	13345	211	300	7461	10057	242	312	8371	10494
Aug-17	3.8	4.3	236	236	7592	7592	229	277	7487	9210	247	284	7923	9557
Sep-17	3.7	4.5	225	225	7510	7510	210	315	6820	11788	245	450	7621	16840
Oct-17	4.5	13.2	244	244	7965	7965	198	261	7001	17194	243	549	9136	34167
Nov-17	7.1	20.8	196	196	6086	6086	159	324	10338	33131	209	435	12948	75455
Dec-17	6.0	12.6	158	158	7342	7342	183	249	9012	18973	145	206	7054	11025
Jan-18	9.0	19.3	170	170	8331	8331	126	188	8868	15747	144	215	10623	30208
Feb-18	6.0	9.6	267	267	17070	17070	196	442	9636	22676	162	217	7954	12211
Mar-18	5.0	8.6	190	190	7733	7733	218	284	9059	15845	195	256	7938	9633
Apr-18	6.0	13.6	293	293	10708	10708	206	346	9923	17009	158	220	7122	8997
May-18	4.6	5.5	291	291	11051	11051	241	368	9205	16013	217	299	8467	13011
AVE:	5.5	10.7	215	238	8721	9555	174	227	7938	11556	206	251	8759	12156
MIN:	3.6	4.1	94	94	6086	6086	106	123	6595	7530	137	132	7054	7399
MAX:	9.6	28.6	365	365	17070	17070	241	442	10338	33131	270	549	12948	75455

Bremerton West Plant Data (2013-2018)

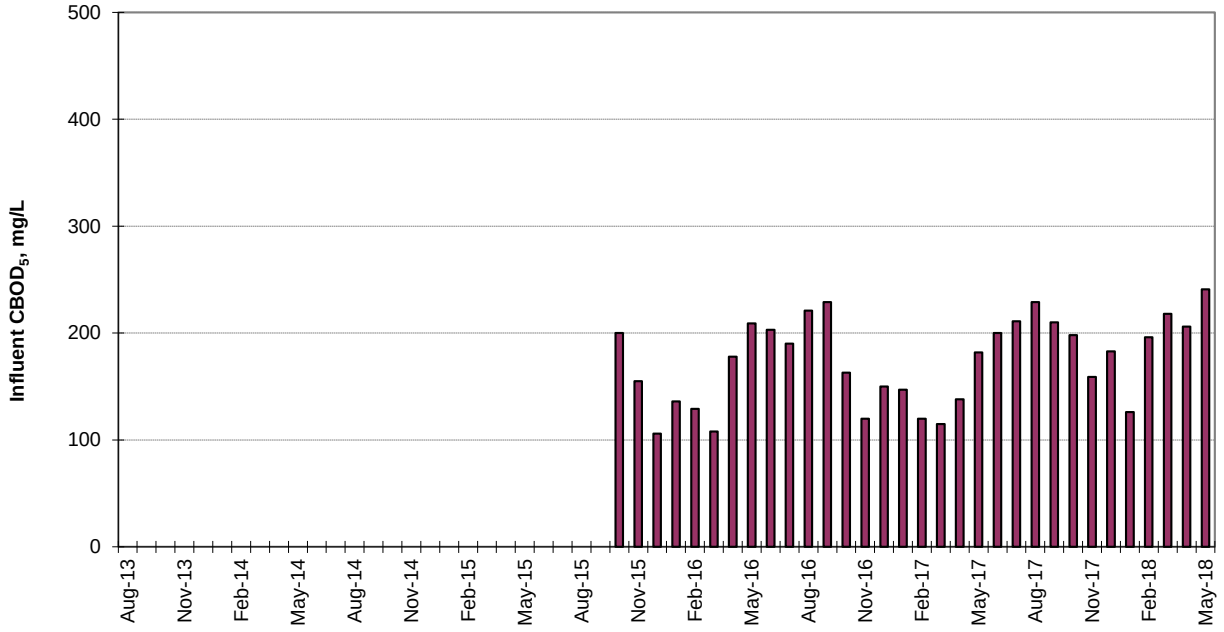
	Effluent																				
Date	BOD5, mg/L	BOD5, mg/L	BOD5, ppd	BOD5, ppd	BOD5, % Removal	CBOD5, mg/L	CBOD5, mg/L	CBOD5, ppd	CBOD5, ppd	CBOD5, % Removal	TSS, mg/L	TSS, mg/L	TSS, ppd	TSS, ppd	TSS, % Removal	Fecal Coliform, #/100 mL	Fecal Coliform, #/100 mL	PH	PH	TRC, mg/L	TRC, mg/L
	Mnthly Ave	Wkly Ave	Mnthly Ave	Wkly Ave	Ave	Mnthly Ave	Wkly Ave	Mnthly Ave	Wkly Ave	Ave	Mnthly Ave	Wkly Ave	Mnthly Ave	Wkly Ave	Ave	GEM	GM7	Min	Max	Ave	Max
Aug-13	6	7	213	253	97						7	8	242	318	97	29	44	6.7	7.2	0.043	0.135
Sep-13	10	13	390	587	95						8	12	351	643	96	37	68	6.5	7.2	0.033	0.090
Oct-13	9	16	294	534	96						4	5	145	251	98	21	67	6.6	7.2	0.044	0.225
Nov-13	6	8	249	401	97						4	5	148	158	98	55	86	6.7	7.3	0.035	0.110
Dec-13	9	11	260	345	97						5	6	159	168	98	35	69	7.2	7.4	0.021	0.165
Jan-14	8	15	304	542	97						6	8	248	492	97	50	84	6.9	7.5	0.034	0.130
Feb-14	6	7	342	514	95						7	9	446	752	95	68	131	6.4	7.3	0.026	0.080
Mar-14	8	45	613	1348	93						9	12	664	1414	93	132	201	6.5	7.2	0.030	0.065
Apr-14	8	12	382	635	96						5	6	231	315	97	118	185	7.0	7.3	0.039	0.115
May-14	12	21	555	1154	93						5	7	230	290	97	87	168	6.8	7.4	0.035	0.140
Jun-14	11	16	368	597	95						7	9	251	292	97	81	99	7.4	7.7	0.030	0.105
Jul-14	10	13	325	410	96						7	10	224	328	97	37	51	7.2	7.9	0.039	0.130
Aug-14	11	17	375	517	94						7	8	241	307	97	24	32	7.3	7.4	0.030	0.130
Sep-14	12	23	444	701	94						8	10	291	387	97	60	133	7.2	7.4	0.022	0.065
Oct-14	9	12	380	566	95						6	7	255	374	97	34	53	7.0	7.4	0.032	0.140
Nov-14	7	11	279	407	96						6	8	322	668	97	31	56	7.0	7.5	0.016	0.045
Dec-14	7	8	433	690	94						7	8	498	715	94	43	61	6.9	7.5	0.020	0.095
Jan-15	6	8	264	413	97						5	6	263	324	97	47	70	6.7	7.4	0.024	0.115
Feb-15	10	12	540	953	95						5	9	361	805	96	33	63	6.9	7.4	0.031	0.085
Mar-15	29	78	1497	3309	87						6	8	309	673	97	56	96	7.3	7.5	0.035	0.085
Apr-15	33	45	1271	1686	89						4	6	162	212	98	36	32	7.2	7.6	0.028	0.080
May-15	22	38	726	1257	97						5	6	178	209	98	19	24	7.4	7.6	0.033	0.170
Jun-15	17	24	548	731	94						7	10	206	289	97	17	22	7.5	7.6	0.025	0.080
Jul-15	16	25	495	765	95						6	6	168	206	98	20	35	7.4	7.6	0.028	0.120
Aug-15	13	17	398	473	95						7	7	217	261	97	58	73	7.0	7.6	0.025	0.110
Sep-15	11	18	401	582	95						6	7	222	253	97	164	201	7.0	7.8	0.087	0.225
Oct-15						7	9	240	264	94	7	8	256	391	91	71	241	7.0	7.4	0.067	0.280
Nov-15						8	9	383	585	88	7	8	382	579	85	10	11	6.8	7.3	0.039	0.080
Dec-15						10	14	887	2048	75	12	15	1044	1972	79	19	34	6.6	7.3	0.036	0.170
Jan-16						9	9	614	779	89	11	14	1034	2071	92	15	21	6.8	7.3	0.023	0.065
Feb-16						9	10	560	711	93	10	14	641	852	94	13	16	6.9	7.3	0.026	0.050
Mar-16						9	10	678	1068	91	9	11	725	1268	93	17	25	6.8	7.3	0.026	0.060
Apr-16						9	10	366	414	95	7	7	256	279	97	17	26	7.1	7.4	0.034	0.140
May-16						9	11	344	422	95	7	8	251	296	97	12	16	7.2	7.6	0.031	0.105
Jun-16						11	16	394	603	94	7	9	250	336	97	14	19	7.3	7.6	0.038	0.105
Jul-16						10	12	338	442	94	6	7	203	236	98	11	14	7.3	7.6	0.029	0.065
Aug-16						9	10	318	347	96	5	7	181	228	98	11	15	7.4	7.6	0.027	0.065
Sep-16						10	12	347	391	96	8	10	278	337	97	14	22	7.5	7.6	0.040	0.125
Oct-16						11	16	564	648	93	9	13	555	860	95	18	30	6.7	7.6	0.035	0.070
Nov-16						7	9	495	695	93	8	11	645	1136	94	24	41	6.5	7.2	0.031	0.085
Dec-16						8	9	425	477	94	8	9	451	539	94	14	16	6.7	7.2	0.035	0.090
Jan-17						11	13	722	1528	92	9	11	557	1191	94	19	28	6.5	7.3	0.036	0.105
Feb-17						10	11	788	1144	91	8	10	689	1045	94	20	25	7.0	7.7	0.037	0.080
Mar-17						11	13	788	1171	90	9	10	651	952	93	20	25	6.5	7.2	0.037	0.095
Apr-17						9	10	515	677	94	6	8	373	512	96	15	17	6.8	7.2	0.037	0.075
May-17						10	13	438	570	94	9	11	367	504	96	26	43	6.8	7.1	0.037	0.080
Jun-17						9	10	319	364	95	9	11	335	468	96	20	30	6.8	7.4	0.039	0.080
Jul-17						7	8	243	291	97	6	7	226	329	97	21	34	7.0	7.5	0.034	0.085
Aug-17						9	12	278	371	96	6	7	208	240	97	23	40	7.2	7.5	0.035	0.150
Sep-17						10	11	308	343	95	7	7	205	224	97	15	16	7.3	7.6	0.035	0.095
Oct-17						7	10	308	656	96	7	9	305	611	97	13	14	6.8	7.5	0.029	0.085
Nov-17						10	15	794	1823	92	12	17	834	1840	93	16	17	7.1	7.3	0.025	0.075
Dec-17						8	11	455	906	94	9	9	461	586	95	15	19	6.8	7.4	0.041	0.190
Jan-18						9	11	782	1255	92	9	11	762	1270	93	16	18	6.8	7.4	0.029	0.075
Feb-18						9	10	426	585	95	10	11	482	520	95	20	30	7.1	7.4	0.033	0.070
Mar-18						6	7	250	312	97	7	8	292	339	97	17	19	7.0	7.4	0.029	0.065
Apr-18						6	7	297	353	96	7	8	369	539	96	20	31	6.7	7.2	0.036	0.075
May-18						9	11	359	422	96	6	7	247	292	97	14	20	7.1	7.4	0.032	0.090
AVE:	12	20	475	783	95	9	11	469	708	93	7	9	372	585	96	34	55	7.0	7.4	0.03	0.11
MIN:	6	7	213	253	87	6	7	240	264	75	4	5	145	158	79	10	11	6.4	7.1	0.02	0.05
MAX:	33	78	1497	3309	97	11	16	887	2048	97	12	17	1044	2071	98	164	241	7.5	7.9	0.09	0.28

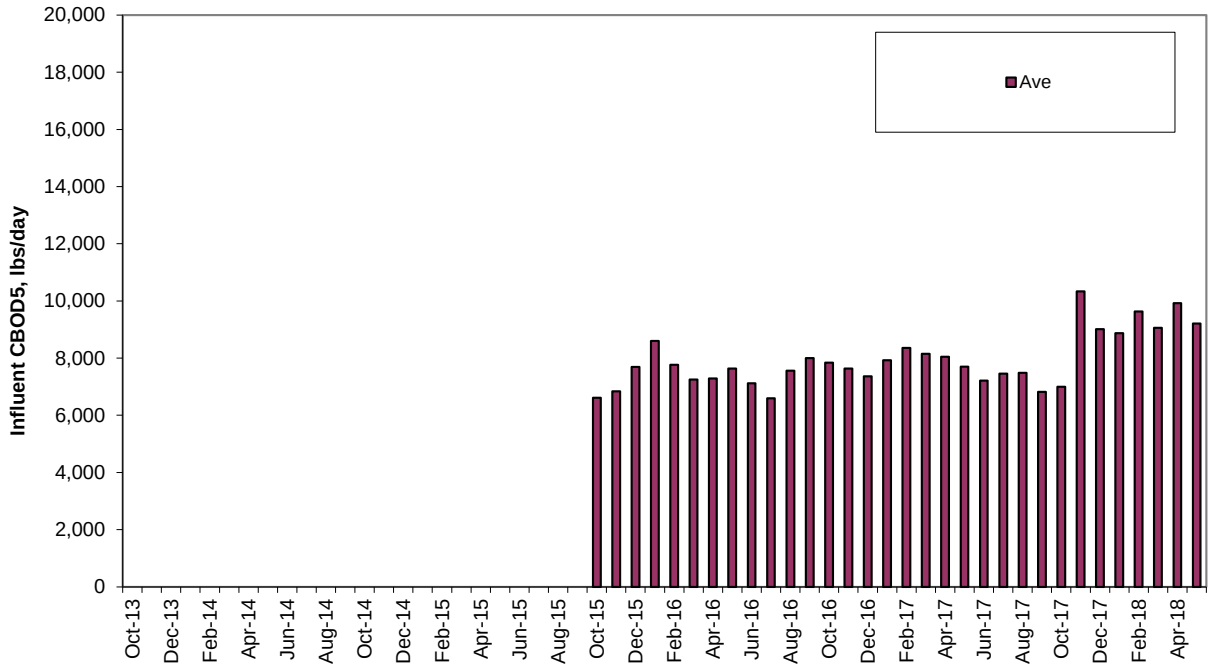
Bremerton West Plant - Influent BOD_5



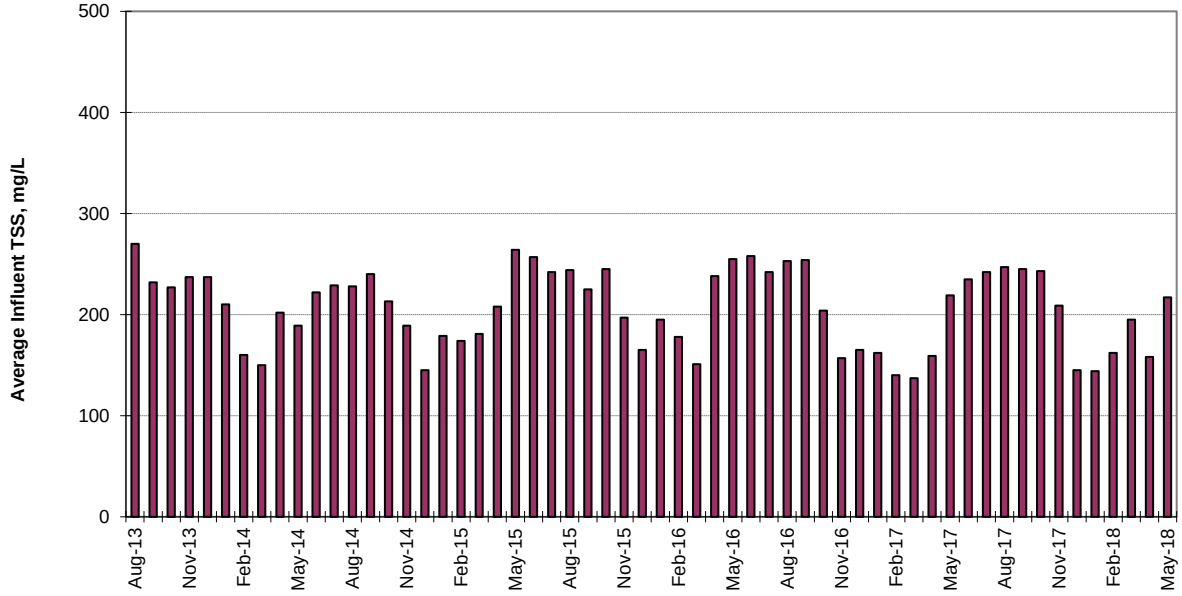


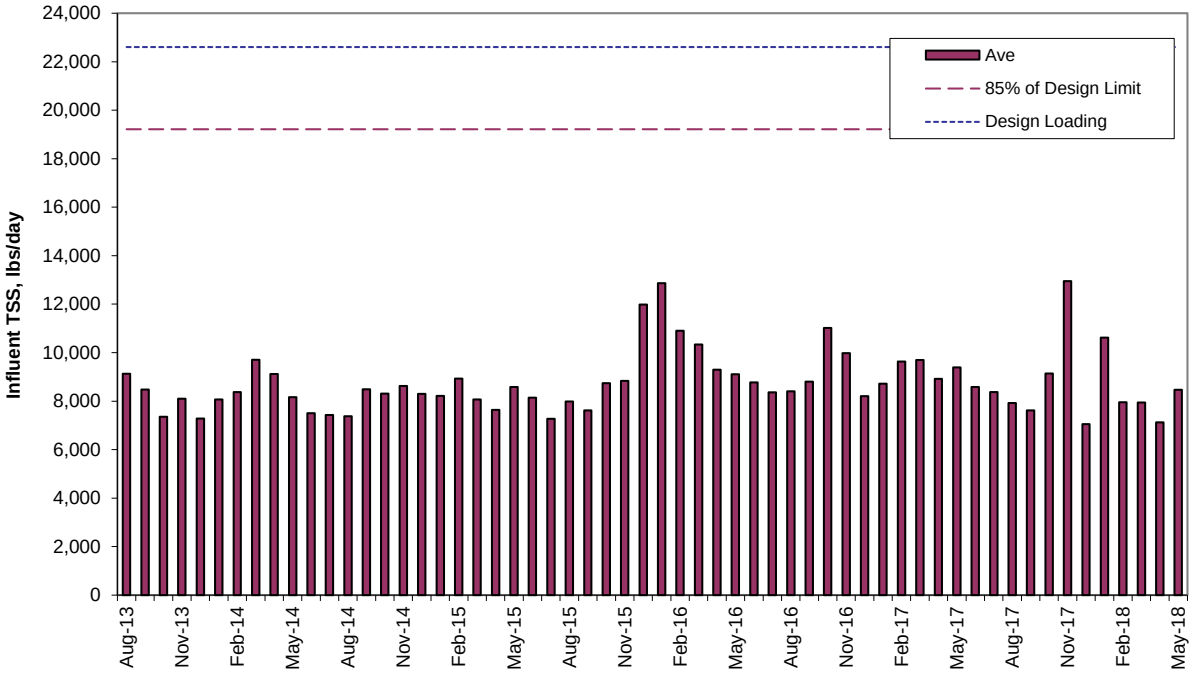
Bremerton West Plant - Influent $CBOD_5$



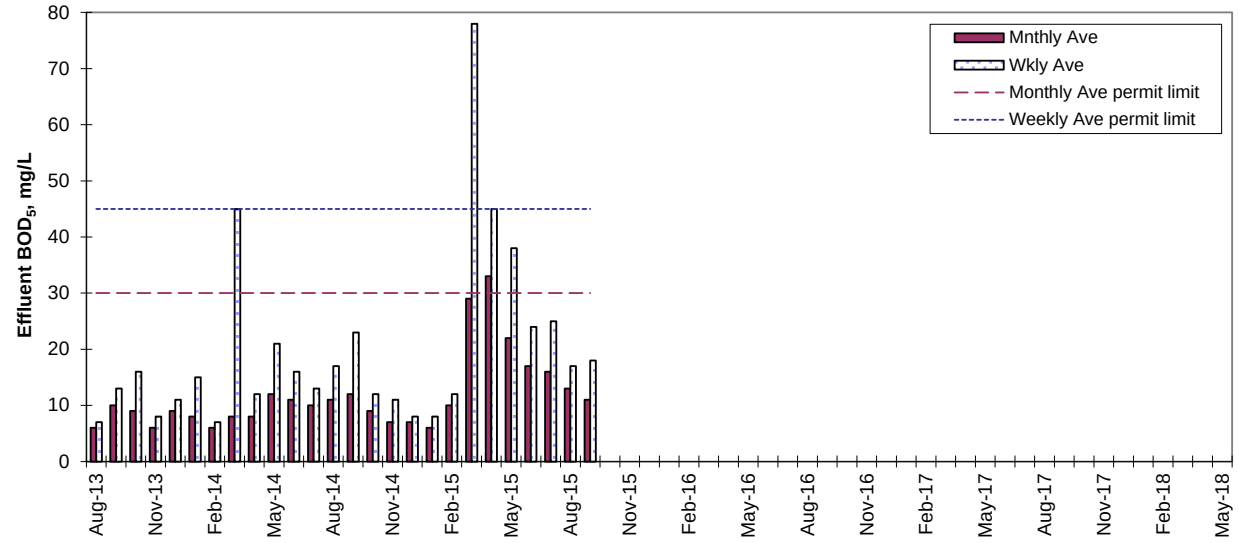


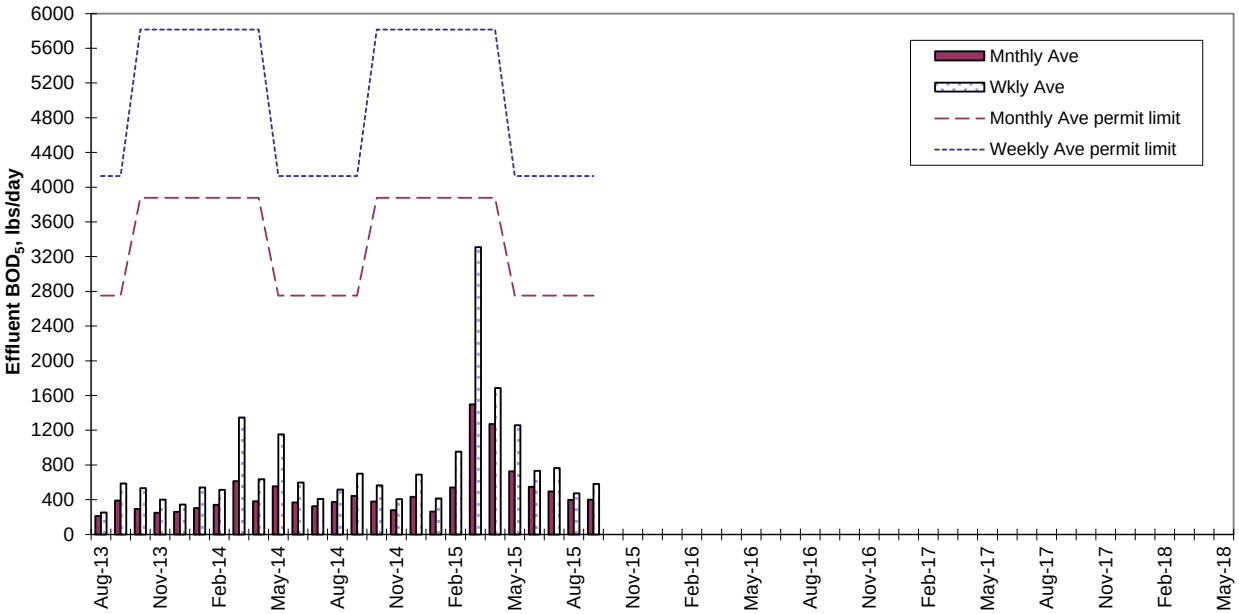
Bremerton West Plant - Influent TSS



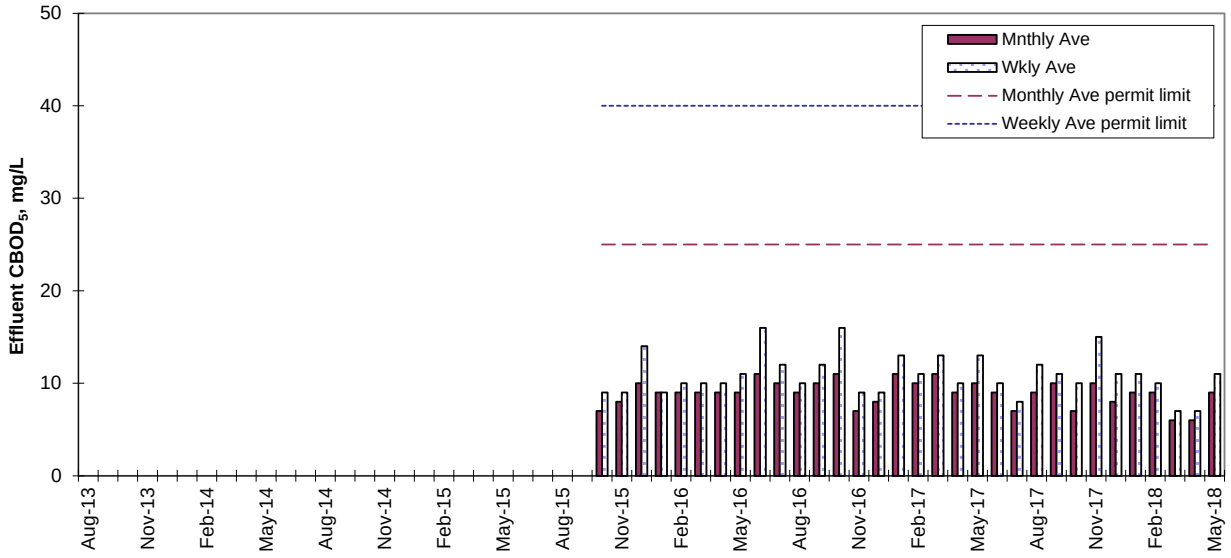


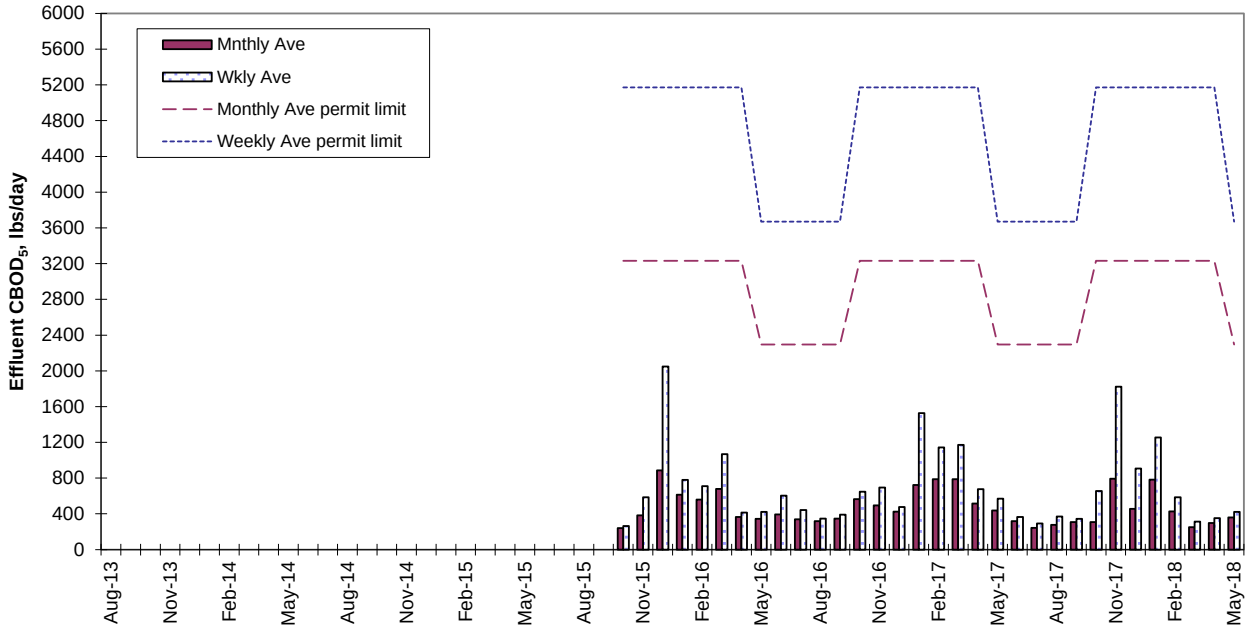
Bremerton West Plant - Effluent BOD_5



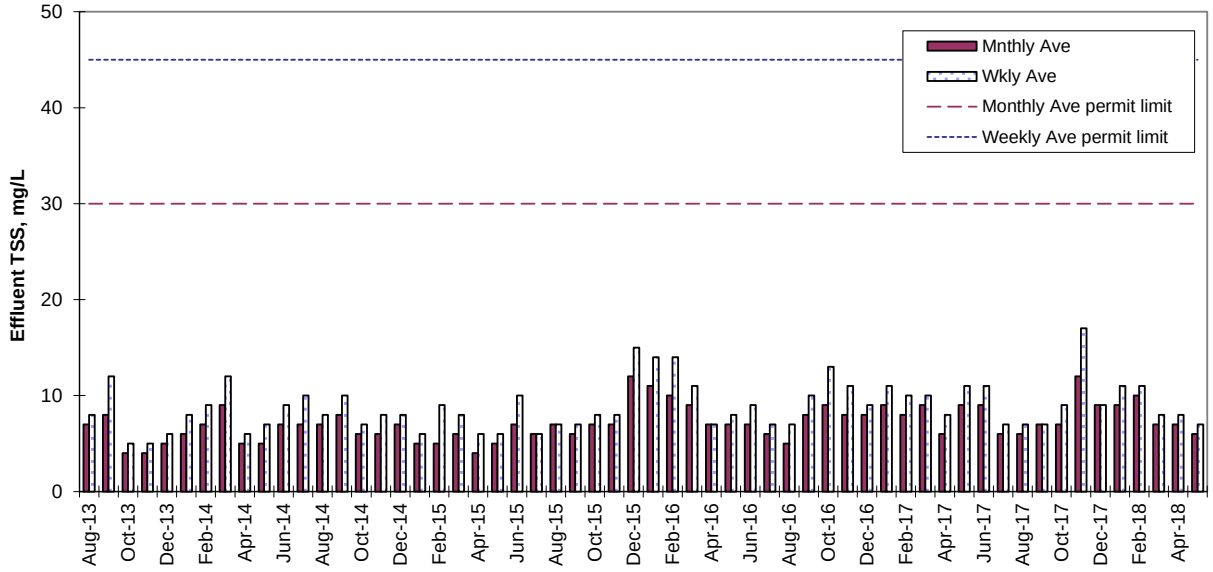


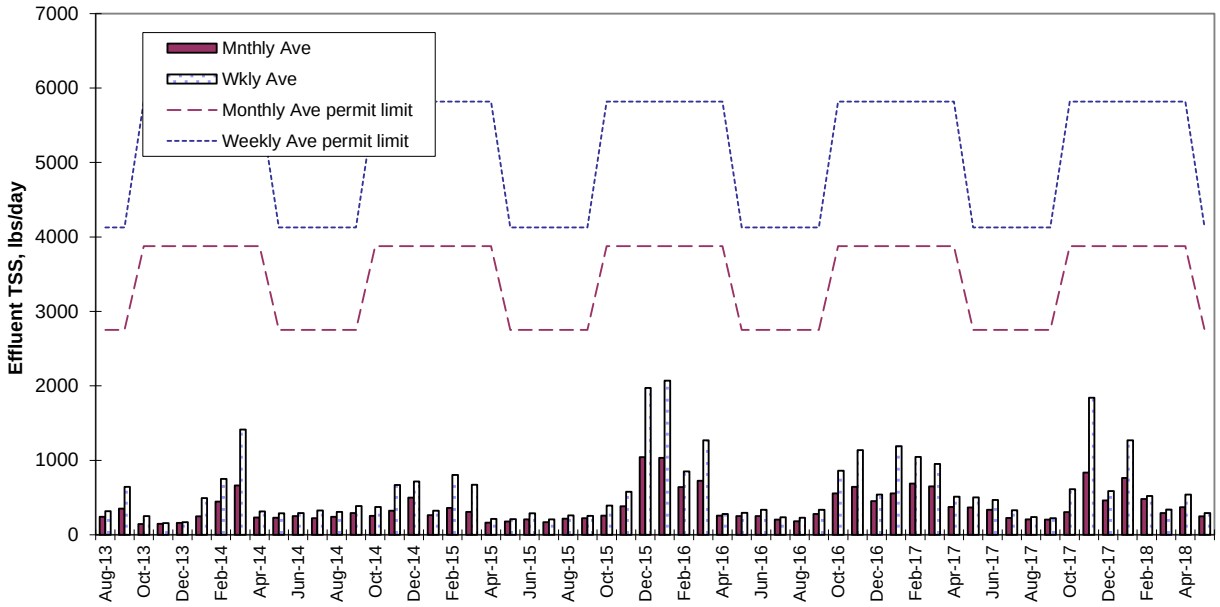
Bremerton West Plant - Effluent $CBOD_5$



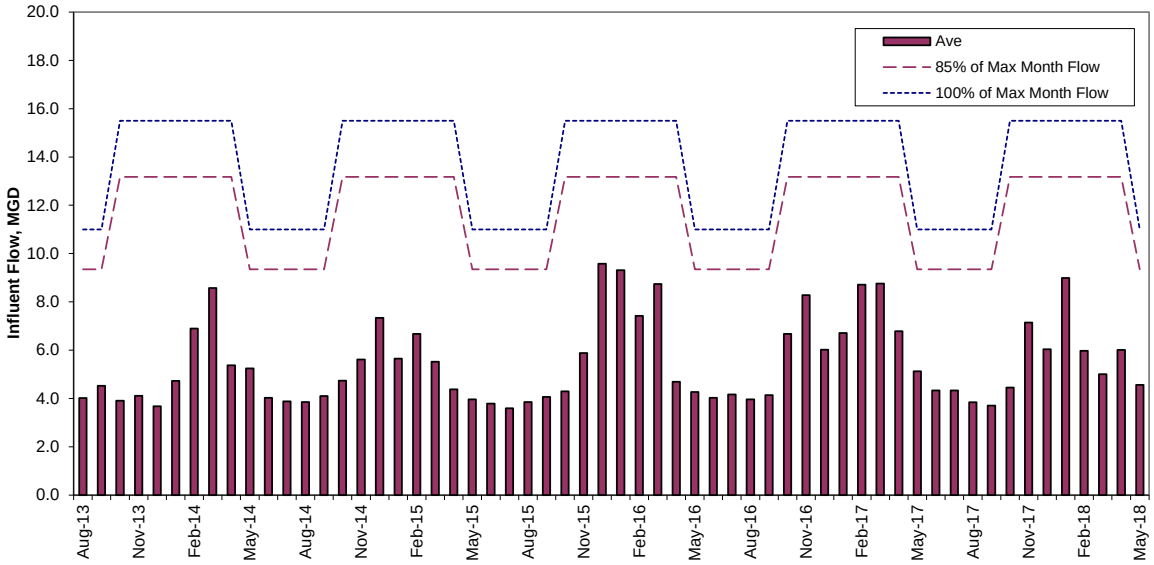


Bremerton West Plant - Effluent TSS

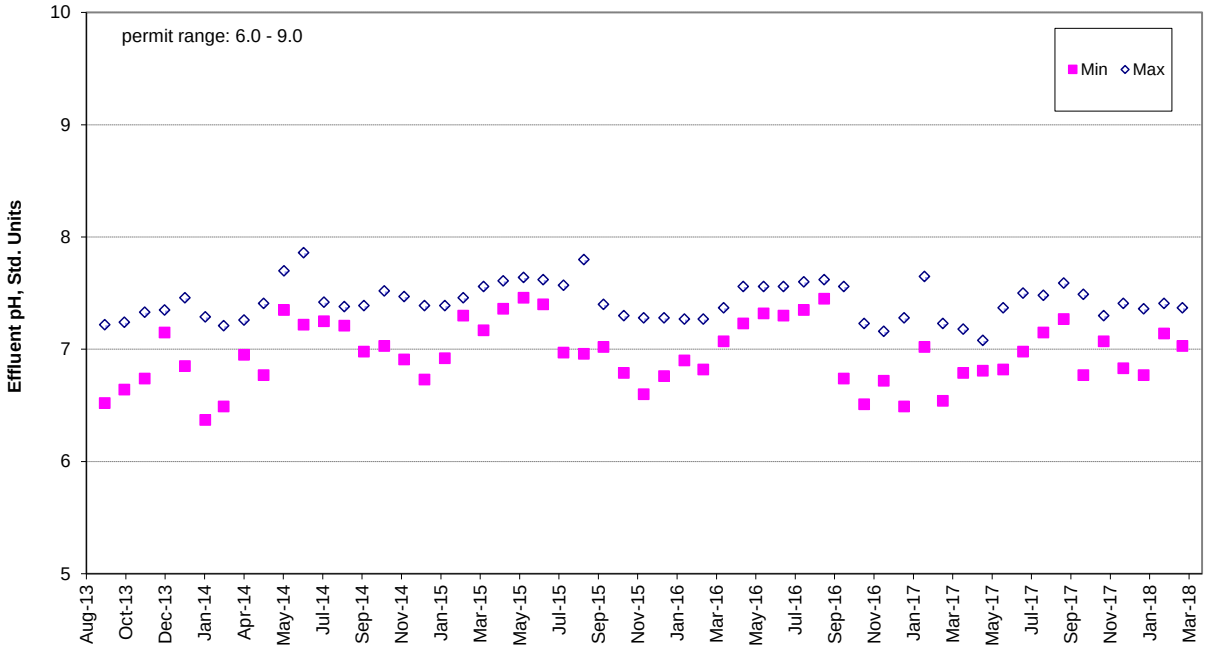




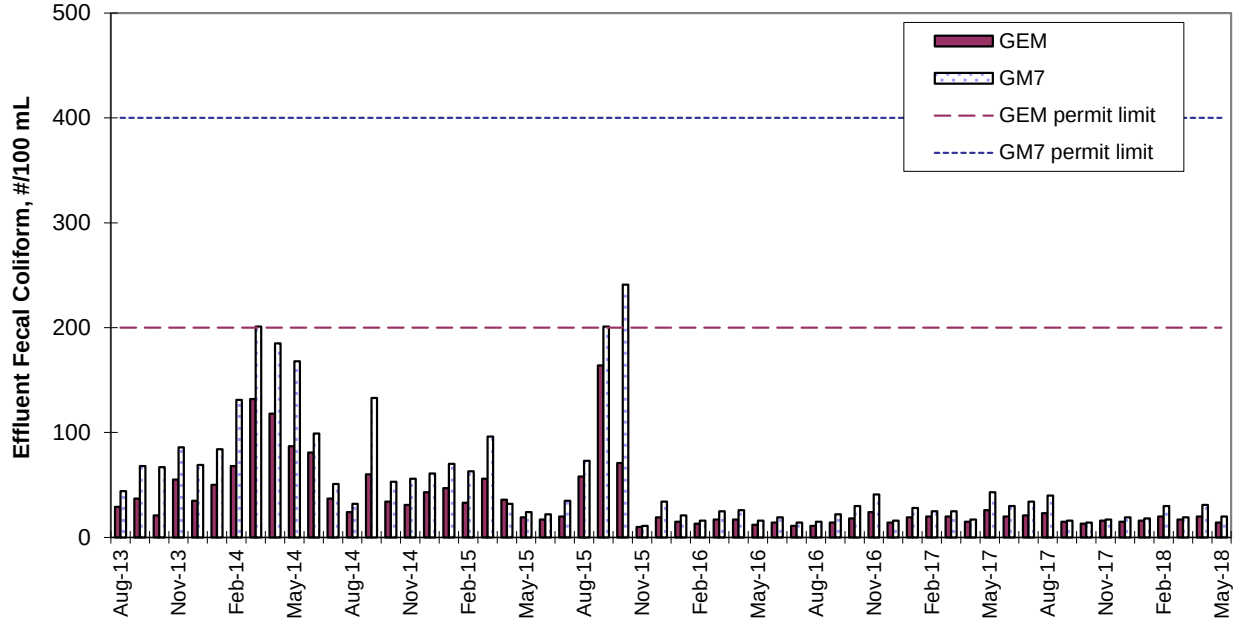
Bremerton West Plant - Influent Flow



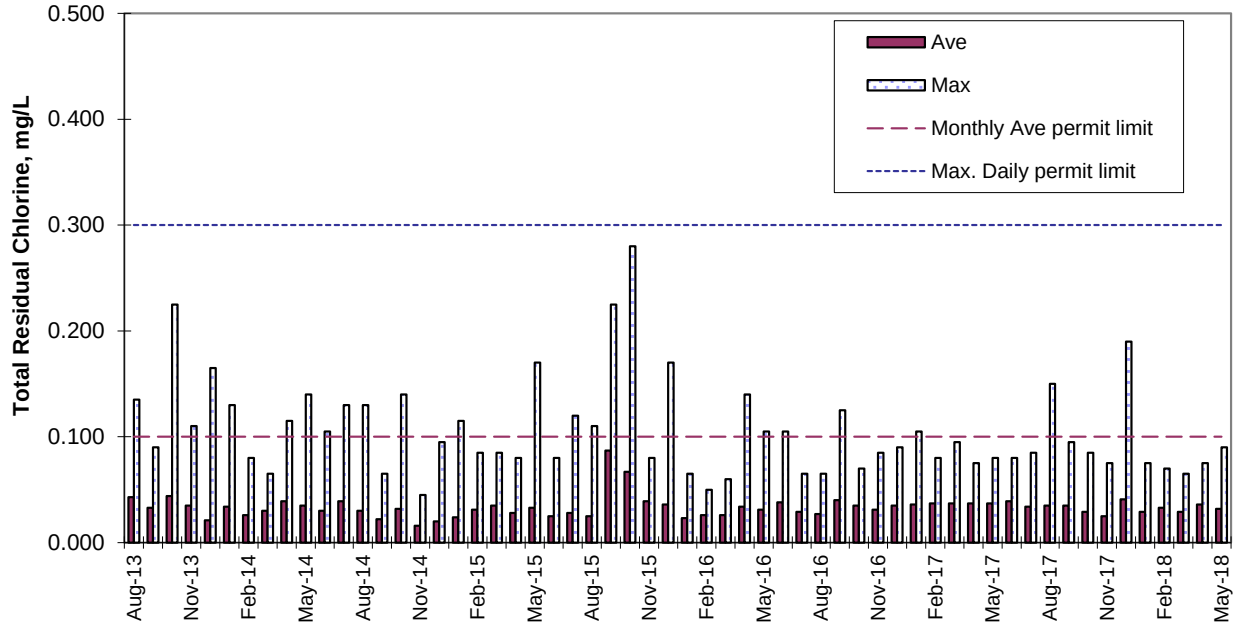
Bremerton West Plant - Effluent pH



Bremerton West Plant - Effluent Fecal Coliform



Bremerton West Plant - Effluent Chlorine



Bremerton West Plant - Additional Effluent Data

Bremerton West Plant - Priority Pollutant Testing Data								
(only those parameters with at least one set of results > the detection limit (DL) are listed)								
Parameters		Unit	7/2/14	1/7/15	7/12/16	Min.	Avg.	Max.
Chloroform		µg/L	3.4	0.98	0.91	0.91	1.763	3.4
Bromoform		µg/L	<DL	<DL	0.31	0.31	0.31	0.31
Bromodichloromethane		µg/L	0.34	0.24	<DL	0.24	0.29	0.34
Toluene		µg/L	0.17	<DL	<DL	0.17	0.17	0.17
2,6-Dinitrotoluene		µg/L	1	0.62	<DL	0.62	0.81	1
Buty benzyl phthalate		µg/L	<DL	0.24	<DL	0.24	0.24	0.24
Di-n-butyl phthalate		µg/L	<DL	0.15	<DL	0.15	0.15	0.15
Phenol		mg/L	<DL	0.53	<DL	0.53	0.53	0.53
Total Phenol		µg/L	3	9.1	7	3	6.367	9.1
Pyrene		µg/L	<DL	<DL	0.12	0.12	0.12	0.12
1,2-Diphenylhydrazine		µg/L	<DL	0.15	<DL	0.15	0.15	0.15
Bis (2-Ethylhexyl) phthalate		µg/L	11	30	<DL	11	20.5	30
Mercury		µg/L	0.0024	0.0021	0.0042	0.0021	0.003	0
Antimony		µg/L	<DL	0.46	<DL	0.46	0.46	0.46
Cadmium		µg/L	0.2	<DL	0.33	0.2	0.265	0.33
Copper		µg/L	9.4	3.6	8.6	3.6	7.2	9.4
Lead		µg/L	0.26	0.45	<DL	0.26	0.355	0.45
Nickel		µg/L	6.3	3.9	7.9	3.9	6.033	7.9
Zinc		µg/L	17	20	19	17	18.67	20
Iron		mg/L	<DL	<DL	0.21	0.21	0.21	0.21
Other Data								
Parameters		Unit	7/2/14	1/7/15	7/12/16	Min.	Avg.	Max.
Ammonia		mg/L as N	39	<DL	26	26	32.5	39
Nitrate Nitrite		mg/L as N	1.7	<DL	2.2	1.7	1.95	2.2
TKN		mg/L as N	36	<DL	35	35	35.5	36
Phosphorus		mg/L as P	<DL	<DL	3.9	3.9	3.9	3.9
ortho-Phosphate		mg/L as P	<DL	<DL	4	4	4	4
O&G		mg/L	<DL	<DL	<DL			
TDS		mg/L	2000	1800	2100	1800	1967	2100

Bremerton West Plant – WET Test Results Summary

Scheduled	Test Code	Collected	Start Date	Duration	Organism	Endpoint	NOEC	LOEC	PMSD	Effluent Survival (100%)	Met Performance Standard?
2013 January	RMAR2841	1/8/2013	1/9/2013	Acute	*Pimephales promelas* fathead minnow	96-Hour Survival	50%	100%	8.2%	87.5%	Yes
2013 April	RMAR2946	4/9/2013	4/10/2013	Acute	*Ceriodaphnia dubia* water flea	48-Hour Survival	100%	>100%	8.3%	100.0%	Yes
2013 July	RMAR035	7/9/2013	7/10/2013	Acute	*Pimephales promelas* fathead minnow	96-Hour Survival	100%	>100%	5.3%	97.5%	Yes
2014 April	RMAR3253	4/8/2014	4/9/2014	Acute	*Mysis bahia* Shrimp	48-Hour Survival	50%	100%	10.9%	62.5%	No*
2014 July	RMAR3307	7/8/2014	7/9/2014	Acute	*Atherinops affinis* Topsmelt	96-Hour Survival	100%	>100%	13.5%	90.0%	Yes
2014 October	RMAR3451	10/7/2014	10/8/2017	Acute	*Mysis bahia* Shrimp	48-Hour Survival	100%	>100%	8.4%	87.5%	Yes
2015 January	RMAR3532	1/20/2015	1/21/2015	Acute	*Atherinops affinis* Topsmelt	96-Hour Survival	100%	>100%	n/a	100.0%	Yes
2015 April	RMAR3620	4/21/2015	4/22/2015	Acute	*Mysis bahia* Shrimp	48-Hour Survival	25%	50%	14.8%	17.5%	No*
2015 July	RMAR3681	7/21/2015	7/22/2015	Acute	*Atherinops affinis* Topsmelt	96-Hour Survival	100%	>100%	10.9%	100.0%	Yes
2015 October	RMAR3791	10/20/2015	10/21/2015	Acute	*Mysis bahia* Shrimp	48-Hour Survival	50%	100%	9.2%	55.0%	No*
2016 January	N/A	1/19/2017	1/20/2017	Acute	*Atherinops affinis* Topsmelt	96-Hour Survival	100%	>100%	N/A	100.0%	Yes
2016 April	RMAR3914	4/19/2016	4/20/2016	Acute	*Mysis bahia* Shrimp	48-Hour Survival	100%	>100%	12.3%	87.5%	Yes
2016 July	JAMM0168	7/27/2016	7/28/2016	Acute	*Atherinops affinis* Topsmelt	96-Hour Survival	25%	50%	10.4%	0.0%	No*
2016 October	JAMM0169	10/18/2016	10/19/2016	Acute	*Mysis bahia* Shrimp	48-Hour Survival	100%	>100%	14.6%	90.2%	Yes
2017 January	JAMM0170	1/17/2017	1/18/2017	Acute	*Menidia* silverside	96-Hour Survival	100%	>100%	8.3%	87.5%	Yes
2017 April	JAMM0174	4/17/2017	4/18/2017	Chronic	*Mysis bahia* Shrimp	7 Day Survival 7 Day Biomass	50% 10%	100% 50%	13.4% 12.7%	57.5%	Yes
2017 April	JAMM0173	4/18/2017	4/19/2017	Acute	*Mysis bahia* Shrimp	48-Hour Survival	50%	100%	15.0%	32.5%	No*
2017 July	JAMM0199	7/17/2017	7/18/2017	Chronic	*Atherinops affinis* Topsmelt	7 Day Survival 7 Day Biomass	50% 50%	100% 100%	15.2% 15.2%	8.0%	Yes
2017 July	JAMM0198	7/18/2017	7/19/2017	Acute	*Atherinops affinis* Topsmelt	96-Hour Survival	50%	100%	11.3%	5.0%	No*

*The acute test result showed less than 65% survival in 100% effluent. An acute WET limit is needed if the testing was for effluent characterization (WAC 173-205-050(2)(a)(ii)) or compliance monitoring (WAC 173-205-120(1)(a)). Another effluent characterization for acute WET (WAC 173-205-060(3)(a)) is needed if the testing was an end of permit term check (WAC 173-205-030(8)). Note: This does not necessarily mean that the

LOEC = Lowest observed effect concentration.
NOEC= No observed effect concentration.
PMSD= Percent minimum significant difference.

Bremerton West Plant – Monitoring Frequency Evaluation

Date	CBOD5, mg/L	TSS, mg/L
	Mnthly Ave	Mnthly Ave
Oct-15	7	7
Nov-15	8	7
Dec-15	10	12
Jan-16	9	11
Feb-16	9	10
Mar-16	9	9
Apr-16	9	7
May-16	9	7
Jun-16	11	7
Jul-16	10	6
Aug-16	9	5
Sep-16	10	8
Oct-16	11	9
Nov-16	7	8
Dec-16	8	8
Jan-17	11	9
Feb-17	10	8
Mar-17	11	9
Apr-17	9	6
May-17	10	9
Jun-17	9	9
Jul-17	7	6
Aug-17	9	6
Sep-17	10	7
Oct-17	7	7
Nov-17	10	12
Dec-17	8	9
Jan-18	9	9
Feb-18	9	10
Mar-18	6	7
Apr-18	6	7
May-18	9	6
AVE	9	8
MIN	6	5
MAX	11	12
STD	1.4	1.8
CV	0.16	0.22
AML	30	30
Ratio (AVG/AML)	0.30	0.27

Bremerton East Plant Data (2013-2018)

Ambient Data				Influent Data		
Parameter	Duration	Rainfall		Parameter	Solids (Residue)	Total BOD5
Units	Hours	Inches		Units	mg/L	mg/L
Statistical Base	Total	Total		Statistical Base	Average	Average
Date	Value	Value		Date	Value	Value
9/1/13	1.00	0.80		9/1/13	116	88
1/1/14	24.00	2.04		1/1/14	175	124
2/1/14	24.00	2.04		2/1/14	125	77
3/1/14	34.29	10.86		3/1/14	116	71
9/1/14	1.75	1.00		9/1/14	122	50
11/1/14	3.00	1.54		11/1/14	50	89
12/1/14	2.06	1.33		12/1/14	66	37
3/1/15	4.10	0.82		3/1/15	110	94
12/1/15	54.17	7.08		12/1/15	69	63
1/1/16	36.02	7.06		1/1/16	92	66
3/1/16	10.80	3.23		3/1/16	117	89
10/1/16	0.83	1.56		10/1/16	160	115
1/1/17	8.23	4.38		1/1/17	108	74
2/1/17	66.02	6.64		2/1/17	91	55
3/1/17	16.25	2.72		3/1/17	93	105
10/1/17	5.00	1.19		10/1/17	133	123
11/1/17	25.54	2.45		11/1/17	60	65
12/1/17	6.00	1.80		12/1/17	172	95
1/1/18	22.05	6.91		1/1/18	123	64
4/1/18	4.80	3.82		4/1/18	128	107
Min	0.83	0.80		Min	50	37
Max	66.02	10.86		Max	175	124
Average	17.50	3.46		Average	111	83
Median	9.52	2.24		Median	116	83
95th Percentile	54.76	7.27		95th Percentile	172	123

Bremerton East Plant Data (2013-2018)

Effluent Data

Parameter	Duration	Fecal Coliform	Flow	Number of Events	pH	pH	Solids (Residue)	Solids (Residue)	Solids (Residue)	Total BOD5	Volume
Units	Hours	#/100 mL	MGD	Number	Standard Units	Standard Units	mL/L	mg/L	Percent	mg/L	MG
Statistical Base	Total	Monthly G.M.	Average	Total	Daily Maximum	Daily Minimum	Average	Average	Average	Average	Total
Limits	- / -	- / 400	- / -	- / -	- / 9	6 / -	- / -	- / -	- / -	- / -	- / -
Date	Value	Value	Value	Value	Value	Value	Value	Value	Value	Value	Value
9/1/13	1.00	10	0.89	1	6.95	6.95	0.010	7	94	51	0.85
1/1/14	5.50	82	0.35	1	7.31	7.31	8.300	24	86	32	0.35
2/1/14	5.50	23	1.50	1	6.78	6.60	0.010	33	73	24	0.35
3/1/14	34.29	114	2.06	3	6.53	5.97	0.110	28	71	26	2.06
9/1/14	1.75	25	0.17	1	6.84	6.84	0.100	9	93	22	0.17
11/1/14	3.00	10	0.41	1	6.67	6.67	0.020	8	84	11	0.41
12/1/14	2.06	17	0.27	2	7.80	7.36	0.010	11	80	13	0.54
3/1/15	4.10	100	1.03	1	7.10	7.10	0.100	34	69	44	1.03
12/1/15	54.17	13	4.51	2	6.78	6.65	0.030	16	73	28	9.02
1/1/16	36.02	14	3.03	2	6.68	6.30	0.010	15	79	15	6.06
3/1/16	10.80	62	0.61	2	6.80	6.46	0.006	6	95	24	5.40
10/1/16	0.83	10	0.88	1	6.10	6.10	0.001	16	60	46	0.88
1/1/17	8.23	10	2.02	1	6.93	6.93	0.001	20	81	25	2.02
2/1/17	66.02	48	4.04	2	6.58	6.51	0.010	14	83	26	4.04
3/1/17	16.25	24	1.07	2	6.62	6.58	0.100	4	96	49	2.14
10/1/17	5.00	44	0.13	2	6.88	6.71	0.010	18	86	37	0.72
11/1/17	25.54	147	2.15	2	7.05	6.93	0.027	8	83	46	4.30
12/1/17	6.00	10	1.57	1	6.81	6.81	0.010	12	93	20	1.57
1/1/18	22.05	28	0.72	5	6.98	6.81	0.016	12	88	24	3.59
4/1/18	4.60	14	0.20	2	7.19	6.98	0.004	11	93	93	0.40
Min	0.83	10	0.13	1	6.10	5.97	0.001	4	60	11	0.17
Max	66.02	147	4.51	5	7.80	7.36	8.300	34	96	93	9.02
Average	15.64	40	1.38	2	6.87	6.73	0.444	15	83	33	2.30
Median	5.75	24	0.96	2	6.83	6.76	0.010	13	84	26	1.30
95th Percentile	54.76	116	4.06	3	7.33	7.31	0.520	33	95	53	6.21

Bremerton East Plant - Additional Effluent Data

Bremerton East Plant - Priority Pollutant Testing Data								
(only those parameters with at least one set of results > the detection limit (DL) are listed)								
Parameters	Unit	3/15/15	12/7/15	10/13/16	Min.	Avg.	Max.
Chloroform	µg/L	1.9	2.3	7.9	1.9	4.033	7.9
1,2-Dichloroethane	µg/L	0.27	<DL	<DL	0.27	0.27	0.27
Bromodichloromethane	µg/L			1	1	1	1
Toluene	µg/L	1.5	0.75	2.4	0.75	1.55	2.4
Ethylbenzene	µg/L	<DL	<DL	0.36	0.36	0.36	0.36
m-Xylene & p-Xylene	µg/L	<DL	<DL	0.64	0.64	0.64	0.64
o-Xylene	µg/L	<DL	<DL	0.52	0.52	0.52	0.52
2-Chloronaphthalene	µg/L	0.13	<DL	<DL	0.13	0.13	0.13
2-Nitrophenol	µg/L	<DL	0.36	<DL	0.36	0.36	0.36
Acenaphthylene	µg/L	0.1	<DL	<DL	0.1	0.1	0.1
Anthracene	µg/L	0.11	<DL	<DL	0.11	0.11	0.11
Benzo[a]anthracene	µg/L	0.15	<DL	<DL	0.15	0.15	0.15
Benzo[a]pyrene	µg/L	0.12	<DL	<DL	0.12	0.12	0.12
Benzofluroanthene	µg/L	0.21	<DL	<DL	0.21	0.21	0.21
Di-n-butyl phthalate	µg/L	<DL	0.34	<DL	0.34	0.34	0.34
Chrysene	µg/L	0.12	<DL	<DL	0.12	0.12	0.12
Dibenz(a,h)anthracene	µg/L	0.12	<DL	<DL	0.12	0.12	0.12
Diethyl phthalate	µg/L	1.1	0.68	<DL	0.68	0.89	1.1
Fluoranthene	µg/L	0.094	<DL	<DL	0.094	0.094	0.09
Fluorene	µg/L	0.12	<DL	<DL	0.12	0.12	0.12
Octadecane	µg/L	2.4	<DL	<DL	2.4	2.4	2.4
Phenol	µg/L	2.4	1.6	3	1.6	2.333	3
Total Phenol	µg/L	10	<DL	8.3	8.3	9.15	10
Pyrene	µg/L	0.13	<DL	<DL	0.13	0.13	0.13
Bis (2-Ethylhexyl) phthalate	µg/L	<DL	<DL	10	10	10	10
n-Decane	µg/L	<DL	<DL	0.54	0.54	0.54	0.54
Mercury	µg/L	0.0043	0.003	0.0068	0.003	0.005	0.01
Antimony	µg/L	5.8	0.51	<DL	0.51	3.155	5.8
Arsenic	µg/L	2.4	<DL	<DL	2.4	2.4	2.4
Chromium	µg/L	0.85	<DL	0.88	0.85	0.865	0.88
Copper	µg/L	7	<DL	3.5	3.5	5.25	7
Lead	µg/L	1.3	0.22	0.46	0.22	0.66	1.3
Zinc	µg/L	26	16	19	16	20.33	26
Other Data							
Parameters	Unit	7/2/14	1/7/15	7/12/16	Min.	Avg.	Max.
Ammonia	mg/L as N	5.3	3.7	5.1	3.7	4.7	5.3
Nitrate Nitrite	mg/L as N	1.3	1.3	0.63	0.63	1.077	1.3
TKN	mg/L as N	9.1	6.1	6.7	6.1	7.3	9.1
Phosphorus	mg/L as P	0.27	0.34	0.57	0.27	0.393	0.57
ortho-Phosphate	mg/L as P						
O&G	mg/L	<DL	<DL	<DL			
TDS	mg/L	98	150	100	98	116	150

Bremerton West Plant - Reasonable Potential Calculations

Reasonable Potential Calculation

Facility	Bremerton - West Plant
Water Body Type	Marine

Dilution Factors:	Acute	Chronic
Aquatic Life	20.0	127.0
Human Health Carcinogenic		127.0
Human Health Non-Carcinogenic		127.0

Pollutant, CAS No. & NPDES Application Ref. No.		AMMONIA, Criteria as Total NH3	ANTIMONY (INORGANIC) 7440360 1M	BROMOFORM 75252 5V	BUTYLBENZYL PHTHALATE 85687 15B	CADMIUM - 7440439 4M Hardness dependent	CHLORINE (Total Residual) 7782505	CHLOROFORM 67663 11V	COPPER - 744058 6M Hardness dependent	DICHLOROBROMOMETHANE 75274 12V	DI-n-BUTYL PHTHALATE 84742 26B	DINITROTOLUENE 2,6 606202 28B
Effluent Data	# of Samples (n)	48	3	3	3	3	1764	3	3	3	3	3
	Coeff of Variation (Cv)	0.28	0.6	0.6	0.6	0.6	0.46	0.6	0.6	0.6	0.6	0.6
	Effluent Concentration, ug/L (Max. or 95th Percentile)	39,000	0.46	0.31	0.24	0.33	200	3.4	9.4	0.34	0.15	
	Calculated 50th percentile Effluent Conc. (when n>10)											
Receiving Water Data	90th Percentile Conc., ug/L	0				0	0		0			
	Geo Mean, ug/L		0	0	0			0		0	0	
Water Quality Criteria	Aquatic Life Criteria, ug/L Acute	5,491	-	-	-	42	13	-	4.8	-	-	-
	Aquatic Life Criteria, ug/L Chronic	825	-	-	-	9.3	7.5	-	3.1	-	-	-
	WQ Criteria for Protection of Human Health, ug/L	-	90	12	0.013	-	-	600	-	2.8	8	-
	Metal Criteria Translator, decimal Acute	-	-	-	-	0.994	-	-	0.83	-	-	-
	Metal Criteria Translator, decimal Chronic	-	-	-	-	0.994	-	-	0.83	-	-	-
	Carcinogen?	N	N	Y	N	N	N	Y	N	Y	N	N

Aquatic Life Reasonable Potential

Effluent percentile value		0.950				0.950	0.950		0.950			
s	$s^2=\ln(CV^2+1)$	0.275				0.555	0.438		0.555			
Pn	$Pn=(1\text{-confidence level})^{1/n}$	0.939				0.368	0.998		0.368			
Multiplier		1.00				3.00	1.00		3.00			
Max concentration (ug/L) at edge of…	Acute	1,950				0.049	10.000		1.170			
	Chronic	307				0.008	1.575		0.184			
Reasonable Potential? Limit Required?		**NO**				**NO**	**NO**		**NO**			

Aquatic Life Limit Calculation

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

Human Health Reasonable Potential

s	$s^2=\ln(CV^2+1)$		0.55451	0.554513	0.55451		0.554513		0.55451	0.55451		
Pn	Pn=(1-confidence level)1/n		0.368	0.368	0.368		0.368		0.368	0.368		
Multiplier			1.20486	1.204861	1.20486		1.204861		1.20486	1.20486		
Dilution Factor			127	127	127		127		127	127		
Max Conc. at edge of Chronic Zone, ug/L			0.00436	0.002941	0.00228		3.2E-02		0.00323	0.00142		
Reasonable Potential? Limit Required?			**NO**	**NO**	**NO**		**NO**		**NO**	**NO**		

Reasonable Potential Calculation - Page 2

Facility	Bremerton - West Plant
Water Body Type	Marine

Dilution Factors:	Acute	Chronic
Aquatic Life	20.0	127.0
Human Health Carcinogenic		127.0
Human Health Non-Carcinogenic		127.0

Pollutant, CAS No. & NPDES Application Ref. No.			1,2 DIPHENYLHYDRAZINE 122667 30B	IRON 7439896	LEAD - 7439921 7M Dependent on hardness	MERCURY 7439976 8M	NICKEL - 7440020 9M - Dependent on hardness	PHENOL 108952 10A	PYRENE 129000 45B	TOLUENE 108883 25V	ZINC- 7440666 13M hardness dependent		
Effluent Data	# of Samples (n)		3	3	3	3	3	3	3	3	3	3	3
	Coeff of Variation (Cv)		0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6
	Effluent Concentration, ug/L (Max. or 95th Percentile)		0.15		0.45	0.0042	7.9	0.53	0.12	0.17	20		
	Calculated 50th percentile Effluent Conc. (when n>10)												
Receiving Water Data	90th Percentile Conc., ug/L				0	0	0	0			0		
	Geo Mean, ug/L		0			0	0	0	0	0	0		
Water Quality Criteria	Aquatic Life Criteria, ug/L	Acute	-	-	210	1.8	74	-	-	-	90		
		Chronic	-	-	8.1	0.025	8.2	-	-	-	81		
	WQ Criteria for Protection of Human Health, ug/L		0.02	-	-	0.15	100	70000	8	130	1000		
	Metal Criteria Translator, decimal	Acute	-	-	0.951	0.85	0.99	-	-	-	0.946		
		Chronic	-	-	0.951	-	0.99	-	-	-	0.946		
	Carcinogen?		Y	N	N	N	N	N	N	N	N		

Aquatic Life Reasonable Potential

Effluent percentile value					0.950	0.950	0.950				0.950		
s	$s^2=\ln(CV^2+1)$				0.555	0.555	0.555				0.555		
Pn	$Pn=(1\text{-confidence level})^{1/n}$				0.368	0.368	0.368				0.368		
Multiplier					3.00	3.00	3.00				3.00		
Max concentration (ug/L) at edge of…		Acute			0.064	0.001	1.173				2.838		
		Chronic			0.010	0.000	0.185				0.447		
Reasonable Potential? Limit Required?					**NO**	**NO**	**NO**				**NO**		

Aquatic Life Limit Calculation

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

Human Health Reasonable Potential

s	$s^2=\ln(CV^2+1)$	0.55451		0.55451	0.554513	0.554513	0.554513	0.55451	0.55451
Pn	Pn=(1-confidence level)1/n	0.368		0.368	0.368	0.368	0.368	0.368	0.368
Multiplier		1.20486		1.20486	1.204861	1.204861	1.204861	1.20486	1.20486
Dilution Factor		127		127	127	127	127	127	127
Max Conc. at edge of Chronic Zone, ug/L		0.00142		4E-05	0.074948	5.0E-03	1.1E-03	0.00161	0.18974
Reasonable Potential? Limit Required?		**NO**		**NO**	**NO**	**NO**	**NO**	**NO**	**NO**

Bremerton West Plant - Calculations for Fecal Coliform

Calculation of Fecal Coliform at Chronic Mixing Zone

INPUT	
Chronic Dilution Factor	127.0
Receiving Water Fecal Coliform, #/100 mL	4
Effluent Fecal Coliform - worst case, #/100 mL	400
Surface Water Criteria, #/100 mL	*14*
OUTPUT	
Fecal Coliform at Mixing Zone Boundary, #/100 mL	**7**
Difference between mixed and ambient, #/100 mL	3

Conclusion: At design flow, the discharge has no reasonable potential to violate water quality standards for fecal coliform.

Bremerton West Plant - Calculations for Ammonia

Marine Un-ionized Ammonia Criteria Calculation

Calculation of seawater fraction of un-ionized ammonia from Hampson (1977). Un-ionized ammonia criteria for salt water are from EPA 440/5-88-004. Revised 19-Oct-93.

INPUT	
1. Receiving Water Temperature, deg C (90th percentile):	14.8
2. Receiving Water pH, (90th percentile):	8.2
3. Receiving Water Salinity, g/kg (10th percentile):	29.8
4. Pressure, atm (EPA criteria assumes 1 atm):	1.0
5. Unionized ammonia criteria (mg un-ionized NH_3 per liter) from EPA 440/5-88-004:	
Acute:	0.233
Chronic:	0.035
OUTPUT	
Using mixed temp and pH at mixing zone boundaries?	No
1. Molal Ionic Strength (not valid if >0.85):	0.612
2. pKa8 at 25 deg C (Whitfield model "B"):	9.316
3. Percent of Total Ammonia Present as Unionized:	3.5%
4. Total Ammonia Criteria (mg/L as NH_3):	
Acute:	6.68
Chronic:	1.00
RESULTS	
Total Ammonia Criteria (mg/L as N)	
Acute:	**5.49**
Chronic:	**0.82**

Bremerton West Plant - Calculations for Temperature

Marine Temperature Reasonable Potential and Limit Calculation

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

INPUT	
1. Chronic Dilution Factor at Mixing Zone Boundary	127.0
2. Annual max 1DADMax Ambient Temperature (Background 90th percentile)	14.8 °C
3. 1DADMax Effluent Temperature (95th percentile)	22.0 °C
4. Aquatic Life Temperature WQ Criterion	16.0 °C
OUTPUT	
5. Temperature at Chronic Mixing Zone Boundary:	14.86 °C
6. Incremental Temperature Increase or decrease:	0.06 °C
7. Incremental Temperature Increase 12/(T-2) if T≤ crit:	0.94 °C
8. Maximum Allowable Temperature at Mixing Zone Boundary:	15.74 °C
A. If ambient temp is warmer than WQ criterion	
9. Does temp fall within this warmer temp range?	NO
10. Temp increase allowed at mixing zone boundary, if required:	---
B. If ambient temp is cooler than WQ criterion but within 12/(T_{amb}-2) and within 0.3 °C of the criterion	
11. Does temp fall within this incremental temp. range?	NO
12. Temp increase allowed at mixing zone boundary, if required:	---
C. If ambient temp is cooler than (WQ criterion-0.3) but within 12/(T_{amb}-2) of the criterion	
13. Does temp fall within this Incremental temp. range?	NO
14. Temp increase allowed at mixing zone boundary, if required:	---
D. If ambient temp is cooler than (WQ criterion - 12/(T_{amb}-2))	
15. Does temp fall within this Incremental temp. range?	YES
16. Temp increase allowed at mixing zone boundary, if required:	NO LIMIT
RESULTS	
17. Do any of the above cells show a temp increase?	**NO**
18. Temperature Limit if Required?	**NO LIMIT**

Bremerton East Plant - Reasonable Potential Calculations

Reasonable Potential Calculation

Facility	Bremerton - East Plant
Water Body Type	Marine

Dilution Factors:	Acute	Chronic
Aquatic Life	66.0	444.0
Human Health Carcinogenic		444.0
Human Health Non-Carcinogenic		444.0

Pollutant, CAS No. & NPDES Application Ref. No.		AMMONIA, Criteria as Total NH3										
Effluent Data	# of Samples (n)	3										
	Coeff of Variation (Cv)	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6
	Effluent Concentration, ug/L (Max. or 95th Percentile)	5,300										
	Calculated 50th percentile Effluent Conc. (when n>10)											
Receiving Water Data	90th Percentile Conc., ug/L	0										
	Geo Mean, ug/L											
Water Quality Criteria	Aquatic Life Criteria, ug/L — Acute	4,909										
	Aquatic Life Criteria, ug/L — Chronic	737										
	WQ Criteria for Protection of Human Health, ug/L	-										
	Metal Criteria Translator, decimal — Acute	-										
	Metal Criteria Translator, decimal — Chronic	-										
	Carcinogen?	N										

Aquatic Life Reasonable Potential

Effluent percentile value			0.950
s	$s^2=\ln(CV^2+1)$		0.555
Pn	$Pn=(1\text{-confidence level})^{1/n}$		0.368
Multiplier			3.00
Max concentration (ug/L) at edge of…		Acute	241
		Chronic	36
Reasonable Potential? Limit Required?			**NO**

Bremerton East Plant - Calculations for Fecal Coliform

Calculation of Fecal Coliform at Chronic Mixing Zone

INPUT	
Chronic Dilution Factor	444.0
Receiving Water Fecal Coliform, #/100 mL	3
Effluent Fecal Coliform - worst case, #/100 mL	400
Surface Water Criteria, #/100 mL	*14*
OUTPUT	
Fecal Coliform at Mixing Zone Boundary, #/100 mL	**4**
Difference between mixed and ambient, #/100 mL	1

Conclusion: At design flow, the discharge has no reasonable potential to violate water quality standards for fecal coliform.

Bremerton East Plant - Calculations for Ammonia

Marine Un-ionized Ammonia Criteria Calculation

Calculation of seawater fraction of un-ionized ammonia from Hampson (1977). Un-ionized ammonia criteria for salt water are from EPA 440/5-88-004. Revised 19-Oct-93.

INPUT	
1. Receiving Water Temperature, deg C (90th percentile):	13.3
2. Receiving Water pH, (90th percentile):	8.2
3. Receiving Water Salinity, g/kg (10th percentile):	30.2
4. Pressure, atm (EPA criteria assumes 1 atm):	1.0
5. Unionized ammonia criteria (mg un-ionized NH_3 per liter) from EPA 440/5-88-004:	
Acute:	0.233
Chronic:	0.035
OUTPUT	
Using mixed temp and pH at mixing zone boundaries?	No
1. Molal Ionic Strength (not valid if >0.85):	0.620
2. pKa8 at 25 deg C (Whitfield model "B"):	9.317
3. Percent of Total Ammonia Present as Unionized:	3.1%
4. Total Ammonia Criteria (mg/L as NH_3):	
Acute:	7.45
Chronic:	1.12
RESULTS	
Total Ammonia Criteria (mg/L as N)	
Acute:	**6.13**
Chronic:	**0.92**

Bremerton East Plant - Calculations for Temperature

Marine Temperature Reasonable Potential and Limit Calculation

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

INPUT	
1. Chronic Dilution Factor at Mixing Zone Boundary	444.0
2. Annual max 1DADMax Ambient Temperature (Background 90th percentile)	11.2 °C
3. 1DADMax Effluent Temperature (95th percentile)	16.6 °C
4. Aquatic Life Temperature WQ Criterion	16.0 °C
OUTPUT	
5. Temperature at Chronic Mixing Zone Boundary:	11.21 °C
6. Incremental Temperature Increase or decrease:	0.01 °C
7. Incremental Temperature Increase 12/(T-2) if T≤ crit:	1.30 °C
8. Maximum Allowable Temperature at Mixing Zone Boundary:	12.50 °C
A. If ambient temp is warmer than WQ criterion	
9. Does temp fall within this warmer temp range?	NO
10. Temp increase allowed at mixing zone boundary, if required:	---
B. If ambient temp is cooler than WQ criterion but within 12/(T_{amb}-2) and within 0.3 °C of the criterion	
11. Does temp fall within this incremental temp. range?	NO
12. Temp increase allowed at mixing zone boundary, if required:	---
C. If ambient temp is cooler than (WQ criterion-0.3) but within 12/(T_{amb}-2) of the criterion	
13. Does temp fall within this Incremental temp. range?	NO
14. Temp increase allowed at mixing zone boundary, if required:	---
D. If ambient temp is cooler than (WQ criterion - 12/(T_{amb}-2))	
15. Does temp fall within this Incremental temp. range?	YES
16. Temp increase allowed at mixing zone boundary, if required:	NO LIMIT
RESULTS	
17. Do any of the above cells show a temp increase?	**NO**
18. Temperature Limit if Required?	**NO LIMIT**

Appendix E -- Response to Comments

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