

# **Fact Sheet for NPDES Permit WA0029289**

## **Bremerton Wastewater Treatment Plant**

June 21, 2013

### **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 the 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 were available for public review and comment from April 25, 2013 until May 25, 2013. For more details on preparing and filing comments about these documents, please see *Appendix A – Public Involvement Information*.

The City of Bremerton staff 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 closed, Ecology summarized substantive comments and provided responses to them. Ecology included the summary and responses to comments in this fact sheet as *Appendix F – Response to Comments*, and will publish it when issuing the final NPDES permit. Ecology will not revise the rest of the fact sheet, but the full document will become part of the legal history contained in the facility's permit file.

### **Summary**

The City of Bremerton owns, operates, and maintains two wastewater treatment plants: West Plant and East 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 September 28, 2006. Based on the West Plant's performance data and 2009 upgrades, Ecology approved a higher design flow rating for the West Plant in February 2011. As a result, the proposed permit contains higher effluent mass limits (lbs/day) for 5-day Biochemical Oxygen Demand and Total Suspended Solids discharged from the West Plant than those in the previous permit. Effluent concentration (mg/L) limits for the West Plant and all limits for the East Plant remain the same as those in the previous permit.

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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 F*.

## 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	Name: Pat Coxon Telephone #: 360-473-5448	
Responsible Official	Name: Pat Coxon Title: Wastewater Manager Address: 1600 Oyster Bay Avenue South Bremerton, WA 98312 Telephone #: 360-473-5448	
Type of Treatment	Activated Sludge	High Rate Clarification
Discharge Waterbody Name and Location (NAD83/WGS84 reference datum)	Sinclair Inlet, Puget Sound Latitude: 47.544670° Longitude: -122.669907°	Port Washington Narrows, Puget Sound Latitude: 47.581606° Longitude: -122.637978°
Permit Status		
Issuance Date of Previous Permit	September 28, 2006	
Application for Permit Renewal Submittal Date	December 22, 2010	
Date of Ecology Acceptance of Application	September 19, 2011	
Inspection Status		
Date of Last Sampling Inspection	June 25, 2002	
Date of Last Non-sampling Inspection Date	March 12, 2012	

**Figure 1. Facility Location Map**



## **A. Facility Description**

### *History*

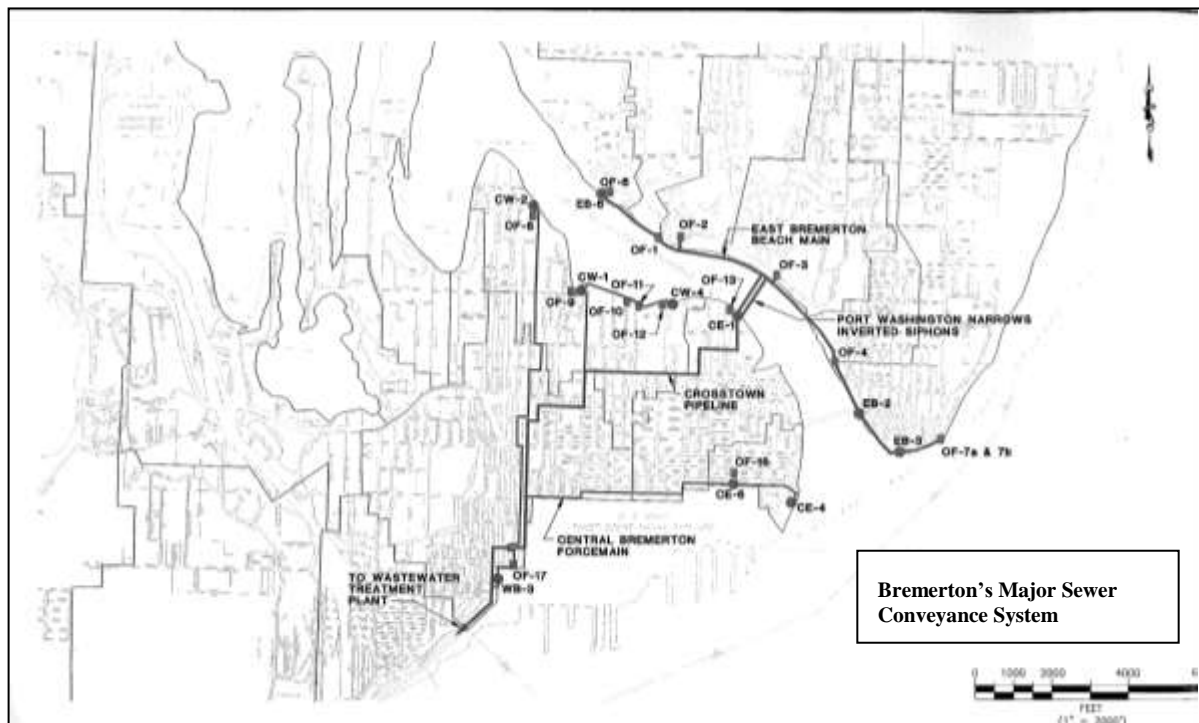
The City of Bremerton (City) has owned, operated, and maintained a secondary wastewater treatment plant (West Plant) in west Bremerton since June 1985. Approximately 60% of Bremerton's sewer system consists of a combined sewage system that conveys a mixture of sanitary sewage and stormwater to the West 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, Bremerton 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.

Bremerton'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*

**Figure 2. Major Sewer Conveyance System**



Bremerton 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 37 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.

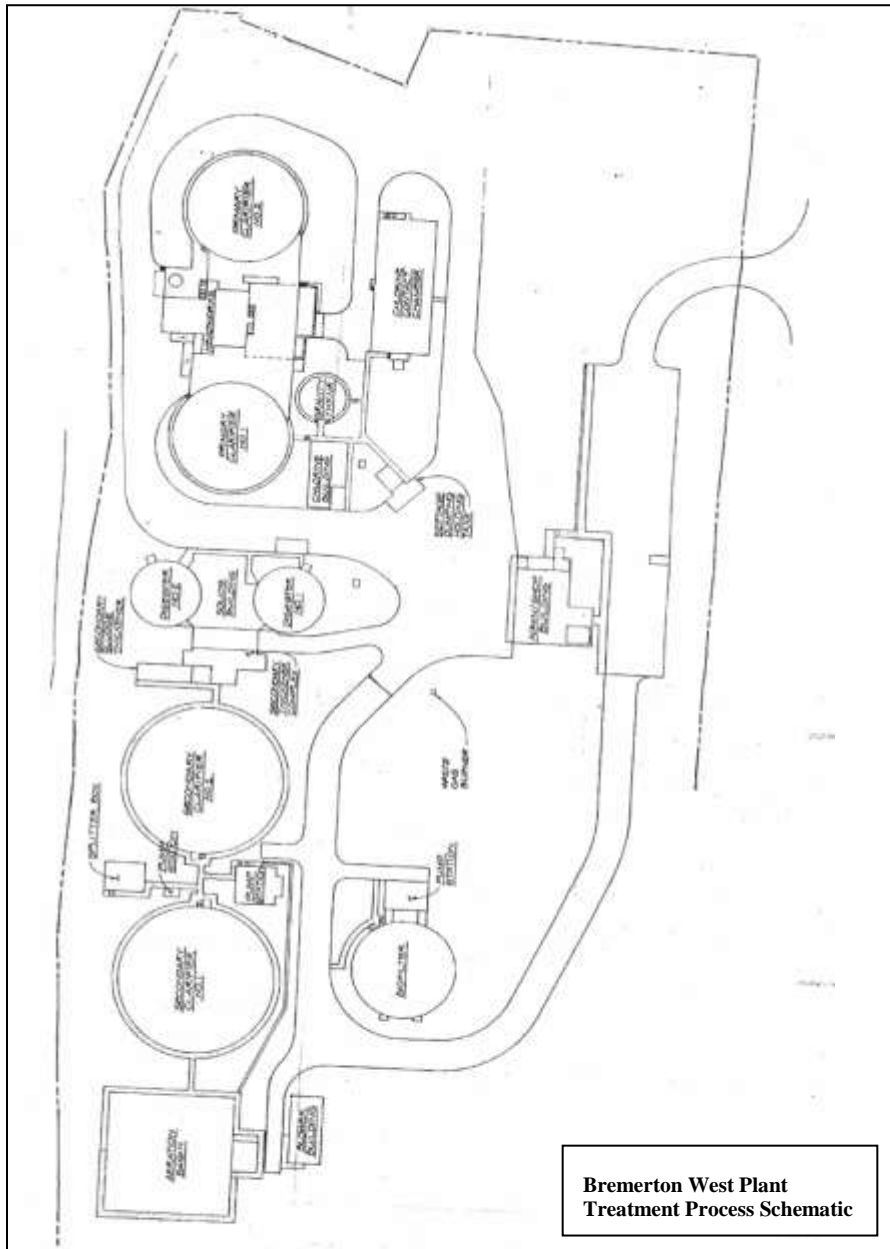
Sewage in East Bremerton flows from six sewer basins through a series of pump stations, gravity pipelines, and pressure mains that discharge to the East Bremerton beach main. The beach main gravity sewer discharges through 16-inch and 24-inch siphons under the Port Washington Narrows to pump station 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 West Bremerton flow from various basins into the central Cross-town Pipeline for conveyance to the West Plant.



## Treatment Processes

West Plant:

**Figure 3. West Plant Treatment Process Schematic**



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. ST-7374. 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, , 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 plant also has a roughing biofilter available, but not currently used for treatment.

The solids stream treatment system includes two rotating drum thickeners (RTDs), two anaerobic digesters, and a centrifuge. 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 RTDs for thickening. The thickened secondary sludge is then pumped to the anaerobic digesters. The centrifuge dewateres 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 RTD 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 secondary 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 32 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 1980's 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,<sup>1</sup> EPA's *Combined Sewer Overflow Guidance for Permit Writers* 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 financial 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.

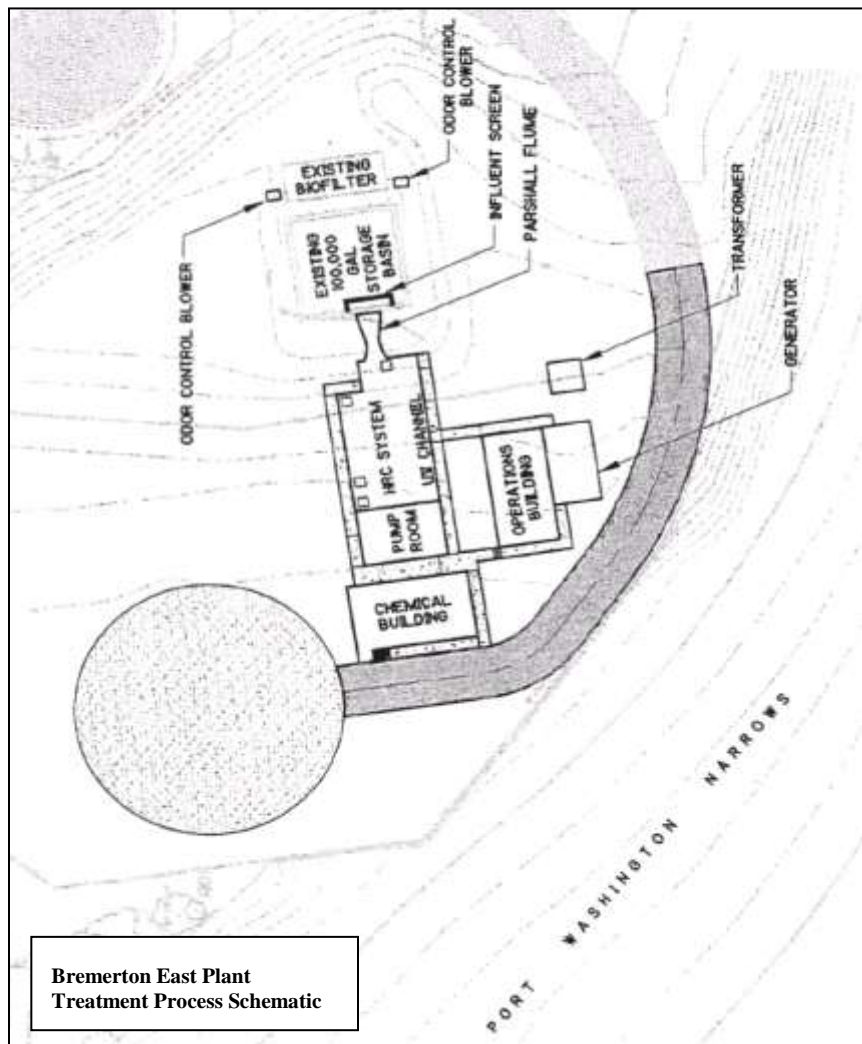
Based on this analysis, Ecology has determined that Bremerton's West Plant meets the "no feasible alternative" criteria and that CSO-related bypass can be authorized as allowed under EPA's *Combined Sewer Overflow Guidance for Permit Writers*. The proposed permit Condition S9, *Wet Weather Operation – 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.

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<sup>1</sup> *Combined Sewer Overflow Guidance for Permit Writers*, EPA, August 1995, pp. 4-34.

East Plant:

**Figure 4. East Plant Treatment Process Schematic**



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.

### *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 County Health District, Bremerton land 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 Outfalls*

#### 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).

**Figure 5. West Plant Discharge Outfall Location**



#### 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-one 5.75-inch diameter ports. 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.

Approximately one and a half years after the City put the plant in operation, WA State Department of Health (DOH), Shellfish Program, conducted a dye test to determine the fate and transport of the effluent from the East Plant. The study resulted in DOH conditionally opening previously closed shellfish beds in Dyes Inlet.

**Figure 6. East Plant Discharge Outfall Location**



## B. Description of the Receiving Water

West Plant:

The West Plant discharges to Sinclair Inlet, an arm of Puget Sound. Although the Port Orchard WWTP discharges to Sinclair Inlet at a location approximately 3 miles to the northeast, no other point-source discharges are located close enough to Bremerton's West Plant to cause dilution zones to overlap.

The ambient background data used for this permit includes the following from Ecology's long-term Monitoring Station SIN001 (Sinclair Inlet – Naval Shipyards):

**Table 2. Ambient Background Data – West Plant**

Parameter		Value used
Temperature	Highest annual 1-DADMax	18.98° C (August 2010)
	90 <sup>th</sup> percentile	14.28° C
pH	Maximum	8.6 standard units
	Minimum	6.8 standard units
	90 <sup>th</sup> percentile	8.2 standard units
Fecal Coliform	90 <sup>th</sup> percentile	4/100 mL
Salinity (90 <sup>th</sup> percentile)		29.9 psu

#### East Plant:

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

The ambient background data used for this permit includes the following from two of the Ecology's long-term Monitoring Stations that are closest to the plant's discharge location: (i) DYE004 (Dyes Inlet – NE of Chico Bay) and (ii) POD006 (Port Orchard – Liberty Bay/Virginia Point).

**Table 3. Ambient Background Data – East Plant**

Parameter		Value used
Temperature (Wet Weather Months October through April)	Highest 1-DADMax	13.3° C
	90 <sup>th</sup> percentile	11.2° C
pH	Maximum	8.3 standard units
	Minimum	8.0 standard units
	90 <sup>th</sup> percentile	8.2 standard units
Fecal Coliform	90 <sup>th</sup> percentile	3/100 mL
Salinity (90 <sup>th</sup> percentile)		30.15 psu

### C. Wastewater Influent Characterization

Bremerton reported the concentration of influent pollutants in discharge monitoring reports. The tabulated data represents the quality of the wastewater influent received at the West Plant from October 2006 through August 2012, and at the East Plant from January 2006 through November 2011. The influent received at these plants is characterized as follows:

**Table 4. Wastewater Influent Characterization – West Plant**

Parameter	Units	# of Samples	Average Value	Maximum Daily Value
Biochemical Oxygen Demand (BOD <sub>5</sub> )	mg/L	71	202	424 (July 2009)
	lbs/day		6,997	20,000 (Nov. 2011)
Total Suspended Solids (TSS)	mg/L		206	8,843 (Dec. 2011)
	lbs/day		6,954	24,810 (Nov. 2011)

**Table 5. Wastewater Influent Characterization – East Plant**

Parameter	Units	# of Samples	Average Value	Maximum Daily Value
TSS	mg/L	34	89	144 (Dec. 2010)
BOD <sub>5</sub>	mg/L	18	70	117

## D. Wastewater Effluent Characterization

Bremerton WWTP staff 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 the West Plant from October 2006 through August 2012, and from the East Plant from January 2006 through November 2011. The wastewater effluent at these plants is characterized as follows:

Parameter	Units	# of Samples	Average Value	Maximum Weekly Average
BOD <sub>5</sub>	mg/L	71	8	41
	lbs/day		331	5,368 (Nov. 2011)
TSS	mg/L		8	32
	lbs/day		325	4,471 (Nov. 2011)

Parameter	Units	# of Samples	Average Value	Maximum Daily Value
Total Residual Chlorine	mg/L	366	0.035	0.185
Total Ammonia	mg/L	71	24.4	36.3 (95 <sup>th</sup> percentile)
Dissolved Oxygen	mg/L	31	8.6	5.9 (minimum)
TKN	mg/L	12	15.7	35.1
(NO <sub>2</sub> + NO <sub>3</sub> ) - N	mg/L	12	2.3	5.0
Total Phosphorus	mg/L	3	3.4	3.5
Temperature	Summer	°C	18°C	20°C
	Winter		12°C	14°C
Cyanide	µg/L	3	40.0	49.0
Arsenic	µg/L	13	2.12	2.40
Cadmium	µg/L	13	All samples below method detection limit (MDL)	< 2.0
Chromium	µg/L	13	1.59	3.40
Copper	µg/L	13	4.53	6.20
Lead	µg/L	13	Many samples below MDL	0.30
Mercury	µg/L	13	Many samples below MDL	0.00974
Nickel	µg/L	13	4.83	7.10
Zinc	µg/L	13	20.78	30.00

Parameter	Units	# of Samples	Maximum Monthly Geometric Mean	Maximum Weekly Geometric Mean
Fecal Coliforms	# / 100 mL	71	135	253

Parameter	Units	# of Samples	Minimum Value	Maximum Value
pH	standard units	84	7.0	7.6



**Table 7. Wastewater Effluent Characterization – East Plant**

Parameter	Units	# of Samples	Average Value	Maximum Daily Value
TSS	mg/L	34	16	39 (95 <sup>th</sup> percentile)
TSS Removal	%	34	81%	94% (95 <sup>th</sup> percentile)
Settleable Solids	mL/L	34	0.12	0.53 (95 <sup>th</sup> percentile)
BOD <sub>5</sub>	mg/L	18	26	70
DO	mg/L	25	7.5	4.8 (minimum)
Ammonia (NH <sub>3</sub> -N)	mg/L	32	4.6	7.3 (95 <sup>th</sup> percentile)
Temperature	°C	25	11.9	15.4 (95 <sup>th</sup> percentile)

Parameter	Units	# of Samples	Maximum Daily Geometric Mean	Minimum Daily Geometric Mean
Fecal Coliforms	# / 100 mL	43	696 (446 (95 <sup>th</sup> percentile))	10

Parameter	Units	# of Samples	Minimum Value	Maximum Value
pH	Standard units	25	6.1	7.8

Parameter	Units	# of Samples	Minimum Value	Maximum Value
Arsenic	µg/L	6	< 1.0	2.5
Cadmium	µg/L	6	< 1.0	< 1.0
Chromium	µg/L	6	< 1.0	1.9
Copper	µg/L	6	5.23	8.43
Lead	µg/L	6	< 1.0	2.66
Mercury	µg/L	6	< 0.041	< 0.2
Nickel	µg/L	6	1.34	2.4
Zinc	µg/L	6	27.8	60.2

## **E. Summary of Compliance With Previous Permit Issued on September 28, 2006**

The previous permit placed effluent limits on BOD<sub>5</sub>, TSS, pH, fecal coliform bacteria, total residual chlorine, and acute toxicity, for the West Plant. In addition, the permit placed effluent limits on TSS removal efficiency, settleable solids, and fecal coliform bacteria, for the East Plant. Both plants complied with the effluent limits and permit conditions throughout the duration of the permit issued on September 28, 2006. 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. Ecology received all required submittals from the City on time.

## **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 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, 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 – West Plant**

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.

<b>Table 8. Design Criteria – West Plant</b>	
<b>Parameter</b>	<b>Design Quantity</b>
Maximum Month Design Flow (MMDF) (May through September)	11.0 MGD
MMDF (October through April)	15.5 MGD
BOD <sub>5</sub> Loading for Maximum Month	18,100 lb/day
TSS Loading for Maximum Month	22,600 lb/day

## B. Technology-based Effluent Limits – West Plant

Federal and state regulations define technology-based effluent limits for municipal 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 municipal wastewater.

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

The table below identifies technology-based limits for pH, fecal coliform, BOD<sub>5</sub>, and TSS, as listed in chapter 173-221 WAC. Section III.G of this fact sheet reviews the potential for water quality-based limits.

<b>Table 9. Technology-based Effluent Limits – West Plant</b>		
<b>Parameter</b>	<b>Average Monthly Limit</b>	<b>Average Weekly Limit</b>
BOD <sub>5</sub> (concentration)	30 mg/L	45 mg/L
	In addition, the BOD <sub>5</sub> effluent concentration must not exceed 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
	In addition, the TSS effluent concentration must not exceed 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.	

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

<b>Parameter</b>	<b>Daily Minimum</b>	<b>Daily Maximum</b>
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 BOD<sub>5</sub> and Total Suspended Solids as follows:

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

where:

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

DF = Maximum Monthly Average Design flow (MGD)

CF = Conversion factor of 8.34

**Table 10. Technology-based Mass Limits – West Plant**

Parameter	Concentration Limit (mg/L)	Mass Limit (lbs/day)	
		May through September	October through April
BOD <sub>5</sub> Monthly Average	30	2752	3878
BOD <sub>5</sub> Weekly Average	45	4128	5817
TSS Monthly Average	30	2752	3878
TSS Weekly Average	45	4128	5817

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 BOD<sub>5</sub> 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 BOD<sub>5</sub> 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<sub>5</sub> and TSS. However, the concentration and mass loading limits as stated above remain in effect year-round.

### **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.G of this fact sheet reviews the potential for water quality-based limits.

<b>Table 11. Technology-based Effluent Limits – East Plant</b>	
<b>Parameter</b>	<b>Limit</b>
TSS removal	Minimum 50%
Settleable Solids	Less than 0.3 mL/L

#### **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*

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

##### *Narrative Criteria*

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

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

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

### *Antidegradation*

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

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

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

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

- The facility is planning a new or expanded action.
- 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--**The proposed permit increases the authorized design flows and waste loading processed at Bremerton's West Plant, which meets the definition of an "expanded action". Because of this expanded action, Ecology determined that Bremerton's West Plant must meet Tier II requirements. A Tier II analysis focuses on evaluating feasible alternatives that would eliminate or significantly reduce the level of degradation. The analysis also includes a review of the benefits and costs associated with the lowering of water quality. New discharges and facility expansions are prohibited from lowering water quality without providing overriding public benefits.

As part of the CSO reduction program, Bremerton modified its sewer collection system to convey and treat a significant portion of its combined sewage to the West Plant for treatment. To provide treatment for this additional flow, Bremerton also made several improvements to the West Plant to provide reliability and redundancy at the plant during wet-weather operations. After completing the improvements, Bremerton submitted a rerating study to Ecology that sought approval of higher design flows for the West Plant based on past performance. The rerating study included a revised dilution analysis and an antidegradation (Tier II) analysis that demonstrated the expanded action would result in "no measurable degradation to existing water quality at the edge of the chronic mixing zone." Ecology approved the rerating study and the dilution study/antidegradation analysis in February 2011. The following tables show the approved design flows and revised dilution factors:

<b>Table 12. Rerated Design Flows for the West Plant</b>	
<b>Parameter</b>	<b>Design Quantity</b>
Maximum Month Design Flow (MMDF) (May through September)	11.0 MGD
MMDF (October through April)	15.5 MGD

<b>Table 13. Approved Dilution Factors for the West Plant</b>		
	<b>Dilution Factors</b>	
	<b>Acute</b>	<b>Chronic</b>
May through September	37	141
October through April	20	127

Bremerton's antidegradation analysis for the West Plant demonstrated that the plant will meet Tier II requirements because it will not cause measurable degradation to existing water quality at the edge of the chronic mixing zone. Table 14 below summarizes for each parameter of concern the definition of "measurable change" and shows the estimated change expected at the edge of the chronic mixing zone. Based on the analysis, Ecology determined that this facility will not cause measurable degradation to existing water quality at the edge of the chronic mixing zone and will meet Tier II requirements.

<b>Table 14. Demonstration of "No Measurable Change" at the Edge of Chronic Mixing Zone</b>		
<b>Parameter</b>	<b>Definition of "Measurable Change" from Ambient Conditions</b>	<b>Estimated Change expected at the Edge of Chronic Mixing Zone</b>
Temperature	Increase of 0.3°C or greater	Increase of 0.01°C
Dissolved Oxygen	Decrease of 0.2 mg/L or greater	Near-field decrease of 0.004 mg/L
Bacteria level (Fecal Coliform)	Increase of 2 cfu/100 mL or greater	Increase of 0.46 cfu/100 mL
pH	Change of 0.1 units or greater	Change of 0.04 units
Turbidity	Increase of 0.5 NTU or greater	No observable impact anticipated.
Toxic or radioactive substances	Any detectable increase. Detectable increase is defined as the increase greater than quantitation level (QL).	See below.
Ammonia	Increase of 0.3 mg/L or greater	Increase of 0.019 mg/L
Arsenic	Increase of 0.5 µg/L or greater	Increase of 0.003 µg/L
Chromium	Increase of 1.0 µg/L or greater	Increase of 0.0017 µg/L
Copper	Increase of 2.0 µg/L or greater	Increase of 0.006 µg/L
Mercury	Increase of 0.0005 µg/L or greater	Increase of 0.00001 µg/L
Nickel	Increase of 0.5 µg/L or greater	Increase of 0.018 µg/L
Selenium	Increase of 1.0 µg/L or greater	Increase of 0.003 µg/L
Zinc	Increase of 2.5 µg/L or greater	Increase of 0.025 µg/L
Total Phenols	Increase of 50 µg/L or greater	Increase of 0.00005 µg/L
Chloroform	Increase of 2.0 µg/L or greater	Increase of 0.0017 µg/L

### *Water Quality Consideration for 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 included specific conditions in the proposed permit to ensure that Bremerton continues to make progress towards meeting water quality goals for each CSO outfall in its system. Section V.F 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)].

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 10 means the effluent is 10% and the receiving water is 90% of the total volume of water at the boundary of the mixing zone. 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 mixing zone boundary. The concentration of pollutants at the boundaries of any of these mixing zones may not exceed the numerical criteria for that zone.

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

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

- A 70-year lifetime of daily exposures.
- An ingestion rate for fish or shellfish measured in kg/day.
- An ingestion rate of two liters/day for drinking water.
- A one-in-one-million cancer risk for carcinogenic chemicals.

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

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

The proposed permit specifies the size and location of the allowed mixing zones (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’s WWTPs 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: <http://www.ecy.wa.gov/biblio/92109.html>.

**Table 15. Critical Conditions Used to Model the West Plant Discharge**

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

Critical Condition		Value
Water Depth at MLLW		29 feet
10 <sup>th</sup> 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

**Table 16. Critical Conditions Used to Model the East Plant Discharge**

(Source: *Eastside CSO Treatment Facility Engineering Report*, Camp Dresser & McKee, January 2001)

Critical Condition	Value
Water Depth at MLLW	24 feet
10 <sup>th</sup> percentile current speed for acute mixing zone	0.11 m/sec
50th percentile current speed for chronic and human health mixing zones	0.66 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)

**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, and the centerline dilution factor 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 the receiving waters for both plants are identified below:

Table 17. 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	<ul style="list-style-type: none"> <li>• 5 NTU over background when the background is 50 NTU or less; or</li> <li>• A 10 percent increase in turbidity when the background turbidity is more than 50 NTU.</li> </ul>
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 in Table 18.

Table 18. 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

Sinclair Inlet is listed in the 2012 303(d) list as an impaired waterbody for pH, temperature, Dissolved Oxygen (DO) and fecal coliform. Fecal coliform is listed as Category 5; DO, pH, and temperature are listed as Category 2. These categories are defined as follows:

Category 2 – Waters of concern: Waters where there is some evidence of a water quality problem, but not enough to require production of a water quality improvement project (also known as a TMDL) at this time. There are several reasons why a waterbody would be placed in this category. A waterbody might have pollution levels that are not quite high enough to violate the water quality standards, or there may not have been enough violations to categorize it as impaired according to Ecology's listing policy. There might be data showing water quality violations, but the data was not collected using proper scientific methods. In each situation, Category 2 Waters are water bodies that Ecology will continue to test.

Category 5 – Polluted waters that require a TMDL: Category 5 waters are water bodies formally listed on the 303(d) list as “impaired” or not meeting designated criteria. Placement in this category means that Ecology has data showing that the water quality standards have been violated for one or more pollutants, and there is no TMDL or pollution control plan. TMDLs are required for the water bodies in this category.

Ecology conducted a total maximum daily load (TMDL) study to address the non-attainment of fecal coliform water quality standards in Sinclair Inlet. 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*, April 2012.

## **G. Evaluation of Surface Water Quality-based Effluent Limits for Numeric Criteria**

Pollutants in an effluent may affect the aquatic environment near the point of discharge (near-field) or at a considerable distance from the point of discharge (far-field). Toxic pollutants, for example, are near-field pollutants; their adverse effects diminish rapidly with mixing in the receiving water. Conversely, a pollutant such as biochemical oxygen demand (BOD<sub>5</sub>) is a far-field pollutant whose adverse effect occurs away from the discharge even after dilution has occurred. Thus, the method of calculating surface water quality-based effluent limits varies with the point at which the pollutant has its maximum effect.

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

**Chronic Mixing Zone--**WAC 173-201A-400(7)(b) specifies that in estuarine waters, 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.

**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 mixing zone.

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 twenty 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 Update Re-Rating Analysis Report*, April 2010, Cosmopolitan Engineering. The mixing zone analysis was approved by Ecology on February 17, 2011.

The horizontal distance of the chronic mixing zone is 229 feet in any direction from each discharge port. The mixing zone extends from the top of the discharge ports to the water surface at MLLW.

The acute mixing zone for this outfall extends 22.9 feet in any direction from each discharge port.

#### East Plant:

The diffuser for the East Plant at Outfall 002 is 80 feet long with a diameter of 36 inches. The diffuser has a total of twenty one 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 *Mixing Zone Study Report*, October 2000, Cosmopolitan Engineering. The mixing zone analysis was approved by Ecology on February 17, 2011.

The horizontal distance of the chronic mixing zone is 224 feet in any direction from each discharge port. The mixing zone extends from the top of the discharge ports to the water surface at MLLW.

The acute mixing zone for this outfall extends 22.4 feet in any direction from each discharge port.

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

<b>Table 19. Dilution Factors</b>			
<b>Criteria</b>	<b>Dilution Factors</b>		
	<b>Outfall # 001 (West Plant)</b>		<b>Outfall # 002 (East Plant)</b>
	<b>May – Sept</b>	<b>Oct – April</b>	
Acute Aquatic Life Criteria	37	20	51
Chronic Aquatic Life Criteria	141	127	467
Human Health Criteria – Non-carcinogen	141	127	467

#### *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<sub>5</sub> 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<sub>5</sub>) 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<sub>5</sub>) 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**--As discussed in III.F above, Ecology's TMDL study in Sinclair Inlet 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.

In addition, Ecology modeled the numbers of fecal coliform by simple mixing analysis using the technology-based limit of 400 organisms/100 mL, receiving water concentration of 4 organisms/100 mL, and a dilution factor of 127 (see Appendix E). 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 from the West Plant: chlorine, ammonia, heavy metals, cyanide, bromoform, carbon tetrachloride, chloroform, dichlorobromomethane, 1,4 dichlorobenzene, dimethylphthalate, and phenol. Ecology conducted a reasonable potential analysis (see Appendix E) on these parameters to determine whether it would require effluent limits in this permit.

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

No valid ambient background data were available for any of the toxic pollutants present in the discharge. These pollutants, if present in the ambient environment, are expected to be present in very low concentrations. In addition, this facility's discharge achieves high dilution factors in the ambient environment. Therefore, Ecology used zero for background for these pollutants.

Ecology determined that the toxic chemicals present in the West Plant discharge pose no reasonable potential to exceed the water quality criteria at the critical condition using procedures given in EPA, 1991 (see Appendix E) and as described above. Ecology's determination assumes that this facility meets the other effluent limits of this permit.



The previous permit issued on September 28, 2006, placed water-quality-based chlorine limit of 0.1 mg/L average monthly and 0.3 mg/L maximum daily, and the facility is able to comply with it. The proposed permit includes the same limit.

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

- Highest 1-day maximum criteria in marine waters.
- 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 marine 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 99<sup>th</sup> 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 West Plant discharge to exceed the annual summer maximum, and the incremental warming criteria (see temperature calculations in Appendix E).

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

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

The highest summer temperature measured in Bremerton's West Plant effluent during the previous permit cycle was 20° C. The City of Port Orchard and West Sound Utility District (PO/WSUD) operate a WWTP similar to Bremerton's across the Sinclair Inlet from the West Plant. Of the 732 effluent samples collected from 2006 through 2011 at the PO/WSUD WWTP, the highest temperature recorded was 22.6° C. There is no reasonable potential to violate the water quality standards for temperature well above the maximum effluent temperature expected at the West Plant. Therefore, the proposed permit does not include the routine temperature monitoring for the West Plant.

**General lethality and migration blockage:** The receiving water conditions listed in Table 2 of the fact sheet indicate that the receiving water does not exceed a 1DMax of 23°C or a 7DADMax of 22°C.

### *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 467 (see Appendix E). 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 from the East Plant: ammonia, and heavy metals. Ecology conducted a reasonable potential analysis (see Appendix E) on these parameters to determine whether it would require effluent limits in this permit.

No valid ambient background data were available for any of the toxic pollutants present in the discharge. These pollutants, if present in the ambient environment, are expected to be present at very low concentrations. In addition, this facility's discharge achieves high dilution factors in the ambient environment. Therefore, Ecology used zero for background for these pollutants.

Ecology determined that the toxic chemicals present in the East Plant discharge pose no reasonable potential to exceed the water quality criteria at the critical condition using procedures given in EPA, 1991 (see Appendix E) and as described above. Ecology's determination assumes that this facility meets the other effluent limits of this permit.

## **Temperature**

### **Reasonable Potential Analysis**

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

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

The reasonable potential analysis shows that there is no reasonable potential to violate water quality standards for temperature well above the maximum effluent temperature expected at the East Plant. In addition, the East Plant discharges intermittently during the winter months, which is outside of critical summer period. Therefore, the proposed permit does not include routine temperature monitoring for the East Plant.

**General lethality and migration blockage:** The receiving water conditions listed in Table 3 of the fact sheet indicate that the receiving water does not exceed a 1DMax of 23°C or a 7DADMax of 22°C.

## **H. Human Health**

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

#### West Plant:

Ecology determined the effluent contains chemicals of concern for human health, based on the data indicating the discharge contains regulated chemicals. The chemicals of concern for human health present in the effluent are cyanide, mercury, nickel, selenium, thallium, bromoform, carbon tetrachloride, chloroform, dichlorobromomethane, 1,4 dichlorobenzene, dimethylphthalate, and phenol.

Ecology evaluated the West Plant's 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 (see Appendix E). The evaluation showed that the discharge has no reasonable potential to cause a violation of water quality standards, and an effluent limit is not needed.

#### East Plant

Ecology determined the effluent contains chemicals of concern for human health, based on the data indicating the discharge contains regulated chemicals. The chemical of concern for human health present in the effluent is nickel.

Ecology evaluated the East Plant's 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 (see Appendix E). The evaluation showed that the discharge has no reasonable potential to cause a violation of water quality standards, and an effluent limit is not needed.

### **I. Sediment Quality**

The aquatic sediment standards (chapter 173-204 WAC) protect aquatic biota and human health. Under these standards Ecology may require a facility to evaluate the potential for its discharge to cause a violation of sediment standards (WAC 173-204-400). You can obtain additional information about sediments at the Aquatic Lands Cleanup Unit website. <http://www.ecy.wa.gov/programs/tcp/smu/sediment.html>

Ecology determined that the West Plant and CSO discharges have the potential to cause a violation of the sediment quality standards because of the presence of toxic substances in the discharges.

Bremerton will need to demonstrate that either:

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

The proposed permit requires Bremerton to conduct sediment sampling and analysis near the treatment plants and CSO discharge locations. Due to cost considerations, Bremerton can collect sediment samples at the treatment plants and CSO discharge locations at the same time. Condition S10.A. of the proposed permit requires Bremerton to submit the sediment sampling and analysis plan by October 1, 2014, in conjunction with the CSO Post

Construction Monitoring Plan. Condition S10.B. of the proposed permit requires Bremerton to submit the sediment monitoring results with the next permit renewal application.

During the previous permit term, Bremerton's consultant Rosedale Marine Engineering conducted an underwater inspection of the East Plant outfall in November 2008. The outfall inspection report indicates that there has been substantial accretion of sediments on both sides of the pipe, consisting of some coarse sand, predominantly gravels, and some cobbles. The sediments are well washed of fines, and the sand and pea gravels are highly mobile due to the high currents at this site. Based on this inspection, the East Plant discharge location does not appear to be in an area of deposition. Therefore, Bremerton may not be required to conduct sediment sampling and analysis at the East Plant discharge location. Bremerton will need to discuss this with Ecology's Sediment Management Section prior to preparing the sediment sampling and analysis plan.

## J. Whole Effluent Toxicity – West Plant

The water quality standards for surface waters prohibit the 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* (<http://www.ecy.wa.gov/biblio/9580.html>), which is referenced in the permit. Ecology recommends that Bremerton WWTP staff send a copy of the acute and chronic toxicity sections(s) of its NPDES permit to the laboratory.

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

concentration of effluent at the boundary of the acute mixing zone during critical conditions. The ACEC equals 2.7% effluent (May through September) and 5% effluent (October through June).

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. 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.

Bremerton has been using freshwater species for acute WET testing for the West Plant effluent. Due to the presence of high salinity (from the Puget Sound Naval Shipyard discharge) in the plant effluent, the proposed permit requires acute WET testing on saltwater species.

High ammonia concentration in the West Plant effluent appears to be causing failure of the performance limit (less than 65% survival in 100% effluent) for acute toxicity. A recent acute WET test conducted with "Suppression of pH Rise" showed no failure of the performance limit. Therefore, the proposed permit allows reduction in acute WET test monitoring from 4/year to 2/year beginning January 2016, provided the "Lowest Observed Effects Concentration (LOEC)" is equal to or greater than 100% for all the tests performed from January 2014 through October 2015.

Chronic WET testing conducted during effluent characterization showed no reasonable potential for the West Plant's discharge to cause receiving water chronic toxicity. The proposed permit will not include a chronic WET limit. 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. 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.

## **K. Groundwater Quality Limits**

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

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

## L. Comparison of Effluent Limits with the Previous Permit Issued on September 28, 2006

Table 20. Comparison of Previous and Proposed Effluent Limits – West Plant						
		Previous Effluent Limits: Outfall # 001		Proposed Effluent Limits: Outfall # 001		
Parameter		Basis of Limit	Average Monthly	Average Weekly	Average Monthly	Average Weekly
BOD <sub>5</sub>		Technology	30 mg/L	45 mg/L	30 mg/L	45 mg/L
BOD <sub>5</sub>	May through September		2527 lbs/day	3790 lbs/day	2752 lbs/day	4218 lbs/day
	October through April				3878 lbs/day	5817 lbs/day
TSS		Technology	30 mg/L	45 mg/L	30 mg/L	45 mg/L
TSS	May through September		2527 lbs/day	3790 lbs/day	2752 lbs/day	4218 lbs/day
	October through April				3878 lbs/day	5817 lbs/day
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	200/100 mL	400/100 mL
Parameter		Basis of Limit	Limit		Limit	
pH		Technology	6.0 – 9.0 Standard Units		6.0 – 9.0 Standard Units	
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	0.1 mg/L	0.3 mg/L
Parameter		Basis of Limit	Previous Effluent Limits: Outfall # 001		Proposed Effluent Limits: Outfall # 001	
Acute Toxicity		Testing during the previous permit term	No acute toxicity in a whole effluent toxicity test concentration representing the acute critical effluent concentration of 5% effluent.		No acute toxicity in a whole effluent toxicity test concentration representing the acute critical effluent concentration of 2.7% effluent (May - September) and 5% effluent (October - April).	

Table 21. Comparison of Previous and Proposed Effluent Limits – East Plant			
		Previous Effluent Limits: Outfall # 002	Proposed Effluent Limits: Outfall # 002
Parameter	Basis of Limit	Average Yearly	Average Yearly
TSS Removal Efficiency	Technology	Equal to or greater than 50% removal of influent TSS	Equal to or greater than 50% removal of influent TSS
Settleable Solids	Technology	0.3 mL/L/hour	0.3 mL/L
Parameter	Basis of Limit	Monthly Geometric Mean Limit	Monthly Geometric Mean Limit
Fecal Coliform Bacteria	Treatment Technology	400/100 mL	400/100 mL

## 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, DL, and QL on the discharge monitoring report or in the required report.

### A. Wastewater Monitoring – West Plant

The monitoring schedule is detailed in the proposed permit under Special Condition S2. Specified monitoring frequencies take into account the quantity and variability of the discharge, the treatment method, past compliance, significance of pollutants, and cost of monitoring. The 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<sub>5</sub> and TSS, and daily for fecal coliform.

The guidelines in Ecology's Permit Writer's Manual (PWM) provides for reduction in monitoring frequency based on the facility's performance in the two years preceding permit renewal. Reduction of monitoring frequency is generally granted at the time of permit renewal by examination of performance in the two years preceding the permit renewal. The amount of reduction is dependent upon the ratio of performance for the last two years to the monthly average effluent limitation.

Bremerton's previous permit required monitoring frequency of 3/week for BOD<sub>5</sub> and TSS, and 5/week for fecal coliform, for the West Plant. The monitoring data was analyzed to determine if the same monitoring frequency could be retained in the renewed permit. An analysis of the West Plant's monitoring data from January 2011 through November 2012 shows that the West Plant qualifies for reduction in monitoring frequency (see Appendix D). Therefore, the proposed monitoring frequencies are same as those in the previous permit.

As stated earlier in the *SUMMARY OF COMPLIANCE WITH THE EXISTING PERMIT* section of this fact sheet, based on DMRs submitted to Ecology, the Permittee has consistently remained in compliance with the effluent limits and there have been no exceedance of influent design criteria. Therefore, monitoring of these parameters at the existing level is deemed sufficient.

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:

<b>Table 22. Accredited Parameters</b>				
<b>General Chemistry</b>				
<b>Parameter Name</b>	<b>Analyte Code</b>	<b>Method Description</b>	<b>Method Code</b>	<b>Matrix</b>
Ammonia	1515	EPA 350.1_2_1993	10063602	Non-Potable Water
Solids, Total Suspended	1960	SM 2540 D-97	20051201	Non-Potable Water
Chlorine (Residual), Total	1940	SM 4500-Cl G-00	20081612	Non-Potable Water
pH	1900	SM 4500-H+ B-00	20105219	Non-Potable Water
Dissolved Oxygen	1880	SM 4500-O G-01	20121408	Non-Potable Water
Biochemical Oxygen Demand	1530	SM 5210 B-01	20135006	Non-Potable Water
Fecal coliform-count	2530	SM 9222 D (m-FC)-97	20210008	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 – West Plant

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 Bremerton to:

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

Special Condition S4 restricts the amount of flow.

If a municipality intends to apply for Ecology-administered funding for the design or construction of a facility project, the plan must meet the standard of a “Facility Plan”, as defined in WAC 173-98-030. A complete “Facility Plan” includes all elements of an “Engineering Report” along with State Environmental Review Process (SERP) documentation to demonstrate compliance with 40 CFR 35.3140 and 40 CFR 35.3145, and a cost effectiveness analysis as required by WAC 173-98-730. The municipality should contact Ecology’s regional office as early as practical before planning a project that may include Ecology-administered funding.

## C. Operation and Maintenance

The proposed permit contains Special Condition S5 as authorized under RCW 90.48.110, WAC 173-220-150, WAC 173-230, and WAC 173-240-080. Ecology included it to ensure proper operation and regular maintenance of equipment, and to ensure that Bremerton 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's West Plant [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 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 Bremerton 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.

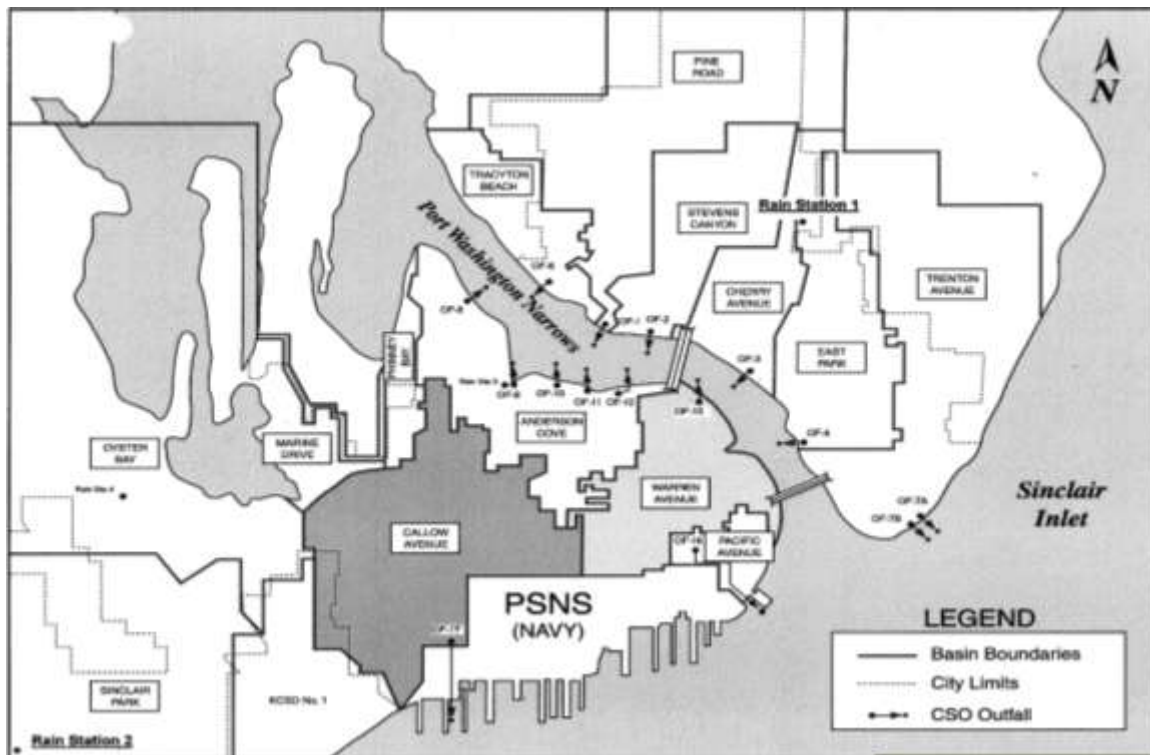
The final use and disposal of sewage sludge from Bremerton's WWTPs is regulated by U.S. EPA under 40 CFR 503, and by Ecology under chapter 70.95J RCW, chapter 173-308 WAC "Biosolids Management," and chapter 173-350 WAC "Solid Waste Handling Standards." The disposal of other solid waste is under the jurisdiction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

## **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. WAC 173-245 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 Figure 7 below:

**Figure 7. CSO Outfalls Locations**



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

Ecology requires municipalities to initially develop combined sewer overflow (CSO) reduction plans per WAC 173-245 requirements. These plans are substantially equivalent to the long-term control plan (LTCP) as defined by EPA in its CSO control policy. WAC 173-245 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.

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 Bremerton to monitor the volume, duration and precipitation associated with each CSO discharge event at each identified outfall.

### *Annual CSO Report*

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

Bremerton must also assess in its annual reports 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 proposed permit requires Bremerton to develop and submit to Ecology, a post-construction monitoring plan by October 1, 2014. The permit also requires Bremerton to implement the monitoring plan and to report monitoring data with the next permit renewal application. EPA guidance on post-construction monitoring plans is available at the following web location: [http://cfpub.epa.gov/npdes/home.cfm?program\\_id=5](http://cfpub.epa.gov/npdes/home.cfm?program_id=5)

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. Outfall Evaluation**

The previous permit issued on September 28, 2006, required Bremerton to conduct an outfall inspection at both plants, and submit a report of the findings. Bremerton’s consultant, Rosedale Marine Engineering, conducted an underwater inspection of the West Plant and East Plant outfalls on November 18 and 19, 2008. Bremerton submitted the inspection report and video recordings with the permit renewal application.

The inspection report indicated that West Plant outfall and diffuser are in excellent shape and generally consistent with the as-built drawings. All diffuser ports were open and flowing fully during the inspection. No structural deterioration of the outfall pipe or joint hardware was observed. Therefore, the proposed permit does not require an outfall evaluation for the West Plant.

For the East Plant, the outfall pipe appeared to be in good condition; however, the inspection could not confirm the hydraulic capacity of the outfall. Since the plant operates intermittently and infrequently, the divers were unable to assess whether the diffuser ports were intact and able to pass effluent flow.

Bremerton commissioned the East Plant on January 1, 2002. As part of the plant construction, the City contracted with a diving company to jet and clean the East Plant outfall, which removed debris and cobbles from the entire length of the outfall diffuser structure. The contractor completed the work prior to plant commissioning.

The plant operates infrequently for short durations a few times per year. Operation always takes place under adverse weather conditions and with little advanced notice, which makes conducting an inspection of the outfall in operation logistically difficult, if not impossible. The plant has discharged peak hour flows in excess of 15 MGD several times through the outfall during its operating history. Since Bremerton staff have not observed signs of flow restrictions they believe all diffuser ports remain open and fully flowing. Therefore, the proposed permit does not require an outfall evaluation for the East Plant.

## H. 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.

Washington State Department of Ecology.

December 2011. *Permit Writer's Manual*. Publication Number 92-109

(<http://www.ecy.wa.gov/biblio/92109.html>)

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

Permit and Wastewater Related Information

(<http://www.ecy.wa.gov/programs/wq/permits/guidance.html>)

City of Bremerton.

2013. *Technical Memorandum – Westside WWTP No Feasible Alternatives Treatment Analysis*, Parametrix.

2010. *Mixing Zone Study Update Re-Rating Analysis*, Cosmopolitan Engineering.

2009. *Wastewater Treatment Plant Rerating Study*, Richwine Environmental.

2008. *Eastside and Westside Outfall Inspections*, Rosedale Marine Engineering.

2005. *City of Bremerton Wastewater Comprehensive Plan Update*, Camp Dresser & McKee.

2001. *Eastside CSO Treatment Facility Engineering Report*, Camp Dresser & McKee.

2000. *CSO Reduction Plan Update*, HDR Engineering.



## **Appendix A--Public Involvement Information**

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

Ecology placed a Public Notice of Draft on April 25, 2013, 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:

- Told 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).
- Offered to provide the documents in an alternate format to accommodate special needs.
- Asked people to tell us how well the proposed permit would protect the receiving water.
- Invited people to suggest fairer conditions, limits, and requirements for the permit.
- Invited comments on Ecology's determination of compliance with antidegradation rules.
- Urged people to submit their comments, in writing, before the end of the comment period.
- Told how to request a public hearing about the proposed NPDES permit.
- Explained 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 <http://www.ecy.wa.gov/biblio/0307023.html>.

You may obtain further information from Ecology by telephone, 425-649-7201, 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 Mike Dawda.

## 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
<b>Department of Ecology</b> Attn: Appeals Processing Desk 300 Desmond Drive SE Lacey, WA 98503	<b>Department of Ecology</b> Attn: Appeals Processing Desk PO Box 47608 Olympia, WA 98504-7608
<b>Pollution Control Hearings Board</b> 1111 Israel RD SW STE 301 Tumwater, WA 98501	<b>Pollution Control Hearings Board</b> 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 months time taking into account zero discharge days.

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

**Background water quality** -- The concentrations of chemical, physical, biological or radiological constituents or other characteristics in or of groundwater at a particular point in time upgradient of an activity that has not been affected by that activity [WAC 173-200-020(3)]. Background water quality for any parameter is statistically defined as the 95% upper tolerance interval with a 95% confidence based on at least eight hydraulically upgradient water quality samples. The eight samples are collected over a period of at least one year, with no more than one sample collected during any month in a single calendar year.

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

**BOD5** -- Determining the five-day Biochemical Oxygen Demand of an effluent is an indirect way of measuring the quantity of organic material present in an effluent that is utilized by bacteria. The BOD5 is used in modeling to measure the reduction of dissolved oxygen in receiving waters after effluent is discharged. Stress caused by reduced dissolved oxygen levels makes organisms less competitive and less able to sustain their species in the aquatic environment. Although BOD<sub>5</sub> 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 storm water and, also, leachate from solid waste facilities.

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

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

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

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

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

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

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

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

**Method detection level (MDL)** -- See Method Detection Level.

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

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

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

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

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

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

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

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

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

- a. Exceeds 0.5 % of treatment plant design capacity criteria and discharges <25,000 gallons per day; or
- b. Is a member of a group of similar industrial users which, taken together, have the potential to cause pass through or interference at the POTW (e.g. facilities which develop photographic film or paper, and car washes).

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

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

cleanup procedures. The QL is calculated by multiplying the MDL by 3.18 and rounding the result to the number nearest to  $(1, 2, \text{ or } 5) \times 10^n$ , where  $n$  is an integer (64 FR 30417).

**ALSO GIVEN AS:**

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

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

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

**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<sub>5</sub>** -- 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<sub>5</sub> 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<sub>5</sub> test is sufficient to remove the particulate organic fraction.

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

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

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

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

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

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

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

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

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

**CSO Related Terminology:**

**Combined Sewer Overflow (CSO)** -- An event during which excess combined sewage flow caused by inflow is discharged from a combined sewer, rather than conveyed to the sewage treatment plant because either the capacity of the treatment plant or the combined sewer is exceeded.

**Event** -- A CSO event is defined as a 24-hour minimum inter-event time for a CSO outfall.

**Inter-Event Time (IET)** -- The dry period or time steps between storm or CSO events. A CSO event is defined as a 24-hour minimum inter-event time for a CSO outfall.

**Minimum Inter-Event Time (MIET)** -- The amount of dry time or non-overflow time required to indicate a storm event or CSO event is independent ( $CV = 1$ ).

**Storm Duration** -- The time from the first wet time step at the beginning of the storm event to the last wet time step ending the event.

**Storm Event** -- A period of rainfall separated from other wet time steps by a dry period equal to or greater than the minimum precipitation inter-event time.

**Storm Inter-Arrival Time** -- The time from the beginning of one storm event to the beginning of the next storm event (equal to one storm duration and one inter-event time).

**Threshold Rainfall** -- The amount of rainfall necessary to cause runoff. In the Portland, Oregon area this varies from 0.05 to 0.1 inch, depending on length of the storm.

**Wet Time Steps** -- A time increment in a precipitation record in which a measurable amount of precipitation occurs. The measurable amount may be defined as threshold rainfall.

## Appendix D--West Plant Monitoring Frequency Reduction Analysis

Ecology's *Permit Writer's Manual* (PWM) recommends minimum monitoring based on the size and complexity of the facility. The guidelines in the PWM also provides for reduction in monitoring frequency based on the facility's performance in the two years preceding renewal. Reduction of monitoring frequency is generally granted at time of permit renewal by examination of performance in the two years preceding the permit renewal. The amount of reduction is dependent upon the ratio of performance for the last two years to the monthly average effluent limitation. The allowable monitoring frequency is shown in Table 1 below:

**Table 1. Allowable Monitoring Frequency Based on Ratio of Long Term Effluent Average to the Average Monthly limit**

Baseline Monitoring Frequency	Ratio of Long Term Average (LTA) to Average Monthly Limit (AML) (LTA/AML)			
	75-66%	65-50%	49-25%	<25%
	<b>Allowable Monitoring Frequency based on LTA/AML</b>			
5/week	4/week	3/week	2/week	1/week
7/week	5/week	4/week	3/week	1/week

The EXCEL spreadsheet on the following page shows the LTA/AML ratio for BOD<sub>5</sub>, TSS and fecal coliform based on Bremerton's West Plant monitoring data from January 2011 through November 2012. Table 2 below shows comparison of : (i) Recommended Minimum Monitoring Requirements in PWM, (ii) Allowable Monitoring Frequency based on LTA/AML ratio, and (iii) Monitoring Frequency in the proposed permit.

**Table 2. Comparison of PWM Recommended Monitoring Frequency, Allowable Monitoring Frequency, and Monitoring Frequency in the Proposed Permit**

Parameter	Unit	LTA/AML (%)	PWM Recommended Monitoring Frequency	Allowable Monitoring Frequency based on LTA/AML	Monitoring Frequency in the Proposed Permit
BOD <sub>5</sub>	mg/L	30%	5/week	2/week	3/week
BOD <sub>5</sub>	lbs/day	16%	5/week	1/week	3/week
TSS	mg/L	26%	5/week	2/week	3/week
TSS	lbs/day	15%	5/week	1/week	3/week
Fecal Coliform	#/100 mL	24%	7/week	1/week	5/week

Bremerton West Plant Monitoring Data - January 2011 through November 2012					
Date	BOD5 (mg/L)	BOD5 (lbs/day)	TSS (mg/L)	TSS (lbs/day)	Fecal Coliform (#/100ml)
	Monthly Avg	Monthly Avg	Monthly Avg	Monthly Avg	Geo Mean
Jan-11	9	371	9	394	24
Feb-11	11	406	7	289	51
Mar-11	8	670	9	774	59
Apr-11	5	204	7	259	67
May-11	6	206	8	264	30
Jun-11	7	217	7	196	17
Jul-11	8	213	6	172	10
Aug-11	7	177	7	174	12
Sep-11	8	218	7	212	14
Oct-11	8	271	9	302	57
Nov-11	15	1391	15	1323	51
Dec-11	11	529	6	247	56
Jan-12	9	500	7	443	106
Feb-12	7	295	5	240	130
Mar-12	6	314	7	443	100
Apr-12	5	214	6	227	135
May-12	9	334	10	370	70
Jun-12	8	267	7	262	73
Jul-12	10	294	6	186	41
Aug-12	19	667	10	350	95
Sep-12	9	264	6	171	45
Oct-12	12	626	8	374	69
Nov-12	10	896	9	840	54
LTA *	9	415	8	370	48
AML *	30	2527	30	2527	200
LTA/AML (%)	30	16	26	15	24
* LTA is the Long Term Average and AML is the Average Monthly Limit					

## Appendix E--Technical Calculations

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

### 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 (MC) is based on the following calculation:

$$MC = [EC + (AC \times DF)] \div (1 + DF)$$

where:

EC = Effluent Concentration

AC = Ambient Concentration

DF = Dilution Factor

### Reasonable Potential Analysis:

The spreadsheets REASPOT.XLS, and LIMIT.XLS in Ecology's TSDCALC Workbook determine reasonable potential (to violate the aquatic life water quality standards) and calculate effluent limits. The spreadsheet also determines reasonable potential for human health pollutants and calculates 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).

<b>BREMERTON WEST PLANT</b>	
<i>Calculation of Fecal Coliform at Chronic Mixing Zone</i>	
<b>INPUT</b>	
Chronic Dilution Factor	127
Ambient Fecal Coliform, #/100 ml	4
Effluent Fecal Coliform - worst case, #/100 ml	400
Surface Water Criteria, #/100 ml	14
<b>OUTPUT</b>	
<b>Fecal Coliform at Mixing Zone Boundary, #/100 ml</b>	<b>7</b>
Difference between mixed and ambient, #/100 ml	3
<b>Conclusion: At design flow, the discharge has no reasonable potential to violate water quality standards for fecal coliform.</b>	

<b>BREMERTON WEST PLANT</b>	
<b>Marine Un-ionized Ammonia Criteria Calculation</b>	
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.	
<b>INPUT</b>	
1. Receiving Water Temperature, deg C (90th percentile):	14.3
2. Receiving Water pH, (90th percentile):	8.20
3. Receiving Water Salinity, g/Kg (90th percentile):	29.90
4. Pressure (atm; EPA criteria assumes 1 atm):	1.0
5. Unionized ammonia criteria (mg un-ionized NH <sub>3</sub> per liter)	
from EPA 440/5-88-004	
Acute:	0.233
Chronic:	0.035
<b>OUTPUT</b>	
1. Molal Ionic Strength (not valid if >0.85):	0.614
2. pKa8 at 25 deg C (Whitfield model "B"):	9.316
3. Percent of Total Ammonia Present as Unionized:	3.4%
4. Total Ammonia Criteria (mg/L as NH <sub>3</sub> )	
Acute:	6.94
Chronic:	1.04
<b>RESULTS</b>	
<b>Total Ammonia Criteria (mg/L as NH<sub>3</sub>-N)</b>	<b>0.82</b>
<b>Acute:</b>	<b>5.70</b>
<b>Chronic:</b>	<b>0.86</b>

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BREMERTON WEST PLANT										These values are used on other tabs:			
										Amb. Temperature, °C		14.28	
										Amb. pH		8.2	
										Amb. Salinity, psu		29.9	

Reasonable Potential Calculation										Facility		BREMERTON WEST PLANT			
Water Body Type		Marine													
Dilution Factors:		Acute		Chronic											
Aquatic Life		20		127											
Human Health Carcinogenic				127											
Human Health Non-Carcinogenic				127											
Pollutant, CAS No. & NPDES Application Ref. No.		<div>AMMONIA, Criteria as Total NH3</div> <div>CHLORINE (Total Residual) 7782505</div> <div>CYANIDE 57125 14M</div> <div>ARSENIC (dissolved) 7440382 2M</div> <div>CHROMIUM(HEX) 18540299</div> <div>COPPER - 744058 6M Hardness dependent</div> <div>LEAD - 7439921 7M Dependent on hardness</div> <div>MERCURY 7439976 8M</div> <div>NICKEL - 7440020 9M - Dependent on hardness</div> <div>SELENIUM 7782492 10M</div> <div>THALLIUM 7440280 12M</div> <div>ZINC- 7440666 13M hardness dependent</div>													
Effluent Data		# of Samples (n)	71	366	3	13	13	13	13	13	13	3	3	13	
		Coeff of Variation (Cv)	0.33	0.6	0.6	0.6	0.6	0.26	0.6	0.6	0.32	0.6	0.6	0.32	
		Effluent Concentration, ug/L (Max. or 95th Percentile)	36,300	185	49	2.4	3.4	6.2	0.3	0.0097	7.1	0.003	0.0005	30	
		Calculated 50th percentile Effluent Conc. (when n>10)							0.0016	0.0047					
Ambient Data		90th Percentile Conc., ug/L	0	0	0	0	0	0	0	0	0	0	0	0	
		Geo Mean, ug/L													
Water Quality Criteria		Aquatic Life Criteria, ug/L	Acute	5,704	13	9.1	69	1100	4.8	210	1.8	74	290	-	90
			Chronic	857	7.5	2.8	36	50	3.1	8.1	0.025	8.2	71	-	81
		WQ Criteria for Protection of Human Health, ug/L		-	-	220000	-	-	-	-	0.15	4600	4200	6.3	-
		Metal Criteria	Acute	-	-	1	0.993	0.83	0.951	0.85	0.99	-	-	0.946	
		Translator, decimal	Chronic	-	-	-	0.993	0.83	0.951	-	0.99	-	-	0.946	
		Carcinogen?		N	N	Y	N	N	N	N	N	N	N	N	
Aquatic Life Reasonable Potential															
s			0.3215	0.5545	0.5545	0.5545	0.5545	0.2558	0.5545	0.5545	0.3122	0.5545	0.5545	0.312233	
Pn			0.9587	0.9918	0.3684	0.7942	0.7942	0.7942	0.7942	0.7942	0.7942	0.3684		0.794183	
Multiplier			1.00	1.00	3.00	1.58	1.58	1.23	1.58	1.58	1.29	3.00	3.00	1.29	
Max concentration (ug/L) at edge of...		Acute	1,815	9.250	7.349	0.190	0.267	0.318	0.023	0.001	0.455	0.000		1.835	
		Chronic	286	1.4567	1.1574	0.0298	0.0420	0.0500	0.0035	0.0001	0.0716	0.0001		0.2890	
Reasonable Potential? Limit Required?			NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	n/a	NO	
Human Health Reasonable Potential															
s					0.5545					0.5545	0.3122	0.5545	0.5545		
Pn			0.959	0.992	0.368	0.794	0.794	0.794	0.794	0.794	0.794	0.368		0.794	
Multiplier					1.2049					1	1	1.2049	1.2049		
Dilution Factor			127	127	127	127	127	127	127	127	127	127	127	127	
Max Conc. at edge of Chronic Zone, ug/L					0.4649					1E-05	4E-05	3E-05	5E-06		
Reasonable Potential? Limit Required?			n/a	n/a	NO	n/a	n/a	n/a	n/a	NO	NO	NO	NO	n/a	
References: WAC 173-201A.															
Technical Support Document for Water Quality-based Toxics Control, US EPA, March 1991, EPA/505/2-90-001, pages 56/99															
NOTE: Since the dilution factor (DF) for Human Health Carcinogenic (HHC) chemicals is not available, it was assumed to be the same as the DF for human health non-carcinogenic (HHNC) chemicals. This is a conservative assumption because HHC DF is always less than HHNC DF.															

BREMERTON WEST PLANT				These values are used on other tabs:			
				Amb. Temperature, °C		14.28	
				Amb. pH		8.2	
				Amb. Salinity, psu		29.9	
<b>Reasonable Potential Calculation</b>							
Water Body Type		Marine		Facility		BREMERTON WEST PLANT	
<b>Dilution Factors:</b>		Acute		Chronic			
Aquatic Life		20		127			
Human Health Carcinogenic				127			
Human Health Non-Carcinogenic				127			
Pollutant, CAS No. & NPDES Application Ref. No.		BROMOFORM 75252 5V		CARBON TETRACHLORIDE 56235 6V		CHLOROFORM 67663 11V	
		DICHLOBROMOMETHANE 75274 12V		1,4 DICHLOBENZENE 106467 22B		DIMETHYLPHTHALATE 131113 25B	
		PHENOL 108952 10A					
Effluent Data		# of Samples (n)		3		3	
		Coeff of Variation (Cv)		0.6		0.6	
		Effluent Concentration, ug/L (Max. or 95th Percentile)		0.52		0.22	
		Calculated 50th percentile Effluent Conc. (when n>10)					
Ambient Data		90th Percentile Conc., ug/L		0		0	
		Geo Mean, ug/L					
Water Quality Criteria		Aquatic Life Criteria, ug/L		Acute		Chronic	
		WQ Criteria for Protection of Human Health, ug/L		360		4.4	
		Metal Criteria		Acute		Chronic	
		Translator, decimal		-		-	
		Carcinogen?		Y		Y	
Human Health Reasonable Potential		s		0.5545		0.5545	
		Pn		#DIV/0!		0.368	
		Multiplier		1.2049		1.2049	
		Dilution Factor		127		127	
		Max Conc. at edge of Chronic Zone, ug/L		0.0049		0.0021	
Reasonable Potential? Limit Required?		NO		NO		NO	
References:		WAC 173-201A.					
		Technical Support Document for Water Quality-based Toxics Control, US EPA, March 1991, EPA/505/2-90-001, pages 56/99.					
NOTE: Since the dilution factor (DF) for Human Health Carcinogenic (HHC) chemicals is not available, it was assumed to be the same as the DF for human health non-carcinogenic (HHNC) chemicals. This is a conservative assumption because HHC DF is always less than HHNC DF.							



BREMERTON WEST PLANT	
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: <a href="http://www.ecy.wa.gov/biblio/0610100.html">http://www.ecy.wa.gov/biblio/0610100.html</a>	
INPUT	
1. Chronic Dilution Factor at Mixing Zone Boundary	127
2. Annual max 1DADMax Ambient Temperature (Background 90th percentile)	14.3 °C
3. 1DADMax Effluent Temperature (95th percentile)	20.0 °C
4. Aquatic Life Temperature WQ Criterion	16.0 °C
OUTPUT	
5. Temperature at Chronic Mixing Zone Boundary:	14.33 °C
6. Incremental Temperature Increase or decrease:	0.05 °C
7. Incremental Temperature Increase $12/(T-2)$ if $T \leq \text{crit}$ :	0.98 °C
8. Maximum Allowable Temperature at Mixing Zone Boundary:	15.26 °C
<b>A. If ambient temp is warmer than WQ criterion</b>	
9. Does temp fall within this warmer temp range?	NO
10. Temp increase allowed at mixing zone boundary, if required:	---
<b>B. If ambient temp is cooler than WQ criterion but within <math>12/(T_{\text{amb}}-2)</math> and within 0.3 °C of the criterion</b>	
11. Does temp fall within this incremental temp. range?	NO
12. Temp increase allowed at mixing zone boundary, if required:	---
<b>C. If ambient temp is cooler than (WQ criterion-0.3) but within <math>12/(T_{\text{amb}}-2)</math> of the criterion</b>	
13. Does temp fall within this Incremental temp. range?	NO
14. Temp increase allowed at mixing zone boundary, if required:	---
<b>D. If ambient temp is cooler than (WQ criterion - <math>12/(T_{\text{amb}}-2)</math>)</b>	
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	
<i>Calculation of Fecal Coliform at Chronic Mixing Zone</i>	
INPUT	
Chronic Dilution Factor	467
Ambient 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
<b>Conclusion: At design flow, the discharge has no reasonable potential to violate water quality standards for fecal coliform.</b>	

BREMERTON EAST PLANT	
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):	16.0
2. Receiving Water pH, (90th percentile):	8.2
3. Receiving Water Salinity, g/kg (90th percentile):	30.2
4. Pressure, atm (EPA criteria assumes 1 atm):	1.0
5. Unionized ammonia criteria (mg un-ionized NH <sub>3</sub> per liter)	
from EPA 440/5-88-004	
Acute:	0.233
Chronic:	0.035
OUTPUT	
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:	3.8%
4. Total Ammonia Criteria (mg/L as NH <sub>3</sub> ):	
Acute:	6.15
Chronic:	0.92
RESULTS	
<b>Total Ammonia Criteria (mg/L as N)</b>	
Acute:	5.06
Chronic:	0.76

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BREMERTON EAST PLANT										These values are used on other tabs:						
										Receiving Water Temp, °C		15.96				
										Receiving Water pH		8.2				
										Receiving Water Salinity, psu		30.15				
<b>Reasonable Potential Calculation</b>																
Water Body Type		Marine														
<b>Dilution Factors:</b>		<b>Acute Chronic</b>														
Aquatic Life		51 467														
Human Health Carcinogenic		467														
Human Health Non-Carcinogenic		467														
<b>Pollutant, CAS No. &amp; NPDES Application Ref. No.</b>		<b>AMMONIA, Criteria as Total NH3</b>	<b>ARSENIC (dissolved) 7440382 2M</b>	<b>CHROMIUM(HEX) 18540299</b>	<b>COPPER - 744058 6M Hardness dependent</b>	<b>LEAD - 7439921 7M Dependent on hardness</b>	<b>NICKEL - 7440020 9M - Dependent on hardness</b>	<b>ZINC- 7440666 13M hardness dependent</b>								
<b>Effluent Data</b>	# of Samples (n)	32	6	6	6	6	6	6								
	Coeff of Variation (Cv)	0.43	0.6	0.6	0.6	0.6	0.6	0.6								
	Effluent Concentration, ug/L (Max. or 95th Percentile)	7,300	2.5	1.9	8.43	2.66	2.4	60.2								
	Calculated 50th percentile Effluent Conc. (when n>10)															
<b>Receiving Water Data</b>	90th Percentile Conc., ug/L	0	0	0	0	0	0	0								
	Geo Mean, ug/L															
<b>Water Quality Criteria</b>	Aquatic Life Criteria, ug/L	Acute	5,061	69	1100	4.8	210	74	90	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
		Chronic	760	36	50	3.1	8.1	8.2	81	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
	WQ Criteria for Protection of Human Health, ug/L		-	-	-	-	-	4600	-							
	Metal Criteria	Acute	-	1	0.993	0.83	0.951	0.99	0.946	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
	Translator, decimal	Chronic	-	-	0.993	0.83	0.951	0.99	0.946	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
	Carcinogen?		N	Y	N	N	N	N	N							
<b>Aquatic Life Reasonable Potential</b>																
s		0.412	0.555	0.555	0.555	0.555	0.555	0.555								
Pn		0.911	0.607	0.607	0.607	0.607	0.607	0.607	#DIV/0!	#DIV/0!	#REF!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	
Multiplier		1.00	2.14	2.14	2.14	2.14	2.14	2.14								
Max concentration (ug/L) at edge of...	Acute	143	0.105	0.079	0.294	0.106	0.100	2.392	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	
	Chronic	16	0.011	0.009	0.032	0.012	0.011	0.261	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	
<b>Reasonable Potential? Limit Required?</b>		<b>NO</b>	<b>NO</b>	<b>NO</b>	<b>NO</b>	<b>NO</b>	<b>NO</b>	<b>NO</b>								
<b>Human Health Reasonable Potential</b>																
s							0.55451									
Pn		0.911	0.607	0.607	0.607	0.607	0.607	0.607	#DIV/0!	#DIV/0!	#REF!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	
Multiplier							0.86028									
Dilution Factor		467	467	467	467	467	467	467	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	
Max Conc. at edge of Chronic Zone, ug/L							0.00442									
<b>Reasonable Potential? Limit Required?</b>		<b>NO</b>														

BREMERTON EAST PLANT	
<b>Marine Temperature Reasonable Potential and Limit Calculation - October through April</b>	
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: <a href="http://www.ecy.wa.gov/biblio/0610100.html">http://www.ecy.wa.gov/biblio/0610100.html</a>	
<b>INPUT</b>	
1. Chronic Dilution Factor at Mixing Zone Boundary	467
2. Annual max 1DADMax Ambient Temperature (Background 90th percentile)	11.2 °C
3. 1DADMax Effluent Temperature (95th percentile)	15.4 °C
4. Aquatic Life Temperature WQ Criterion	16.0 °C
<b>OUTPUT</b>	
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 $T \leq \text{crit}$ :	1.30 °C
8. Maximum Allowable Temperature at Mixing Zone Boundary:	12.50 °C
<b>A. If ambient temp is warmer than WQ criterion</b>	
9. Does temp fall within this warmer temp range?	NO
10. Temp increase allowed at mixing zone boundary, if required:	---
<b>B. If ambient temp is cooler than WQ criterion but within <math>12/(T_{\text{amb}}-2)</math> and within 0.3 °C of the criterion</b>	
11. Does temp fall within this incremental temp. range?	NO
12. Temp increase allowed at mixing zone boundary, if required:	---
<b>C. If ambient temp is cooler than (WQ criterion-0.3) but within <math>12/(T_{\text{amb}}-2)</math> of the criterion</b>	
13. Does temp fall within this Incremental temp. range?	NO
14. Temp increase allowed at mixing zone boundary, if required:	---
<b>D. If ambient temp is cooler than (WQ criterion - <math>12/(T_{\text{amb}}-2)</math>)</b>	
15. Does temp fall within this Incremental temp. range?	YES
16. Temp increase allowed at mixing zone boundary, if required:	NO LIMIT
<b>RESULTS</b>	
17. Do any of the above cells show a temp increase?	NO
18. Temperature Limit if Required?	NO LIMIT

## Appendix F--Response to Comments

During the 30-day public notice period for this permit, Ecology received comments from the Washington State Department of Health (WDOH) - Shellfish Program, and the City of Bremerton's WWTP staff.

WDOH's comment received via email is included in this Appendix. This comment points out that a combination of field studies and predictive modeling were the basis for the shellfish growing area upgrade in Dyes Inlet. Ecology acknowledges the comment and it is made a part of this Fact Sheet for the administrative record.

Bremerton's comments via two separate letters are also included in this appendix. The proposed permit requires monthly monitoring of nutrients (ammonia, nitrite/nitrate, TKN, soluble reactive phosphorus, and total phosphorus) in the effluent, through the permit cycle (Permit Condition S2.A.4). The previous permit did not require monitoring for nitrite/nitrate and soluble reactive phosphorus and gave the option of monitoring TKN or total nitrogen. Bremerton is requesting that monthly nutrients monitoring be initially reduced to two years during the permit cycle. As stated in the letter, the reason for this request is that this would give Ecology 24 statistical data points, which is adequate to develop an analytical baseline.

Ecology's current policy requires monthly monitoring of nutrients in the effluent for plants with greater than 1.0 MGD design flow that discharge to marine waters. Under this policy, the Permittee can request Ecology to reduce or eliminate monitoring of the above-mentioned parameters after 2 years of data collection, provided the data shows low variability. Since there are a few new nutrient parameters (nitrite/nitrate and soluble reactive phosphorus) included in this permit that were not in the previous permit and we do not know that the future data will show low variability, Ecology is maintaining the requirement to conduct monthly nutrient monitoring for the life of the permit, at this time. However, the Permittee can make a request for a reduction in monitoring in the future as allowed by Condition S2.G, *Request for Reduction in Monitoring*, of this permit. As required by this condition, the Permittee must (i) provide a written request, (ii) clearly state the parameters for which it is requesting reduced monitoring, and (iii) clearly state the justification for the reduction.

Comments received via email from the Washington State Department of Health (WDOH) - Shellfish Program

**From:** Toy, Mark C (DOH)

**Sent:** Thursday, April 25, 2013 9:26 AM

**To:** Thompson, Cheryl (ECY)

**Cc:** Dawda, Mike (ECY)

**Subject:** RE: Announcement of Availability of Draft Wastewater Permit for City of Bremerton

Hi Cheryl, Mike – I skimmed the draft NPDES Permit and it looks fine. I have one comment on the draft Fact Sheet.

Page 14 of the draft Fact Sheet states:

‘Approximately one and a half years after the City put the plant in operation, WA State Department of Health (DOH), Shellfish Program, conducted a dye test to determine the fate and transport of the effluent from the East Plant. The study resulted in DOH conditionally opening previously closed shellfish beds in Dyes Inlet.’

Here’s what our 2003 Sanitary Survey (which was the basis for upgrading north Dyes Inlet) states:

‘The City of Bremerton has significantly reduced the frequency and quantity of combined sewage overflows (CSOs) since 1996. CSO modeling work was conducted through the ENVIRONMENTAL INVESTMENT (ENVVEST) project, which was initiated with the Puget Sound Naval Shipyard (PSNS), the Environmental Protection Agency (EPA) and the Department of Ecology. The results of field studies and the predictive model developed by the ENVVEST project predict that CSOs associated with major rain storms reach the intertidal shellfish beds in the North Dyes Inlet growing area. However, the model output indicates a very large dilution of these CSOs, sufficient to not cause the bacteriological shellfish water quality criterion to be exceeded. The results from this ENVVEST model, combined with the reduction in CSOs in recent years, provide the basis and information to allow the Department of Health to consider upgrading the classification of portions of northern Dyes Inlet.’

So, it was a combination of field studies and predictive modeling that were the basis for the growing area upgrade. It was actually a drogue, not a dye study that was the basis for setting the sanitary line. Attachment B of the 2003 Sanitary Survey states:

“DOH will not allow the commercial harvest of shellfish on the shoreline between Windy Point and the Port Washington Narrows, based on the close approach of drogues to this shoreline from drogue releases in the Narrows in October 2000. The transit pathways of these drogues indicate that CSOs from the Narrows can travel rapidly to, and remain near this area of shoreline.”

Maybe more information than you want, but I would just change that sentence on page 14 to include the ENVVEST modeling and generalize the dye test to ‘field studies’. Thanks.

Letters/Comments received from the City of Bremerton



May 8, 2013

WA State DOE  
NW Regional Office  
3190 - 160<sup>th</sup> Ave. SE  
Bellevue, WA 98008-5452

ATTN: Permit Coordinator

This letter is in regards to commenting on the current draft NPDES Permit (WA0029289) for the City of Bremerton's wastewater treatment systems.

On page 9, (4) Effluent Characterization - Final Wastewater Effluent, the draft permit is requiring the City to analyze Total Phosphorus (TP) and Soluble Reactive Phosphorus (SRP) on a monthly basis, for the duration of the five year permit term.

The City of Bremerton is requesting that the testing requirements for TP & SRP be reduced to the following: Monthly testing as outlined in the draft permit, for a period of **two years** instead of the requested five years. This will give Ecology a historical baseline to compare with the existing Phosphorus analytical data, which the City of Bremerton has been conducting since 1999 (enclosed).

I appreciate the opportunity to comment on the draft NPDES Permit, and I would also appreciate a response to our request.

Respectfully,

Pat J Coxon  
Wastewater Manager  
City of Bremerton

CC: File



May 16, 2013

WA State DOE  
NW Regional Office  
3190 - 160<sup>th</sup> Ave. SE  
Bellevue, WA 98008-5452

ATTN: Permit Coordinator

This letter is in regards to commenting on the current draft NPDES Permit (WA0029289) for the City of Bremerton's wastewater treatment systems.

On page 9, (4) Effluent Characterization - Final Wastewater Effluent, the draft permit is requiring the City to analyze Total Ammonia, Nitrate+Nitrite Nitrogen and Total Kjeldahl Nitrogen (TKN) on a monthly basis, for the duration of the five year permit term.

The City of Bremerton is requesting that the testing requirements for Total Ammonia, Nitrate+Nitrite Nitrogen and TKN be reduced to the following: Monthly testing as outlined in the draft permit, for a period of two years instead of the requested five years.

This will give Ecology 24 statistical data points, which is adequate to develop a analytical baseline.

I appreciate the opportunity to comment on the draft NPDES Permit, and I would also appreciate a response to our request.

Respectfully,

*Pat J Coxon*

Pat J Coxon  
Wastewater Manager  
City of Bremerton

CC: File