

Fact Sheet for NPDES Permit WA0020702

Langley Wastewater Treatment Plant

Public Notice of Draft date: October 5, 2019

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 Langley Wastewater Treatment Plant (WWTP).

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

Ecology makes the draft permit and fact sheet available for public review and comment at least thirty (30) days before issuing the final permit. Copies of the fact sheet and draft permit for the Langley WWTP, NPDES permit no. WA0020702, are available for public review and comment from October 5, 2019, until November 6, 2019. For more details on preparing and filing comments about these documents, please see **Appendix A - Public Involvement Information**.

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

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

Summary

The City of Langley operates a 0.15 million gallons per day (MGD) sequencing batch reactor wastewater treatment plant. The facility discharges treated effluent to Saratoga Passage in Puget Sound. The proposed permit contains the same effluent limits for biochemical oxygen demand (BOD₅), total suspended solids (TSS), fecal coliform, pH, and total residual chlorine.

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I. Introduction

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

The following regulations apply to domestic wastewater NPDES permits:

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

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

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

II. Background Information

Table 1. General Facility Information

Facility Information	
Applicant	City of Langley
Facility Name and Address	Langley WWTP 4999 Coles Road Langley, WA 98260
Contact at Facility	Name: Randi Perry Title: Utilities Supervisor Telephone #: 360-221-4274
Responsible Official	Name: Tim Callison Title: Mayor Address: 112 Second Street Langley, WA 98260 Telephone #: 360-221-4246 x12
Type of Treatment	Secondary treatment – sequencing batch reactor
Facility Location (NAD83/WGS84 reference datum)	Latitude: 48.03007 Longitude: -122.421464
Discharge Waterbody Name and Location (NAD83/WGS84 reference datum)	Puget Sound – Saratoga Passage Latitude: 48.04389 Longitude: -122.40917
Permit Status	
Issuance Date of Previous Permit	July 30, 2014
Application for Permit Renewal Submittal Date	February 27, 2019
Date of Ecology Acceptance of Application	March 13, 2019
Inspection Status	
Date of Last Inspection	January 23, 2018

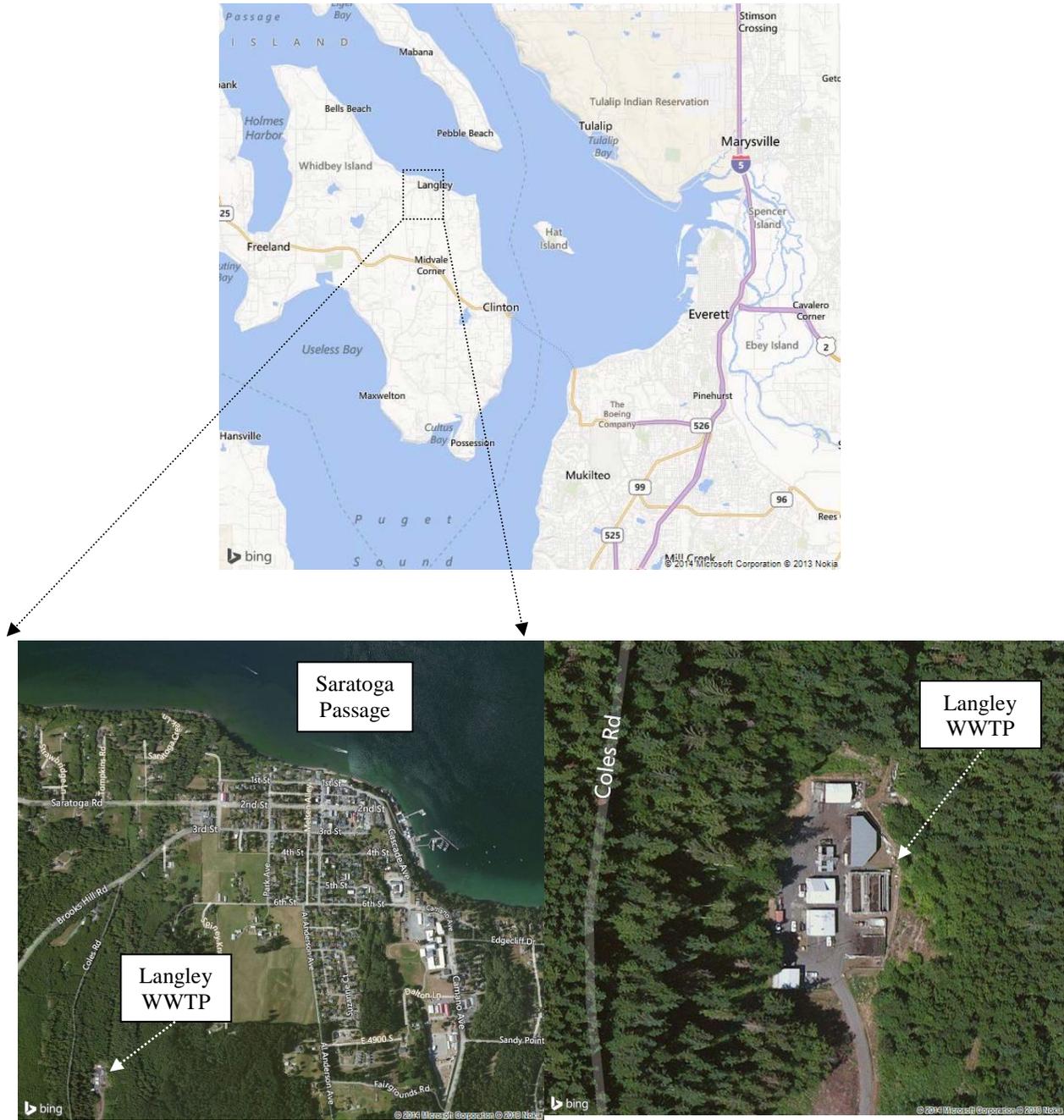


Figure 1. Facility Location Map

A. Facility description

History

The original wastewater treatment plant was constructed in 1963. The facility was located at the foot of Anthes Street near the shoreline of Puget Sound. The City built a chlorine contact chamber in 1973. The secondary wastewater treatment system, a sequencing batch reactor (SBR), was constructed in 1991-1992 at the current Langley WWTP site. The plant went online in October 1992. In 2012, an inline 3/8-inch bar screen was installed in the treatment plant headworks.

Collection system status

Three pump stations convey wastewater to the Langley WWTP. The sewer flows by gravity to the Sunrise Beach Pump Station where it pumps wastewater to the old WWTP site (at the foot of Anthes Street). Then, Pump Station No. 1 (at the old WWTP site) pumps wastewater to Pump Station No. 2. Pump Station No. 2 pumps the wastewater to the Langley WWTP. In 2011, the City upgraded Pump Station No. 2 with new pumps (each 500 gpm) and discharge piping. WWTP operators are able to monitor pump operations at Pump Stations No. 1 and No. 2 from the WWTP control center. The Sunrise Beach Pump Station has a generator plug-in for use with a portable generator. Pump Stations No. 1 and No. 2 have permanent generators installed.

The City investigated sources of inflow and infiltration (I/I) in the 2015 General Sewer Plan (PACE Engineers). In 2017, the City submitted an I/I evaluation which referred to the 2015 General Sewer Plan for I/I minimization projects. The 2017 I/I evaluation outlined actions the City has taken and plans to take to address I/I issues, including:

- Prioritizing of sewer improvements to reduce high flows to the WWTP after rain events.
- Working with City council to plan for funding to complete projects.
- Increasing rates to fund the highest priority sewer system repairs and replacements.
- Replacing manhole covers.
- Working with customers to inspect side sewers that are thought to be major contributors of inflow.

During a January 2018 Class I inspection, the City stated that further study of key sewer lines would be completed to confirm prioritization of improvement projects. However, due to current budgeting, the City may not be able to complete as many sewer improvements as outlined in the 2015 General Sewer Plan. Currently, the Langley WWTP is operating under the design flow and I/I is not having an adverse effect on treatment.

Flows to the plant are predominantly residential with some restaurants. No significant industrial users contribute to the system.

Treatment processes

The influent passes through a grit chamber, Parshall flume, and 3/8-inch bar screen with screenings washer and compactor. Following screening, wastewater flows by gravity to one-of-two SBR basins (171,600 gallons each). Flows alternate between the two SBRs; one

processes wastewater while the other fills with wastewater. The SBR processes the wastewater with about 5 to 6 cycles a day. Each cycle includes fill, react (alternating aeration and anoxic mixing), settling, decant, and idle.

Effluent is decanted from the top of the SBRs to one of two chlorine contact chambers for a contact time of at least one hour. Both contact chambers are usually in operation and are cleaned every 6 months. Each chamber can be isolated for cleaning or operation. Chlorine gas is used for disinfection. Effluent flows by gravity from the chlorine chambers to the outfall line and eventually to the Saratoga Passage in Puget Sound. Effluent flow is measured by an ultra-sonic flow meter. The Langley WWTP schematic process flow diagram is shown in **Appendix E**.

Solid wastes/Residual solids

The treatment facilities remove solids during the treatment of the wastewater at the headworks (grit and screenings) and incidental solids (rags, scum, and other debris) removed as part of the routine maintenance of the equipment. The Langley WWTP drains grit, rags, and screenings and disposes this solid waste at the local landfill.

Solids from the SBRs are pumped to one of two aerobic digesters (25,600 gallons each). Supernatant from the digesters is routed to an on-site manhole where submersible pumps convey supernatant to the influent channels. The operators remove grit from the digesters annually. Solids from the digester are pumped by a positive displacement sludge pump to a belt filter press unit for dewatering. Polymer is fed into the influent line to the belt filter press to produce dewatered solids. Dewatered solids are then combined with local green waste, composted, and given away to the public as usable compost (Class A compost).

The Langley WWTP also accepts septic sewage for treatment from septic hauling trucks (~10,000 gallons per month). In 2011, the City installed septage screening equipment to pre-treat the septic sewage and to meet the 3/8-inch screening requirement prior to entering the SBRs.

Discharge outfall

Effluent is discharged to Puget Sound – Saratoga Passage through a 7,200-foot, 12-inch outfall pipe. The final 1,000 feet is offshore and terminates at a depth of 40 feet below mean lower low water (MLLW). The outfall is equipped with a 43.5-foot long diffuser containing 10 3-inch diffuser ports, alternating sides. The first six ports are 5 feet apart and the last three are 4.5 feet apart. The final diffuser port is on the end plate. The majority of the outfall pipe is constructed of ductile iron. The final 100 feet of the outfall and diffuser are HDPE pipe. In 2012, the City conducted an outfall inspection. The inspection included the ductile iron and HDPE segments of the outfall pipe. The ductile iron segment showed signs of corrosion but no leaks were present.

Staff

The Langley WWTP is classified as a Class II facility. A Group III and Group II operator are the full-time operators. One Group I operators from the City Public Works Department assists with WWTP operations. One operator is always on call during off hours which includes evenings, weekends, and holidays.

B. Description of the receiving water

The Langley WWTP discharges to Puget Sound – Saratoga Passage. There are various stormwater outfalls nearby.

The ambient background data used for this permit includes the following from the ambient water quality monitoring station SAR003 at Saratoga Passage – East Point. Data can be found on Ecology’s EIM database, <https://fortress.wa.gov/ecy/eimreporting/>.

Table 2. Ambient Background Data

Parameter	Value
Temperature (90 th percentile 1-DMax)	11.9 °C
Temperature (maximum)	18.4 °C
pH (minimum, 90 th percentile, maximum)	7.1, 7.9, 8.8 standard units
Dissolved Oxygen (average, 5 th percentile)	6.5, 4.6 mg/L
Fecal Coliform (maximum)	6/100 mL
Salinity (average)	29.3 PSU

C. Wastewater influent characterization

The Langley WWTP reported the concentration of influent pollutants in discharge monitoring reports from September 2014 through January 2019. The influent wastewater is characterized as follows:

Table 3. Wastewater Influent Characterization

Parameter	Units	Average Value (of monthly averages)	Maximum Value (of all samples)
Flow	MGD	0.075	0.22
Biochemical Oxygen Demand (BOD ₅)	mg/L	376	909
BOD ₅	lbs/day	216	445
Total Suspended Solids (TSS)	mg/L	260	924
TSS	lbs/day	149	354

D. Wastewater effluent characterization

The Langley WWTP reported the concentration of pollutants in the discharge in the permit application and in discharge monitoring reports. The tabulated data represents the quality of the wastewater effluent discharged from September 2014 through January 2019. The wastewater effluent is characterized as follows:

Table 4. Wastewater Effluent Characterization

Parameter	Units	Average Value (of monthly averages)	Maximum Value (of weekly averages)
BOD ₅	mg/L	3.33	11.5
BOD ₅	lbs/day	5.61	16.4
TSS	mg/L	4.38	18.2
TSS	lbs/day	2.7	13.8
Total Residual Chlorine	mg/L	0.18	0.71

Parameter	Units	Maximum Monthly Geometric Mean	Maximum Weekly Geometric Mean
Fecal Coliform	#/100 mL	94	309

Parameter	Units	Minimum Value	Maximum Value
pH	standard units	6.4	7.2

ab	Units	Average Value	Maximum Value
Flow	MGD	0.076	0.27
Temperature	°C	20.6	26.0
Ammonia	mg/L as N	0.12	0.42
Nitrate+Nitrite	mg/L as N	17.3	28.3
Total Kjeldahl Nitrogen	mg/L as N	3.04	19
Dissolved Oxygen	mg/L	7.70	10.4
Oil and Grease	mg/L	0.95	2.1
Total Phosphorus	mg/L	4.08	4.53
Total Dissolved Solids	mg/L	324	354
Total Hardness	mg/L	108	113

E. Summary of compliance with previous permit issued July 30, 2014

The previous permit placed effluent limits on BOD₅, TSS, total residual chlorine, pH, and fecal coliform.

The Langley WWTP has complied with the effluent limits and permit conditions throughout the duration of the permit issued on July 30, 2014. 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.

The Langley WWTP submitted all required reports by the required due date. The following table summarizes compliance with report submittal requirements over the permit term.

Table 5. Permit Submittals

Submittal Name	Due Date	Date Received
Infiltration and Inflow Evaluation	5/15/2017	4/19/2017
Operations and Maintenance Manual Update	8/31/2016	8/24/2016
Application for Permit Renewal	2/28/2019	2/27/2019

F. State environmental policy act (SEPA) compliance

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

III. Proposed Permit Limits

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

- Technology-based limits are based upon the treatment methods available to treat specific pollutants. Technology-based limits are set by the EPA and published as a regulation, or Ecology develops the limit on a case-by-case basis (40 CFR 125.3, and chapter 173-220 WAC).
- Water quality-based limits are calculated so that the effluent will comply with the Surface Water Quality Standards (chapter 173-201A WAC), Ground Water Standards (chapter 173-200 WAC), Sediment Quality Standards (chapter 173-204 WAC), or the National Toxics Rule (40 CFR 131.36).
- Ecology must apply the most stringent of these limits to each parameter of concern. These limits are described below.

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

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

A. Design criteria

Under WAC 173-220-150 (1)(g), flows and waste loadings must not exceed approved design criteria. Ecology approved design criteria for this facility's treatment plant in the plans and specifications prepared by Gray & Osborne, Inc. (1991). The table below includes design criteria from the referenced document.

Table 6. Design Criteria for Langley WWTP

Parameter	Design Quantity
Maximum Month Design Flow (MMDF)	0.15 MGD
BOD ₅ Loading for Maximum Month	425 lb/day
TSS Loading for Maximum Month	425 lb/day

B. Technology-based effluent limits

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

The table below identifies technology-based limits for pH, fecal coliform, BOD₅, and TSS, as listed in chapter 173-221 WAC. Section III.F of this fact sheet describes the potential for water quality-based limits.

Table 7. Technology-based Limits

Parameter	Average Monthly Limit	Average Weekly Limit
BOD ₅ (concentration)	30 mg/L	45 mg/L
BOD ₅ (concentration)	In addition, the BOD ₅ effluent concentration must not exceed fifteen percent (15%) of the average influent concentration.	
TSS (concentration)	30 mg/L	45 mg/L
TSS (concentration)	In addition, the TSS effluent concentration must not exceed fifteen percent (15%) of the average influent concentration.	
Chlorine	0.5 mg/L	0.75 mg/L

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

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

Ecology derived the technology-based monthly average limit for chlorine from standard operating practices. The Water Pollution Control Federation's *Chlorination of Wastewater* (1976) states that a properly designed and maintained wastewater treatment plant can achieve adequate disinfection if a 0.5 mg/L chlorine residual is maintained after fifteen minutes of contact time. See also Metcalf and Eddy, *Wastewater Engineering, Treatment, Disposal and Reuse*, Third Edition, 1991. A treatment plant that provides adequate chlorination contact time can meet the 0.5 mg/L chlorine limit on a monthly average basis. According to WAC 173-221-030(11)(b), the corresponding weekly average is 0.75 mg/L.

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 BOD₅ and Total Suspended Solids as follows:

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

where:

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

DF = Maximum Monthly Average Design flow (MGD)

CF = Conversion factor of 8.34

Table 8. Technology-based Mass Limits

Parameter	Concentration Limit (mg/L)	Mass Limit (lbs/day)
BOD ₅ Monthly Average	30	38
BOD ₅ Weekly Average	45	56
TSS Monthly Average	30	38
TSS Weekly Average	45	56

C. Surface water quality-based effluent limits

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

Numerical criteria for the protection of aquatic life and recreation

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

Numerical criteria for the protection of human health

In 1992, U.S. EPA published 91 numeric water quality criteria for the protection of human health that are applicable to dischargers in Washington State in its National Toxics Rule (40 CFR (EPA, 1992)). Ecology submitted a standards revision for 192 new human health criteria for 97 pollutants to EPA on August 1, 2016. In accordance with requirements of CWA section 303(c)(2)(B), EPA finalized 144 new and revised Washington specific human health criteria for priority pollutants, to apply to waters under Washington's jurisdiction. EPA approved 45 human health criteria as submitted by Washington. The EPA took no action on Ecology submitted criteria for arsenic, dioxin, and thallium. The existing criteria for these three pollutants as adopted in the National Toxics Rule (40 CFR 131.36) remain in effect.

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

Narrative criteria

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

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

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

Antidegradation

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

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

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

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

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

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

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

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

Mixing zones

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

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

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

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

The mixing zone analysis produces a numerical value called a dilution factor (DF). A dilution factor represents the amount of mixing of effluent and receiving water that occurs at the boundary of the mixing zone. For example, a dilution factor of 4 means the effluent is 25% and the receiving water is 75% of the total volume of water at the boundary of the mixing zone. Ecology uses dilution factors with the water quality criteria to calculate reasonable potentials and effluent limits. Water quality standards include both aquatic life-based criteria and human health-based criteria. The former are applied at both the acute and chronic mixing zone boundaries; the latter are applied only at the chronic boundary. The concentration of pollutants at the boundaries of any of these mixing zones may not exceed the numerical criteria for that zone.

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

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

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

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

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

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

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

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

3. Ecology must consider critical discharge conditions.

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

Critical discharge conditions are those conditions that result in reduced dilution or increased effect of the pollutant. Factors affecting dilution include the depth of water, the density stratification in the water column, the currents, and the rate of discharge. Density stratification is determined by the salinity and temperature of the receiving water. Temperatures are warmer in the surface waters in summer. Therefore, density stratification is generally greatest during the summer months. Density stratification affects how far up in the water column a freshwater plume may rise. The rate of mixing is greatest when an effluent is rising. The effluent stops rising when the mixed effluent is the same density as the surrounding water. After the effluent stops rising, the rate of mixing is much more gradual. Water depth can affect dilution when a plume might rise to the surface when there is little or no stratification. Ecology uses the water depth at mean lower low water (MLLW) for marine waters. Ecology’s *Permit Writer’s Manual* describes additional guidance on criteria/design conditions for determining dilution factors. The manual can be obtained from Ecology’s website at:

<https://fortress.wa.gov/ecy/publications/documents/92109.pdf>

Table 9. Critical Conditions Used to Model the Discharge

Critical Condition	Value
Water depth at MLLW	40 feet
Density profile with a difference of 8.6 sigma-t units between -40 feet MLLW and the surface	
10 th or 90 th percentile current speeds for acute mixing zone	0.114-0.116 m/sec
50 th percentile current speeds for chronic and human health mixing zones	0.185-0.186 m/sec
Maximum average monthly effluent flow for chronic and human health non-carcinogen	0.10 MGD
Maximum daily flow for acute mixing zone	0.176 MGD
1 DAD MAX effluent temperature	11.4 degrees C

In 2009, Ecology modeled the outfall at critical conditions using Plumes. Ambient data used in the modeling is from Ecology’s ambient data station SAR003 – Saratoga Passage East Point.

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

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

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

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

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

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

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

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

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

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

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

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

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

7. Maximum size of mixing zone.

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

8. Acute mixing zone.

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

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

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

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

- **Comply with size restrictions.**

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

9. Overlap of mixing zones.

This mixing zone does not overlap another mixing zone.

D. Designated uses and surface water quality criteria

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

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

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

Table 10. Marine Aquatic Life Uses and Associated Criteria

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"> • 5 NTU over background when the background is 50 NTU or less; or • A 10 percent increase in turbidity when the background turbidity is more than 50 NTU.
pH Criteria	pH must be within the range of 7.0 to 8.5 with a human-caused variation within the above range of less than 0.5 units.

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

The recreational uses for this receiving water are identified below.

Table 11. Recreational Uses

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.

E. Water quality impairments

Parts of Saratoga Passage are on the 303(d) list for impaired waters for dissolved oxygen, however Ecology has not documented any water quality impairments in the vicinity of the Langley WWTP outfall.

Nutrients are naturally present in marine waters or introduced through anthropogenic sources. These can include Pacific Ocean water entering Puget Sound through upwelling, plant material, wild animal waste, livestock manure, agriculture, urban runoff, wastewater treatment plant effluent, and the atmosphere. Nutrients are essential for sustaining aquatic life; however, excess nutrients can fuel the excessive growth of algae driving a condition called eutrophication. These algae eventually die, sink to greater depth, and decompose—a process that further consumes dissolved oxygen (DO) in the water.

Ecology, in conjunction with the Pacific Northwest National Laboratory, has developed the Salish Sea Model (model) to understand the significance of anthropogenic nutrient sources into Puget Sound. The model incorporates state-of-the-science methodology, accounting for hydrodynamics, water quality and sediment interactions. As modeled, the Salish Sea includes Puget Sound and extends into the coastal waters of southwest British Columbia, Washington, and northwest Oregon. In 2019, Ecology published the *Puget Sound Nutrient Source Reduction Project – Volume 1: Model Updates and Bounding Scenarios* report. The initial model results, outlined in the report, found that excessive nutrients in rivers and from point sources flowing into Puget Sound, such as domestic WWTPs, are causing or contributing to DO depletion below surface water quality standards (WAC 173-201A). Many parts of Puget Sound and the Salish Sea have DO levels that fall below the concentrations needed for marine life to thrive. These low level oxygen conditions persist for some or most of the year. Ecology is and will continue to use the model to guide management actions necessary to improve water quality in Puget Sound for the protection of aquatic life.

Given the number of dischargers to Puget Sound, a General Permit may be the best mechanism to control nutrient discharges. A General Permit would roll out the requirements in a manner that creates uniformity in schedule and approach. On August 21, 2019, Ecology announced a Preliminary Determination to develop a Puget Sound Nutrients General Permit. If Ecology moves forward with the General Permit, the permit development process will determine:

- Specific domestic WWTPs to be regulated by the proposed permit;
- Interim permit conditions to cap nutrient loading at current operating conditions;
- Planning efforts needed to evaluate nutrient reduction targets;
- Numeric effluent limits that reflect treatment efficiency of existing WWTPs consistent with facility-specific engineering reports.

Future iterations of the Puget Sound Nutrients General Permit will incorporate water quality-based effluent limits based on the results of the Puget Sound Nutrient Source Reduction Project and the Salish Sea Model.

To receive notifications on the progress of the Puget Sound Nutrients General Permit development process, you may subscribe to Ecology's Nutrients-Permit listserv, <http://listserv.ecology.wa.gov/scripts/wa-ECOLOGY.exe?A0=NUTRIENTS-PERMIT>.

If Ecology does not proceed with the Puget Sound Nutrients General Permit, Ecology will modify or reissue individual permits for WWTPs discharging into Puget Sound to include appropriate nutrient controls.

The proposed permit includes increasing monitoring of nitrogen. Future permitting actions, still under development, will address capping and planning conditions.

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

Ecology must consider the narrative criteria described in WAC 173-201A-160 when it determines permit limits and conditions. Narrative water quality criteria limit the toxic, radioactive, or other deleterious material concentrations that the facility may discharge which have the potential to adversely affect designated uses, cause acute or chronic toxicity to biota, impair aesthetic values, or adversely affect human health.

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

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

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

Pollutants in an effluent may affect the aquatic environment near the point of discharge (near-field) or at a considerable distance from the point of discharge (far-field). Toxic pollutants, for example, are near-field pollutants; their adverse effects diminish rapidly with mixing in the receiving water. Conversely, a pollutant such as biochemical oxygen demand (BOD₅) is a far-field pollutant whose adverse effect occurs away from the discharge even after dilution has occurred. Thus, the method of calculating surface water quality-based effluent limits varies with the point at which the pollutant has its maximum effect.

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

The Langley WWTP outfall is approximately 7,200 feet long (the final 1,000 feet offshore) with a diameter of 12 inches. The diffuser has a total of 10 3-inch diameter ports. The diffuser ports discharge at a depth of 40 feet MLLW. Ecology obtained this information from the *City of Langley 2015 General Sewer Plan* prepared by PACE Engineers, Inc.

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

The horizontal distance of the chronic mixing zone is 523.5 feet. The mixing zone extends from the bottom to the top of the water column.

Acute Mixing Zone--WAC 173-201A-400(8)(b) specifies that in estuarine waters a zone where acute criteria may be exceeded must not extend beyond 10% of the distance established for the chronic zone.

The horizontal distance of the acute mixing zone is 91.5 feet. The mixing zone extends from the bottom to the top of the water column.

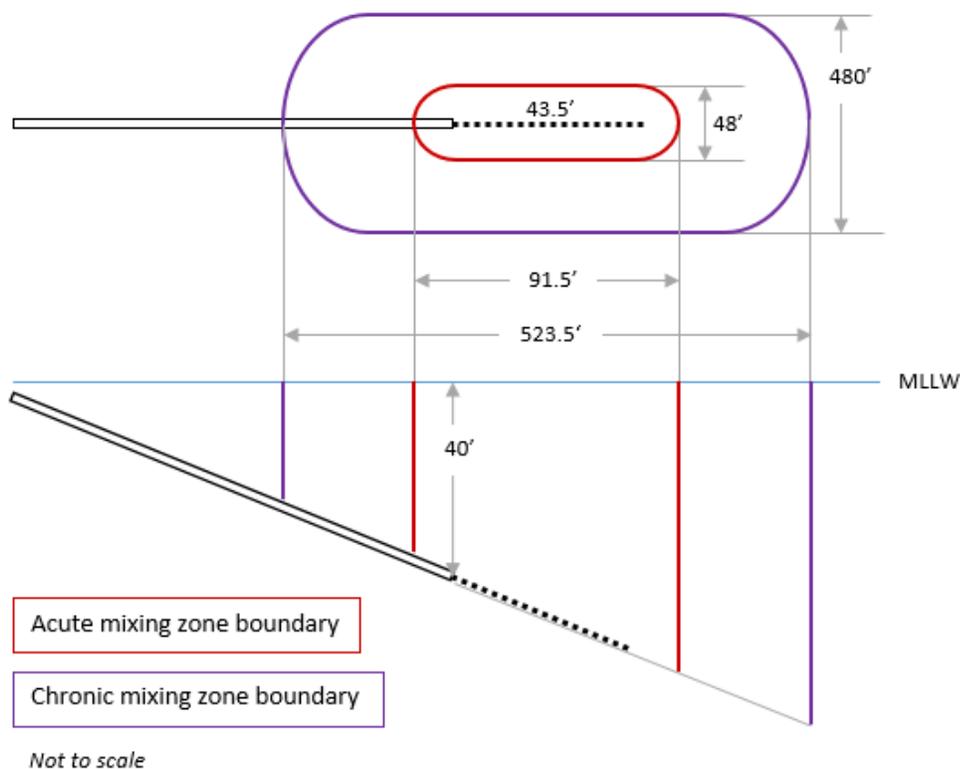


Figure 2. Mixing Zone Diagram

Ecology determined the dilution factors that occur within these zones at the critical condition using the EPA UM3 Model accessed through the PLUMES interface. The model is capable of estimated dilutions achieved by multi-port diffusers. The dilution factors are listed below.

Table 12. Dilution Factors (DF)

Criteria	Acute	Chronic
Aquatic Life	133	203
Human Health, Carcinogen		203
Human Health, Non-carcinogen		203

Ecology determined the impacts of dissolved oxygen deficiency, pH, fecal coliform, chlorine, ammonia, 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--BOD₅ 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 (BOD₅) of an effluent sample indicates the amount of biodegradable material in the wastewater and estimates the magnitude of oxygen consumption the wastewater will generate in the receiving water. The amount of ammonia-based nitrogen in the wastewater also provides an indication of oxygen demand potential in the receiving water.

Ecology modeled the impact of BOD₅ on the receiving water using Ecology's PermitCalc spreadsheet, at critical condition and with the technology-based effluent limit for BOD₅ described under "Technology-Based Effluent Limits" above. The calculations to determine dissolved oxygen impacts are shown in **Appendix E**.

Ecology predicted no violation of the surface water quality standards for dissolved oxygen due to the impacts of biochemical oxygen demand (BOD₅) under critical conditions. Therefore, the proposed permit contains the technology-based effluent limit for BOD₅. The permit also does not contain a limit on ammonia based on dissolved oxygen impacts (ammonia toxicity is examined elsewhere in this fact sheet).

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

Fecal Coliform--Ecology modeled the numbers of fecal coliform by simple mixing analysis using the technology-based limit of 400 organisms per 100 ml and a dilution factor of 203.

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. The calculation can be seen in **Appendix E**.

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: chlorine and ammonia. 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 chlorine or ammonia. Ecology used zero for background.

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

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

- Annual 1-Day maximum criteria
- Supplemental spawning and rearing season criteria (September 15 to June 15)
- Incremental warming restrictions
- Protections against acute effects

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

- Annual 1-Day maximum 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.

Criteria for marine waters and some fresh waters are expressed as the highest 1-Day annual maximum temperature (1-DMax). The threshold criteria apply at the edge of the chronic mixing zone.

- 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 (T_i), calculated as,

$$T_i = \frac{12}{(T_{amb} - 2)}$$

These increments are permitted only to the extent doing so does not cause temperatures to exceed the annual maximum criteria.

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

When Ecology has not yet completed a TMDL, our policy allows each point source to warm water at the edge of the chronic mixing zone by 0.3°C. This is true regardless of the background temperature and even if doing so would cause the temperature at the edge of a standard mixing zone to exceed the numeric threshold criteria. Allowing a 0.3°C warming for each point source is reasonable and protective where the dilution factor is based on 25% or less of the critical flow.

This is because the fully mixed effect on temperature will only be a fraction of the 0.3°C cumulative allowance (0.075°C or less) for all human sources combined.

- Protections for temperature acute effects

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

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

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

Reasonable potential analysis

Ecology calculated the reasonable potential for the discharge to exceed the annual maximum and the incremental warming criteria at the edge of the chronic mixing zone during critical condition. As shown in **Appendix E**, Ecology predicts that the Langley WWTP discharge will increase temperature in the vicinity of the outfall by 0.07 °C to a temperature of 11.97°C.

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. Based on the ambient temperature (T_{amb}) of 11.9°C for the waters around the outfall and the incremental warming equation above, the maximum allowable incremental temperature change is 1.21°C. As noted above, Ecology predicts the discharge from the outfall to cause an incremental temperature increase of 0.07°C, which is well within the allowable incremental change and does not exceed the 1-Day maximum. Based on the predicted temperature and incremental change at the edge of the chronic mixing zone, there is no reasonable potential for discharges from the outfall to exceed water quality standards. Therefore, the proposed permit does not include a temperature limit.

Ecology also considered the acute effects the discharge may have in the receiving water. The Langley WWTP discharges treated domestic wastewater that does not approach temperatures near 33°C. Therefore, no reasonable potential exists for instantaneous lethality. Ambient records indicate that receiving water temperatures may approach 17.5°C. The Langley WWTP effluent does not cause a measurable increase (> 0.3 °C) at the chronic mixing zone, see **Appendix E**. Furthermore, ambient records do not indicate that receiving water temperatures approach 23°C. Based on this analysis, the proposed permit does not include any temperature limits.

H. Human health

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

Ecology determined the applicant's discharge is unlikely to contain chemicals regulated to protect human health based on existing effluent data or knowledge of discharges to the wastewater treatment system. Ecology will reevaluate this discharge for impacts to human health at the next permit reissuance.

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. <https://ecology.wa.gov/Spills-Cleanup/Contamination-cleanup/Sediment-cleanup>

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

J. Whole effluent toxicity

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

Using the screening criteria in chapter 173-205-040 WAC, Ecology determined that toxic effects caused by unidentified pollutants in the effluent are unlikely. Therefore, this permit does not require WET testing. Ecology may require WET testing in the future if it receives information indicating that toxicity may be present in this effluent.

K. Groundwater quality limits

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

The Langley WWTP 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 July 30, 2014

Table 13. Comparison of Previous and Proposed Effluent Limits

Parameter	Basis of Limit	Previous Effluent Limits: Outfall # 001		Proposed Effluent Limits: Outfall # 001	
		Average Monthly	Average Weekly	Average Monthly	Average Weekly
BOD ₅	Technology	30 mg/L 38 lbs/day 85% removal	45 mg/L 56 lbs/day	No change	
TSS	Technology	30 mg/L 38 lbs/day 85% removal	45 mg/L 56 lbs/day	No change	
Total residual chlorine	Technology	0.5 mg/L	0.75 mg/L	No change	

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

Parameter	Basis of Limit	Limit (min – max)	Limit (min – max)
pH	Technology	6.0 – 9.0 standard units	No change

IV. Monitoring Requirements

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

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

A. Wastewater monitoring

The monitoring schedule is detailed in the proposed permit under Special Condition S.2. Specified monitoring frequencies take into account the quantity and variability of the discharge, the treatment method, past compliance, significance of pollutants, and cost of monitoring.

Agency guidance for monitoring frequency is given in the current version of Ecology's *Permit Writer's Manual* (Publication Number 92-109). The Langley WWTP must follow the guidance for activated sludge plants <2.0 MGD design flow. However, Ecology may reduce the monitoring requirements based on good performance. The allowable monitoring frequency reduction is based on the ratio of the long-term average (LTA) to the average monthly limit (AML).

The Langley WWTP has been in good compliance for the previous permit term and has not had an effluent limit violation in over 10 years. In addition, the LTA/AML ratios, for parameters with influent or effluent limits, fall within the range to allow for a monitoring frequency reduction, see Appendix E. Therefore, Ecology is authorizing the reduced monitoring frequency that is outlined in the proposed permit. The reduced monitoring frequency will be reviewed at the next permit renewal to ensure it is representative of the Langley WWTP's discharge.

Ecology has included monthly monitoring for ammonia and nitrate+nitrite in the proposed permit. The additional data is intended to produce a statistically appropriate data set to establish a baseline for this discharger. Ecology will use this data as it develops the permitting approach for nutrient reduction.

The previous permit term required annual monitoring for dissolved oxygen, oil and grease, total phosphorus, total hardness, and total dissolved solids and quarterly monitoring for total kjeldahl nitrogen. The proposed permit slightly modified the monitoring requirements for these parameters to quarterly in the final year of the permit before permit application. This change does not increase the number of samples the facility will have to collect or analyze. Quarterly data will provide insight into the potential seasonality of these parameter effluent concentrations.

Ecology will require monitoring of both fecal coliform and enterococci in the proposed permit. Enterococci monitoring will only be required quarterly in the final year before permit application. This dual monitoring will help inform both Ecology and the City of Langley of the correlation between the two indicators.

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

B. Lab accreditation

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

Langley City Laboratory					Accreditation #:	W458-18
999 Coles Road					Revision Date:	10/21/2018
Langley, WA 98260-0366					Expiration Date:	10/20/2019
Contact: Randi Perry Phone: (360) 221-4274					County:	Island
Tests internal samples only					EPA ID:	WA00976

State	City	CompanyName	MatrixDescription	Matrix	Category	MethodName	MethodCode	AnalyteName	AnalyteID
WA	Langley	Langley City Laboratory	Drinking Water	D	Microbiology	SM 9223 B Colilert 18@ (PA)	20214419	Total coli/E.coli - detect	2502
WA	Langley	Langley City Laboratory	Non-Potable Water	N	General Chemistry	SM 2540 D-2011	20051212	Solids, Total Suspended	1960
WA	Langley	Langley City Laboratory	Non-Potable Water	N	General Chemistry	SM 4500-Cl G-2011	20081623	Chlorine (Residual), Total	1940
WA	Langley	Langley City Laboratory	Non-Potable Water	N	General Chemistry	SM 4500-H+ B-2011	20105220	pH	1900
WA	Langley	Langley City Laboratory	Non-Potable Water	N	General Chemistry	SM 4500-O G-2011	20121668	Dissolved Oxygen	1880
WA	Langley	Langley City Laboratory	Non-Potable Water	N	General Chemistry	SM 5210 B-2011	20135266	Biochemical Oxygen Demand (BOD)	1530
WA	Langley	Langley City Laboratory	Non-Potable Water	N	Microbiology	SM 9222 D (mFC)-06	20210019	Fecal coliform-count	2530

V. Other Permit Conditions

A. Reporting and record keeping

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

B. Prevention of facility overloading

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

- Take the actions detailed in proposed permit Special Condition S.4.
- Design and construct expansions or modifications before the treatment plant reaches existing capacity.
- Report and correct conditions that could result in new or increased discharges of pollutants.

Special Condition S.4 restricts the amount of flow.

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

C. Operation and maintenance

The proposed permit contains Special Condition S.5 as authorized under RCW 90.48.110, WAC 173-220-150, chapter 173-230 WAC, and WAC 173-240-080. Ecology included it to ensure proper operation and regular maintenance of equipment, and to ensure that the Langley WWTP takes adequate safeguards so that it uses constructed facilities to their optimum potential in terms of pollutant capture and treatment.

The collection system is considerably older than the present Langley WWTP. The City of Langley has worked on identification and removal of excess I/I in their system. The I/I report submitted during the previous permit cycle indicates that I/I is improving.. The City has prioritized sewer improvement projects to further reduce I/I and control high influent flows during rain events. To ensure progress on I/I reduction, the proposed permit requires the City to submit an I/I evaluation (Special Condition S4.E). The evaluation must include the following information:

- Sewer improvement projects the City has completed since the last I/I evaluation submitted to Ecology in 2017.
- A description of any rate increases or other funding obtained to continue sewer improvement projects focused on I/I reduction.

- A description of any studies or inspections of the collection system to further identify leaking pipes.
- An analysis of influent flows during the last 5 years for wet and dry months including wet and dry months average rain, annual rain, wet and dry average flow, and annual average flow.

The following references may aid the City in these tasks:

- American Society of Civil Engineers and Water Environment Federation Manual of Practice FD-6, *Existing Sewer Evaluation and Rehabilitation*.
- U.S. Environmental Protection Agency, *Handbook for Sewer System Infrastructure Analysis and Rehabilitation*, EPA/625/6-91/030, 1991.
- Washington State Department of Transportation, *Standard Specifications for Road, Bridge, and Municipal Construction*, 2018.
- U.S. Environmental Protection Agency, *Infiltration/Inflow: I/I Analysis and Project Certification*, 1985. Available as Ecology Publication No. 97-03, <https://fortress.wa.gov/ecy/publications/documents/9703.pdf>

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 Langley WWTP [WAC 173-216-110(5)]. Industries discharging wastewater that is similar in character to domestic wastewater do not require a permit.

Routine identification and reporting of industrial users

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

E. Solid wastes

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

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

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

F. Outfall evaluation

In 2012, the City conducted an outfall inspection. The inspection included the ductile iron and HDPE segments of the outfall pipe. The ductile iron segment showed signs of corrosion but no leaks were present. Due to signs of corrosion, the proposed permit requires the City of Langley to conduct an outfall inspection and submit a report detailing the findings of that inspection (Special Condition S.8). The inspection must evaluate the physical condition of the discharge pipe and diffusers, and evaluate the extent of sediment accumulations in the vicinity of the outfall.

G. General conditions

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

VI. Permit Issuance Procedures

A. Permit modifications

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

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

B. Proposed permit issuance

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

VII. References for Text and Appendices

Environmental Protection Agency (EPA)

- 1992. National Toxics Rule. Federal Register, V. 57, No. 246, Tuesday, December 22, 1992.
- 1991. *Technical Support Document for Water Quality-based Toxics Control*. EPA/505/2-90-001.
- 1988. *Technical Guidance on Supplementary Stream Design Conditions for Steady State Modeling*. USEPA Office of Water, Washington, D.C.
- 1985. *Water Quality Assessment: A Screening Procedure for Toxic and Conventional Pollutants in Surface and Ground Water*. EPA/600/6-85/002a.
- 1983. *Water Quality Standards Handbook*. USEPA Office of Water, Washington, D.C.

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

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

Washington State Department of Ecology.

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

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

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

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

Permit and Wastewater Related Information

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

Water Pollution Control Federation.

1976. *Chlorination of Wastewater*.

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

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

Appendix A--Public Involvement Information

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

Ecology will place a Public Notice of Draft on October 5, 2019, in the *Whidbey News Times/South Whidbey Record* to inform the public and to invite comment on the proposed draft National Pollutant Discharge Elimination System permit and fact sheet.

The notice:

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

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

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

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

The primary author of this permit and fact sheet is Maia Hoffman.

Appendix B--Your Right to Appeal

You have a right to appeal this permit to the Pollution Control Hearing Board (PCHB) within thirty (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 thirty (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
<p>Department of Ecology Attn: Appeals Processing Desk 300 Desmond Drive SE Lacey, WA 98503</p>	<p>Department of Ecology Attn: Appeals Processing Desk PO Box 47608 Olympia, WA 98504-7608</p>
<p>Pollution Control Hearings Board 1111 Israel RD SW STE 301 Tumwater, WA 98501</p>	<p>Pollution Control Hearings Board PO Box 40903 Olympia, WA 98504-0903</p>

Appendix C--Glossary

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

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

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

AKART -- The acronym for "all known, available, and reasonable methods of prevention, control and treatment." AKART is a technology-based approach to limiting pollutants from wastewater discharges, which requires an engineering judgment and an economic judgment. AKART must be applied to all wastes and contaminants prior to entry into waters of the state in accordance with RCW 90.48.010 and 520, WAC 173-200-030(2)(c)(ii), and WAC 173-216-110(1)(a).

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

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

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

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

Average monthly (intermittent) discharge limit -- The average of the measured values obtained over a calendar month's time taking into account zero discharge days.

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

Engineering report -- A document that thoroughly examines the engineering and administrative aspects of a particular domestic or industrial wastewater facility. The report must contain the appropriate information required in WAC 173-240-060 or 173-240-130.

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

ALSO GIVEN AS:

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

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

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

Sample Maximum -- No sample may exceed this value.

Significant industrial user (SIU) --

- 1) All industrial users subject to Categorical Pretreatment Standards under 40 CFR 403.6 and 40 CFR Chapter I, Subchapter N; and
- 2) Any other industrial user that: discharges an average of 25,000 gallons per day or more of process wastewater to the POTW (excluding sanitary, noncontact cooling, and boiler blow-down wastewater); contributes a process 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 BOD₅ -- Determining the soluble fraction of Biochemical Oxygen Demand of an effluent is an indirect way of measuring the quantity of soluble organic material present in an effluent that is utilized by bacteria. Although the soluble BOD₅ test is not specifically described in Standard Methods, filtering the raw sample through at least a 1.2 um filter prior to running the standard BOD₅ test is sufficient to remove the particulate organic fraction.

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

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

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

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

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

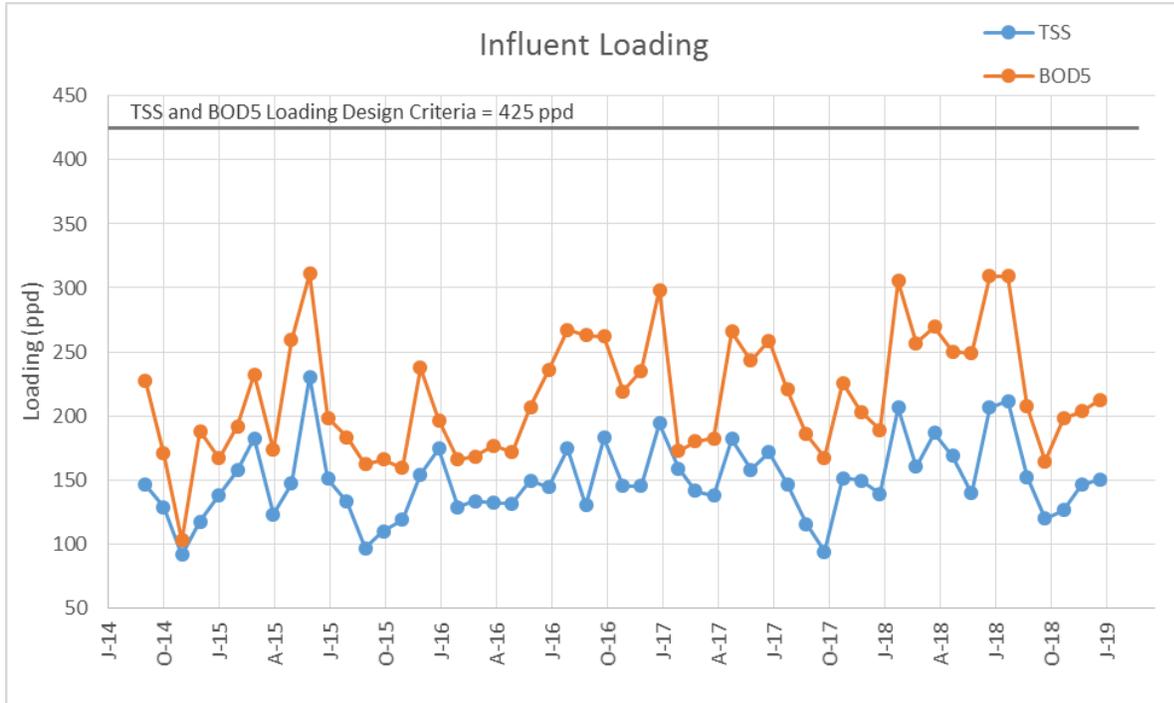
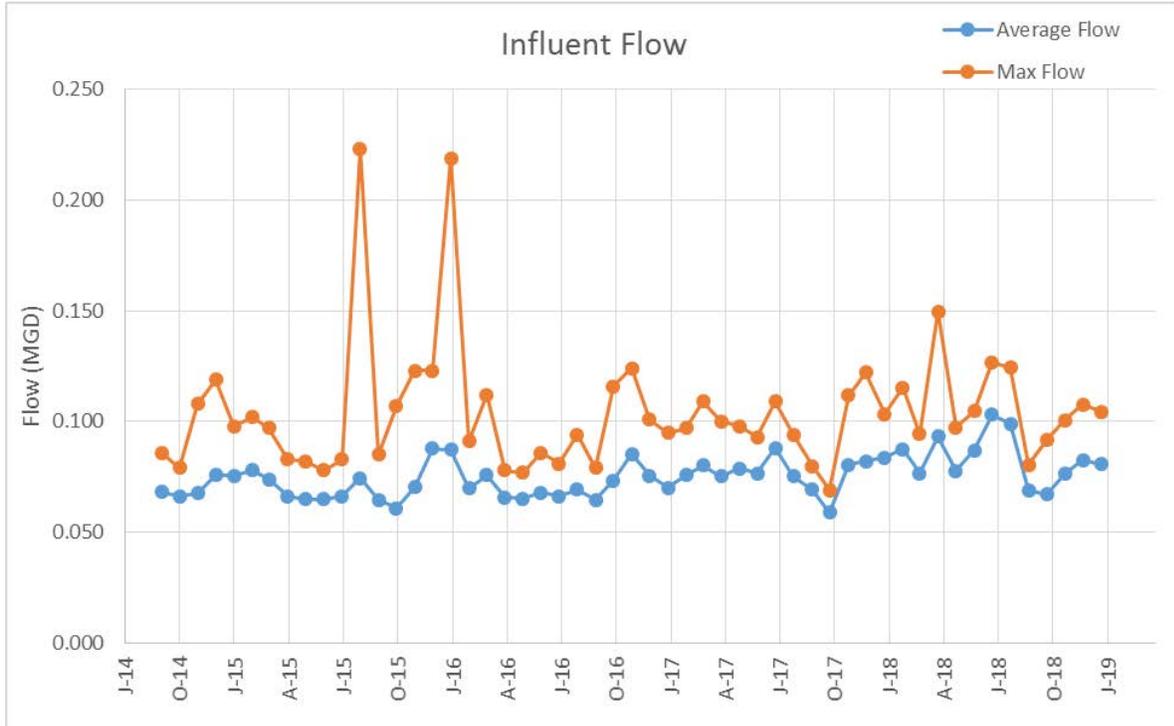
Total maximum daily load (TMDL) -- A determination of the amount of pollutant that a water body can receive and still meet water quality standards.

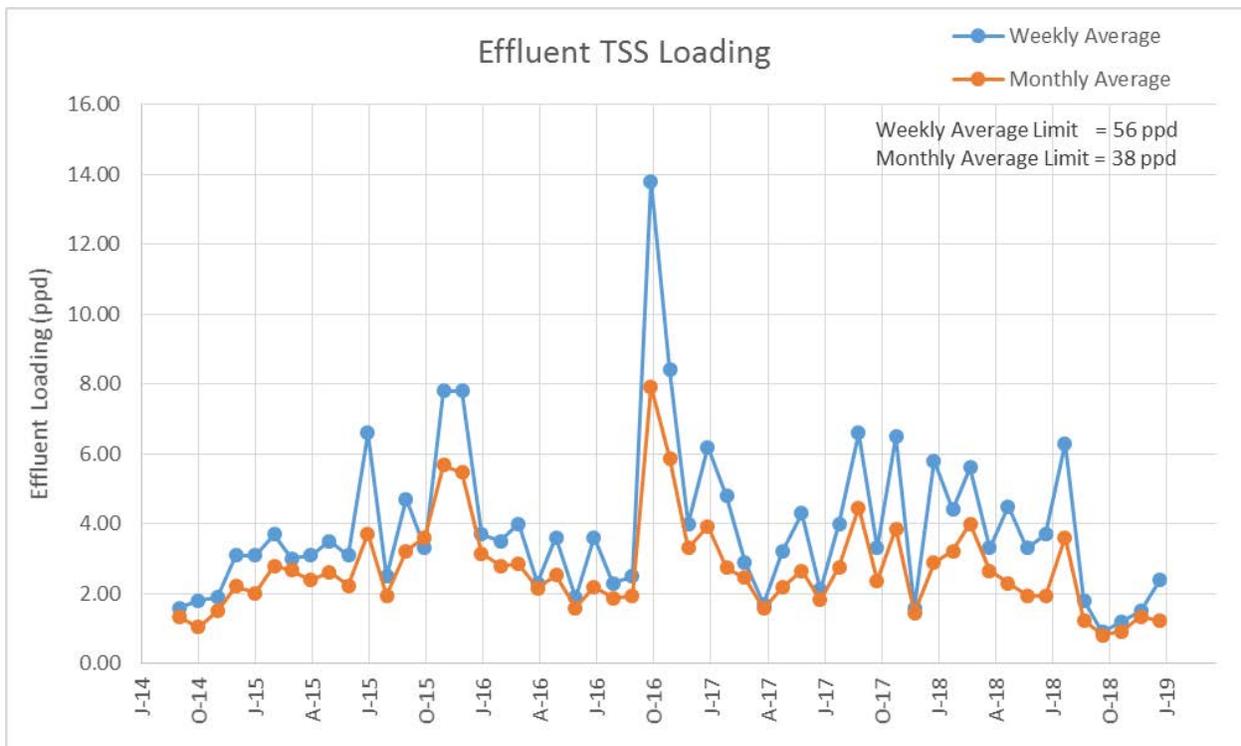
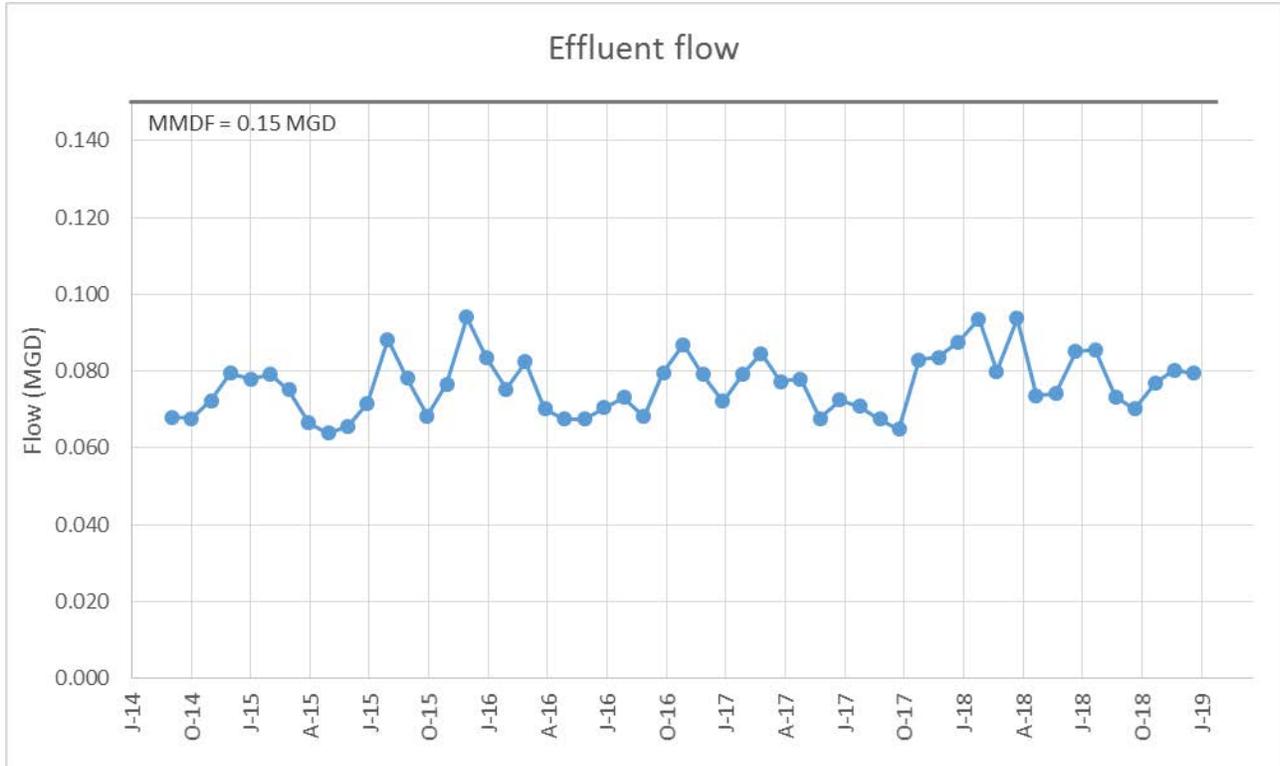
Total suspended solids (TSS) -- Total suspended solids is the particulate material in an effluent. Large quantities of TSS discharged to a receiving water may result in solids accumulation. Apart from any toxic effects attributable to substances leached out by water, suspended solids may kill fish, shellfish,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

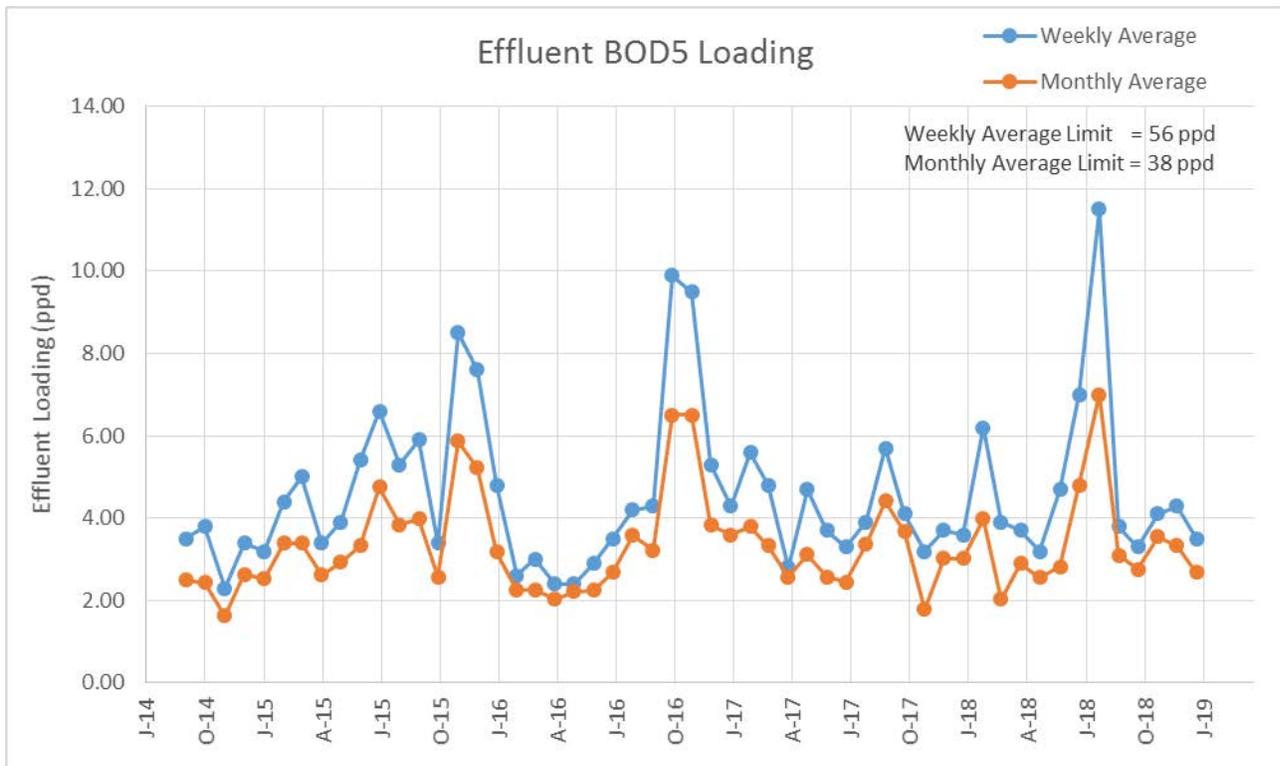
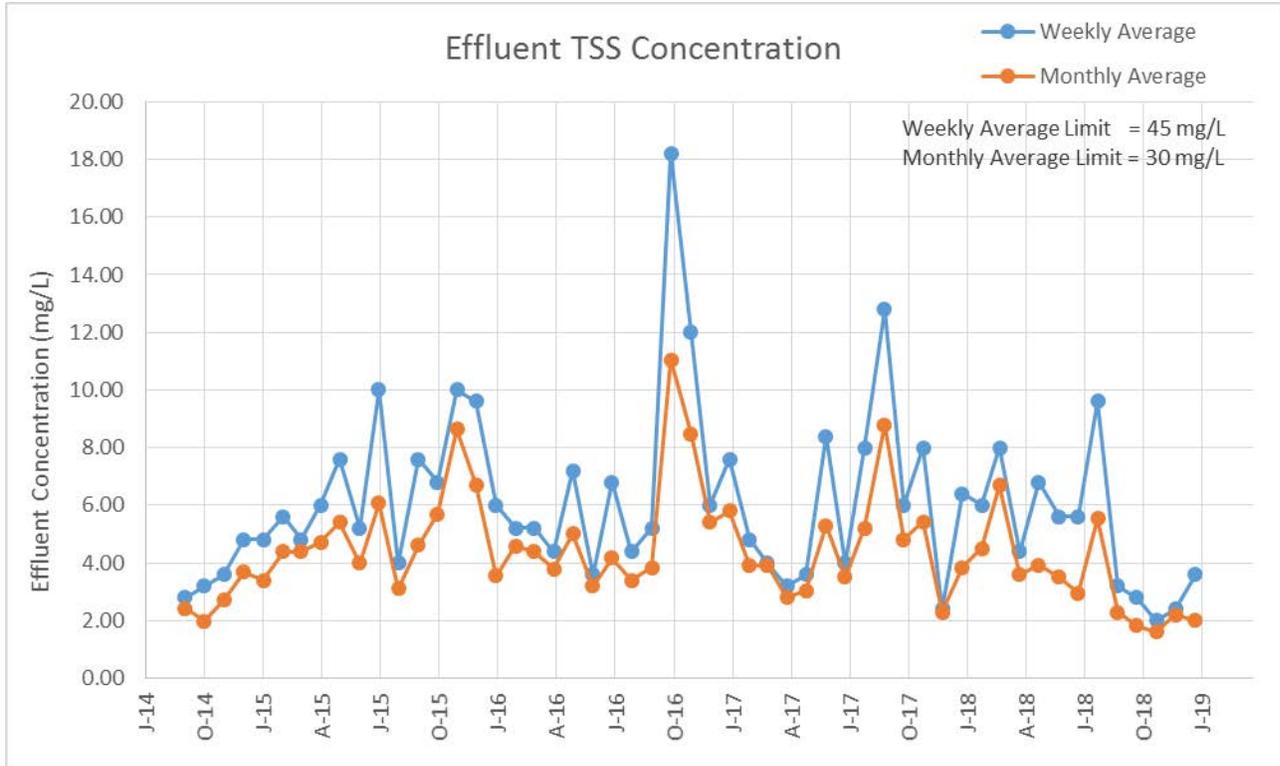
Upset -- An exceptional incident in which there is unintentional and temporary noncompliance with technology-based permit effluent limits because of factors beyond the reasonable control of the Permittee. An upset does not include noncompliance to the extent caused by operational error, improperly designed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

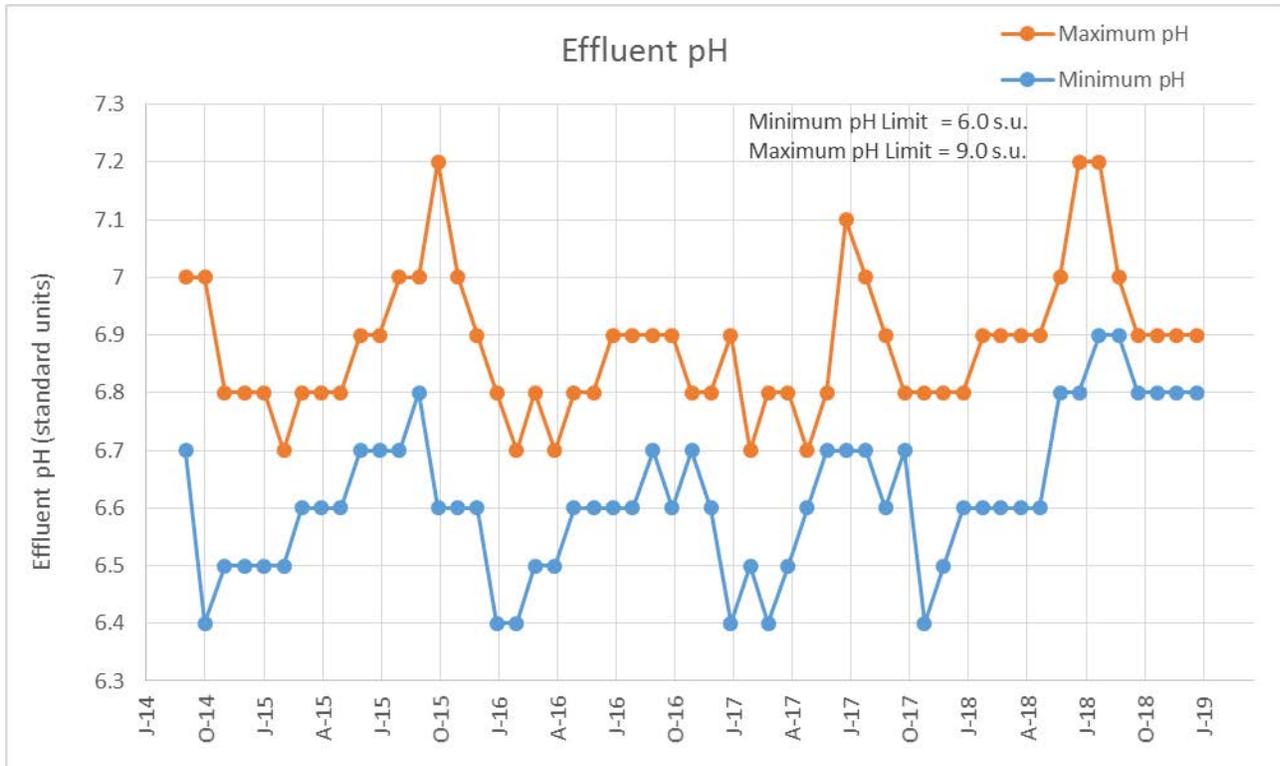
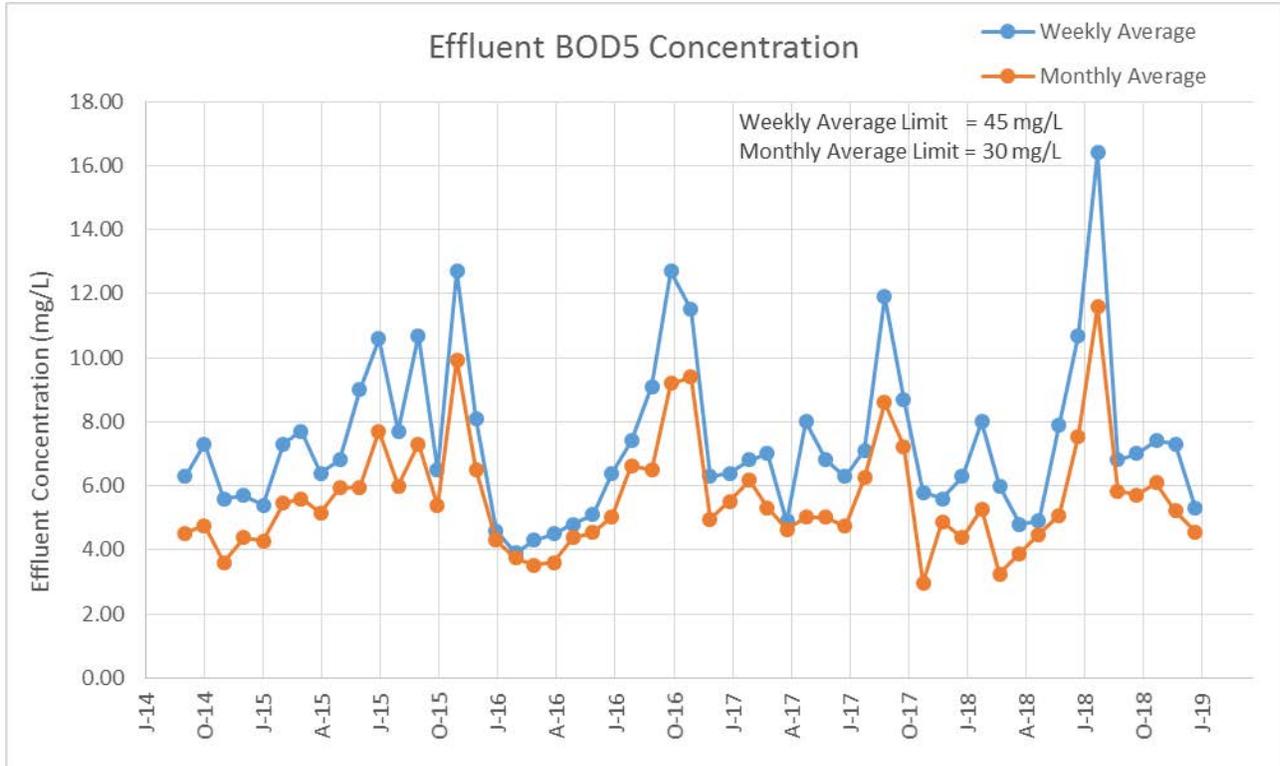
Water quality-based effluent limit -- A limit imposed on the concentration of an effluent parameter to prevent the concentration of that parameter from exceeding its water quality criterion after discharge into receiving waters.

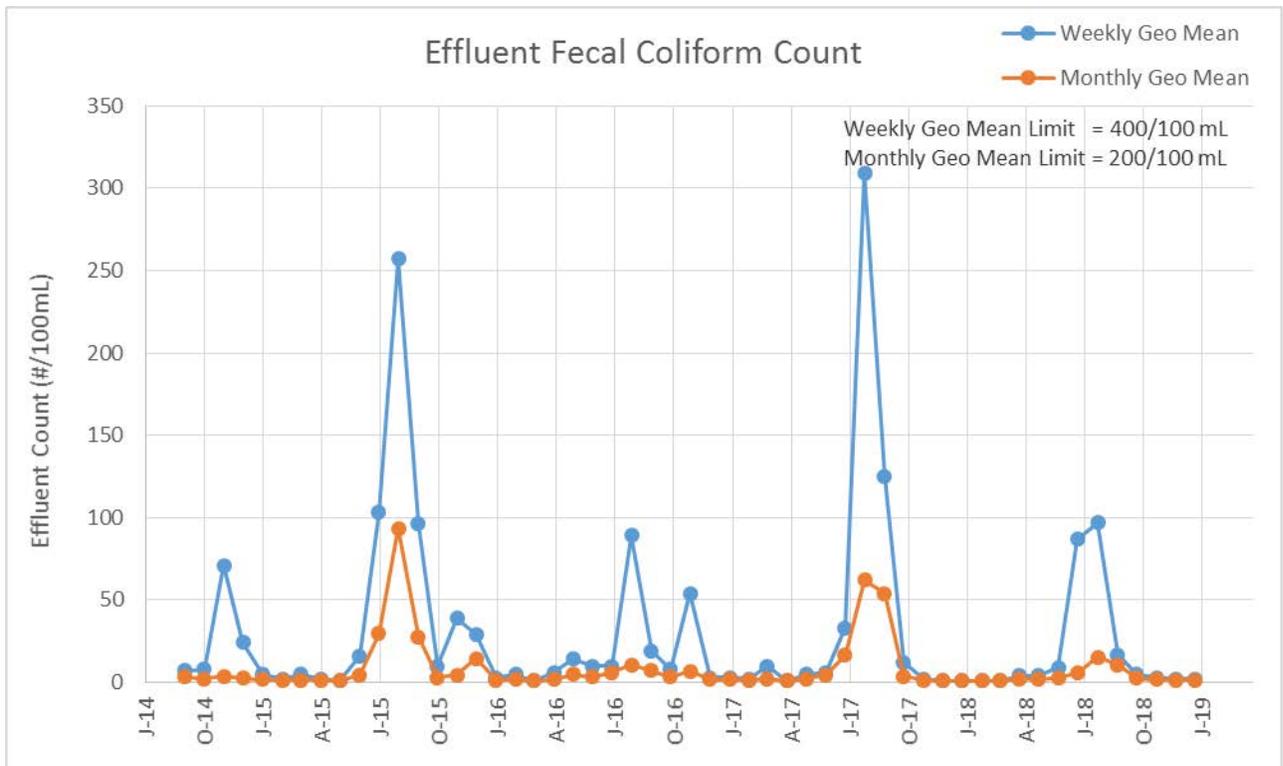
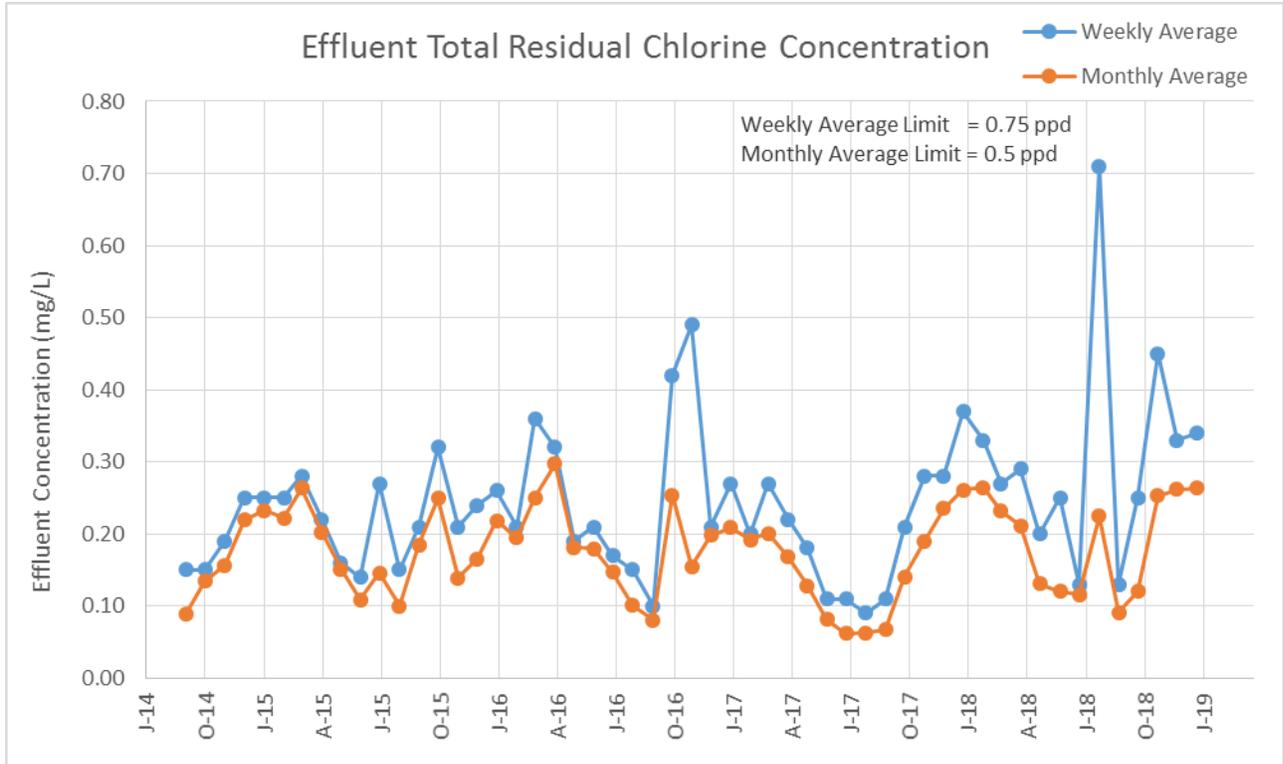
Appendix D--Langley WWTP Influent and Effluent Data











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 in the PermitCalc workbook on Ecology's webpage at: <https://ecology.wa.gov/Regulations-Permits/Guidance-technical-assistance/Water-quality-permits-guidance>

Simple Mixing:

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

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

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

Reasonable Potential Analysis:

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

Calculation of BOD₅ Oxidation with Temperature Adjustment

INPUT	
Effluent BOD ₅ (mg/L)	45
Effluent Dissolved Oxygen (DO) (mg/L)	7.7
Receiving Water Temperature (deg C)	11.9
Receiving Water DO (mg/L)	4.6
DO WQ Standards (mg/L)	6
Chronic Mixing Dilution Factor	203.0
Time for effluent to travel from outfall to chronic mixing boundary (days)	0.016
Oxidation rate of BOD, base e at 20 deg C, k_1 (day ⁻¹)*	0.23
OUTPUT	
Effluent Ultimate BOD (mg/L)	65.85
Oxidation rate of BOD at ambient temperature, base e (day ⁻¹)	0.16
BOD oxidized between outfall and chronic mixing zone (mg/L)	0.17
RESULTS	
DO at chronic mixing zone	4.61
Difference between ambient DO and DO at chronic mixing boundary	-0.01
There is no reasonable potential of not meeting the DO criteria under these conditions.	

Calculation of Fecal Coliform at Chronic Mixing Zone

INPUT	
Chronic Dilution Factor	203.0
Receiving Water Fecal Coliform, #/100 ml	6
Effluent Fecal Coliform - worst case, #/100 ml	400
Surface Water Criteria, #/100 ml	14
OUTPUT	
Fecal Coliform at Mixing Zone Boundary, #/100 ml	8
Difference between mixed and ambient, #/100 ml	2

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

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-

INPUT	
1. Receiving Water Temperature, deg C (90th percentile):	11.9
2. Receiving Water pH, (90th percentile):	7.9
3. Receiving Water Salinity, g/kg (10th percentile):	29.3
4. Pressure, atm (EPA criteria assumes 1 atm):	1.0
5. Unionized ammonia criteria (mg un-ionized NH ₃ per liter) from EPA 440/5-88-004:	
Acute:	0.233
Chronic:	0.035
OUTPUT	
Using mixed temp and pH at mixing zone boundaries?	No
1. Molal Ionic Strength (not valid if >0.85):	0.602
2. pKa8 at 25 deg C (Whitfield model "B"):	9.315
3. Percent of Total Ammonia Present as Unionized:	1.4%
4. Total Ammonia Criteria (mg/L as NH ₃):	
Acute:	16.15
Chronic:	2.43
RESULTS	
Total Ammonia Criteria (mg/L as N)	
Acute:	13.28
Chronic:	2.00

Pollutant, CAS No. & NPDES Application Ref. No.		AMMONIA, Criteria as Total NH3	CHLORINE (Total Residual) 7782505
Effluent Data	# of Samples (n)	17	1371
	Coeff of Variation (Cv)	0.6	0.48
	Effluent Concentration, ug/L (Max. or 95th Percentile)	420	750
	Calculated 50th percentile Effluent Conc. (when n>10)		
Receiving Water Data	90th Percentile Conc., ug/L	0	0
	Geo Mean, ug/L		
Water Quality Criteria	Aquatic Life Criteria, Acute ug/L	13,283	13
	Chronic	1,995	7.5
	WQ Criteria for Protection of Human Health, ug/L	-	-
	Metal Criteria Acute	-	-
	Translator, decimal Chronic	-	-
	Carcinogen?	N	N

Aquatic Life Reasonable Potential			
Effluent percentile value		0.950	0.950
s	$s^2 = \ln(CV^2 + 1)$	0.555	0.455
Pn	$Pn = (1 - \text{confidence level})^{1/n}$	0.838	0.998
Multiplier		1.44	1.00
Max concentration (ug/L) at edge of...	Acute	5	5.639
	Chronic	3	3.695
Reasonable Potential? Limit Required?		NO	NO

Marine Temperature Reasonable Potential and Limit Calculation

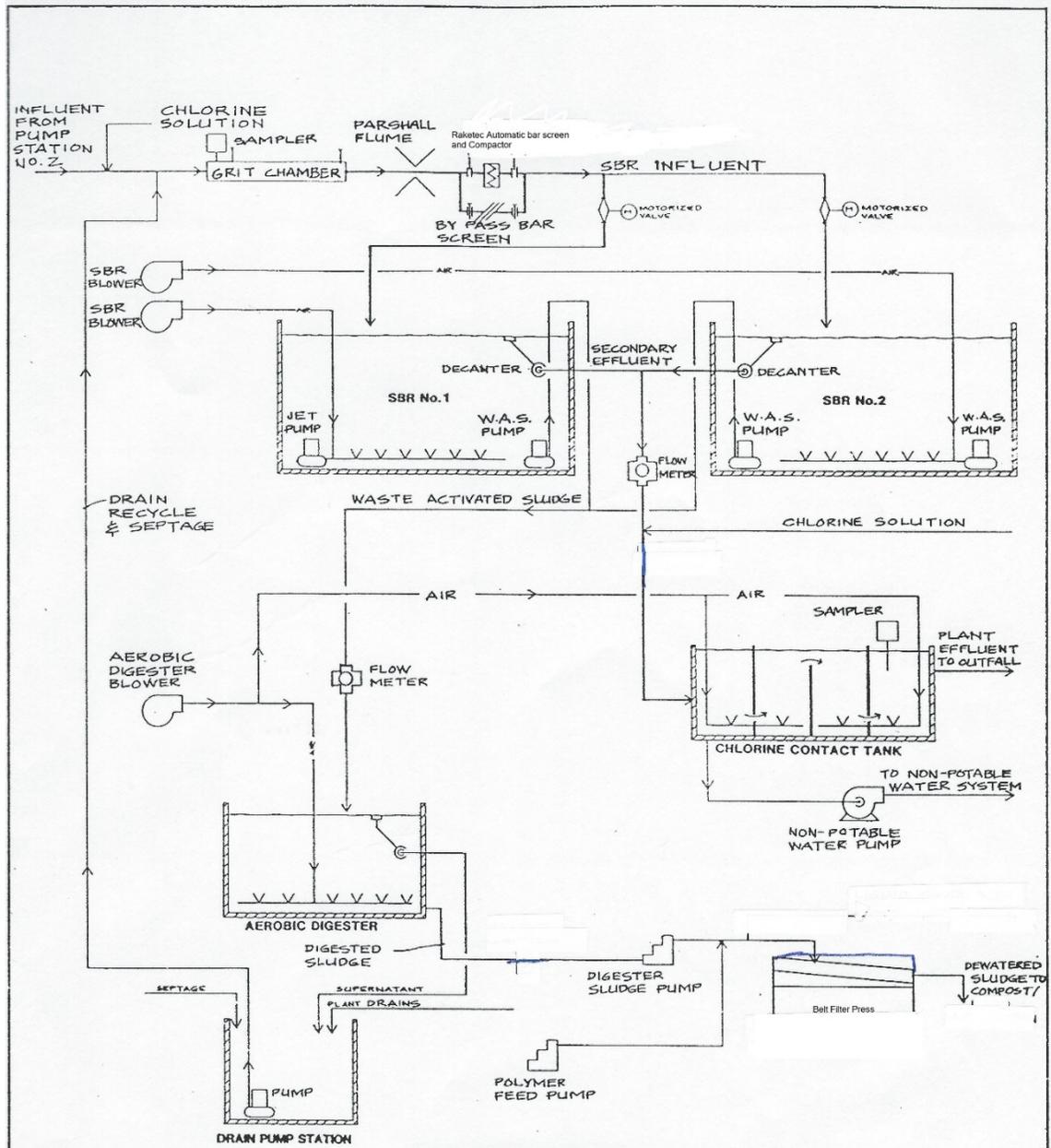
Based on WAC 173-201A-200(1)(c)(i)–(ii) and Water Quality Program Guidance. All Data inputs must meet WQ guidelines. The Water Quality temperature guidance document may be found at: <http://www.ecy.wa.gov/biblio/0610100.html>

INPUT		
1. Chronic Dilution Factor at Mixing Zone Boundary	203.0	203.0
2. Annual max 1DADMax Ambient Temperature (Background 90th percentile)	11.9 °C	17.5 °C
3. 1DADMax Effluent Temperature (95th percentile)	26.0 °C	26.0 °C
4. Aquatic Life Temperature WQ Criterion	16.0 °C	16.0 °C
OUTPUT		
5. Temperature at Chronic Mixing Zone Boundary:	11.97 °C	17.54 °C
6. Incremental Temperature Increase or decrease:	0.07 °C	0.04 °C
7. Incremental Temperature Increase $12/(T-2)$ if $T \leq$ crit:	1.21 °C	---
8. Maximum Allowable Temperature at Mixing Zone Boundary:	13.11 °C	17.80 °C
A. If ambient temp is warmer than WQ criterion		
9. Does temp fall within this warmer temp range?	NO	YES
10. Temp increase allowed at mixing zone boundary, if required:	---	NO LIMIT
B. If ambient temp is cooler than WQ criterion but within $12/(T_{amb}-2)$ and within 0.3 °C of the criterion		
11. Does temp fall within this incremental temp. range?	NO	---
12. Temp increase allowed at mixing zone boundary, if required:	---	---
C. If ambient temp is cooler than (WQ criterion-0.3) but within $12/(T_{amb}-2)$ of the criterion		
13. Does temp fall within this Incremental temp. range?	NO	---
14. Temp increase allowed at mixing zone boundary, if required:	---	---
D. If ambient temp is cooler than (WQ criterion - $12/(T_{amb}-2)$)		
15. Does temp fall within this Incremental temp. range?	YES	---
16. Temp increase allowed at mixing zone boundary, if required:	NO LIMIT	---
RESULTS		
17. Do any of the above cells show a temp increase?	NO	NO
18. Temperature Limit if Required?	NO LIMIT	NO LIMIT

The following calculations support the reduced monitoring frequency in the proposed permit. Influent and effluent data from the last two years (January 2017 through January 2019) was used to calculate the long term average for each parameter.

Parameter	Long Term Average (LTA)	Average Monthly Limit (AML)	LTA/AML Ratio
<i>Influent</i>			
BOD ₅	228 lbs/day	425 lbs/day	0.54
TSS	156 lbs/day	425 lbs/day	0.37
<i>Effluent</i>			
BOD ₅	5.64 mg/L	30 mg/L	0.19
TSS	9.40 mg/L	30 mg/L	0.31
Fecal Coliform	3.08 CFU/100mL	200 CFU/100mL	0.02
Total Residual Chlorine	0.17 mg/L	0.5 mg/L	0.34

Appendix F--Langley WWTP Process Schematic



PROCESS SCHEMATIC

FIGURE 1.3-1
CITY OF LANGLEY WASTEWATER TREATMENT FACILITY
TREATMENT PROCESS SCHEMATIC

Appendix G--Response to Comments

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