Fact Sheet for NPDES Permit WA0024074

City of Mount Vernon Wastewater Treatment Plant

Public Notice Date: September 27, 2016

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 City of Mount Vernon 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 Mt. Vernon WWTP, NPDES permit WA0024074, are available for public review and comment from September 27, 2016, until October 27, 2016. For more details on preparing and filing comments about these documents, please see *Appendix A – Public Involvement Information.*

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

After the public comment period 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 Mount Vernon owns and operates an activated sludge wastewater treatment facility that discharges into the Skagit River at river mile 10.7. The plant treats domestic and industrial wastewater from the City of Mount Vernon's service area. The collection system includes two combined sewer overflow (CSO) outfalls. Ecology issued the previous permit on December 17, 2010, and modified the permit on March 11, 2014, to correct an error in testing requirements.

The proposed permit removes influent and effluent limits based on the dry weather nitrogen removal operations mode. These were technology-based limits derived from the maximum influent loading to the plant for that configuration. The proposed permit applies the same limits year round for biochemical oxygen demand (BOD_5) and total suspended solids (TSS) as the previous permit's limits for November-June. The proposed permit contains the same limits for fecal coliform bacteria as the previous permit. The minimum pH limit is slightly increased to 6.3. All limits apply to discharges from outfall 004. The proposed permit does not include any limits for outfall 001. This outfall was not used during the previous permit cycle and would be accessed only in an emergency situation.

Table of Contents

I. Introduction

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

The following regulations apply to domestic wastewater NPDES permits:

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

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

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

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

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

II. Background Information

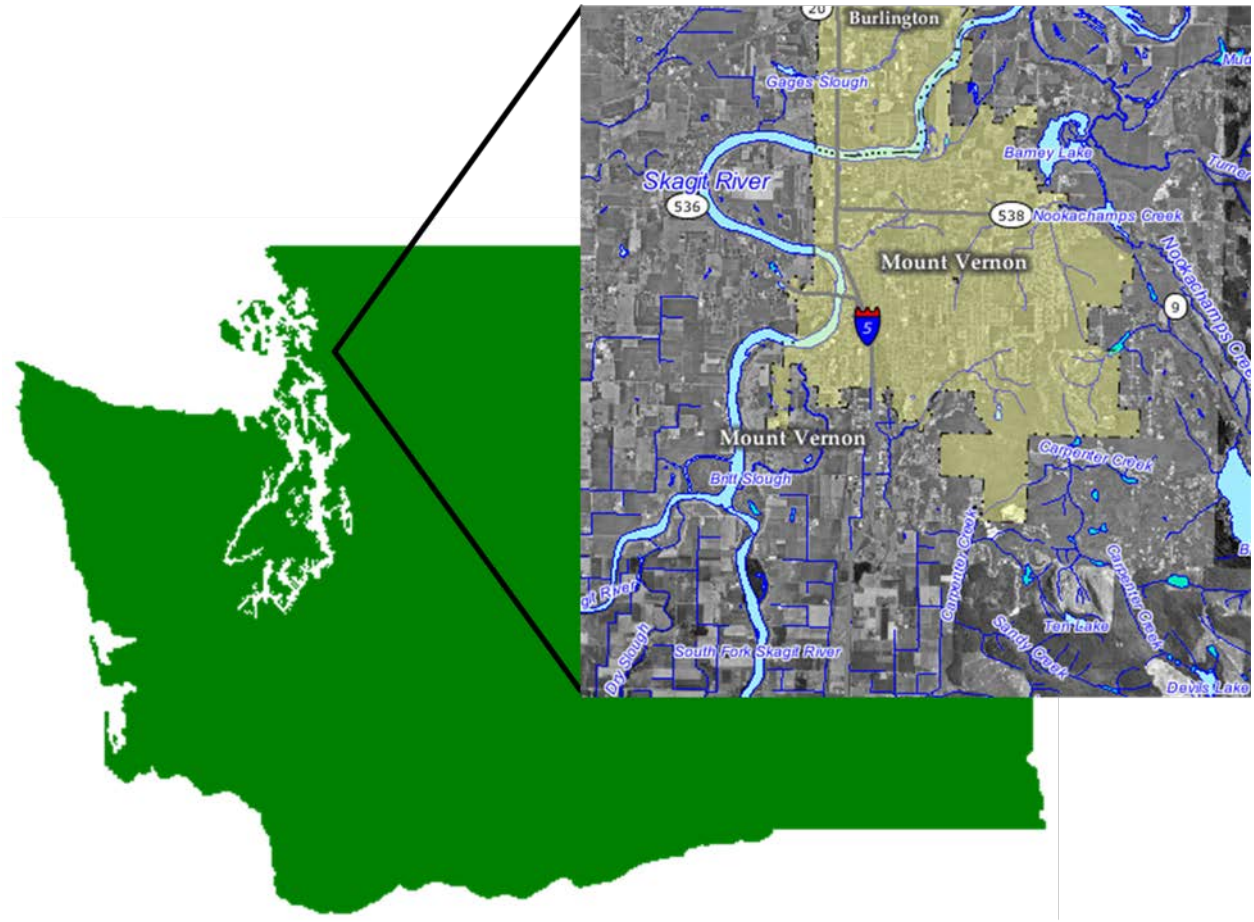
Table 1. General Facility Information

Facility Information	
Applicant	City of Mount Vernon
Facility Name and Address	Mt. Vernon WWTP 1401 Britt Road Mt. Vernon, WA 98273
Contact at Facility	Gary Duranceau, Wastewater Division Manager (360) 336-6219
Responsible Official	Jill Boudreau, Mayor 910 Cleveland Avenue P.O. Box 809 Mount Vernon, WA 98273 (360) 336-6211
Type of Treatment	Secondary biological treatment: activated sludge with nitrification/denitrification
Facility Location (NAD83/WGS84 reference datum)	Latitude: 48.411516 Longitude: -122.347029
Discharge Waterbody Name and Locations (NAD83/WGS84 reference datum)	Skagit River Main Outfall (004) Latitude: 48.41307 Longitude: -122.349485 CSO Outfall 002 (Park Street) Latitude: 48.413694 Longitude: -122.344556 CSO Outfall 003 (Division Street) Latitude: 48.421436 Longitude: -122.338836

Permit Status	
Issuance Date of Previous Permit	December 17, 2010 Modification Date: March 11, 2014
Application for Permit Renewal Submittal Date	June 3, 2015
Date of Ecology Acceptance of Application	July 17, 2015

Inspection Status	
Date of Last Sampling Inspection	February 23, 2010
Date of Last Non-sampling Inspection Date	January 27, 2015

Figure 1. Facility Location Map



A. Facility description

History

The City of Mount Vernon's sewerage system dates from the early 1900's with combined sanitary and storm sewers conveying wastewater from the city to the Skagit River. In 1948, the City constructed a primary sewage treatment plant consisting of a pump station, primary clarifier, and two anaerobic digesters (a primary and a secondary).

In the late 1960's, the State required an upgrade of the plant to provide secondary treatment. At the time there were no federal secondary treatment standards. Accordingly, a secondary plant was designed to achieve the State standard at that time of 85% BOD and 90% TSS removal. The plant configuration after a 1972 upgrade included a primary clarifier, an oxidation tower (biofilter), a secondary clarifier and chlorine disinfection. The two 1948 digesters were retrofitted, a sludge thickener was added and the original primary clarifier was converted into an aerobic digester. Construction of that facility was completed in 1974.

During the middle of the 1970's, the plant performed adequately and achieved the effluent limits specified in the City's NPDES permit. With increases in population, and substantial increases in industrial loading, the quality of the effluent from the plant deteriorated as the influent BOD loading increased. By the early 1980's, the plant failed to meet effluent discharge standards due to organic overloading. In 1988, the City expanded and upgraded the secondary treatment facilities and installed an influent pump station, grit separator, aeration blowers, aeration basins, secondary clarifier, chlorine mixing chamber, dissolved air flotation thickener, primary anaerobic digester, and belt filter press for sludge dewatering.

Ecology conducted water quality scoping studies on the lower Skagit River during the 1990's. The studies identified concern for dissolved oxygen concentrations in the south fork of the Skagit near Conway. Although the water body was not listed as impaired on the State's 303(d) list for dissolved oxygen, Ecology proposed waste load allocations on ammonia and carbonaceous biochemical oxygen demand (CBOD) as a preventive measure to protect the water body from future impairments. Additional monitoring conducted by Skagit County and Mount Vernon provided data that raised doubt about whether dissolved oxygen levels were as low as Ecology initially found. Given the uncertainty of whether waste load allocations were necessary to protect water quality of the lower Skagit, Ecology removed limits based on the waste load allocations from Mount Vernon's permit in 2005.

In response to the ammonia waste load allocations proposed in the 1997 water quality report, the City temporarily modified the aeration basins in 2003 to operate in a Modified Ludzack Ettinger (MLE) configuration to provide nitrification and partial denitrification. The modification required installation of a submersible mixer in cell four of the aeration basin, which became an anoxic selector cell. The modification also added a vertical propeller pump to recycle mixed liquor from cell two to the anoxic cell four. Other changes required for the modification included installation of a caustic soda storage tank and peristaltic metering pump to adjust mixed liquor pH when nitrifying. Although the initial motivation was to comply with proposed low ammonia discharge limits, the city discovered that the MLE process had additional benefits to overall plant performance, such as improved filament control and sludge settling. In 2015, influent BOD loads began to approach the design limit for the MLE process, and the City decided to revise its operations plan so as not to require the use of this process during specified months.

The City completed an additional upgrade to the treatment plant in late 2009. This upgrade added a new pretreatment building that includes 6 mm plate screens, vortex grit chambers and new primary clarifiers. The project also reconfigured and rehabilitated the aeration basins to add in a specific anoxic selector cell; added two new secondary clarifiers; converted the disinfection system from chlorine to UV light; and added a biofiltration odor control system. The upgrade improved the City's ability to maximize treatment of combined sewer flows to secondary standards and enhanced the ability to switch into nitrification/denitrification during the dry weather season.

Collection system status

The collection system services an area of approximately 16 square miles and consists of approximately 120 miles of pipe ranging in size from 6 inches to 60 inches. Flow within the system is assisted by 13 sanitary pump stations and 7 stormwater pump stations. All pump

stations have alarms installed to notify city staff of operational problems and backup generators are installed at the major pump stations. Bioxide (calcium nitrate) is injected into the collection system at a number of locations for odor control.

The predominant source of flow to the treatment plant is domestic sewage from residential and light commercial entities. Pretreated process wastewater from two large industrial facilities also discharge into the City's collection system. Flow from the industrial sources account for approximately 10% of the average daily flow to the treatment plant.

In addition to sanitary sewer flows, the collection system includes combined sanitary and stormwater flows from approximately 555 acres of the City's older downtown area. The primary means of controlling combined sewer overflows has been the central CSO regulator. Three overflow structures divert flows exceeding the regulator's capacity to two pump stations and overflow outfalls.

In 1996 the City of Mount Vernon and Ecology signed an Order on Consent (#DE 96WQ-N105), which mandated that the City achieve compliance with the "greatest reasonable reduction" of combined sewer overflows, as defined in WAC 173-245, by January 1, 2015. The City has completed improvements to its wastewater facility and collection system including:

- 1998 – Completion of the central CSO regulator. The regulator consists of 6,800 feet of 60-inch concrete pipe and 600 feet of 30-inch pipe to provide approximately 1.1 million gallons of in-line storage.
- 1998 – Addition of a modulating sluice gate upstream of the influent pump station.
- 2004 – Addition of a new pump at Park Street pump station.
- 2009 – Completion of the WWTP Phase 1 upgrade.
- 2012 – Rebuilt 3 effluent pumps to increase capacity to 12 MGD each.
- 2013 – Upgrade of two influent pump station pumps to 100 hp and increasing pumping capacity to 22 MGD.
- 2013 – Automated CSO regulator gates to assure maximum storage in system.
- 2013 – Raised elevation of overflow weirs at Park Street, Division Street, and Freeway Drive increasing storage capacity and reducing potential overflow volumes.
- 2014 – Modified the two 60 hp pumps in the influent pump station with larger impellers and rewound motors to increase their power rating to 68 hp and to increase their pumping capacity by 0.5 MGD per pump.
- 2016 – Installed new multi-rake bar screen in influent building with a capacity of 26 MGD, in addition to existing 12 MGD bar screen.

Table 2 shows the number of CSO events and total annual discharge flow reported by the City of Mount Vernon for 2011 through 2015. The City believes the projects it has completed will result in compliance with CSO Performance Standard of an average of no more than one untreated overflow per year per outfall. Because these projects were completed recently, additional data is needed before Ecology can determine whether the standard has been met. The proposed permit requires ongoing monitoring and reporting of CSO events. The City is required to propose additional CSO control projects if needed to achieve compliance with the Performance Standard.

Table 2. Combined Sewer Overflow Summary

Year	Number of Overflow Events at Division St. Outfall	Number of Overflow Events at Park St. Outfall	Total Annual Discharge Volume (million gallons)
2011	4	3	7,991,000
2012	2	2	5,793,000
2013	1	0	405,000
2014	2	1	156,000
2015	2	2	7,674,000
5-year Average	**2.2**	**1.6**	**4,404,000**

Treatment processes

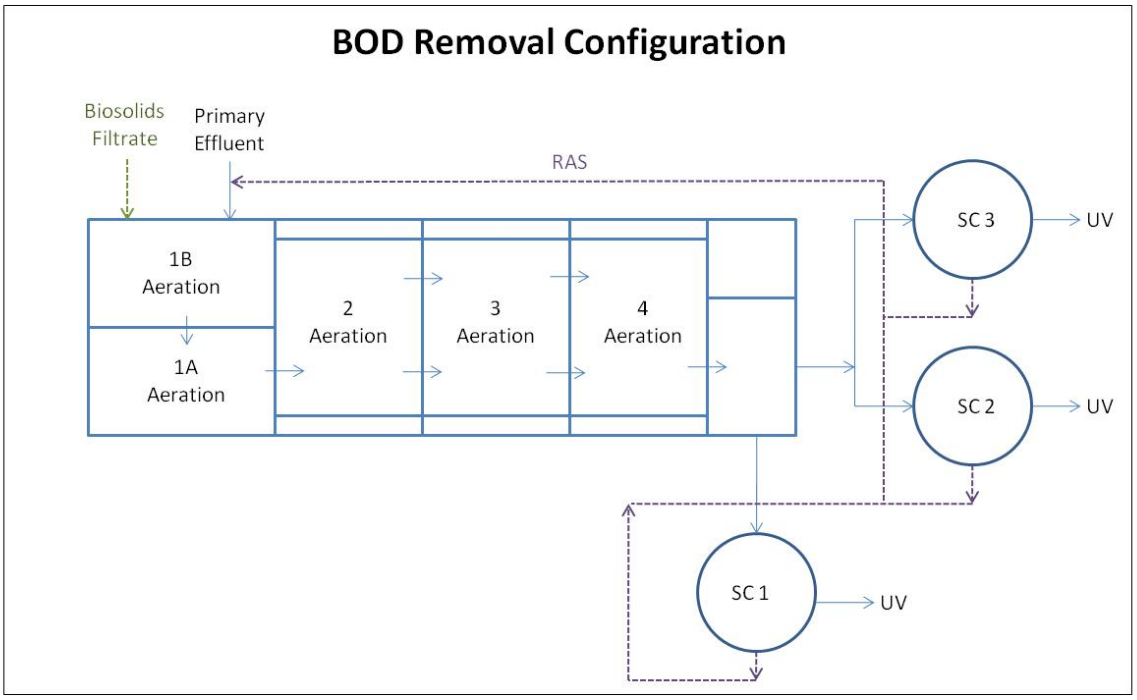
Appendix C contains a complete process flow diagram for the current facility. Flow enters the plant at two locations. The majority of the city's flow, including all combined sewer flow, enters through the Hazel Street Interceptor at the influent pump station. The remaining flow (approximately 10%) enters through a force main from West Mount Vernon that bypasses the influent building and discharges directly into the Pretreatment Building.

The influent pump station includes two mechanically-cleaned coarse bar screens. Treatment plant staff collect raw wastewater samples from the inlet channels to the influent pump station using an automatic composite sampler. Two 68 hp and two 100 hp pumps equipped with variable frequency drives in the influent building transfer wastewater from the pump station to the Pretreatment building. A small amount of internal plant flow returns to the influent pump station. This return flow, however, is metered separately and is not sampled by the influent sampler. Although the plant does not include the West Mount Vernon flow in their influent composite sampling, the amount of flow from this area is not sufficient enough to change concentrations as measured at the influent pump station.

The Pretreatment Building provides preliminary treatment using a rock trap, self-cleaning fine (6 mm) perforated plate screens and vortex grit chambers. A Parshall flume located after the grit chambers provides influent flow measurements for the plant. Screened and degritted wastewater then flows to one or both of the primary clarifiers. Primary sludge is pulled off of the bottom of the clarifier and pumped to the digester for anaerobic treatment. Floatable scum at the surface of the clarifiers is skimmed off and diverted to a scum pit. The clarifiers are covered for odor control.

After primary clarification, flows enter the aeration basins. Normally the basins operate with complete aeration in a "BOD Removal" mode. Operating in this mode the plant can treat 15 MGD (maximum monthly average). Staff operate the basins with a generally young sludge age of 5 days and keep the mixed liquor concentration within a range of 1,200-1,500 mg/L when configured for BOD only removal. Figure 2 illustrates the general flow routing through the aeration basins during BOD removal.

Figure 2. Secondary Flow Configuration in BOD Removal Mode



While in the BOD removal mode, there is an option to have an anoxic cell online. The anoxic cell would be the first cell in the aeration basins that the forward flow enters. There are several benefits of having the anoxic cell online. By using the MLSS recycle pumps, basin discharge can be pumped back into the anoxic cell to help buffer pH drop which in turn will reduce the potential need for chemical addition to maintain the pH level. The MLSS pumps can be run in either a fixed paced mode or a flow paced mode. The anoxic cell also helps control the growth of certain filamentous organisms, and helps promote the formation of firm floc particles thru the denitrification process.

During the dry-weather season operators may reconfigure the treatment system to allow the aeration basins to operate in a Modified Ludzack-Ettinger (MLE) process mode. The MLE process allows for simultaneous nitrification and denitrification to remove nitrogen from the wastewater. Reconfiguration requires switching cell 1B to anoxic operation and increasing the internal recycle rate of activated sludge. The MLE process requires higher mixed liquor concentrations (approximately 3,000 mg/L) and an older sludge population (greater than 10 days). The process also requires 100% mixed liquor recycle rate. This mode of operation was required in the previous permit during the months of July through October. However, influent loadings to the treatment plant began to approach the maximum capacity of the plant in MLE mode in 2015. To maintain treatment capacity, the City made the decision to operate in BOD removal mode year round. The proposed permit removes the influent load design limits based on use of the MLE mode. Ecology encourages the City to continue to use the MLE process mode during dry weather.

Mixed liquor from the aeration basins is routed to the secondary clarifiers. The facility has 3 secondary clarifiers; 2 constructed during the 2009 plant expansion and the third constructed during the 1988 plant improvement project. Overflow from the individual secondary clarifiers combine at the secondary effluent junction box and from there is routed to the UV

system for disinfection. The UV system is divided into two channels. Each channel consists of one Trojan UV bank with 15 lamp modules with 8 lamps per module (total of 120 lamps per bank). The UV structure has two empty channels available for future expansion. The UV banks include automatic wipers to keep the bulbs clean. Plant staff collect effluent grab samples from the channels between the UV system and the effluent wet well. Composite samples and continuous monitoring for temperature and pH occurs at the effluent wet well.

The WWTP is staffed with 12 operators, which includes the Wastewater Division Manager, Assistant Supervisor and Process Analyst. There are 3 Group IV operators and 6 Group III operators. One operator is assigned on weekend days and 2 operators on holidays. The operators rotate the 24 hour on-call duty. Normal plant hours are 6 am to 4:30 pm Monday through Friday. Weekend coverage is about 8 hours a day.

Influent to the wastewater treatment plant is domestic sewage from predominantly residential and light commercial connections. Mount Vernon reported the following industrial discharges to their treatment system:

- Draper Valley Farms (permit ST0003861) discharges wastewater generated from chicken processing operations as well as stormwater from limited areas of their plant site.
- Hallmark Refining Corporation (ST0007382) discharges wastewater associated with silver reclamation from waste film and chemicals from the photographic industry.
- Inman Landfill (ST0007405) discharges leachate from a closed landfill.

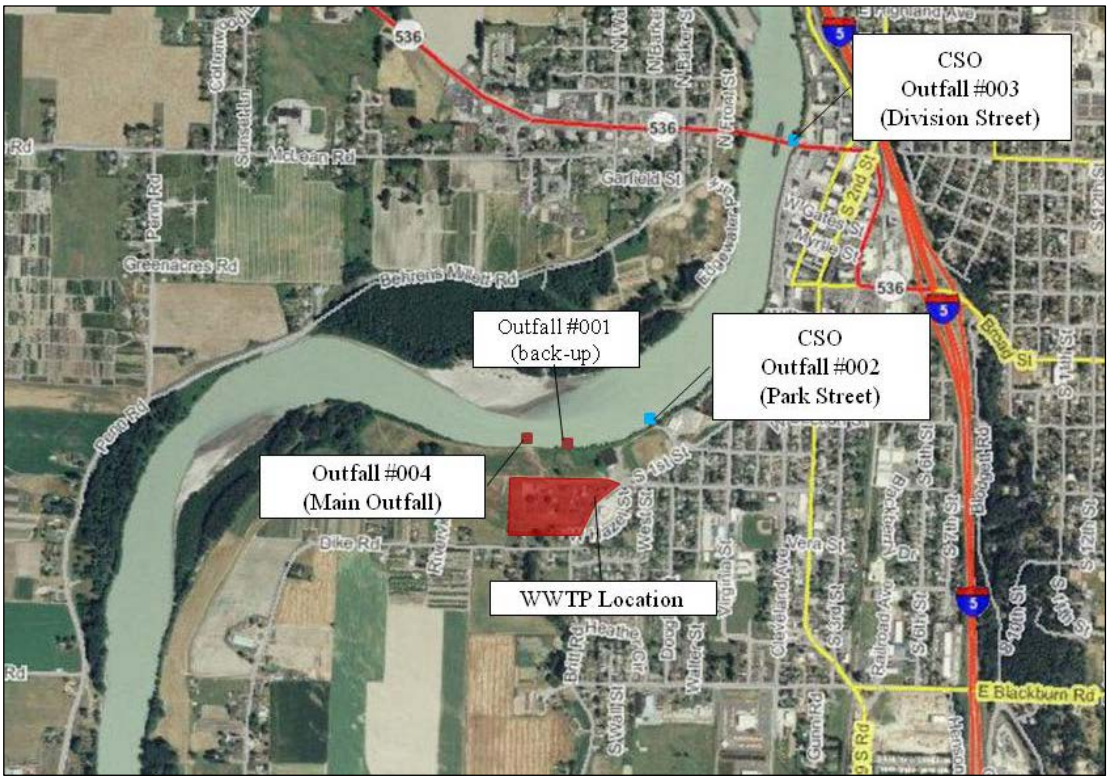
Solid wastes/residual solids

The WWTP removes solid waste at the influent building and the Pretreatment building. The facility meets the screening requirement of WAC 173-308-205 with 6mm perforated plate screens. Screenings removed at the influent building drop into a washer-compactor prior to disposal into a dumpster as solid waste. Debris removed by screens in the Pretreatment building are also sent to a washer-compactor prior to being bagged and disposed of as solid waste. Grit from the vortex grit chambers are thickened with grit classifiers before being bagged and disposed of as solid waste. The waste bins containing compacted screenings and grit are picked up weekly. All excess water from the washer-compactors and the grit classifiers are returned to the treatment process. Scum from the surface of the primary clarifiers and primary sludge are pumped to the anaerobic digester for stabilization. Waste activated sludge from the biological treatment process is sent to the DAFT unit for thickening before digestion in the anaerobic digester. After digestion, solids are thickened with a belt filter press and trucked to Boulder Park for use as soil amendment. Biosolids transferred to Boulder Park are managed under Ecology's General Biosolids Permit.

Discharge outfall

The treated and disinfected effluent flows into the effluent wet well and then to the Skagit River through outfall 004 – a 48" diameter pipe equipped with a 36" Tideflex valve located at the deepest part of the channel. Effluent is normally discharged by gravity, but is pumped when the river level is high. In emergency situations the plant has the ability to also route effluent flow to the original outfall (Outfall 001), a 24" side-bank outfall. Outfall 001 is not permitted as an authorized discharge location. Figure 3 shows locations of the outfalls, including the two CSO outfalls.

Figure 3. Outfall Locations



B. Description of the receiving water

The Mt. Vernon WWTP discharges to the Skagit River at approximately river mile 10.7. Other nearby point source outfalls upstream from Mt. Vernon include the City of Anacortes Water Treatment Plant (RM 13), City of Burlington WWTP (RM 18.1), and City of Sedro-Woolley WWTP (RM 22.8). The discharge for Skagit County Sewer District No. 2 (Big Lake WWTP) is downstream from Mt. Vernon at RM 7.8. Significant nearby non-point sources of pollutants include stormwater runoff from the cities of Mount Vernon, Burlington, and Sedro-Woolley, and agricultural runoff. Nearby drinking water intakes include the City of Anacortes Water Treatment Plant (RM 13).

Table 3 summarizes ambient background data used to draft the proposed permit. Ecology used data from Ecology's long-term Water Quality Monitoring Station #03A060, located one mile north of Mount Vernon's city limits at the old Highway 99 bridge crossing the Skagit River. The station is approximately 5 river miles above the Mount Vernon WWTP discharge. Data for this permit are from 2008-2014. Metals values are the dissolved form.

https://fortress.wa.gov/ecy/eap/riverwq/station.asp?theyear=&tab=final_data&scrolly=486&wria=03&sta=03A060

Table 3. Ambient Background Data

Parameter	Value Used
Temperature (highest annual 7-DADMax)	18.5°C
pH (95th/5th percentiles)	7.51 / 7.01 standard units
Dissolved Oxygen (average)	11.5 mg/L
Total Ammonia-N (95th percentile)	0.033 mg/L
Fecal Coliform (average)	11.5/100 mL
Turbidity (average)	12 NTU
Hardness	34 mg/L as CaCO3
Copper	0.63 µg/L
Lead	0.032 µg/L
Mercury	0.0046 µg/L
Nickel	1.36 µg/L
Silver	Not detected
Zinc	3.72 µg/L

C. Wastewater influent characterization

Mt. Vernon reported the concentration of influent pollutants in discharge monitoring reports. The influent wastewater is characterized as follows:

Table 4. Wastewater Influent Characterization, January 2011 – December 2015

Parameter	Units	Average Value	Maximum Value
Biochemical Oxygen Demand (BOD_5) – monthly average	mg/L	227	347
Biochemical Oxygen Demand (BOD5) – monthly average	lbs/day	6,960	10,570
Total Suspended Solids (TSS) – monthly average	mg/L	223	348
Total Suspended Solids (TSS) – monthly average	lbs/day	6,895	9,267
Flow – monthly average	MGD	3.98	6.51
Flow – max day	MGD	--	18.4

D. Wastewater effluent characterization

Mt. Vernon reported the concentration of pollutants in the discharge in the permit application and in discharge monitoring reports. The wastewater effluent is characterized as follows:

Table 5. Wastewater Effluent Characterization, January 2011 – December 2015

Parameter	Units	# of Samples	Average Value	Maximum Value
Biochemical Oxygen Demand (BOD_5) – monthly average	mg/L	780	13	25
Biochemical Oxygen Demand (BOD5) – monthly average	lbs/day	780	441	960
Total Suspended Solids (TSS) – monthly average	mg/L	780	6	15
Total Suspended Solids (TSS) – monthly average	lbs/day	780	219	883

Table 5. Wastewater Effluent Characterization, January 2011 – December 2015

Parameter	Units	# of Samples	Average Value	Maximum Value
Ammonia	mg/L	260	16.9	61.4
Nitrate + Nitrite	mg/L	60	5.72	19
Ortho-phosphate	mg/L	60	2.2	7.47
Total Kjeldahl Nitrogen	mg/L	60	16.8	40.9
Total Phosphorus	mg/L	60	2.69	8.47
Temperature (7-DAD Max)	°C	continuous recording	18.9	26
Hardness	mg/L	4	72.9	96.4
Arsenic	µg/L	7	0.39	0.8
Cadmium	µg/L	7	0.12	0.7
Chromium	µg/L	7	0.47	0.9
Copper	µg/L	7	5.29	9.0
Lead	µg/L	7	0.14	0.43
Mercury	µg/L	4	0.00197	0.00224
Nickel	µg/L	7	9.14	24
Selenium	µg/L	7	0.23	0.34
Silver	µg/L	7	0.056	0.17
Thallium	µg/L	7	0.03	0.12
Zinc	µg/L	7	35.6	47
Total Phenolic Compounds	µg/L	4	2.75	11
Chloroform	µg/L	5	1.16	2.4
Toluene	µg/L	5	0.39	1.0
Bis (2-ethylhexyl) phthalate	µg/L	9	131	486
1,4-Dichlorobenzene	µg/L	5	0.71	1.2

Parameter	Units	# of Samples	Maximum Monthly Geometric Mean	Maximum Weekly Geometric Mean
Fecal Coliforms	#/100 mL	1300	59	230

Parameter	Units	# of Samples	Minimum Value	Maximum Value
pH	standard units	continuous recording	6.0	8.1

E. Summary of compliance with previous permit issued December 17, 2010

The previous permit placed effluent limits on Biochemical Oxygen Demand (5-day), Total Suspended Solids, fecal coliform bacteria, and pH. It also included limits for copper and bis(2-ethylhexyl) phthalate for emergency or maintenance discharges from outfall 001. Outfall 001 was not used during the previous permit term.

Mt. Vernon has complied with the effluent limits and permit conditions throughout the duration of the permit issued on December 17, 2010. Mt. Vernon received the "Outstanding Treatment Plant" award each year from 2011-2014. 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 following table summarizes the permit triggers that occurred during the permit term. Permit triggers are not violations but rather when triggered require the permit holder to take an action defined in the permit. When the 85% design criteria warning level was reached for three months in a row (August through October 2015), Mt. Vernon was required to submit a plan for continuing to maintain treatment capacity. Because the design limit in effect during those months was for the MLE (nitrogen removal) treatment mode, Mt. Vernon's plan for providing adequate capacity is to operate in BOD removal mode in the future. Nitrogen removal is not required by the permit.

Table 6. Permit Triggers

Violation Date	Parameter	Statistical Base	Units	Value	Design Limit / 85% Trigger	Violation
Sep-14	BOD5	Average	Lbs/Day	8172	8800 / 7480	85% Design Criteria Warning
Sep-14	TSS	Average	Lbs/Day	9002	9300 / 7905	85% Design Criteria Warning
Aug-15	BOD5	Average	Lbs/Day	7485	8800 / 7480	85% Design Criteria Warning
Sep-15	BOD5	Average	Lbs/Day	7917	8800 / 7480	85% Design Criteria Warning
Oct-15	BOD5	Average	Lbs/Day	7977	8800 / 7480	85% Design Criteria Warning

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

Table 7. Submittals

Submittal Name	Due Date	Received Date
Acute Toxicity Characterization	8/30/2014	7/11/2014
Acute Toxicity Characterization	2/28/2015	2/25/2015
Additional Effluent Characterization	3/15/2011	3/9/2011
Additional Effluent Characterization	8/15/2011	7/6/2011
Additional Effluent Characterization	11/15/2011	7/27/2011
Additional Effluent Characterization	12/31/2011	11/2/2011
Application For Permit Renewal	6/15/2015	6/3/2015
Chronic Toxicity Characterization	10/31/2014	9/5/2014
Chronic Toxicity Characterization	4/28/2015	2/25/2015
Combined Sewer Overflow Annual Report	4/1/2011	3/25/2011
Combined Sewer Overflow Annual Report	4/1/2012	3/28/2012
Combined Sewer Overflow Annual Report	4/1/2013	3/21/2013
Combined Sewer Overflow Annual Report	4/1/2014	3/10/2014
Combined Sewer Overflow Annual Report	4/1/2015	3/17/2015
Combined Sewer Overflow Reduction Plan Amendment	1/1/2015	12/30/2014
CSO Control Effectiveness Report	3/31/2012	3/28/2012
Industrial User Survey	6/15/2015	6/22/2015
Operation And Maintenance Manual	7/1/2015	6/18/2015
Post Construction Monitoring Program Plan	1/1/2015	12/30/2014

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 City of Mount Vernon Wastewater Treatment Plant Upgrade, Phase 1 Contract Drawings (2006) prepared by HDR Engineering. The table below includes design criteria from the referenced report.

Table 8. Design Criteria for the City of Mt. Vernon WWTP

Parameter	Design Quantity
Maximum Month Design Flow (MMDF)	15 MGD
BOD_5 Loading for Maximum Month	17,300 lb/day
TSS Loading for Maximum Month	18,300 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 federal CSO Control Policy (59 FR 18688) also requires entities with Combined Sewer Overflows to implement "Nine Minimum Controls" as technology-based performance standards for CSO discharges. Nine Minimum Controls are discussed in more detail in Section V of this fact sheet.

The table below identifies technology-based limits for pH, fecal coliform, BOD_5, 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 9. 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.	

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

Technology-based mass limits are based on WAC 173-220-130(3)(b) and 173-221-030(11)(b). Ecology calculated the monthly and weekly average mass limits for BOD_5 and Total Suspended Solids as follows:

Mass Limit = CL x DF x CF

where:

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

Table 10. Technology-based Mass Limits

Parameter	Concentration Limit (mg/L)	Mass Limit lbs/day)
BOD_5 Monthly Average	30	3,753
BOD_5 Weekly Average	45	5,630
TSS Monthly Average	30	3,753
TSS Weekly Average	45	5,630

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

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

Narrative criteria

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

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

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

Antidegradation

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

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

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

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

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

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

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

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

Combined sewer overflows

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

Mixing zones

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

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

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

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

The mixing zone analysis produces a numerical value called a dilution factor (DF). A dilution factor represents the amount of mixing of effluent and receiving water that occurs at the boundary of the mixing zone. For example, a dilution factor of 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 liters/day for drinking water.
- A one-in-one-million cancer risk for carcinogenic chemicals.

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

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

   The proposed permit specifies the size and location of the allowed mixing 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 Mt. Vernon 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'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/SummaryPages/92109.html.

   Cosmopolitan Engineering conducted a mixing zone analysis for Outfall 004 in 2008. The study established acute and chronic dilution factors based on modeling calibrated with a dye tracer study. The model used the critical conditions listed in Table 11.

Table 11. Critical Conditions Used to Model the Discharge

Critical Condition	Value
The seven-day-average low river flow with a recurrence interval of ten years (7Q10)	5,030 cfs
Harmonic mean flow (for human health carcinogen)	13,200 cfs
River depth at the 7Q10 period – outfall line invert	13 feet
River depth at the 7Q10 period – outfall centerline	11.8 feet
River velocity	1.80 ft per second
Manning roughness coefficient	0.035
Diffuser horizontal angle	22.5°
Channel width	400 feet
Maximum average monthly effluent flow for chronic and human health non-carcinogen	3.94 MGD
Maximum dry weather daily flow for acute mixing zone	6.0 million gallons per day (MGD)
Annual average flow for human health carcinogen	3.98 MGD
Effluent temperature	23° C
Calibrated transverse mixing coefficient constant	0.4

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.

Because this is a domestic wastewater discharge, the effluent contains fecal coliform bacteria. Ecology developed the water quality criteria for fecal coliforms (discussed below) to assure that people swimming (primary contact recreation) in water meeting the criteria would not develop gastro enteric illnesses. Ecology has authorized a mixing zone for this discharge. The water quality standard for primary contact recreation will be met at the boundary of this mixing zone.

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

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

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

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

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

Ecology minimizes the size of mixing zones by requiring dischargers to install diffusers when they are appropriate 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 chronic mixing zone.

The authorized chronic 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 at the ten year low flow.

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

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

- **Comply with size restrictions.**

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

9. Overlap of mixing zones.

This mixing zone does not overlap another mixing zone.

D. Designated uses and surface water quality criteria

Applicable designated uses and surface water quality criteria are defined in chapter 173-201A WAC. 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 based on the presence of, or the intent to provide protection for the key uses. All indigenous fish and non-fish aquatic species must be protected in waters of the state in addition to the key species. The Aquatic Life Uses for this receiving water are identified below.

Table 12. Freshwater Aquatic Life Uses and Associated Criteria

Core Summer Salmonid Habitat	
Temperature Criteria – Highest 7-DAD MAX	16°C (60.8°F)
Dissolved Oxygen Criteria	9.5 mg/L
Turbidity Criteria	• 5 NTU over background when the background is 50 NTU or less; or • A 10 percent increase in turbidity when the background turbidity is more than 50 NTU.
Total Dissolved Gas Criteria	Total dissolved gas must not exceed 110 percent of saturation at any point of sample collection.
pH Criteria	The pH must measure within the range of 6.5 to 8.5, with a human-caused variation within the above range of less than 0.2 units.

- The *recreational uses* for this receiving water is identified below.

Table 13. Recreational Uses and Associated Criteria

Recreational Use	Criteria
Primary Contact Recreation	Fecal coliform organism levels must not exceed a geometric mean value of 100 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 200 colonies /100 mL.

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

E. Water quality impairments

The Skagit River is not listed as impaired on the current (2012) 303(d) Water Quality Assessment. Ecology completed a Total Maximum Daily Load (TMDL) Analysis for fecal coliform bacteria in the Lower Skagit River. The TMDL determined wasteload allocations (WLAs) for dischargers covered by a national pollution discharge elimination system (NPDES) permit, and load allocations (LAs) for the part of the river upstream of Sedro-Woolley. The LAs also required the Nookachamps, Carpenter, and Fisher creeks to meet Class A water quality standards. The WLAs required all NPDES permitted dischargers to meet technology-based permit limitations, and abatement of combined sewer overflows (CSOs) to no more than one discharge per year.

Ecology submitted the final TMDL to EPA for approval. EPA approved the TMDL on September 1, 2000.

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

Ecology must consider the narrative criteria described in WAC 173-201A-260 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.

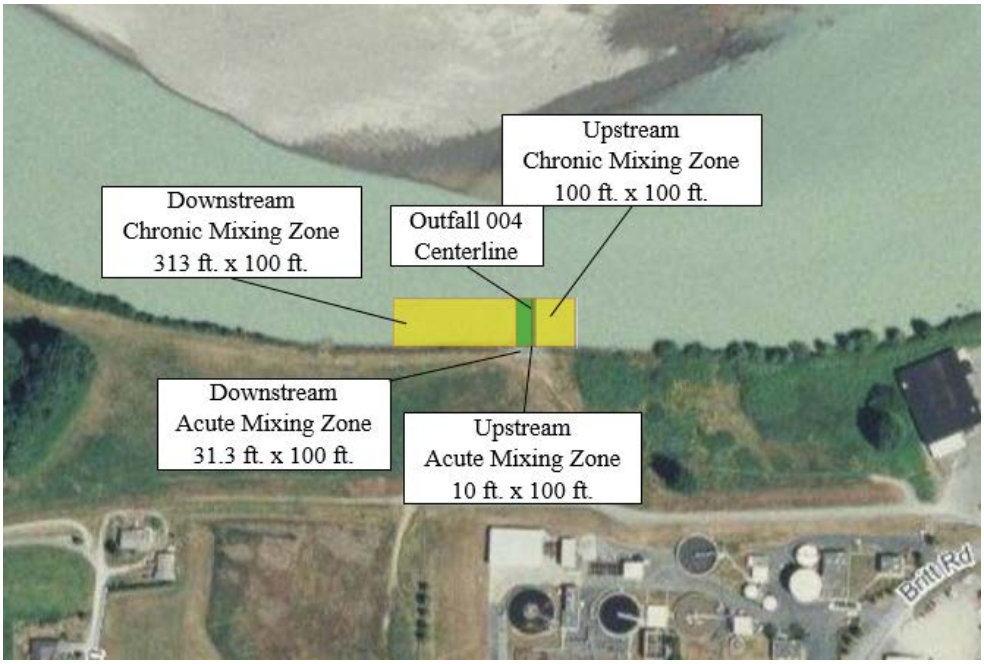
G. Evaluation of surface water quality-based effluent limits for numeric criteria

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 (BOD_5) is a far-field pollutant whose adverse effect occurs away from the discharge even after dilution has occurred. Thus, the method of calculating surface water quality-based effluent limits varies with the point at which the pollutant has its maximum effect.

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

The diffuser at Outfall 004 is a single 36" Tideflex valve that discharges effluent upward at a 22.5° angle. The diffuser invert depth is 13 feet at 7Q10 flow. Figure 4 illustrates the approximate sizes and locations of mixing zones for outfall 004.

Figure 4. Mixing Zone Sizes and Locations



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

The chronic mixing zone for Outfall 004 extends 313 feet downstream and 100 feet upstream. The horizontal distance of the chronic mixing zone is 100 feet. The mixing zone extends from the bottom to the top of the water column.

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

The acute mixing zone for Outfall 004 extends 31.3 feet downstream and 10 feet upstream. The horizontal distance of the acute mixing zone is 100 feet. The mixing zone extends from the bottom to the top of the water column. The dilution factor is based on this distance.

The dilution factors that occur within these zones at the critical condition were calculated by Cosmopolitan Engineering (2008 mixing study) for the aquatic life acute and chronic mixing zones. The dilution factor for human health non-carcinogens is equivalent to the aquatic life chronic dilution factor. The dilution factor for human health carcinogens is based on the annual average flow of the treatment plant and 25% of the harmonic mean flow of the Skagit River. The dilution factors are listed below.

Table 14. Dilution Factors (DF)

Criteria	Outfall 004	
	Acute	Chronic
Aquatic Life	13.6	143
Human Health, Carcinogen		537
Human Health, Non-carcinogen		143

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

Dissolved Oxygen – BOD_5 and Ammonia Effects--Natural decomposition of organic material in wastewater effluent impacts dissolved oxygen in the receiving water at distances far outside of the regulated mixing zone. The 5-day Biochemical Oxygen Demand (BOD_5) of an effluent sample indicates the amount of biodegradable material in the wastewater and estimates the magnitude of oxygen consumption the wastewater will generate in the receiving water. The amount of ammonia-based nitrogen in the wastewater also provides an indication of oxygen demand potential in the receiving water.

Ecology modeled the impact of BOD_5 on the receiving water using the Streeter-Phelps equations, at critical condition and with the technology-based effluent limit for BOD_5 described under "Technology-Based Effluent Limits" above. The calculations to determine dissolved oxygen impacts are shown in Appendix F.

Ecology predicted no violation of the surface water quality standards for dissolved oxygen due to the impacts of biochemical oxygen demand (BOD_5) under critical conditions. Therefore, the proposed permit contains the technology-based effluent limit for BOD_5. 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 – Ecology modeled the impact of the effluent pH on the receiving water using the calculations from EPA, 1988, and the chronic dilution factors tabulated above. Appendix F includes the model results.

Under critical conditions, modeling predicts a violation of the pH criteria for the receiving water. Therefore, the proposed permit includes water quality-based effluent limits for pH of 6.3 to 9.0 for Outfall 004.

Fecal Coliform – The Lower Skagit River TMDL for fecal coliform bacteria set technology-based limits for fecal coliform as the waste load allocations (WLAs) for the four POTWs discharging into the river. The proposed permit includes the technology-based limit of 400 organisms per 100 mL as a weekly geometric mean and 200/100 mL as a monthly geometric mean.

Ecology modeled the numbers of fecal coliform by simple mixing analysis using the chronic dilution factor. Under critical conditions, modeling predicts no violation of the water quality criterion for fecal coliform.

Turbidity--Ecology evaluated the impact of turbidity based on the range of total suspended solids in the effluent and turbidity of the receiving water. Ecology expects no violations of the turbidity criteria outside the designated mixing zone provided the facility meets its technology-based total suspended solids permit limits.

Toxic Pollutants--Federal regulations (40 CFR 122.44) require Ecology to place limits in NPDES permits on toxic chemicals in an effluent whenever there is a reasonable potential for those chemicals to exceed the surface water quality criteria. Ecology does not exempt facilities with technology-based effluent limits from meeting the surface water quality standards.

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

Ammonia's toxicity depends on that portion which is available in the unionized form. The amount of unionized ammonia depends on the temperature and pH in the receiving freshwater. To evaluate ammonia toxicity, Ecology used the available receiving water information for ambient station 03A060 and Ecology spreadsheet tools.

No valid ambient background data were available for arsenic, cadmium, chromium, selenium, and cyanide. Ecology used zero for background.

Valid ambient background data were available for ammonia, copper, lead, mercury, nickel, silver, and zinc (See Table 3). Ecology used all applicable data to evaluate reasonable potential for this discharge to cause a violation of water quality standards.

Ecology determined that ammonia, arsenic, cadmium, chromium, copper, lead, mercury, nickel, selenium, silver, zinc, and cyanide pose no reasonable potential to exceed the water quality criteria at the critical condition using procedures given in EPA, 1991 (Appendix F) 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 summer maximum threshold criteria (June 15 to September 15)
- Supplemental spawning and rearing season criteria (September 15 to June 15)
- Incremental warming restrictions
- Protections against acute effects

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

- Annual summer maximum and supplementary spawning/rearing criteria

  Each water body has an annual maximum temperature criterion [WAC 173-201A-200(1)(c), 210(1)(c), and Table 602]. These threshold criteria (e.g., 12, 16, 17.5, 20°C) protect specific categories of aquatic life by controlling the effect of human actions on summer temperatures.

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

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

- Incremental warming criteria

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

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

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

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

- Protections for temperature acute effects

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

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

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

Reasonable Potential Analysis

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

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

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

Ecology will reevaluate the reasonable potential during the next permit renewal.

H. Human health

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

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

Ecology evaluated the discharge's potential to violate the water quality standards as required by 40 CFR 122.44(d) by following the procedures published in the *Technical Support Document for Water Quality-Based Toxics Control* (EPA/505/2-90-001) and Ecology's *Permit Writer's Manual* to make a reasonable potential determination. The evaluation showed that the discharge has no reasonable potential to cause a violation of water quality standards, and an effluent limit is not needed.

I. Sediment quality

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

Data from the Department of Ecology SEDQUAL information system indicate that 3 samples collected on or before August 25 2003 do NOT exceed the Sediment Management Standards bioassay criterion. The City of Mount Vernon conducted baseline sediment sampling in the vicinity of outfall 004 before installing the outfall. That report determined that the river bed was predominantly sands (98%) and very little silts or clays. Sediment sampling near outfall 001, conducted in 2007, revealed similar bed material distribution. The lack of fine particles (silts and clays), onto which toxins would most likely adsorb, indicates low potential for sediment toxicity near either of the Mount Vernon WWTP outfalls. Furthermore, the high average velocity of 1.81 ft/sec. at 7Q10 flows is high enough to ensure fine particles, such as silts and clays, remain suspended in the river. Given the low likelihood of fine materials near the outfalls, Ecology believes there is little potential for sediment toxicity and will not require additional sediment monitoring in the proposed permit.

J. Whole effluent toxicity

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

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

Laboratories accredited by Ecology for WET testing know how to use the proper WET testing protocols, fulfill the data requirements, and submit results in the correct reporting format. Accredited laboratory staff know about WET testing and how to calculate an NOEC, LC50, EC50, IC25, etc. Ecology gives all accredited labs the most recent version of Ecology Publication No. WQ-R-95-80, *Laboratory Guidance and Whole Effluent Toxicity Test Review Criteria* (https://fortress.wa.gov/ecy/publications/SummaryPages/9580.html), which is referenced in the permit. Ecology recommends that Mt. Vernon send a copy of the acute and chronic toxicity sections of its NPDES permit to the laboratory.

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

- If this facility makes process or material changes which, in Ecology's opinion, increase the potential for effluent toxicity, then Ecology may (in a regulatory order, by permit modification, or in the permit renewal) require the facility to conduct additional effluent

characterization. Mt. Vernon may demonstrate to Ecology that effluent toxicity has not increased by performing additional WET testing and/or chemical analyses after the process or material changes have been made. Ecology recommends that the Permittee check with it first to make sure that Ecology will consider the demonstration adequate to support a decision to not require an additional effluent characterization.

- If WET testing conducted for submittal with a permit application fails to meet the performance standards in WAC 173-205-020, Ecology will assume that effluent toxicity has increased.

K. Groundwater quality limits

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

The Mt. Vernon 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 modified on 3/11/2014

Table 15. Comparison of Previous and Proposed Effluent Limits

		Previous Effluent Limits: Outfall 004 and 001		Proposed Effluent Limits: Outfall 004	
Parameter	**Basis of Limit**	**Average Monthly**	**Average Weekly**	**Average Monthly**	**Average Weekly**
Biochemical Oxygen Demand (5-day)	Technology	30 mg/L 3,753 lbs/day (Nov-June) 1,902 lbs/day (July-Oct.) 85% removal	45 mg/L 5,630 lbs/day (Nov-June) 2,852 lbs/day (July-Oct.)	30 mg/L 3,753 lbs/day 85% removal	45 mg/L 5,630 lbs/day
Total Suspended Solids	Technology	30 mg/L 3,753 lbs/day (Nov-June) 1,902 lbs/day (July-Oct.) 85% removal	45 mg/L 5,630 lbs/day (Nov-June) 2,852 lbs/day (July-Oct.)	30 mg/L 3,753 lbs/day 85% removal	45 mg/L 5,630 lbs/day

Parameter		**Monthly Geometric Mean Limit**	**Weekly Geometric Mean Limit**	**Monthly Geometric Mean Limit**	**Weekly Geometric Mean Limit**
Fecal Coliform Bacteria	Technology	200/100 ml	400/100 ml	200/100 ml	400/100 ml

Parameter		**Daily Minimum Limit**	**Daily Maximum Limit**	**Daily Minimum Limit**	**Daily Maximum Limit**
pH	Technology	6.2	9.0	6.3	9.0

Ecology removed the effluent mass limits based on the MLE operations mode for the months of July through October. Mount Vernon plans to discontinue using that process because that configuration of the treatment plant reduces the capacity to treat influent loads. The effluent limits removed were calculated directly from the influent loading limits and were not water quality-based. Ecology may increase technology-based limits based on "material and substantial alterations to the permitted facility" (40 CFR 125.3(d)).

All limits for outfall 001 are removed from the proposed permit. Any discharges from outfall 001 will be considered unauthorized discharges and subject to the notification and reporting requirements of Special Conditions S3.F (Reporting permit violations) and S5.F (Bypass procedures).

IV. Monitoring Requirements

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

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

A. Wastewater monitoring

The monitoring schedule is detailed in the proposed permit under Special Condition S.2. Specified monitoring frequencies take into account the quantity and variability of the discharge, the treatment method, past compliance, significance of pollutants, and cost of monitoring. The required monitoring frequency is consistent with agency guidance given in the current version of Ecology's *Permit Writer's Manual* (Publication Number 92-09) for conventional activated sludge facilities designed to treat more than 5.0 MGD.

Monitoring frequencies for TSS, BOD_5, and fecal coliform are consistent with the previous permit, but are lower than the baseline frequencies for this type of treatment plant. Mount Vernon was allowed lower monitoring frequencies in the previous two permit cycles based on demonstrated good performance. The amount of reduction depends on the ratio of performance for the last two years to the monthly average effluent limit. The ratio of effluent average to the Average Monthly Limit during 2014 through 2015 for BOD_5 is 52%, for TSS 19%, and for fecal coliform 4%. Therefore the reduced monitoring frequencies are consistent with Ecology's *Permit Writer's Manual* guidelines.

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 in Table 16.

Table 16. Accredited Parameters

Parameter Name	Category	Method Name	Matrix Description
Ammonia	General Chemistry	EPA 350.1_2_1993	Non-Potable Water
Dissolved Oxygen	General Chemistry	Hach 10360 Rev 1.1	Non-Potable Water
Alkalinity	General Chemistry	SM 2320 B-97	Non-Potable Water
Solids, Total Suspended	General Chemistry	SM 2540 D-97	Non-Potable Water
Chlorine (Residual), Total	General Chemistry	SM 4500-Cl G-00	Non-Potable Water
pH	General Chemistry	SM 4500-H+ B-00	Non-Potable Water
Nitrate	General Chemistry	SM 4500-$NO3^-$ E-00	Non-Potable Water
Biochemical Oxygen Demand (BOD)	General Chemistry	SM 5210 B-01	Non-Potable Water
Fecal coliform-count	Microbiology	SM 9222 D (m-FC)-97	Non-Potable Water

The Mt. Vernon WWTP last updated their Laboratory QA/QC Plan in October 2007. During a November 2015 technical assistance visit at the facility, Ecology discussed compliance sampling and analysis procedures with plant staff and discovered that some practices may not conform to procedures outlined in the latest edition of *Standard Methods for the Examination of Water and Wastewater* or comparable methods identified in 40 CFR 136. Ecology included a requirement to review and update the QA/QC manual in the proposed permit as condition S5.H.

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 Mt. Vernon 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.

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 Mt. Vernon takes adequate safeguards so that it uses constructed facilities to their optimum potential in terms of pollutant capture and treatment.

D. Pretreatment

Duty to enforce discharge prohibitions

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

- The first section of the pretreatment requirements prohibits the POTW from accepting pollutants which causes "pass-through" or "interference". This general prohibition is from 40 CFR §403.5(a). Appendix C of this fact sheet defines these terms.
- The second section reinforces a number of specific state and federal pretreatment prohibitions found in WAC 173-216-060 and 40 CFR §403.5(b). These reinforce that the POTW may not accept certain wastes, which:
    a. Are prohibited due to dangerous waste rules.
    b. Are explosive or flammable.
    c. Have too high or low of a pH (too corrosive, acidic or basic).
    d. May cause a blockage such as grease, sand, rocks, or viscous materials.
    e. Are hot enough to cause a problem.
    f. Are of sufficient strength or volume to interfere with treatment.
    g. Contain too much petroleum-based oils, mineral oil, or cutting fluid.
    h. Create noxious or toxic gases at any point.

40 CFR Part 403 contains the regulatory basis for these prohibitions, with the exception of the pH provisions which are based on WAC 173-216-060.

- The third section of pretreatment conditions reflects state prohibitions on the POTW accepting certain types of discharges unless the discharge has received prior written authorization from Ecology. These discharges include:
    a. Cooling water in significant volumes.
    b. Stormwater and other direct inflow sources.
    c. Wastewaters significantly affecting system hydraulic loading, which do not require treatment.

Federal and state pretreatment program requirements

Ecology administers the Pretreatment Program under the terms of the addendum to the "Memorandum of Understanding between Washington Department of Ecology and the United States Environmental Protection Agency, Region 10" (1986) and 40 CFR, part 403.

Under this delegation of authority, Ecology issues wastewater discharge permits for significant industrial users (SIUs) discharging to POTWs which have not been delegated authority to issue wastewater discharge permits. Ecology must approve, condition, or deny new discharges or a significant increase in the discharge for existing significant industrial users (SIUs) [40 CFR 403.8 (f)(1)(i) and(iii)].

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

Routine identification and reporting of industrial users

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

Requirements for performing an industrial user survey

This POTW has the potential to serve significant industrial or commercial users and must conduct an industrial user (IU) survey. The purpose of the IU Survey is to identify all facilities that may be subject to pretreatment standards or requirements so that Ecology can take appropriate measures to control these discharges. The POTW should identify each such user, and require them to apply for a permit before allowing their discharge to the POTW to commence. For SIUs, the POTW must require they actually are issued a permit prior to accepting their discharge. The steps the POTW must document in their IU Survey submittal include:

1. The POTW must develop a master list of businesses that may be subject to pretreatment standards and requirements and show their disposition. This list must be based on several sources of information including business licenses, and water and sewer billing records.
2. The POTW must canvas all the potential sources, having them either complete a survey form or ruling them out by confirming they only generate domestic wastewater.
3. The POTW must develop a list of the SIUs and potential SIUs in all areas served by the POTW. The list must contain sufficient information on each to allow Ecology to decide which discharges merit further controls such as a state waste discharge permit.

Properly completing an Industrial User Survey helps Ecology control discharges that may otherwise harm the POTW including its collection system, processes, and receiving waters. Where surveys are incomplete, Ecology may take such enforcement as appropriate and/or require the POTW to develop a fully delegated pretreatment program.

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 Skagit County Health Department.

F. Combined sewer overflows

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

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

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

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

The proposed permit requires Mt. Vernon to submit an amendment of its CSO reduction plan by December 31, 2018. The amendment must include an assessment of the effectiveness of the CSO controls, and if needed, a list of projects to achieve compliance with CSO Performance Standard.

Nine Minimum Controls

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

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

The nine minimum controls include:

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

CSO Monitoring

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

Annual CSO Report

Mt. Vernon must submit annual reports according to the requirements of WAC 173-245-090(1). This report: (a) details the past year's frequency and volume of combined sewage discharge from each CSO site, (b) explains the previous year's CSO reduction accomplishments, and (c) lists the projects planned for the next year. The report must indicate whether a CSO site has increased over the baseline annual condition. If an increase has occurred, the Permittee must propose a project and/or schedule to reduce that site below its baseline conditions. The report must document implementation of the nine minimum controls, and wet weather operation (flow blending) at the treatment plant.

Mt. Vernon must also assess in its annual reports and CSO reduction plan amendment whether identified outfalls meet the state standard of one untreated discharge per year per CSO. Assessment may be based on a 5 year running average.

Post-Construction Monitoring Program

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

that documents compliance. Mt. Vernon submitted a post-construction monitoring plan to Ecology on 12/30/2014. The proposed permit requires Mt. Vernon to implement the monitoring plan and to report monitoring data in the annual CSO report.

G. Outfall evaluation

The proposed permit requires Mt. Vernon to conduct an outfall inspection and submit a report detailing the findings of that inspection (Special Condition S.9). 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.

H. General conditions

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

VI. Permit Issuance Procedures

A. Permit modifications

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

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

B. Proposed permit issuance

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

VII. References for Text and Appendices

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

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Appendix A – Public Involvement Information

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

Ecology will place a Public Notice of Draft on September 27, 2016, in the *Skagit Valley Herald* 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/SummaryPages/0307023.html.

You may obtain further information from Ecology by telephone, 425-649-7037, or by writing to the address listed below.

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

The primary author of this permit and fact sheet is Laura Fricke, P.E.

Appendix B – Your Right to Appeal

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

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

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

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

ADDRESS AND LOCATION INFORMATION

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

Appendix C – Glossary

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

- Inhibits or disrupts the POTW, its treatment processes or operations, or its sludge processes, use or disposal; and

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

b. Is a member of a group of similar industrial users which, taken together, have the potential to cause pass through or interference at the POTW (e.g. facilities which develop photographic film or paper, and car washes).
Ecology may determine that a discharger initially classified as a potential significant industrial user should be managed as a significant industrial user.

Quantitation level (QL) -- Also known as Minimum Level of Quantitation (ML) – The lowest level at which the entire analytical system must give a recognizable signal and acceptable calibration point for the analyte. It is equivalent to the concentration of the lowest calibration standard, assuming that the lab has used all method-specified sample weights, volumes, and cleanup procedures. The QL is calculated by multiplying the MDL by 3.18 and rounding the

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

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

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

Sample Maximum -- No sample may exceed this value.

Significant industrial user (SIU) --

1) All industrial users subject to Categorical Pretreatment Standards under 40 CFR 403.6 and 40 CFR Chapter I, Subchapter N and;

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

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

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

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

Soil scientist -- An individual who is registered as a Certified or Registered Professional Soil Scientist or as a Certified Professional Soil Specialist by the American Registry of Certified Professionals in Agronomy, Crops, and Soils or by the National Society of Consulting

Scientists or who has the credentials for membership. Minimum requirements for eligibility are: possession of a baccalaureate, masters, or doctorate degree from a U.S. or Canadian institution with a minimum of 30 semester hours or 45 quarter hours professional core courses in agronomy, crops or soils, and have 5,3,or 1 years, respectively, of professional experience working in the area of agronomy, crops, or soils.

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

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

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

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

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

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

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

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

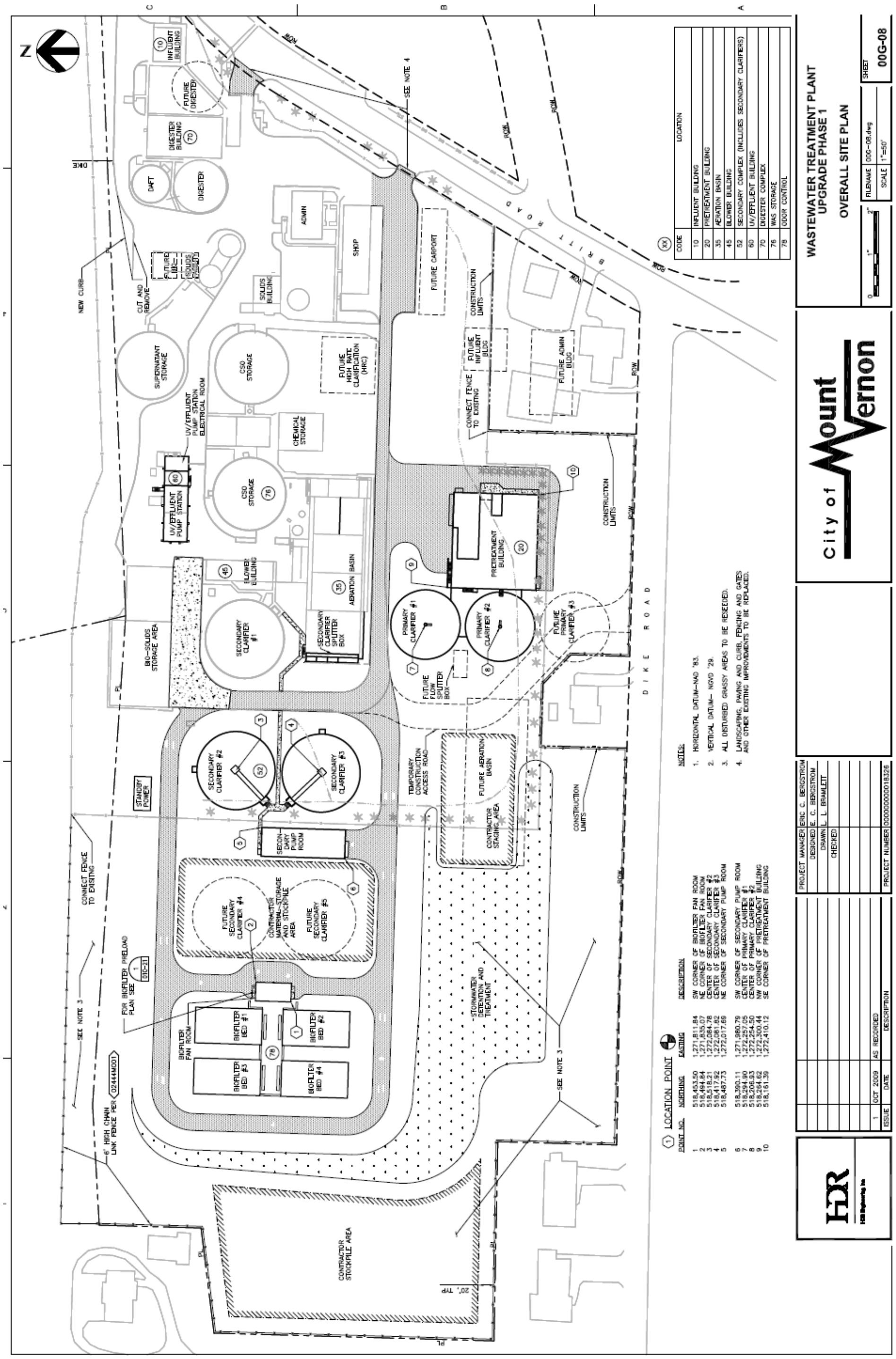
Total suspended solids (TSS) -- Total suspended solids is the particulate material in an effluent. Large quantities of TSS discharged to a receiving water may result in solids accumulation. Apart from any toxic effects attributable to substances leached out by water, suspended solids may kill fish, shellfish,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

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

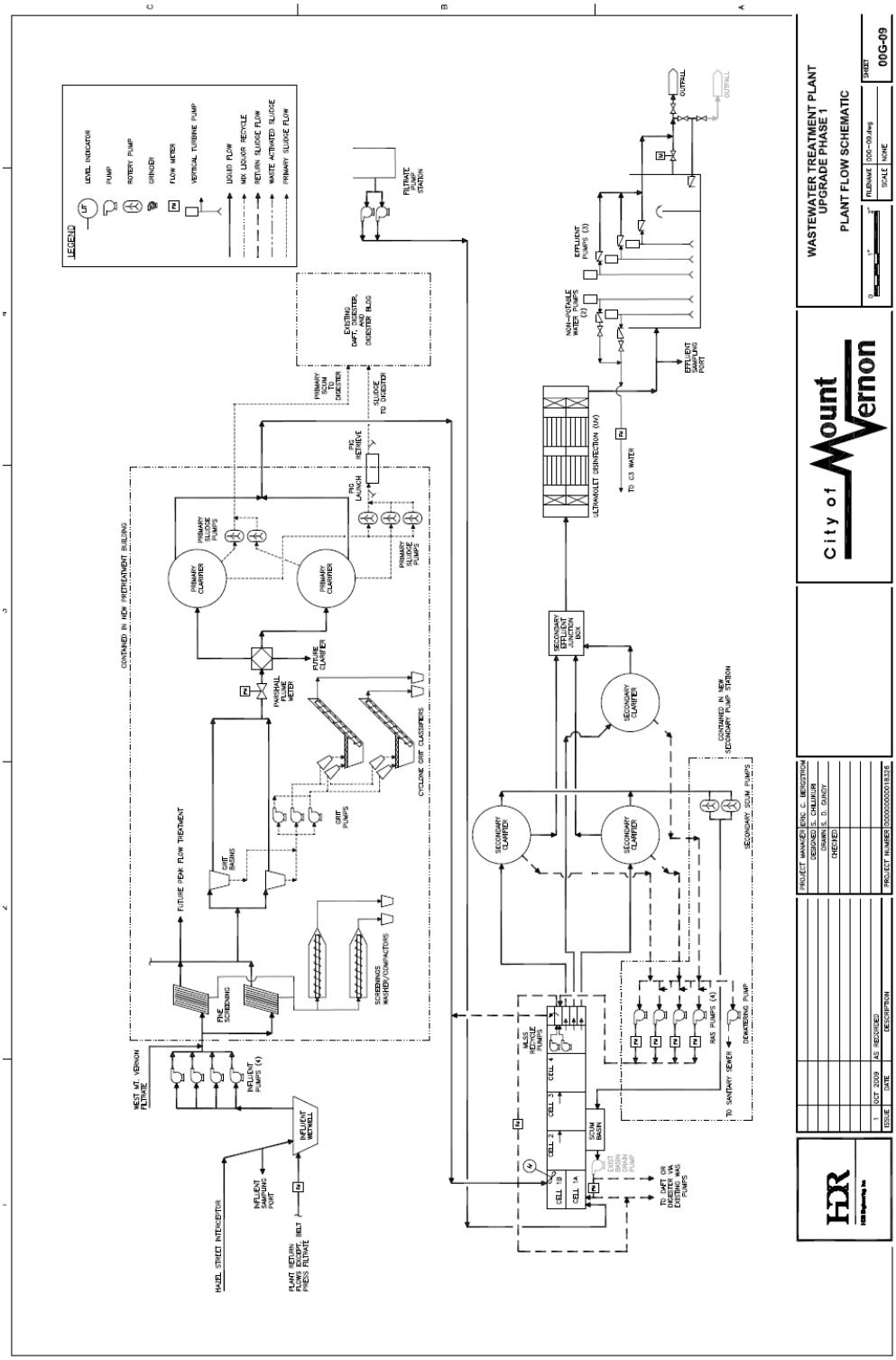
Water quality-based effluent limit -- A limit imposed on the concentration of an effluent parameter to prevent the concentration of that parameter from exceeding its water quality criterion after discharge into receiving waters.

Appendix D – WWTP Diagrams

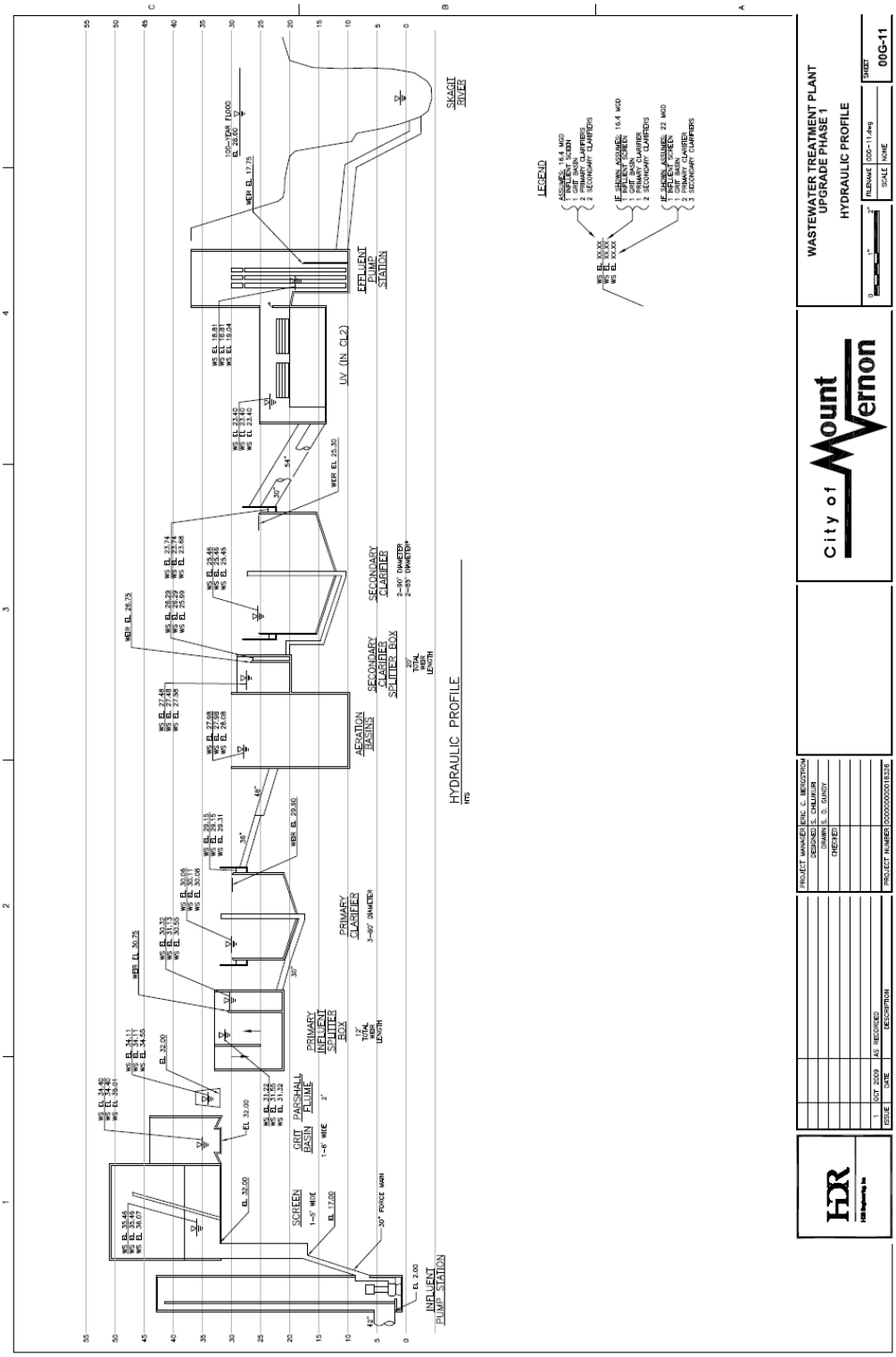
WWTP Site Plan



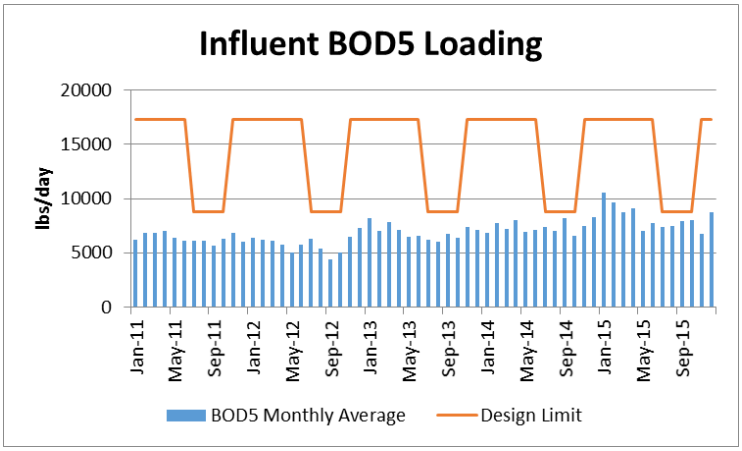
Flow Schematic

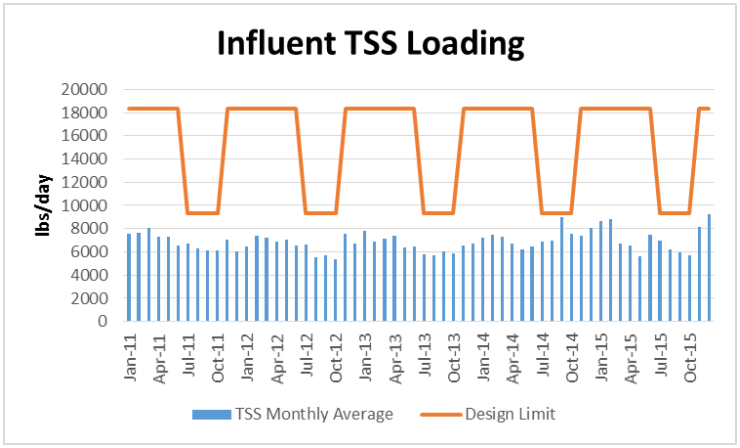


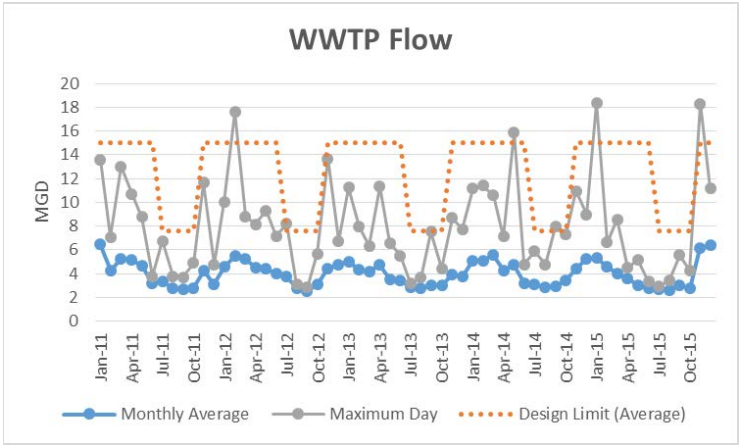
Hydraulic Profile

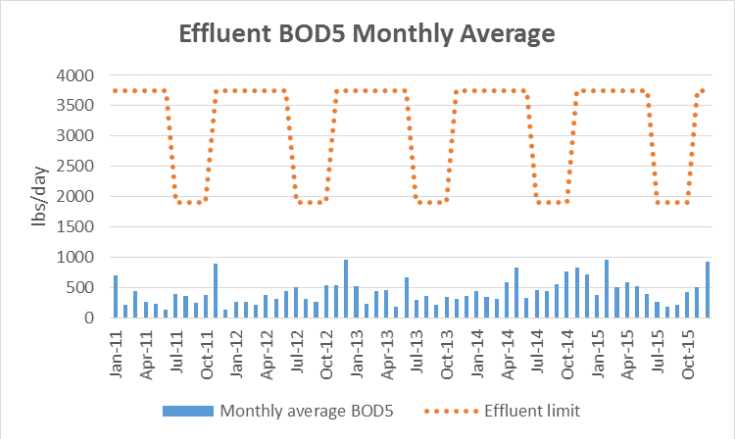

HYDRAULIC PROFILE
NTS
LEGEND
WASTEWATER TREATMENT PLANT
UPGRADE PHASE 1
HYDRAULIC PROFILE
City of Mount Vernon
HDR
00G-11

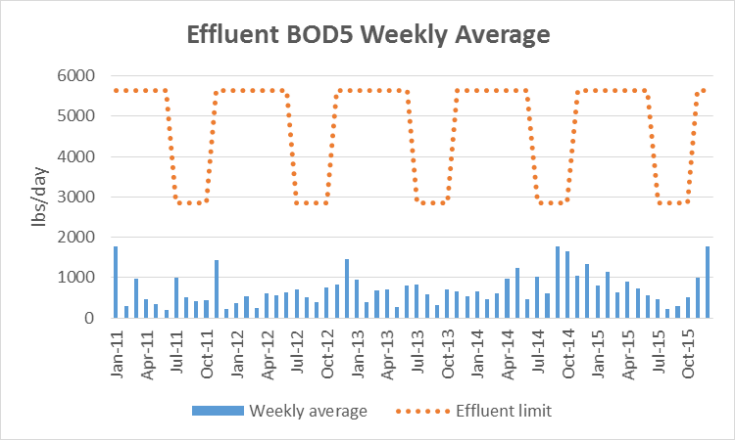
Appendix E – Influent and Effluent Data

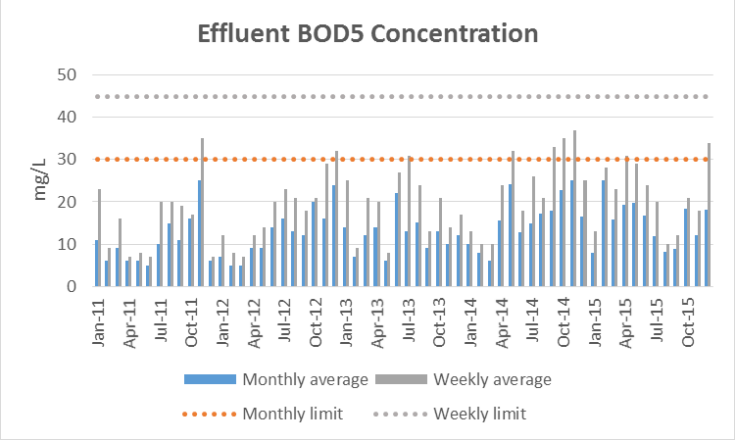


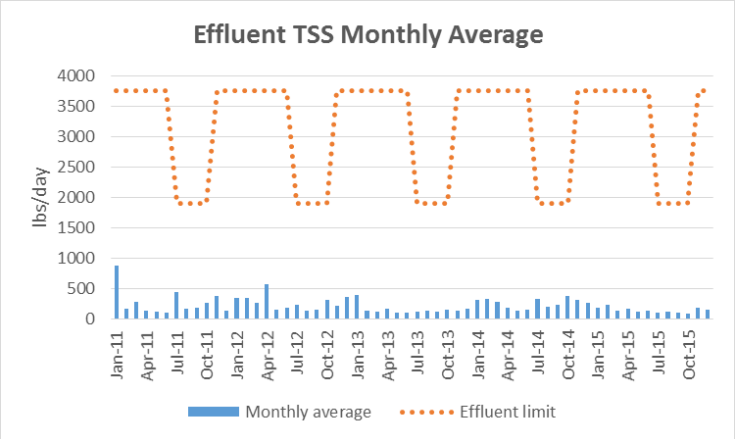


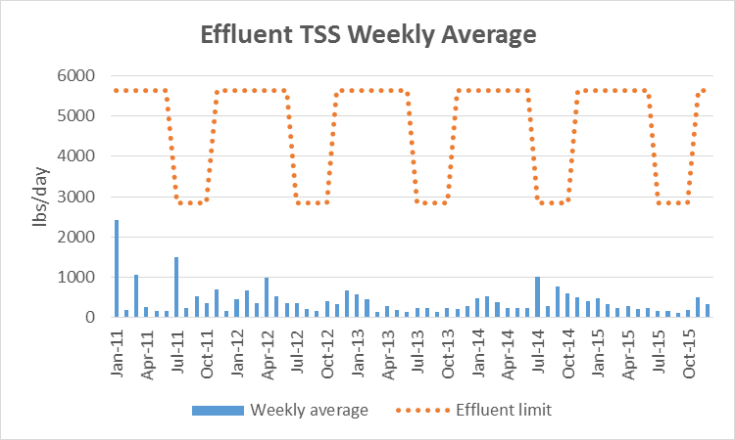



Effluent BOD5 Monthly Average
lbs/day
4000
3500
3000
2500
2000
1500
1000
500
0
Jan-11
Apr-11
Jul-11
Oct-11
Jan-12
Apr-12
Jul-12
Oct-12
Jan-13
Apr-13
Jul-13
Oct-13
Jan-14
Apr-14
Jul-14
Oct-14
Jan-15
Apr-15
Jul-15
Oct-15
Monthly average BOD5
Effluent limit


Effluent BOD5 Weekly Average
lbs/day
6000
5000
4000
3000
2000
1000
0
Jan-11
Apr-11
Jul-11
Oct-11
Jan-12
Apr-12
Jul-12
Oct-12
Jan-13
Apr-13
Jul-13
Oct-13
Jan-14
Apr-14
Jul-14
Oct-14
Jan-15
Apr-15
Jul-15
Oct-15
Weekly average
Effluent limit


Effluent BOD5 Concentration
mg/L
50
40
30
20
10
0
Jan-11
Apr-11
Jul-11
Oct-11
Jan-12
Apr-12
Jul-12
Oct-12
Jan-13
Apr-13
Jul-13
Oct-13
Jan-14
Apr-14
Jul-14
Oct-14
Jan-15
Apr-15
Jul-15
Oct-15
Monthly average
Weekly average
Monthly limit
Weekly limit


Effluent TSS Monthly Average
lbs/day
4000
3500
3000
2500
2000
1500
1000
500
0
Jan-11
Apr-11
Jul-11
Oct-11
Jan-12
Apr-12
Jul-12
Oct-12
Jan-13
Apr-13
Jul-13
Oct-13
Jan-14
Apr-14
Jul-14
Oct-14
Jan-15
Apr-15
Jul-15
Oct-15
Monthly average
Effluent limit


Effluent TSS Weekly Average
lbs/day
6000
5000
4000
3000
2000
1000
0
Jan-11
Apr-11
Jul-11
Oct-11
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Apr-12
Jul-12
Oct-12
Jan-13
Apr-13
Jul-13
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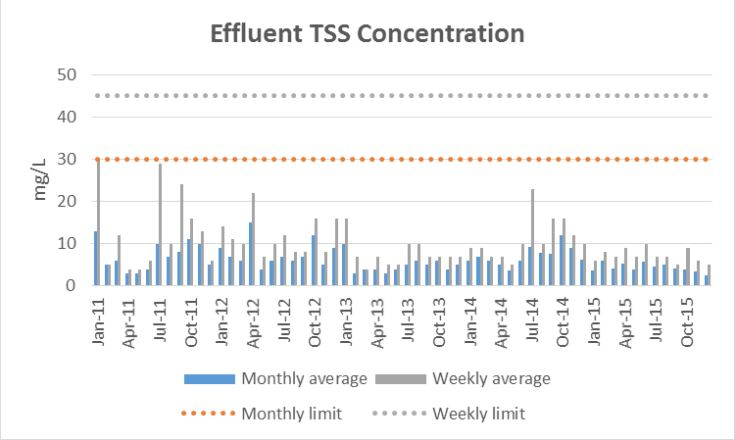
Apr-14
Jul-14
Oct-14
Jan-15
Apr-15
Jul-15
Oct-15
Weekly average
Effluent limit


Effluent TSS Concentration
mg/L
50
40
30
20
10
0
Jan-11
Apr-11
Jul-11
Oct-11
Jan-12
Apr-12
Jul-12
Oct-12
Jan-13
Apr-13
Jul-13
Oct-13
Jan-14
Apr-14
Jul-14
Oct-14
Jan-15
Apr-15
Jul-15
Oct-15
Monthly average
Weekly average
Monthly limit
Weekly limit

Effluent Monitoring Data (Conventionals), 2011-2015

Parameter	BOD5	BOD5	BOD5	BOD5	BOD5	Fecal Coliform	Fecal Coliform	TSS	TSS	TSS	TSS	TSS	Temp. (7-DAD Max)	pH Daily Max	pH Daily Min
Units	Lbs/Day	Lbs/Day	mg/L	mg/L	Percent removal	#/100ml	#/100ml	Lbs/Day	Lbs/Day	mg/L	mg/L	Percent removal	Degrees C	Standard Units	Standard Units
Statistical Base	Average	Weekly Average	Average	Weekly Average	Average	Geo. Mean	Weekly Geo. Mean	Average	Weekly Average	Average	Weekly Average	Average	Maximum	Maximum	Minimum
Limits	3753/1902	5630/2852	30	45	85 (min)	200	400	3753/1902	5630/2852	30	45	85 (min)		- / 9	6.2 / -
Date	Value	Value	Value	Value	Value	Value	Value	Value	Value	Value	Value	Value	Value	Value	Value
1/1/2011	705	1763	11	23	91.3	6	21	883	2422	13	30	91.4	13.7	6.4	7.3
2/1/2011	223	301	6	9	97.0	3	4	171	192	5	5	97.7	13.9	7.6	6.5
3/1/2011	439	978	9	16	94.4	4	6	276	1067	6	12	96.8	13.8	7.2	6.6
4/1/2011	275	468	6	7	96.5	5	6	139	268	3	4	98.4	14.4	7.2	6.7
5/1/2011	243	354	6	8	96.6	8	61	122	159	3	4	98.5	16.0	7.4	6.7
6/1/2011	142	189	5	7	97.8	14	15	95	158	4	6	98.4	18.8	7.6	7.1
7/1/2011	392	1003	10	20	95.4	6	14	441	1505	10	29	95.9	20.2	7.4	6.6
8/1/2011	360	502	15	20	94.0	5	46	172	236	7	10	97.4	21.9	7.1	6.6
9/1/2011	256	420	11	19	95.6	3	12	184	542	8	24	97.1	22.2	7.3	6.6
10/1/2011	377	428	16	17	94.1	7	40	257	367	11	16	96.0	19.4	7.3	6.2
11/1/2011	901	1436	25	35	87.9	18	34	378	702	10	13	95.3	17.3	7.3	6.8
12/1/2011	145	220	6	7	97.4	11	84	138	169	5	6	97.9	13.1	7.3	6.9
1/1/2012	262	363	7	12	96.2	15	37	349	452	9	14	95.1	13.0	7.2	6.8
2/1/2012	263	526	5	8	96.8	35	60	346	665	7	11	96.0	13.6	7.4	6.5
3/1/2012	216	247	5	7	96.6	24	61	258	358	6	10	96.5	13.4	7.9	6.4
4/1/2012	381	609	9	12	93.9	59	230	562	998	15	22	92.0	15.1	7.5	6.8
5/1/2012	324	573	9	14	93.5	7	21	148	542	4	7	98.0	17.7	7.5	6.7
6/1/2012	453	627	14	20	92.3	9	23	185	351	6	10	97.1	19.2	7.4	6.7
7/1/2012	515	707	16	23	91.9	7	21	233	362	7	12	96.7	20.9	7.6	6.5
8/1/2012	309	511	13	21	94.3	3	9	134	204	6	8	97.5	22.9	7.4	6.6
9/1/2012	268	400	12	18	94.0	8	17	150	177	7	8	97.4	21.7	7.2	6.6
10/1/2012	538	755	20	21	89.9	30	128	312	412	12	16	94.7	19.7	7.2	6.7
11/1/2012	535	832	16	29	91.8	11	20	206	330	5	8	97.6	18.4	7.3	6.5
12/1/2012	960	1465	24	32	87.0	16	29	359	679	9	16	94.7	14.2	7.2	6.7
1/1/2013	530	958	14	25	93.6	30	106	399	581	10	16	94.9	12.3	7.5	6.6
2/1/2013	236	398	7	9	96.7	4	9	126	465	3	7	98.5	11.7	7.3	6.7
3/1/2013	440	679	12	21	94.6	4	5	120	143	4	4	98.1	13.7	7.3	6.7
4/1/2013	467	707	14	20	93.5	17	54	168	280	4	7	98.1	14.7	7.8	6.5
5/1/2013	187	264	6	8	97.2	9	26	100	197	3	5	98.6	18.6	7.7	6.9
6/1/2013	665	813	22	27	90.1	5	11	108	132	4	5	98.3	22.4	7.4	6.8
7/1/2013	307	832	13	31	94.9	3	12	123	245	5	10	98.0	25.0	6.9	6.6
8/1/2013	366	593	15	24	94.1	5	10	138	239	6	10	97.6	25.3	6.9	6.6
9/1/2013	212	316	9	13	96.9	4	7	110	142	5	7	98.0	25.1	7.1	6.4
10/1/2013	356	700	13	21	94.7	5	13	143	235	6	7	97.4	19.2	7.2	6.6
11/1/2013	316	648	10	14	96.0	14	50	130	206	4	7	98.2	17.0	7.3	6.6
12/1/2013	363	541	12	17	95.1	5	6	165	291	5	7	97.7	15.8	7.4	6.7
1/1/2014	438	656	10	13	94.4	9	25	305	476	6	9	96.7	16.8	7.7	7.0
2/1/2014	341	465	8	10	96.0	15	62	320	538	7	9	96.2	16.6	7.6	6.9
3/1/2014	318	610	6	10	96.3	13	21	277	392	6	7	96.2	17.0	7.5	6.9
4/1/2014	587	966	16	24	92.9	13	33	181	245	5	7	97.4	18.5	7.5	6.7
5/1/2014	828	1244	24	32	88.8	16	32	136	234	4	5	97.9	22.6	7.4	6.6
6/1/2014	339	460	13	18	95.1	5	8	153	237	6	10	97.6	22.9	7.3	6.0
7/1/2014	454	1018	15	26	94.6	5	14	327	1012	9	23	96.6	25.0	7.0	6.5
8/1/2014	440	598	17	21	93.9	3	23	194	281	8	10	97.2	26.0	7.4	6.4
9/1/2014	564	1767	18	33	94.3	3	6	234	763	8	16	97.7	26.0	7.8	6.8
10/1/2014	771	1650	23	35	90.0	9	24	380	601	12	16	95.5	25.7	7.6	6.8
11/1/2014	837	1046	25	37	88.9	15	32	316	514	9	12	95.9	21.3	7.4	6.8
12/1/2014	718	1339	16	25	92.0	18	59	261	407	6	10	97.0	19.1	8.1	6.9
1/1/2015	389	809	8	13	96.7	11	122	189	478	4	6	98.0	18.1	8.0	6.6
2/1/2015	955	1144	25	28	90.2	7	166	231	349	6	8	97.5	19.3	7.5	6.7
3/1/2015	508	625	16	23	94.1	3	15	138	232	4	7	98.0	17.3	6.9	6.7
4/1/2015	586	897	19	31	93.8	5	16	162	289	5	9	97.7	19.6	7.6	6.7
5/1/2015	519	728	20	29	92.5	11	43	113	218	4	7	98.1	22.2	7.4	6.7
6/1/2015	394	570	17	24	94.9	6	12	134	249	6	10	98.1	24.7	7.1	6.6
7/1/2015	275	458	12	20	96.3	4	16	103	167	5	7	98.4		7.3	6.6
8/1/2015	181	223	8	10	97.7	3	9	111	156	5	7	98.2		7.0	6.5
9/1/2015	220	302	9	12	97.2	6	17	100	122	4	5	98.3	25.7	7.5	6.4
10/1/2015	422	504	18	21	94.8	12	57	91	201	4	9	98.4	24.9	7.4	6.7
11/1/2015	511	992	12	18	93.4	12	32	187	501	3	6	98.6	18.0	7.7	6.5
12/1/2015	934	1775	18	34	89.4	9	22	152	344	3	5	98.3	13.6	7.8	6.6
Min	142	189	5	7	87.0	3	4	91	122	3	4	91.4	11.7	6.4	6.0
Max	960	1775	25	37	97.8	59	230	883	2422	15	30	98.6	26.0	8.1	7.3
Avg	441	733	13	20	94.0	11	36	219	425	6	10	97.1	18.9	7.4	6.7
Median	391	626	13	20	94.4	8	22	172	311	6	9	97.6	18.7	7.4	6.7
95th %	933	1757	25	35	97.4	30	128	439	1064	12	24	98.5	25.7	7.9	7.0

Effluent Monitoring Data (Nutrients), 2011-2015

Parameter	Ammonia	Ammonia	Nitrate + Nitrite	Ortho-phosphate	TKN	Total Phosphorus
Units	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
Statistical Base	Average	Maximum				
Date	Value	Value	Value	Value	Value	Value
1/1/2011	26.3	39.0	0.03	1.30	30.5	1.34
2/1/2011	26.9	32.4	0.08	2.14	29.8	2.12
3/1/2011	24.9	44.7	0.58	0.41	14.3	0.30
4/1/2011	17.9	23.3	9.65	0.54	8.6	0.70
5/1/2011	23.1	44.4	1.92	0.03	13.7	0.17
6/1/2011	26.2	32.0	0.04	0.49	30.2	0.60
7/1/2011	23.5	38.3	0.05	0.62	37.4	0.62
8/1/2011	2.8	10.0	6.94	0.02	9.3	0.31
9/1/2011	0.9	2.9	8.85	7.47	7.3	8.47
10/1/2011	2.2	7.6	5.87	6.24	4.2	7.79
11/1/2011	15.8	28.4	14.60	3.66	6.2	4.31
12/1/2011	33.3	38.4	0.12	3.03	31.4	1.94
1/1/2012	30.3	32.7	0.07	4.20	40.9	7.67
2/1/2012	25.3	37.1	0.07	2.42	29.4	2.29
3/1/2012	23.9	37.9	0.15	1.25	20.3	1.54
4/1/2012	30.3	35.7	0.02	1.24	22.6	1.78
5/1/2012	20.0	37.4	0.14	0.64	20.1	0.87
6/1/2012	20.2	31.7	11.10	2.30	12.4	4.10
7/1/2012	4.6	9.4	8.18	1.94	9.4	1.92
8/1/2012	0.8	1.9	14.70	3.44	6.3	3.97
9/1/2012	1.8	3.3	19.00	4.32	5.2	5.03
10/1/2012	2.6	5.1	12.10	3.61	7.2	3.60
11/1/2012	15.6	28.4	8.25	2.98	8.3	3.11
12/1/2012	21.5	33.1	4.19	1.90	17.7	2.09
1/1/2013	24.2	32.7	0.35	2.42	26.9	2.77
2/1/2013	26.1	30.4	0.78	1.30	17.5	1.70
3/1/2013	21.5	33.1	0.85	1.61	25.5	1.71
4/1/2013	23.8	37.4	12.80	0.04	5.3	0.19
5/1/2013	34.3	36.4	0.10	0.77	38.6	1.04
6/1/2013	24.8	36.0	0.29	0.29	29.0	0.40
7/1/2013	3.5	5.8	5.70	0.12	8.3	0.70
8/1/2013	2.4	4.8	5.49	4.35	4.6	5.28
9/1/2013	0.9	1.6	8.46	4.25	3.9	5.42
10/1/2013	6.4	14.3	3.51	1.67	7.3	2.15
11/1/2013	22.0	29.8	1.18	0.90	17.9	1.41
12/1/2013	29.1	39.8	0.95	1.80	26.5	2.11
1/1/2014	28.4	36.2	0.29	1.07	33.4	3.12
2/1/2014	26.5	37.4	0.45	0.10	23.0	0.57
3/1/2014	19.6	30.0	0.20	0.06	25.2	0.41
4/1/2014	31.5	60.2	0.25	0.87	23.1	1.18
5/1/2014	19.3	26.5	10.50	4.22	30.4	4.46
6/1/2014	1.2	1.6	12.80	4.12	5.8	4.38
7/1/2014	1.3	2.4	15.00	3.83	5.1	3.65
8/1/2014	1.2	2.0	15.50	3.33	5.0	3.73
9/1/2014	4.0	5.0	9.04	2.72	3.4	3.21
10/1/2014	5.8	9.6	9.89	4.17	4.3	4.94
11/1/2014	13.9	28.1	10.60	1.97	4.1	2.19
12/1/2014	28.4	50.4	1.43	1.70	23.8	1.75
1/1/2015	18.2	26.9	1.57	0.45	13.1	0.51
2/1/2015	15.2	27.3	8.19	1.38	19.8	1.48
3/1/2015	13.0	14.6	8.45	0.09	9.2	0.12
4/1/2015	30.9	45.7	8.31	3.56	19.6	4.15
5/1/2015	43.0	59.8	0.63	0.00	31.4	0.36
6/1/2015	4.3	9.9	8.82	1.26	6.0	1.80
7/1/2015	3.1	7.3	9.52	5.55	6.0	5.95
8/1/2015	1.7	3.8	13.60	5.48	4.2	5.82
9/1/2015	2.3	7.6	9.00	3.00	6.0	7.00
10/1/2015	19.8	61.4	14.00	4.00	15.0	5.00
11/1/2015	21.6	46.2	1.97	1.66	21.5	2.07
12/1/2015	20.9	42.1	5.89	1.59	34.1	1.87
Min	0.8	1.6	0.02	0.00	3.4	0.12
Max	43.0	61.4	19.00	7.47	40.9	8.47
Avg	16.9	26.3	5.72	2.20	16.8	2.69
Median	19.9	30.2	5.60	1.75	14.7	2.08
95th %	33.2	59.3	14.99	5.55	37.2	7.64
Standard deviation	11.2412931					
CV	0.66466722					

Effluent Monitoring Data (Toxics), 2011-2015

	Date	1/25/2011	6/7/2011	7/7/2011	10/4/2011	10/24/2011	11/2/2012	2/7/2014	4/3/2014	7/1/2014	10/6/2014	10/28/2015	max	average
Mercury	ug/l							0.00224	0.00203	0.00166	0.00195		0.00224	0.00197
Antimony	ug/l					0.5	0.025	0.0036	0.9	0.08	0.08	0.08	0.9	0.238371
Arsenic	ug/l					0.026	0.09	0.33	0.6	0.8	0.4	0.5	0.8	0.392286
Cadmium	ug/l					0.006	0.016	0.0025	0.06	0.04	0.7	0.04	0.7	0.1235
Chromium	ug/l					0.022	0.047	0.6	0.6	0.5	0.9	0.6	0.9	0.467
Copper	ug/l					3	4	9	6	5	4	6	9	5.285714
Lead	ug/l					0.0036	0.01	0.006	0.3	0.18	0.06	0.43	0.43	0.141371
Molybdenum	ug/l					1	1	5	0.65	3	2		5	2.108333
Nickel	ug/l					13	5	24	8	5	5	4	24	9.142857
Selenium	ug/l					0.065	0.19	0.1	0.3	0.3	0.3	0.34	0.34	0.227857
Silver	ug/l					0.06	0.01	0.17	0.06	0.03	0.03	0.03	0.17	0.055714
Thallium	ug/l					0.011	0.12	0.003	0.02	0.02	0.02	0.02	0.12	0.030571
Zinc	ug/l					47	35	38	25	43	32	29	47	35.57143
Phenolics	ug/l							0	0	0.005	11		11	2.75125
Cyanide	ug/l							0.0012	5	6	5		6	4.0003
Hex-Cr	ug/l							0.049	0	0	4.4		4.4	1.11225
Di(2-ethylhexyl)phthalate	ug/l	1.1	0.09	0.09	0.9			210	290	486	190	0.6	486	130.9756
Chloroform	ug/l							2.3	2.4	0.8	0.14	0.14	2.4	1.156
1,4-dichlorobenzene	ug/l							0.9	0.7	1.2	0.7	0.045	1.2	0.709
Toluene	ug/l							0.6	0.095	1	0.125	0.125	1	0.389
Hardness	mg/l							96.4	70.5	66.3	58.5		96.4	72.925

Mt. Vernon WWTP Chronic WET Test Results as NOEC/LOEC in % Effluent

Test Code	Collected	Start Date	Organism	Endpoint	NOEC	LOEC	PMSD
RMAR3350	8/4/2014	8/5/2014	*Ceriodaphnia dubia*	7-day Survival	100	> 100	
				Reproduction	100	> 100	28.3%
RMAR3349	8/4/2014	8/5/2014	fathead minnow	7-day Survival	100	> 100	12.3%
				Biomass	100	> 100	20.7%
				Weight	100	> 100	19.5%
RMAR3502	2/2/2015	2/3/2015	*Ceriodaphnia dubia*	7-day Survival	100	> 100	
				Reproduction	25	50	23.9%
RMAR3501	2/2/2015	2/3/2015	fathead minnow	7-day Survival	100	> 100	
				Biomass	100	> 100	14.4%
				Weight	100	> 100	14.4%

Mt. Vernon WWTP Acute WET Test Results as NOEC/LOEC in % Effluent

Test Code	Collected	Start Date	Organism	Endpoint	NOEC	LOEC	PMSD
RMAR3301	6/11/2014	6/11/2014	*Ceriodaphnia dubia*	48-hour Survival	100	> 100	5.0%
RMAR3300	6/11/2014	6/11/2014	fathead minnow	96-hour Survival	100	> 100	8.3%
RMAR3500	12/1/2014	12/2/2014	*Ceriodaphnia dubia*	48-hour Survival	100	> 100	
RMAR3499	12/1/2014	12/2/2014	fathead minnow	96-hour Survival	100	> 100	4.6%

Mt Vernon WWTP Acute WET Test Results as % Survival in 100% Effluent					
Test Code	Collected	Start Date	Organism	Endpoint	% Survival
RMAR3301	6/11/2014	6/11/2014	*Ceriodaphnia dubia*	48-hour Survival	100%
RMAR3300	6/11/2014	6/11/2014	fathead minnow	96-hour Survival	95%
RMAR3500	12/1/2014	12/2/2014	*Ceriodaphnia dubia*	48-hour Survival	100%
RMAR3499	12/1/2014	12/2/2014	fathead minnow	96-hour Survival	100%

The Department of Ecology's water quality permit database, PARIS, contains information and generates reports about National Pollutant Discharge Elimination System (NPDES) permits and State Waste Discharge Permits. A wide range of permit information is available in the system including: numeric limits for permits; discharge locations (outfalls); discharge monitoring reports (DMRs) submitted by permittees; permit and other documents; inspections; violations; and enforcement actions. PARIS enables users to query, view and download reports.

https://fortress.wa.gov/ecy/wqreports/public/f?p=110:300:2124867433767138

Appendix F – 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: http://www.ecy.wa.gov/programs/wq/permits/guidance.html.

Calculation of Fecal Coliform at Chronic Mixing Zone

INPUT	
Chronic Dilution Factor	143.0
Receiving Water Fecal Coliform, #/100 ml	12
Effluent Fecal Coliform - worst case, #/100 ml	400
Surface Water Criteria, #/100 ml	*100*
OUTPUT	
Fecal Coliform at Mixing Zone Boundary, #/100 ml	**14**
Difference between mixed and ambient, #/100 ml	3

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

Freshwater Un-ionized Ammonia Criteria Calculation

Based on Chapter 173-201A WAC, amended November 20, 2006

INPUT	
1. Receiving Water Temperature (deg C):	18.5
2. Receiving Water pH:	7.4
3. Is salmonid habitat an existing or designated use?	Yes
4. Are non-salmonid early life stages present or absent?	Present
OUTPUT	
Using mixed temp and pH at mixing zone boundaries?	no
Ratio	20.202
FT	1.400
FPH	1.600
pKa	9.450
Unionized Fraction	0.009
Unionized ammonia NH3 criteria (mg/L as NH_3)	
Acute:	0.165
Chronic:	0.018
RESULTS	
Total ammonia nitrogen criteria (mg/L as N):	
Acute:	15.341
Chronic:	1.648

Freshwater Temperature Reasonable Potential and Limit Calculation

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

	Core Summer Critera
INPUT	**Outfall 004**
1. Chronic Dilution Factor at Mixing Zone Boundary	143.0
2. 7DADMax Ambient Temperature (T) (Upstream Background 90th percentile)	18.5 °C
3. 7DADMax Effluent Temperature (95th percentile)	26.0 °C
4. Aquatic Life Temperature WQ Criterion in Fresh Water	16.0 °C
OUTPUT	
5. Temperature at Chronic Mixing Zone Boundary:	18.6 °C
6. Incremental Temperature Increase or decrease:	0.1 °C
7. Maximum Allowable Incremental Temperature Increase:	0.3 °C
8. Maximum Allowable Temperature at Mixing Zone Boundary:	18.8 °C
A. If ambient temp is warmer than WQ criterion	
9. Does temp fall within this warmer temp range?	YES
10. Temperature Limit if Required:	NO LIMIT
B. If ambient temp is cooler than WQ criterion but within 28/(T$_{...}$+7) and within 0.3 °C of the criterion	
11. Does temp fall within this incremental temp. range?	---
12. Temp increase allowed at mixing zone boundary, if required:	---
C. If ambient temp is cooler than (WQ criterion-0.3) but within 28/(T$_{...}$+7) of the criterion	
13. Does temp fall within this Incremental temp. range?	---
14. Temp increase allowed at mixing zone boundary, if required:	---
D. If ambient temp is cooler than (WQ criterion - 28/(T$_{...}$+7))	
15. Does temp fall within this Incremental temp. range?	---
16. Temp increase allowed at mixing zone boundary, if required:	---
RESULTS	
17. Do any of the above cells show a temp increase?	**NO**
18. Temperature Limit if Required?	**NO LIMIT**

Calculation of pH of a Mixture of Two Flows

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

INPUT			
	Low pH	**High pH**	
1. Dilution Factor at Mixing Zone Boundary	143.0	143.0	
2. Ambient/Upstream/Background Conditions			
Temperature (deg C):	18.50	18.50	
pH:	7.51	7.51	
Alkalinity (mg CaCO3/L):	28.50	28.50	
3. Effluent Characteristics			
Temperature (deg C):	26.00	26.00	
pH:	6.30	9.00	
Alkalinity (mg CaCO3/L):	190.00	190.00	
OUTPUT			
1. Ionization Constants			
Upstream/Background pKa:	6.39	6.39	
Effluent pKa:	6.34	6.34	
2. Ionization Fractions			
Upstream/Background Ionization Fraction:	0.93	0.93	
Effluent Ionization Fraction:	0.47	1.00	
3. Total Inorganic Carbon			
Upstream/Background Total Inorganic Carbon (mg CaCO3/L):	31	31	
Effluent Total Inorganic Carbon (mg CaCO3/L):	400	190	
4. Condtions at Mixing Zone Boundary			
Temperature (deg C):	18.55	18.55	
Alkalinity (mg CaCO3/L):	29.63	29.63	
Total Inorganic Carbon (mg CaCO3/L):	33.26	31.79	
pKa:	6.39	6.39	
RESULTS			
pH at Mixing Zone Boundary:	**7.30**	**7.53**	

Streeter-Phelps Analysis of Critical Dissolved Oxygen Sag

INPUT				
1. EFFLUENT CHARACTERISTICS				
Discharge (cfs):			12.7	8.2 MGD - highest daily flow for July-Oct
$CBOD_5$ (mg/L):			40	
NBOD (mg/L):			187	Max TKN = 40.9, NBOD = 4.57*40.9
Dissolved Oxygen (mg/L):			6.2	
Temperature (deg C):			26	
2. RECEIVING WATER CHARACTERISTICS				
Upstream Discharge (cfs):			5030	Receiving water characteristics from 2010 fact sheet (McKone)
Upstream $CBOD_5$ (mg/L):			0.4	
Upstream NBOD (mg/L):			0.08	
Upstream Dissolved Oxygen (mg/L):			9.8	
Upstream Temperature (deg C):			18.5	
Elevation (ft NGVD):			180	
Downstream Average Channel Slope (ft/ft):			0.000177	
Downstream Average Channel Depth (ft):			7.3	
Downstream Average Channel Velocity (fps):			1.81	
3. REAERATION RATE (Base e) at 20 deg C (day^{-1}):			0.72	
Reference	Applic. Vel (fps)	Applic. Dep (ft)	Suggested Values	
Churchill	1.5 - 6	2 - 50	0.74	
O'Connor and Dobbins	0.1 - 1.5	2 - 50	0.88	
Owens	0.1 - 6	1 - 2	0.81	
Tsivoglou-Wallace	0.1 - 6	0.1 - 2	0.74	
4. BOD DECAY RATE (Base e) AT 20 deg C (day^{-1}):			0.39	
(or use Wright and McDonnell eqn, 1978, for small rivers.) Enter this value -->			0.16	

OUTPUT		
1. INITIAL MIXED RIVER CONDITION		
$CBOD_5$ (mg/L):	0.5	
NBOD (mg/L):	0.6	
Dissolved Oxygen (mg/L):	9.8	
Temperature (deg C):	18.5	
2. TEMPERATURE ADJUSTED RATE CONSTANTS (Base e)		
Reaeration (day^-1):	0.70	
BOD Decay (day^-1):	0.36	
3. CALCULATED INITIAL ULTIMATE CBODU AND TOTAL BODU		
Initial Mixed CBODU (mg/L):	0.7	
Initial Mixed Total BODU (CBODU + NBOD, mg/L):	1.3	
4. INITIAL DISSOLVED OXYGEN DEFICIT		
Saturation Dissolved Oxygen (mg/L):	9.307	
Initial Deficit (mg/L):	-0.48	
5. TRAVEL TIME TO CRITICAL DO CONCENTRATION (days):	2.86	
6. DISTANCE TO CRITICAL DO CONCENTRATION (miles):	84.68	River mouth is 11 miles downstream
7. CRITICAL DO DEFICIT (mg/L):	0.23	Will not cause 0.2 deficit before the river ends
8. CRITICAL DO CONCENTRATION (mg/L):	**9.07**	

Reasonable Potential Calculation

Facility	Mount Vernon WWTP
Water Body Type	Freshwater
Rec. Water Hardnes	34 mg/L

Dilution Factors:	**Acute**	**Chronic**
Aquatic Life	13.6	143.0
Human Health Carcinogenic		537.0
Human Health Non-Carcinogenic		143.0

Pollutant, CAS No. & NPDES Application Ref. No.		AMMONIA, Criteria as Total NH3	ARSENIC (dissolved) 7440382 2M	BIS(2-ETHYLHEXYL) PHTHALATE 117817 13B	CADMIUM - 7440439 4M Hardness dependent	CHLOROFORM 67663 11V	CHROMIUM(HEX) 18540299	COPPER - 744058 6M Hardness dependent	LEAD - 7439921 7M Dependent on hardness	MERCURY 7439976 8M	NICKEL - 7440020 9M - Dependent on hardness	SELENIUM 7782492 10M
Effluent Data	# of Samples (n)	240	7	9	7	5	4	7	7	4	7	7
	Coeff of Variation (Cv)	0.66	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6
	Effluent Concentration, ug/L (Max. or 95th Percentile)	59,300	0.8	486	0.7	2.4	4.4	9	0.43	0.0022	24	0.34
	Calculated 50th percentile Effluent Conc. (when n>10)											
Receiving Water Data	90th Percentile Conc., ug/L	33	0		0		0	0.77	0.032	0.0046	1.36	0
	Geo Mean, ug/L			0		0		0.63		0.0046	1.36	0
Water Quality Criteria	Aquatic Life Criteria, ug/L — Acute	15,341	360	-	1.1489	-	15	6.15777	19.607	2.1	568.21	20
	Aquatic Life Criteria, ug/L — Chronic	1,648	190	-	0.4639	-	10	4.51522	0.764	0.012	63.105	5
	WQ Criteria for Protection of Human Health, ug/L	-	-	1.8	-	5.7	-	1300	-	0.14	610	170
	Metal Criteria Translator, decimal — Acute	-	1	-	0.943	-	0.982	0.47625	0.466	0.85	0.998	-
	Metal Criteria Translator, decimal — Chronic	-	1	-	0.943	-	0.962	0.47625	0.466	-	0.997	-
	Carcinogen?	N	Y	Y	N	Y	N	N	N	N	N	N

Aquatic Life Reasonable Potential

Effluent percentile value	0.950	0.950	0.950	0.950	0.950	0.950	0.950	0.950	0.950	0.950
s — $s^2=\ln(CV^2+1)$	0.601	0.555	0.555	0.555	0.555	0.555	0.555	0.555	0.555	0.555
Pn — $Pn=(1\text{-confidence level})^{1/n}$	0.988	0.652	0.652	0.473	0.652	0.652	0.473	0.652	0.652	0.652
Multiplier	1.00	2.01	2.01	2.59	2.01	2.01	2.59	2.01	2.01	2.01
Max concentration (ug/L) at edge of... — Acute	4,391	0.118	0.097	0.821	1.345	0.059	0.005	4.791	0.050	
Max concentration (ug/L) at edge of... — Chronic	447	0.011	0.009	0.077	0.825	0.035	0.005	1.686	0.005	
Reasonable Potential? Limit Required?	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	

Human Health Reasonable Potential

s — $s^2=\ln(CV^2+1)$	0.5545	0.55451	0.55451	0.5545	0.5545	0.5545		
Pn — $Pn=(1\text{-confidence level})1/n$	0.717	0.549	0.652	0.473	0.652	0.652		
Multiplier	0.7276	0.93363	0.8054	1.0385	0.8054	0.8054		
Dilution Factor	537	537	143	143	143	143		
Max Conc. at edge of Chronic Zone, ug/L	0.6585	0.00417	6.8E-01	0.0046	1.4857	0.0019		
Reasonable Potential? Limit Required?	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**		

Comments/Notes:

References: WAC 173-201A.

Technical Support Document for Water Quality-based Toxics Control, US EPA, March 1991, EPA/505/2-90-001, pages 56/99

Reasonable Potential Calculation - Page 2

Facility	Mount Vernon WWTP
Water Body Type	Freshwater
Rec. Water Hardnes	34 mg/L

Dilution Factors:	Acute	Chronic
Aquatic Life	13.6	143.0
Human Health Carcinogenic		537.0
Human Health Non-Carcinogenic		143.0

Pollutant, CAS No. & NPDES Application Ref. No.			SILVER - 7740224 11M dependent on hardness.	THALLIUM 7440280 12M	TOLUENE 108883 25V	ZINC- 7440666 13M hardness dependent	ANTIMONY (INORGANIC) 7440360 1M	CYANIDE 57125 14M					
Effluent Data	# of Samples (n)		7	7	5	7	7	4					
	Coeff of Variation (Cv)		0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6
	Effluent Concentration, ug/L (Max. or 95th Percentile)		0.17	0.12	1	47	0.9	6					
	Calculated 50th percentile Effluent Conc. (when n>10)												
Receiving Water Data	90th Percentile Conc., ug/L		0			3.72		0					
	Geo Mean, ug/L			0	0		0	0					
Water Quality Criteria	Aquatic Life Criteria, ug/L	Acute	0.5395	-	-	45.88	-	22					
		Chronic	-	-	-	41.896	-	5.2					
	WQ Criteria for Protection of Human Health, ug/L		-	1.7	6800	-	14	700					
	Metal Criteria Translator, decimal	Acute	0.85	-	-	0.6178	-	-					
		Chronic	-	-	-	0.6178	-	-					
	Carcinogen?		N	N	N	N	N	N					

Aquatic Life Reasonable Potential

Effluent percentile value			0.950			0.950		0.950					
s	$s^2=\ln(CV^2+1)$		0.555			0.555		0.555					
Pn	$Pn=(1-\text{confidence level})^{1/n}$		0.652			0.652		0.473					
Multiplier			2.01			2.01		2.59					
Max concentration (ug/L) at edge of...		Acute	0.021			7.727		1.141					
		Chronic	0.002			4.101		0.108					
Reasonable Potential? Limit Required?			**NO**			**NO**		**NO**					

Human Health Reasonable Potential

s	$s^2=\ln(CV^2+1)$			0.5545	0.5545		0.55451	0.55451					
Pn	$Pn=(1-\text{confidence level})^{1/n}$			0.652	0.549		0.652	0.473					
Multiplier				0.8054	0.9336		0.8054	1.03846					
Dilution Factor				143	143		143	143					
Max Conc. at edge of Chronic Zone, ug/L				0.0007	0.0065		0.00507	4.4E-02					
Reasonable Potential? Limit Required?				**NO**	**NO**		**NO**	**NO**					

Comments/Notes:

References: WAC 173-201A.

Technical Support Document for Water Quality-based Toxics Control, US EPA, March 1991, EPA/505/2-90-001, pages 56/99

Appendix G – Response to Comments

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