Fact Sheet

The U.S. Environmental Protection Agency (EPA)
Proposes to Reissue a National Pollutant Discharge Elimination System (NPDES) Permit to Discharge Pollutants Pursuant to the Provisions of the Clean Water Act (CWA) to:

Tulalip Tribes of Washington
Wastewater Treatment Plant
3015 Mission Beach Road
Tulalip, Washington 98271

Public Comment Start Date: April 5, 2021
Public Comment Expiration Date: May 24, 2021

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EPA Proposes to Reissue NPDES Permit
EPA proposes to reissue the NPDES permit for the facility referenced above. The draft permit places conditions on the discharge of pollutants from the wastewater treatment plant to waters of the United States. In order to ensure protection of water quality and human health, the permit places limits on the types and amounts of pollutants that can be discharged from the facility.

This Fact Sheet includes:
- information on public comment, public hearing, and appeal procedures
- a listing of proposed effluent limitations and other conditions for the facility
- a map and description of the discharge location
- technical material supporting the conditions in the permit

State Certification
EPA is requesting that the Washington State Department of Ecology (Ecology) certify the permit under Section 401 of the Clean Water Act. Ecology will public notice EPA’s request for certification pursuant to Section 401 of the Clean Water Act at:

Public Comment
Because of the COVID-19 virus, access to the Region 10 EPA building is limited. Therefore, we request that all comments on EPA's draft permits or requests for a public hearing be submitted via email to Cody Piscitelli (piscitelli.cody@epa.gov). If you are unable to submit comments via email, please call 206-553-1169. Persons wishing to comment on, or request a Public Hearing for the draft permit for this facility may do so by the expiration date of the Public Comment period. A request for a Public Hearing must state the nature of the issues to be raised as well as the requester's name, address and telephone number. All comments and requests for Public Hearings must be submitted to EPA as described in the Public Comments Section of the attached Public Notice.

After the Public Notice expires, and all comments have been considered, EPA's regional Director for the Water Division will make a final decision regarding permit issuance. If no substantive comments are received, the tentative conditions in the draft permit will become final, and the permit will become effective upon issuance. If substantive comments are received, EPA will address the comments and issue the permit. The permit will become effective no less than 30 days after the issuance date, unless an appeal is submitted to the Environmental Appeals Board within 30 days pursuant to 40 CFR 124.19.

Documents are Available for Review
The draft permits, fact sheet, and other information can also be found by visiting the Region 10 NPDES website at: https://www.epa.gov/npdes-permits/washington-npdes-permits. Because of the COVID-19 virus and limited building access, EPA cannot make hard copies available for viewing at EPA offices.

List of Tables

Acronyms

ACR	Acute-to-Chronic Ratio
AML	Average Monthly Limit
ASR	Alternative State Requirement
AWL	Average Weekly Limit
BA	Biological Assessment
BAT	Best Available Technology economically achievable
BCT	Best Conventional pollutant control Technology
BOD_5	Biochemical oxygen demand, five-day
BOD_{5u}	Biochemical oxygen demand, ultimate
BMP	Best Management Practices
BPT	Best Practicable
°C	Degrees Celsius
CFR	Code of Federal Regulations
CFS	Cubic Feet per Second
COD	Chemical Oxygen Demand
CSO	Combined Sewer Overflow
CV	Coefficient of Variation
CWA	Clean Water Act
DMR	Discharge Monitoring Report
DO	Dissolved oxygen
EA	Environmental Assessment
EFH	Essential Fish Habitat
EIS	Environmental Impact Statement
EPA	U.S. Environmental Protection Agency
ESA	Endangered Species Act
FR	Federal Register
Gpd	Gallons per day
HUC	Hydrologic Unit Code
ICIS	Integrated Compliance Information System
I/I	Infiltration and Inflow
LA	Load Allocation
lbs/day	Pounds per day
mg/L	Milligrams per liter
ml	Milliliters

ML	Minimum Level
µg/L	Micrograms per liter
mgd	Million gallons per day
MDL	Maximum Daily Limit or Method Detection Limit
N	Nitrogen
NEPA	National Environmental Policy Act
NOAA	National Oceanic and Atmospheric Administration
NPDES	National Pollutant Discharge Elimination System
NSPS	New Source Performance Standards
WD	Water Division
O&M	Operations and maintenance
POTW	Publicly owned treatment works
QAP	Quality assurance plan
PMR	Port Madison Reservation
RP	Reasonable Potential
RPM	Reasonable Potential Multiplier
SS	Suspended Solids
SSO	Sanitary Sewer Overflow
s.u.	Standard Units
TKN	Total Kjeldahl Nitrogen
TMDL	Total Maximum Daily Load
TSD	Technical Support Document for Water Quality-based Toxics Control (EPA/505/2-90-001)
TSS	Total suspended solids
USFWS	U.S. Fish and Wildlife Service
USGS	United States Geological Survey
UV	Ultraviolet
WD	Water Division
WLA	Wasteload allocation
WQBEL	Water quality-based effluent limit
WQS	Water Quality Standards
WWTP	Wastewater treatment plant

I. Background Information

A. General Information

This fact sheet provides information on the draft NPDES permit for the following entity:

Table 1. General Facility Information

NPDES Permit #:	WA0024805
Applicant:	Tulalip Tribes of Washington
Type of Ownership	POTW
Physical Address:	3015 Mission Beach Road Tulalip, WA 98271
Mailing Address:	3015 Mission Beach Road Tulalip, WA 98271
Facility Contact:	Mike Leslie Tulalip Utilities Authority Manager mikeleslie@tulaliptribes-nsn.gov (360) 529-7497
Operator Name:	Mike Leslie
Facility Location:	48.049 N, 122.275 W
Receiving Water	Possession Sound, Puget Sound
Facility Outfall	48.04498 N, 122.27958 W

B. Permit History

The most recent NPDES permit for the Tulalip Wastewater Treatment Plant (WWTP) was issued on September 21, 2009, became effective on November 1, 2009 (2009 Permit), and expired on October 31, 2014. An NPDES permit application for permit reissuance was submitted by the permittee on July 15, 2014. EPA determined that the application was timely and complete. Therefore, pursuant to 40 CFR 122.6, the permit has been administratively continued and remains in effect and enforceable.

C. Tribal Consultation

EPA consults with federally recognized tribal governments on a government-to-government basis when EPA actions and decisions may affect tribal interests. Meaningful tribal consultation is an integral component of the federal government's general trust relationship with federally recognized tribes. The federal government recognizes the right of each tribe to self-government, with sovereign powers over their members and their territory. Executive Order 13175 (November 2000), entitled "Consultation and Coordination with Indian Tribal Governments", requires federal agencies to have an accountable process to assure meaningful and timely input by tribal officials in the development of regulatory policies on matters that have tribal implications and to strengthen the government-to-government relationship with Indian tribes. In May 2011, EPA issued the "EPA Policy on Consultation and Coordination with Indian Tribes" which established national guidelines and institutional controls for consultation.

The Tulalip WWTP is located on the Tulalip Indian Reservation. Consistent with the Executive Order and EPA tribal consultation policies, EPA has coordinated with the Tulalip Tribes of Washington (Tulalip Tribe) during development of the draft permit and is inviting the Tulalip Tribe to enter into formal tribal consultation.

II. Facility Information

A. Treatment Plant Description

Service Area

The Tulalip Tribe owns and operates the Tulalip WWTP located in Tulalip, Washington. The collection system has no combined sewers. The facility serves a resident population of 3,200. There are no major industries discharging to the facility.

Treatment Process

The design flow of the facility is 0.616 mgd, which remained unchanged from the last permit issuance. The reported actual flows from the facility from September 2010 to May 2019, range from 0.168 mgd to 0.372 mgd (average monthly flow). The treatment process consists of activated sludge and UV-disinfection. A schematic of the wastewater treatment process and a map showing the location of the treatment facility and discharge are included in Appendix A. Because the design flow is less than 1 mgd, the facility is considered a minor facility.

Since the last permit issuance, there were facility improvements completed around 2015 which included:

1. The chlorine contact basin was converted into a retention basin. (The WWTP converted to disinfection using ultraviolet radiation in 2004, prior to issuance of the previous permit.)
2. The WWTP's two treatment trains are now both in operation and can operate individually or in parallel.
3. The scum collection basins from two clarifiers were combined with the scum collection of the other two clarifiers. This process change allowed the waste scum from all four clarifiers to be delivered to the aerobic digester for solids and sludge processing.
4. The non-functional grit chamber at the upstream side of the headworks was removed.

Other improvements include telemetry upgrades, grout work, valve replacements, pump replacements, and plumbing.

The facility is planning to upgrade the collection system in 2021 to reduce Infiltration and Inflow (I/I). The facility also plans to upgrade their front-end treatment system in 2022 by adding a second, higher capacity headworks equipped with fine screening and grit removal. Currently, there is only a rotary drum fine screen and a manual bar screen.

Outfall Description

The WWTP discharges its wastewater directly to Possession Sound via Outfall 001, a 12-inch marine outfall pipe. The outfall extends approximately 1600 feet offshore in 51 feet of water at mean lower low water (MLLW) and is directed to the southwest with a true bearing of approximately 225 degrees. The outfall was last visually inspected in January 2019 when a dye test was also conducted. During the inspection, the outfall was functioning. The outfall opening was found to be clear of obstacles, and effluent flow was observed to be unimpeded. The concrete outfall pipe was observed to be in good condition, but a metal strap on the pipe needed to be replaced. In an email dated June 27, 2019, Tulalip Utilities indicated that this metal strap was being replaced.

Effluent Characterization

To characterize the effluent, EPA evaluated the facility's application form, discharge monitoring report (DMR) data, and additional data provided by the facility. The effluent quality is summarized in Table 2. Data are provided in Appendix B.

Table 2. Effluent Characterization (from November 2009 to May 2019)

Parameter	Maximum	Minimum	95^{th} Percentile
BOD_5 - Monthly Average (mg/L)	20	3	11.0
BOD_5 - Weekly Average (mg/L)	100	4	23.0
TSS - Monthly Average (mg/L)	37	2	22.7
TSS – Weekly Average (mg/L)	96	2	44.9
pH – Daily Max (95^{th} percentile) and Min. (5^{th} percentile) (S.U.)	8.16	4.29	---
Fecal Coliform – Monthly Average of Geometric Mean (#/100 mL)	22	1	10.0
Fecal Coliform – Weekly Average of Geometric Mean (#/100 mL)	47.3	2	29.6
Flow - Monthly Average (mgd)	0.372	0.168	0.320
Alkalinity - Daily Max (mg/L as $CaCO_3$)	92	54	---
Temperature – Daily Max (°C)	23.1	8.5	21.8
Ammonia as N – Daily Max (mg/L)	12	0.0001	7.7

Source: DMR data from November 2009 to May 2019.
Note: BOD_5 data from the month of January 2010 are excluded due to possible plant upset conditions.

Compliance History

A summary of effluent violations is provided in Table 3 for the last 5-year period from August 2013 to June 2019.

Additional compliance information for this facility, including compliance with other environmental statutes, is available on Enforcement and Compliance History Online (ECHO). The ECHO web address for this facility is: https://echo.epa.gov/detailed-facility-report?fid=110039936656

Table 3. Summary of Effluent Violations (from August 2013 to June 2019)

Parameter	Limit	Units	Number of Instances	Total Number of Violations[1]
pH	Daily Minimum	S.U.	32	32
TSS	Minimum Percent Removal	%	10	301
BOD_5	Weekly Average	mg/L	1	7
TSS	Weekly Average	mg/L	6	42

Notes:
1. The "total number of violations" column provides the number of daily violations; a violation of a weekly limit is counted as 7 days of violations and a violation of a monthly limit is counted as a violation for every day in that month (28 - 31 days).

The compliance trend at the facility is improving during the 5-year period. Most of the violations occurred between August 2013 and December 2017 with 272 violations. Between January 2018 and December 2018, the facility had 95 violations, and between January 2019 and June 2019, the facility had 15 violations, which shows improvement in operations.

EPA conducted an inspection of the facility on March 22, 2017. The inspection encompassed an overview of the wastewater treatment process, records review, operation and maintenance, and the collection system. The results of the inspection showed that there were exceedances of effluent limits, an uncompleted outfall inspection as required by the existing permit, and other operation and maintenance issues.

III. Receiving Water

In drafting permit conditions, EPA must analyze the effect of the facility's discharge on the receiving water. The details of that analysis are provided later in this Fact Sheet. This section summarizes characteristics of the receiving water that impact that analysis.

A. Receiving Water

This facility discharges through a marine outfall into Possession Sound in Puget Sound.

B. Water Quality Standards

Overview

Section 301(b)(1)(C) of the Clean Water Act (CWA) requires the development of limitations in permits necessary to meet water quality standards. 40 CFR 122.4(d) requires that the conditions in NPDES permits ensure compliance with the water quality standards of all affected States. A State's water quality standards are composed of use classifications, numeric and/or narrative water quality criteria and an anti-degradation policy. The use classification system designates the beneficial uses that each water body is expected to achieve, such as drinking water supply, contact recreation, and aquatic life. The numeric and narrative water quality criteria are the criteria deemed necessary to support the beneficial use classification of each water body.The anti-degradation policy represents a three-tiered approach to maintain and protect various levels of water quality and uses.

The facility is located within the exterior boundaries of the Tulalip Indian Reservation, and discharges to Washington State Waters in Puget Sound. The Tulalip Tribe has Treatment as a State (TAS) for CWA purposes to administer a Water Quality Standards (WQS) program. However, because the facility discharges into State Waters, the Washington State WQS apply.

Designated Beneficial Uses

The Washington WQS describes the receiving waters as: Possession Sound between latitude 47°57'N and 48°27'20" N.

The receiving water has the following Use Designations[1]:

- Aquatic Life Use: Excellent
- Recreational Use: Primary
- Harvest Use: All
- Miscellaneous Uses: wildlife habitat, harvesting, commerce and navigation, boating, and aesthetics.

The Excellent Aquatic Life Use designation has a General Description in WAC 173-201A-610, as follows: *"Excellent quality salmonid and other fish migration, rearing, and spawning; clam, oyster, and mussel rearing and spawning; crustaceans and other shellfish (crabs, shrimp, crayfish, scallops, etc.) rearing and spawning."*

C. Receiving Water Quality

Data summarized from Ecology's monitoring station in Possession Sound, PSS019, is shown below; detailed information of this summary is found in Appendix B, Part B, Receiving Water Data.

Table 4. Receiving Water Quality Data

Parameter	Units	Maximum	Minimum	95th Percentile	Average
DO[1]	mg/L	15.39	2.04	9.96	6.88
Fecal Coliform[2]	MPN/100ml	6	0	1	1.06
pH[1]	s.u.	8.73	7.03	8.21	7.62
Temperature[1]	°C	18.62	4.86	12.33	10.10
Ammonia[3]	mg/L as N	0.0190	0.0100	0.0187	0.0133

Footnote:
1. DO, pH and temperature values are obtained from Ecology monitoring station, PSS019.
2. Fecal Coliform – data from Ecology's monitoring station, SAR003.
3. Ammonia values obtained from Ecology's monitoring station, Snodry35 – Everett Harbor.

[1] *See* WAC 173-201A-612 Table 612

Antidegradation

The proposed issuance of an NPDES permit triggers the need to ensure that the conditions in the permit ensure that Tier I, II, and III of the State's antidegradation policy are met. An anti-degradation analysis was conducted by EPA, which concluded that the permit would not result in degradation of water quality. An antidegradation analysis is found in Appendix D.

D. Water Quality Limited Waters

Any waterbody for which the water quality does not, and/or is not expected to meet, applicable WQS is defined as a "water quality limited segment." Section 303(d) of the CWA requires states to develop a Total Maximum Daily Load (TMDL) management plan for water bodies determined to be water quality limited segments. A TMDL is a detailed analysis of the water body to determine its assimilative capacity. The assimilative capacity is the loading of a pollutant that a water body can assimilate without causing or contributing to a violation of WQS. Once the assimilative capacity of the water body has been determined, the TMDL will allocate that capacity among point and non-point pollutant sources, taking into account natural background levels and a margin of safety. Allocations for non-point sources are known as "load allocations" (LAs). The allocations for point sources, known as "waste load allocations" (WLAs), are implemented through effluent limitations in NPDES permits. Effluent limitations for point sources must be consistent with applicable TMDL allocations.

The WWTP discharges in Ecology's Water Resource Inventory Area 7 (WRIA 7). Based on Ecology's mapping tool in July 2020, Ecology has not documented any water quality impairments in the receiving water in the vicinity of the outfall.[2] Ecology is working on a Puget Sound nutrient reduction project to improve water quality, however, a TMDL has not been developed.

IV. Effluent Limitations and Monitoring

Table 5 below presents the existing effluent limits and monitoring requirements in the 2009 Permit. Table 6, below, presents the proposed effluent limits and monitoring requirements in the draft permit.

Table 5. Existing Permit - Effluent Limits and Monitoring Requirements

Effluent Limitations and Monitoring Requirements							
Parameter	Effluent Limitations				Monitoring Requirements		
	Average Monthly Limit	Average Weekly Limit	Maximum Daily Limit	Percent Removal[3]	Sample Location	Sample Frequency	Sample Type
Flow, mgd	Report	---	Report Max. Daily Value	---	Effluent	Continuous	Recording
Biochemical Oxygen	30 mg/l	45 mg/l	---	85% (Min.) [3]	Influent and Effluent	2/week	24-hour composite

[2] Washington State Water Quality Atlas, https://fortress.wa.gov/ecy/waterqualityatlas/map.aspx

Effluent Limitations and Monitoring Requirements							
Demand (BOD_5)	154 lb/day	231 lb/day	---				Cal-culation[2]
Total Suspended Solids (TSS)	30 mg/l	45 mg/l	---	85% (Min.)[3]	Influent and Effluent	2/week	24-hour composite
	154 lb/day	231 lb/day	---				Cal-culation[2]
Fecal Coliform Bacteria[1]	200/100 ml	400/100 ml	---	---	Effluent	5/week	Grab
pH	Within the range of 6.0 to 9.0				Effluent	Daily	Grab
Total Ammonia as N, mg/l[5]	Report[5]	---	Report Max. Daily Value[5]	---	Effluent	1/quarter	24-hour composite
Alkalinity, mg/l as $CaCO_3$	Report	---	Report Max. Daily Value	---	Effluent	1/year	Grab
Temperature, degrees C	Report	---	Report Max. Daily Value	---	Effluent	Daily[6]	Grab
NPDES Application Form 2A Effluent Testing Data[4]	---				Effluent	3/5 years	See Footnote 4

Footnotes

1. The Average Monthly Limit and the Average Weekly Limit for Fecal Coliform are based on the Geometric Mean in organisms/100ml. See Part VI for a definition of geometric mean. If any value used to calculate the geometric mean is less than 1, the permittee must round that value up to 1 for purposes of calculating the geometric mean.

2. Loading is calculated by multiplying the concentration in mg/L by the average daily flow for the day of sampling in mgd and a conversion factor of 8.34. If the concentration is measured in μg/L, the conversion factor is 0.00834. For more information on calculating, averaging, and reporting loads and concentrations see the NPDES Self-Monitoring System User Guide (EPA 833-B-85-100, March 1985).

3. Percent removal is calculated using the following equation: ((monthly average influent concentration – monthly average effluent concentration) / monthly average influent concentration) x100

4. For Effluent Testing Data, in accordance with instructions in NPDES Application Form 2A, Part B.6 and where each test is conducted in a separate permit year during the permitted discharge period, specifically for each of the first three years of the permit

5. The maximum ML for Total Ammonia is 0.05 mg/l.

6. Preferably temperature to be measured during the warmest period of the day.

7. If no discharge occurs during the reporting period, “no discharge” shall be reported on the DMR.

Table 6. Draft Permit - Effluent Limits and Monitoring Requirements

Parameter	Units	Effluent Limitations			Monitoring Requirements		
		Average Monthly	Average Weekly	Maximum Daily	Sample Location	Sample Frequency	Sample Type
Parameters with Effluent Limits							
Biochemical Oxygen Demand (BOD_5) [1]	mg/L	30	45	--	Influent and Effluent	2/week	24-hour composite
	lbs/day	154	231	--			Calculation[1]
BOD_5 Percent Removal [2]	%	85 (minimum)	--	--	--	1/month	Calculation[2]
Total Suspended Solids (TSS) [1]	mg/L	30	45	--	Influent and Effluent	2/week	24-hour composite
	lbs/day	154	231	--			Calculation[1]
TSS Percent Removal [2]	%	85 (minimum)	--	--	--	1/month	Calculation[2]
Fecal Coliform [3] Bacteria	CFU/ 100 ml	200	400	--	Effluent	5/week	Grab
pH	std units	Between 6.0 – 9.0			Effluent	Daily	Grab
Report Parameters							
Flow	mgd	Report	--	Report	Influent and Effluent	Continuous	Recording
Enterococci Bacteria	CFU or MPN/ 100 ml	Report	--	Report	Effluent	5/week beginning March 1, 2022[4]	Grab
Total Ammonia	mg /L as N	Report	--	Report	Effluent	1/month	Grab
Nitrate + Nitrite	mg/L as N	Report	--	Report	Effluent	1/month	Grab
Total Kjeldahl Nitrogen	mg/L as N	Report	--	Report	Effluent	1/month	24-hour composite
Temperature[5]	ºC	Report	--	Report	Effluent	Daily	Grab
Alkalinity	mg/L as $CaCO_3$	Report	--	Report	Effluent	1/month	Grab
Dissolved Oxygen	mg/L	Report		Report	Effluent	1/month	Grab

Effluent Testing for Permit Renewal				
Permit Application Effluent Testing Data[6]	--	Effluent	1/year	--

Notes

1. Loading (in lbs/day) is calculated by multiplying the concentration (in mg/L) by the corresponding flow (in mgd) for the day of sampling and a conversion factor of 8.34. For more information on calculating, averaging, and reporting loads and concentrations see the *NPDES Self-Monitoring System User Guide* (EPA 833-B-85-100, March 1985).

2. Percent Removal. The monthly average percent removal must be calculated from the arithmetic mean of the influent values and the arithmetic mean of the effluent values for that month using the following equation: (average monthly influent concentration – average monthly effluent concentration) ÷ average monthly influent concentration x 100. Influent and effluent samples must be taken over approximately the same time period.

3. The average monthly Fecal Coliform bacteria counts must not exceed a geometric mean of 200/100 ml (Average Monthly Limit), and 400/100ml (Average Weekly Limit). See Part VI of this permit for a definition of geometric mean. The Department of Ecology provides directions to calculate the monthly and weekly geometric mean in publication No. 04-10-020, Information Manual for Treatment Plant Operators available at: https://fortress.wa.gov/ecy/publications/documents/0410020.pdf.

4. Per the request by Ecology on March 18, 2021, the Facility is permitted to operate until March 1, 2022 without monitoring for enterococci bacteria to allow for State accreditation of the Tulalip lab for conducting enterococci sample analysis.

5. Preferably temperature to be measured during the warmest period of the day.

6. Effluent Testing Data - See NPDES Permit Application Form 2A, Tables A and B for the list of pollutants to be included in this testing. The Permittee must use sufficiently sensitive analytical methods in accordance with Part I.4 of this permit. Monitoring results shall be reported in the January DMR of the following year.

Differences Between the Existing and Proposed Permit Limits

The Draft Permit proposes the same effluent limits as the existing permit.

Differences Between the Existing and Proposed Monitoring Requirements

To evaluate nutrient data for the next permit cycle:

- 3 new monitoring parameters added: Nitrate plus Nitrite (1/month), Total Kjeldahl Nitrogen (1/month), Dissolved Oxygen (1/month).
- Revised monitoring schedule: Ammonia (from 1/quarter to 1/month) and Alkalinity (from 1/year to 1/month).

To evaluate hydraulic and organic loadings for the next permit cycle:

- Influent flow rate added (continuous metering).

To evaluate Enterococci Bacteria in the new WQS:

- Enterococci Bacteria added (5/week) beginning March 1, 2021.

A. Basis for Effluent Limits

In general, the CWA requires that the effluent limits for a particular pollutant be the more stringent of either technology-based limits or water quality-based limits. Technology-based limits are set according to the level of treatment that is achievable using available technology. A water quality-based effluent limit is designed to ensure that the water quality standards applicable to a waterbody are being met and may be more stringent than technology-based effluent limits.

B. Pollutants of Concern

Pollutants of concern are those that either have technology-based limits or may need water quality-based limits. EPA identifies pollutants of concern for the discharge based on those which:

- Have a technology-based limit
- Have an assigned wasteload allocation (WLA) from a TMDL
- Had an effluent limit in the previous permit
- Are present in the effluent monitoring. Monitoring data are reported in the application and DMR and any special studies
- Are expected to be in the discharge based on the nature of the discharge

Pollutants expected in the discharge from a facility with this type of treatment, include but are not limited to: five-day biochemical oxygen demand (BOD_5), total suspended solids (TSS), fecal coliform bacteria, pH, ammonia, temperature, and dissolved oxygen (DO).

Based on this analysis, pollutants of concern are as follows:

- BOD_5
- DO
- TSS
- Fecal Coliform bacteria
- Enterococci bacteria
- pH
- Temperature
- Ammonia
- Nitrate plus Nitrite and TKN

C. Technology-Based Effluent Limits

Federal Secondary Treatment Effluent Limits

The CWA requires POTWs to meet performance-based requirements based on available wastewater treatment technology. Section 301 of the CWA established a required performance level, referred to as “secondary treatment,” which POTWs were required to meet by July 1, 1977. EPA has developed and promulgated “secondary treatment” effluent limitations, which are found in 40 CFR 133.102. These technology-based effluent limits apply to certain municipal WWTPs and identify the minimum level of effluent quality attainable by application of secondary treatment in terms of BOD_5, TSS, and pH. The federally promulgated secondary treatment effluent limits are listed in Table 7. For additional information and background refer to Part 5.1 *Technology Based Effluent Limits for POTWs* in the Permit Writers Manual.

Table 7. Secondary Treatment Effluent Limits

Parameter	30-day average	7-day average
BOD_5	30 mg/L	45 mg/L
TSS	30 mg/L	45 mg/L
Removal for BOD_5 and TSS (concentration)	85% (minimum)	---
pH	within the limits of 6.0 - 9.0 s.u.	
Source: 40 CFR 133.102		

Mass-Based Limits

40 CFR 122.45(f) requires that effluent limits be expressed in terms of mass, except under certain conditions. 40 CFR 122.45(b) requires that effluent limitations for POTWs be calculated based on the design flow of the facility. The mass-based limits are expressed in pounds per day and are calculated as follows:

Mass based limit (lb/day) = concentration limit (mg/L) × design flow (mgd) × 8.34[3]

Since the design flow for this facility is 0.616 mgd, the technology-based mass limits for BOD_5 and TSS are calculated as follows:

Average Monthly Limit = 30 mg/L × 0.616 mgd × 8.34 = 154 lbs/day

Average Weekly Limit = 45 mg/L × 0.616 mgd × 8.34 = 231 lbs/day

Ecology's TBEL for Fecal Coliform

WAC 173-221-040, Domestic Wastewater Discharge Standards, provides the following technology-based treatment standards for fecal coliform: Fecal coliform limits shall not exceed a monthly geometric mean of 200 organisms per 100ml and a weekly mean of 400 organisms per 100 ml.

D. Water Quality-Based Effluent Limits

Statutory and Regulatory Basis

Section 301(b)(1)(C) of the CWA requires the development of limitations in permits necessary to meet water quality standards. Discharges to State or Tribal waters must also comply with limitations imposed by the State or Tribe as part of its certification of NPDES permits under section 401 of the CWA. 40 CFR 122.44(d)(1), which implements Section 301(b)(1)(C) of the CWA, requires that permits include limits for all pollutants or parameters which are or may be discharged at a level which will cause, have the reasonable potential to cause, or contribute to an excursion above any State or Tribal water quality standard, including narrative criteria for water quality. Effluent limits must also meet the applicable water quality requirements of affected States other than the State in which the discharge

[3] 8.34 is a conversion factor with units $(lb \times L)/(mg \times gallon \times 10^6)$

originates, which may include downstream States (40 CFR 122.4(d), 122.44(d)(4), see also CWA Section 401(a)(2)).

The NPDES permitting regulations require the permitting authority to make this evaluation using procedures which account for existing controls on point and nonpoint sources of pollution, the variability of the pollutant in the effluent, species sensitivity (for toxicity), and where appropriate, dilution in the receiving water. The limits must be stringent enough to ensure that water quality standards are met and must be consistent with any available wasteload allocation for the discharge in an approved TMDL.

Reasonable Potential Analysis and Need for Water Quality-Based Effluent Limits

EPA uses the process described in the *Technical Support Document for Water Quality-based Toxics Control* (*TSD*) to determine reasonable potential. To determine if there is reasonable potential for the discharge to cause or contribute to an exceedance of water quality criteria for a given pollutant, EPA compares the maximum projected receiving water concentration to the water quality criteria for that pollutant. If the projected receiving water concentration exceeds the criteria, there is reasonable potential, and a water quality-based effluent limit must be included in the permit.

<u>Mixing Zone/Dilution Analysis</u>

In some cases, a dilution allowance or mixing zone is permitted. A mixing zone is a limited area or volume of water where initial dilution of a discharge takes place and within which certain water quality criteria may be exceeded (EPA, 2014). While the criteria may be exceeded within the mixing zone, the use and size of the mixing zone must be limited such that the waterbody as a whole will not be impaired, all designated uses are maintained, and acutely toxic conditions are prevented.

Washington State Regulations

WAC 173-201A-400(7)(b)(ii) states that Puget Sound is considered to be entirely estuarine. Therefore, Possession Sound is "estuarine" for purposes of determining the size of a mixing zone.

The facility's outfall is located at the depth of 51 feet below mean lower low water (MLLW).

WAC 173-201A-400(7)(b)(i) defines the chronic mixing zone for estuarine receiving waters. The mixing zone is determined by adding 200 feet to the depth of water over the discharge port as measured during Mean Lower Low Water (MLLW). Accordingly, it is determined that the size of the mixing zone is 251 feet for the Chronic Criteria. EPA used these site-specific parameters to determine dilution ratios, and reasonable potential calculations as shown in the appendices.

WAC 173-201A-240(b) states that in estuarine waters, a zone where acute criteria may be exceeded shall not extend beyond ten percent of the distance established in subsection (7)(b) of this section as measured independently from the discharge port(s). Therefore, for the acute criteria, the size of the mixing zone is 10%, which calculates to 25.1 feet.

In developing the 2009 Permit conditions, EPA modeled the dilution at the edges of the acute and chronic mixing zones using site-specific conditions using a Visual Plumes model. Visual

Plumes (4th Edition) uses a series of dilution equations based on characteristics of the wastewater effluent and ambient receiving water to determine the physical dispersion of pollutants. For the purpose of the Tulalip WWTP NPDES permit, the UM3 (Three-Dimensional Updated Merge) model version of Visual Plumes was used. UM3 uses a Lagrangian approach which incorporates the presence of ambient current into the model. Effluent parameters for the model include design flow rate, temperature, salinity, and information on the diffuser, including the depth of the diffuser and the number of ports and their sizes, spacing, and angle-orientation. The ambient receiving water characteristics required by the model include temperature, current speed and current direction. The model enables users to model site-specific circumstances and calculate the acute and chronic mixing zone dilution ratios.

A Brooks Farfield model approach was included in the estimation because the plume had reached the surface water before the chronic distance could be reached.

EPA evaluated the bathymetry shape which indicated that the depths towards Possession Sound are in the order of 300 feet, past the outfall at Ecology's monitoring station PSS-019 (Possession Sound – Gedney Island). By comparison, the outfall is located at 51 feet below surface, the depth used for modeling dilution factors. However, since the sea-bed drops into greater depth past the outfall, increased mixing is expected. The salinity and temperature profile for the model was obtained from data collected at PSS-019 (August 23, 2005).

Using the UM3 model and the 4/3 Power Law, the model predicted the mixing zone with the following dilution factors:

Acute Mixing Zone dilution factor: 48.49
Chronic Mixing Zone dilution factor: 67.10

Since the facility's design flow and marine outfall are the same and since Ecology has not changed its mixing zone criteria, EPA has retained the Visual Plumes analysis as it is still applicable to determine the acute and chronic dilution factors.

While EPA used Washington's mixing zone water quality standard to determine the size of the mixing zone, EPA does not have the authority to use a mixing zone if Ecology does not provide for the mixing zone in its CWA 401 Certification. Therefore, if Ecology does not provide a mixing zone or provides different dilution factors in the CWA 401 Certification for this permit, EPA will recalculate the reasonable potential analysis and water quality-based effluent limits based on the dilution provided in the CWA 401 Certification.

Table 8: Visual Plumes Input Parameters

INPUT PARAMETERS	Chronic	Acute	Rationale
Ambient Parameters			
Outfall Depth (ft)	51	51	1974 design drawing, depth below MLLW, based on previous fact sheet
Depth at Discharge Point (ft)	51	51	1974 design drawings, based on previous fact sheet

Tidal Velocity for Run (m/s)	0.1	0.05	0.1 m/s = mean per DOH inspection report 0.05 ~10th percentile standard assumption (N.Glen, Ecology), based on previous fact sheet
Density and Temperature Profiles	Based on data collected from Washington State Department of Ecology's Monitoring Station, PSS-019 on August 23, 2005		
Discharge Parameters			
Vertical Angle of Discharge,	-45	-45	1974 design drawings, based on previous fact sheet
Port Diameter (inches)	12	12	1974 design drawings, based on previous fact sheet
Port Height Above Bottom (m)	0.5	0.5	Assumed allowing for scouring, F. Meriwether, based on previous fact sheet
Temperature of Discharge (ºC)	18.2	18.2	Summer average daily value, based on permit application
Mixing Zone (ft)	251	25.1	Washington State Water Quality Standards for marine discharges
Flow Rate (mgd)	0.289	0.594	Based on recommendations from Washington State Department of Ecology on May 26, 2009
Visual Plumes Output - Dilution Factors			
Acute	**48.49**		
Chronic	**67.10**		

The equations used to conduct the reasonable potential analysis and calculate the water quality-based effluent limits are provided in Appendix D.

Reasonable Potential Analysis and Need for Water Quality-Based Effluent Limits

The reasonable potential and water quality-based effluent limit for specific parameters are summarized below. The calculations are provided in Appendix D.

<u>Ammonia</u>

Ammonia criteria are based on a formula which relies on the pH and temperature of the receiving water, because the fraction of ammonia present as the toxic, un-ionized form increases with increasing pH and temperature. Therefore, the criteria become more stringent as pH and temperature increase. Analysis of the ammonia effluent data was based on 90 samples with the maximum daily discharge of 12.0 mg/L reported in September 2017. For ambient ammonia level, EPA used the 95th percentile concentration of the ambient receiving water of 18.7 ug/l, from Ecology's nearby monitoring station, Snodry35 - Everett Harbor.

In Washington State's WQS, the criteria concentrations based on total ammonia for marine water can be referenced in EPA guidance, Ambient Water Quality Criteria for Ammonia (Saltwater)4 – 1989, EPA440/5-88-004. April 1989. The calculated criteria as shown on Table 9, are: acute criteria of 6.42 mg/l, and chronic criteria of 0.69 mg/l.

The reasonable potential analysis showed that there is no reasonable potential to exceed the

[4] http://www.epa.gov/waterscience/pc/ambientwqc/ammoniasalt1989.pdf

ammonia WQS. Monthly monitoring for ammonia is proposed to generate data for evaluation in the next permit cycle, at the same frequency as for the monitoring for nitrate-nitrite and TKN.

Table 9: Marine Un-ionized Ammonia

Marine Un-ionized Ammonia Criteria Calculation

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

INPUT	
1. Receiving Water Temperature, deg C (95th percentile):	12.3
2. Receiving Water pH, (95th percentile):	8.21
3. Receiving Water Salinity, g/kg (10th percentile):	29.9
4. Pressure, atm (EPA criteria assumes 1 atm):	1.0
5. Unionized ammonia criteria (mg un-ionized NH_3 per liter) from EPA 440/5-88-004:	
Acute:	0.233
Chronic:	0.035
OUTPUT	
Using mixed temp and pH at mixing zone boundaries?	No
1. Molal Ionic Strength (not valid if >0.85):	0.614
2. pKa8 at 25 deg C (Whitfield model "B"):	9.316
3. Percent of Total Ammonia Present as Unionized:	3.0%
4. Total Ammonia Criteria (mg/L as NH_3):	
Acute:	7.81
Chronic:	1.17
RESULTS	
Total Ammonia Criteria (mg/L as N)	
Acute:	**6.42**
Chronic:	**0.96**

Data source: Ecology's monitoring station, PSS019

pH

The Washington water quality criterion for Excellent quality marine water specifies a pH range of 7.0 to 8.5 standard units, with human-caused variation within the above range of less than 0.5 units (WAC 173-201A-210(1)(f)). In the previous permit, the technology-based limit allowed the range of pH from 6.0 s.u. to 9.0 s.u. The DMR data from the last permit cycle show that the facility reported the effluent having a pH range from 3.32 s.u. (minimum) to 13.5 s.u. (maximum).

EPA conducted a reasonable potential analysis that demonstrated that compliance with the technology-based limits of 6.0 to 9.0 standard units will assure compliance with the relevant WQS because of the high buffering capacity of marine water. The impact of effluent pH on the receiving water was modeled and confirms compliance with the water quality standards using calculations developed by Lewis and Wallace, 1988. As shown in Appendix D, there is no reasonable potential to exceed WQS, therefore, the permit retains the technology-based pH effluent limits.

Temperature

In WAC 173-201A-210(1)(c), the Washington water quality criteria limit the ambient water temperature to 16.0ºC (1-day Maximum) for Excellent Quality marine water; when natural conditions exceed 16.0°C, no temperature increases will be allowed which will raise the receiving water temperature by greater than 0.3°C.

The highest ambient temperature of water in the vicinity of Ecology's monitoring station, PSS019, 90th percentile is 11.92°C. The 95th percentile temperature of the effluent as reported in the DMR data is 21.81°C.

As shown in Appendix D, EPA conducted a reasonable potential analysis to determine whether there would be an exceedance of Washington's WQS. Since the ambient temperature increase in the receiving water is predicted to be 0.15°C, which is significantly less than 0.3°C, there is no potential to violate Washington's WQS for temperature; therefore, no effluent limit for temperature is warranted. Effluent temperature monitoring is proposed for the draft permit for comparison with past effluent, and to obtain data for potential future effluent modeling purposes.

BOD_5 and Dissolved Oxygen (DO)

Based on the Federal Secondary Treatment Standards for BOD_5, the facility is required to meet an Average Monthly Limit of 30 mg/l, and an Average Weekly Limit of 45 mg/l. During the last permit cycle, the facility's highest Average Monthly Limit monitoring was 139 mg/l, and the highest Average Weekly Limit monitoring was 250 mg/l, which are both well over the permitted limits. Due to personnel changes at the facility, the facility is unable to explain their circumstances for these exceedances. The Federal Secondary Treatment Standards for BOD_5 are proposed to be retained for the next permit cycle.

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 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.

When BOD_5 is discharged at permitted levels into the marine waters from the WWTP it is not expected to have an appreciable effect on the DO concentration in Puget Sound. The outfall is located 51 feet below surface; however, it is also close to much deeper water. The point of maximum oxygen depletion occurs miles from the source, thus the dilution factor will be far greater than the chronic dilution factor of 67.1. The proposed effluent limitation for BOD_5 will control the discharge of oxygen demanding constituents into Puget Sound.

Nitrate plus Nitrite Nitrogen, and TKN

On January 30, 2020, Ecology announced plans to develop a draft Puget Sound Nutrients General Permit (PSNGP), which applies to nearly 70 domestic WWTPs. The permit will combat discharges of excess nutrients, which have been a significant contributor to low oxygen levels in Puget Sound. The first term of the PSNGP will not include numerical limits, but instead be focused on monitoring and optimization. A future study including data collected during the first term will determine waste load allocations for these state regulated

WWTPs. The PSNGP has not yet been issued, but EPA has included nutrient monitoring in the draft permit based on Ecology's recommendations.

To better understand any possible impacts from the WWTP, the draft permit requires monthly monitoring for these nitrogen compounds: Nitrate plus Nitrite Nitrogen, and TKN. The data generated will be used to determine during the next permit cycle if permit limits are necessary to reduce nutrients from this WWTP. In addition, Ecology may in the future develop a nutrient cap to implement its Puget Sound nutrient reduction strategy.

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Fecal Coliform (Shellfish Harvesting)

In WAC 173-201A-210-(2)(b) the Washington water quality criteria for Shellfish Harvesting requires that the fecal coliform levels shall both not exceed a geometric mean of 14 colonies/100mL and not have more than 10 percent of all samples obtained for calculating the geometric mean value exceeding 43 colonies/100mL. These criteria are to be met at the edges of the mixing zone.

Based on the facility's DMR data for fecal coliform (from September 2010 to May 2019), the 95^{th} percentile of the monthly average of the effluent was 9.98 colonies/100mL (see Appendix B).

Under critical conditions, Ecology's modeling method predicts no appreciable change in the concentration of the number of fecal coliform bacteria in the receiving water and no violation of the water quality criterion (see Appendix D). Therefore, the proposed permit includes Ecology's technology-based effluent limit[5] for fecal coliform bacteria. Accordingly, fecal coliform limits shall not exceed a monthly geometric mean of 200 organisms/100mL and a weekly geometric mean of 400 organisms/100mL.

In addition to the fecal coliform effluent limits described above, the Draft Permit includes reporting for the Shellfish Program in the event of unauthorized discharges such as collection system overflows, plant bypasses, or failure of disinfection system. These conditions would require immediate reporting by telephone to EPA's NPDES Compliance Hotline at (206) 553-1846, to the Washington State Department of Ecology, to the Snohomish Health District at (425) 339-5250 during normal working hours, and (425) 339-5295 outside normal working hours, and to the Washington State Department of Health, Shellfish Program. The Department of Ecology's Northwest Regional Office 24-hour number is (425) 649-7000, and the Department of Health's Shellfish Program office number is (360)236-3330 during normal working hours and (360) 789-8962 outside normal working hours.

[5] WAC 173-221-040, Domestic Wastewater Facility Discharge Standards

Enterococci Bacteria and Fecal Coliform (Primary Contact Recreation)

On January 23, 2019, Ecology adopted amendments to Chapter 173-201A WAC to update fresh and marine WQS for the protection of water contact recreational uses in state waters. This included new bacterial indicators and numeric criteria based on enterococci bacteria instead of fecal coliform for marine waters. EPA approved the new numeric standards on April 30, 2019.

The WQS update included a transition period to phase out the fecal coliform criteria, which expired on December 31, 2020. Accordingly, as of as of January 1, 2021, only the new Enterococci bacteria WQS apply. The criteria to protect primary contact recreation in marine waters are provided below[6].

Bacterial Indicator	Criteria
Fecal coliform Expired 12/31/2020	Fecal coliform organism levels must not exceed a geometric mean value of 14 colonies/100 mL, with not more than 10 percent of all samples (or any single sample when less than ten sample points exist) obtained for calculating the geometric mean value exceeding 43 colonies per 100 mL
Enterococci	Enterococci organism levels within an averaging period must not exceed a geometric mean value of 30 CFU or MPN per 100 mL, with not more than 10 percent of all samples (or any single sample when less than ten sample values exist) obtained within the averaging period exceeding 110 CFU or MPN per 100 mL

Ecology did not revise the technology-based effluent limits for fecal coliform with the recreational WQS update. The technology-based effluent limits state that fecal coliform limits shall not exceed a monthly geometric mean of 200 organisms/100 milliliters (mL), and a weekly geometric mean of 400 organisms per 100 mL[7].

EPA evaluated the WWTP effluent concentration with respect to the existing and updated bacteria criteria. EPA modeled the fecal coliform levels in the effluent using a simple mixing analysis under critical conditions, with the facility discharging at the fecal coliform technology-based limit of 400 organisms per 100 ml with a dilution factor of 67.1. Under critical conditions, modeling predicts no violation of the water quality criterion for fecal coliform, see Appendix D. In the draft permit, EPA is proposing to retain the existing technology-based effluent limit for fecal coliform bacteria.

The permit requires monitoring for both fecal coliform and enterococci. Effluent limits are not proposed for enterococci at this time. In retaining the existing technology-based effluent limits for fecal coliform, the treatment train includes disinfection and as a result there should be no reasonable potential to exceed water quality criteria for either indicator bacteria at the edge of the mixing zone. There are no monitoring data for the facility for enterococci. Thus it

[6] WAC 173-201A-210 (3), Recreational Uses in Marine Waters, and Table 210(3)(b)
[7] WAC 173-221-040, Domestic Wastewater Facility Discharge Standards

is not possible to directly assess reasonable potential using enterococci or develop a correlation between fecal coliform levels and enterococci levels. Dual indicator monitoring will be a part of this permit so that a site-specific correlation can be developed during the permit cycle. EPA will use these data to assess the reasonable potential to exceed the applicable water quality criterion in the next iteration of this permit. Ecology is working with the Facility on State accreditation of the Tulalip lab for conducting enterococci sample analysis. Hence, the permit requires monitoring beginning March 1, 2022, to allow time for the accreditation process.

The permit requires monitoring for both fecal coliform and enterococci. Effluent limits are not proposed for enterococci at this time. In retaining the existing technology-based effluent limits for fecal coliform, the treatment train includes disinfection and as a result there should be no reasonable potential to exceed water quality criteria for either indicator bacteria at the edge of the mixing zone. There are no monitoring data for the facility for enterococci. Thus it is not possible to directly assess reasonable potential using enterococci or develop a correlation between fecal coliform levels and enterococci levels. Dual indicator monitoring will be a part of this permit so that a site-specific correlation can be developed during the permit cycle. EPA will use these data to assess the reasonable potential to exceed the applicable water quality criterion in the next iteration of this permit.

E. Antibacksliding

Section 402(o) of the Clean Water Act and 40 CFR 122.44 (l) generally prohibit the renewal, reissuance or modification of an existing NPDES permit that contains effluent limits, permit conditions or standards that are less stringent than those established in the previous permit (i.e., anti-backsliding) but provides limited exceptions. For explanation of the antibacksliding exceptions refer to Chapter 7 of the Permit Writers Manual *Final Effluent Limitations and Anti-backsliding*.

Since all the proposed effluent limits are as stringent as the previous permit, the draft permit complies with the antibacksliding provisions and an antibacksliding analysis is not necessary.

V. Monitoring Requirements

A. Basis for Effluent and Surface Water Monitoring

Section 308 of the CWA and 40 CFR 122.44(i) require monitoring in permits to determine compliance with effluent limitations. Monitoring may also be required to gather effluent and surface water data to determine if additional effluent limitations are required and/or to monitor effluent impacts on receiving water quality.

The permit also requires the permittee to perform effluent monitoring required by the NPDES Form 2A application, so that these data will be available when the permittee applies for a renewal of its NPDES permit.

The permit also requires the permittee to perform effluent monitoring required by NPDES Permit Application Form 2A, Tables A and B, so that these data will be available when the permittee applies for a renewal of its NPDES permit.

The permittee is responsible for conducting the monitoring and for reporting results on DMRs or on the application for renewal, as appropriate, to EPA.

B. Effluent Monitoring

Monitoring frequencies are based on the nature and effect of the pollutant, as well as a determination of the minimum sampling necessary to adequately monitor the facility's performance. Permittees have the option of taking more frequent samples than are required under the permit. These samples must be used for averaging if they are conducted using EPA-approved test methods (generally found in 40 CFR 136) or as specified in the permit.

C. Outfall 001 Evaluation Report

The draft permit requires the facility to inspect the submerged portion of the outfall pipe and diffuser to document its integrity and continued function, confirm and verify the outfall coordinates, and provide an inspection video. The inspection shall evaluate the structural condition of the submarine portion of the outfall, determine whether portions of the outfall are covered by sediments, and determine whether all diffuser ports are flowing freely. The facility must also perform a dye test to determine the structural integrity of the submarine outfall pipe. Photographic verification shall be included in the report. A brief report of this inspection shall be submitted to EPA, together with the next permit application.

D. Electronic Submission of Discharge Monitoring Reports

The draft permit requires that the permittee submit DMR data electronically using NetDMR. NetDMR is a national web-based tool that allows DMR data to be submitted electronically via a secure Internet application.

VI. Sludge (Biosolids) Requirements

EPA Region 10 separates wastewater and sludge permitting. EPA has authority under the CWA to issue separate sludge-only permits for the purposes of regulating biosolids. EPA may issue a sludge-only permit to each facility at a later date, as appropriate.

Until future issuance of a sludge-only permit, sludge management and disposal activities at each facility continue to be subject to the national sewage sludge standards at 40 CFR Part 503 and any requirements of the State's biosolids program. The Part 503 regulations are self-implementing, which means that facilities must comply with them whether or not a permit has been issued.

VII. Other Permit Conditions

A. Quality Assurance Plan

The facility is required to update the Quality Assurance Plan within 180 days of the effective date of the final permit. The Quality Assurance Plan must include of standard operating procedures the permittee must follow for collecting, handling, storing and shipping samples, laboratory analysis, and data reporting. The plan must be retained on site and be made available to EPA upon request.

B. Operation and Maintenance Plan

The permit requires the facility to properly operate and maintain all facilities and systems of treatment and control. Proper operation and maintenance are essential to meeting discharge limits, monitoring requirements, and all other permit requirements at all times. The permittee is required to develop and implement an operation and maintenance plan for their facility within 180 days of the effective date of the final permit. The plan must be retained on site and made available to EPA upon request.

C. Sanitary Sewer Overflows and Proper Operation and Maintenance of the Collection System

SSOs are not authorized under this permit. The permit contains language to address SSO reporting and public notice and operation and maintenance of the collection system. The permit requires that the permittee identify SSO occurrences and their causes. In addition, the permit establishes reporting, record keeping and third-party notification of SSOs. Finally, the permit requires proper operation and maintenance of the collection system.

The following specific permit conditions apply:

Immediate Reporting – The permittee is required to notify EPA of an SSO within 24 hours of the time the permittee becomes aware of the overflow. (See 40 CFR 122.41(l)(6))

Written Reports – The permittee is required to provide EPA a written report within five days of the time it became aware of any overflow that is subject to the immediate reporting provision. (See 40 CFR 122.41(l)(6)(i)).

Third Party Notice – The permit requires that the permittee establish a process to notify specified third parties of SSOs that may endanger health due to a likelihood of human exposure; or unanticipated bypass and upset that exceeds any effluent limitation in the permit or that may endanger health due to a likelihood of human exposure. The permittee is required to develop, in consultation with appropriate authorities at the local, county, tribal and/or state level, a plan that describes how, under various overflow (and unanticipated bypass and upset) scenarios, the public, as well as other entities, would be notified of overflows that may endanger health. The plan should identify all overflows that would be reported and to whom, and the specific information that would be reported. The plan should include a description of lines of communication and the identities of responsible officials. (See 40 CFR 122.41(l)(6)).

Record Keeping – The permittee is required to keep records of SSOs. The permittee must retain the reports submitted to EPA and other appropriate reports that could include work orders associated with investigation of system problems related to a SSO, that describes the steps taken or planned to reduce, eliminate, and prevent reoccurrence of the SSO. (See 40 CFR 122.41(j)).

Proper Operation and Maintenance – The permit requires proper operation and maintenance of the collection system. (See 40 CFR 122.41(d) and (e)). SSOs may be indicative of improper operation and maintenance of the collection system. The permittee may consider the development and implementation of a capacity, management, operation and maintenance (CMOM) program.

The permittee may refer to the Guide for Evaluating Capacity, Management, Operation, and Maintenance (CMOM) Programs at Sanitary Sewer Collection Systems (EPA 305-B-05-002). This guide identifies some of the criteria used by EPA inspectors to evaluate a collection system's management, operation and maintenance program activities. Owners/operators can review their own systems against the checklist (Chapter 3) to reduce the occurrence of sewer overflows and improve or maintain compliance.

D. Environmental Justice

As part of the permit development process, EPA Region 10 conducted a screening analysis to determine whether this permit action could affect overburdened communities. "Overburdened" communities can include minority, low-income, tribal, and indigenous populations or communities that potentially experience disproportionate environmental harms and risks. EPA used a nationally consistent geospatial tool that contains demographic and environmental data for the United States at the Census block group level. This tool is used to identify permits for which enhanced outreach may be warranted.

The facility is not located within or near a Census block group that is potentially overburdened. The draft permit does not include any additional conditions to address environmental justice.

Regardless of whether a facility is located near a potentially overburdened community, EPA encourages permittees to review (and to consider adopting, where appropriate) Promising Practices for Permit Applicants Seeking EPA-Issued Permits: Ways To Engage Neighboring Communities (see https://www.federalregister.gov/d/2013-10945). Examples of promising practices include: thinking ahead about community's characteristics and the effects of the permit on the community, engaging the right community leaders, providing progress or status reports, inviting members of the community for tours of the facility, providing informational materials translated into different languages, setting up a hotline for community members to voice concerns or request information, follow up, etc.

For more information, please visit https://www.epa.gov/environmentaljustice and Executive Order 12898, *Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations*.

E. Design Criteria

The permit includes design criteria requirements. This provision requires the permittee to compare influent flow to the facility's design flow and prepare a facility plan for maintaining compliance with NPDES permit effluent limits when the flow or loading exceeds 85% of the design criteria values for two months in a twelve-month period.

F. Pretreatment Requirements

The permittee does not have an approved state pretreatment program per 40 CFR 403.10, thus, EPA is the Approval Authority for this WWTP. Since the Tulalip WWTP does not have an approved POTW pretreatment program, EPA is also the Control Authority of industrial users that might introduce pollutants into the WWTP.

Special Condition II.E of the permit reminds the Permittee that it cannot authorize discharges which may violate the specific national prohibitions of the General Pretreatment Program.

The Permittee must develop the legal authority enforceable in Federal, State or local courts which authorizes or enables the POTW to apply and to enforce the requirement of sections 307 (b) and (c) and 402(b)(8) of the Clean Water Act, as described in 40 CFR 403.8(f)(1). Where the POTW is a municipality, legal authority is typically through a sewer use ordinance, which is usually part of the city or county code. EPA has a Model Pretreatment Ordinance for use by municipalities operating POTWs that are required to develop pretreatment programs to regulate industrial discharges to their systems (EPA, 2007). The model ordinance should also be useful for communities with POTWs that are not required to implement a pretreatment program in drafting local ordinances to control nondomestic dischargers within their jurisdictions. The legal authority must be adopted and enforced by the POTW. EPA has a Model Pretreatment Ordinance for use by municipalities operating POTWs that are required to develop pretreatment programs to regulate industrial discharges to their systems (EPA, 2007).

Background on the pretreatment program may be found in the Introduction to the National Pretreatment Program (EPA, 2011).

G. Standard Permit Provisions

Sections III, IV and V of the draft permit contain standard regulatory language that must be included in all NPDES permits. The standard regulatory language covers requirements such as monitoring, recording, and reporting requirements, compliance responsibilities, and other general requirements.

VIII. Other Legal Requirements

A. Endangered Species Act

The Endangered Species Act requires federal agencies to consult with National Oceanic and Atmospheric Administration Fisheries (NOAA Fisheries) and the U.S. Fish and Wildlife Service (USFWS) if their actions could beneficially or adversely affect any threatened or endangered species. Pursuant to Section 7 of the ESA, EPA will consult with the Services on the effects of this permit action on ESA-listed species and designated critical habitats present in the action area.

B. Essential Fish Habitat

Essential fish habitat (EFH) is the waters and substrate (sediments, etc.) necessary for fish to spawn, breed, feed, or grow to maturity. The Magnuson-Stevens Fishery Conservation and Management Act (January 21, 1999) requires EPA to consult with NOAA Fisheries when a proposed discharge has the potential to adversely affect EFH (i.e., reduce quality and/or quantity of EFH). Pursuant to Section 7 of the ESA, EPA will consult with the Services on the effects of this permit action on ESA-listed species and designated critical habitats present in the action area.

The EFH regulations define an adverse effect as any impact which reduces quality and/or quantity of EFH and may include direct (e.g. contamination or physical disruption), indirect (e.g. loss of prey, reduction in species' fecundity), site specific, or habitat-wide impacts, including individual, cumulative, or synergistic consequences of actions.

C. Antidegradation

EPA has completed an antidegradation analysis in Appendix D. Comments on the 401-certification including the antidegradation review can be submitted to Ecology as set forth above (see State Certification on Page 1 of this Fact Sheet).

D. Permit Expiration

The permit will expire five years from the effective date.

IX. References

EPA. 1991. *Technical Support Document for Water Quality-based Toxics Control.* US Environmental Protection Agency, Office of Water, EPA/505/2-90-001.

https://www3.epa.gov/npdes/pubs/owm0264.pdf

EPA. 2010. *NPDES Permit Writers' Manual.* Environmental Protection Agency, Office of Wastewater Management, EPA-833-K-10-001. September 2010. https://www3.epa.gov/npdes/pubs/pwm_2010.pdf

EPA, 2007. *EPA Model Pretreatment Ordinance*, Office of Wastewater Management/Permits Division, January 2007.

EPA, 2011. *Introduction to the National Pretreatment Program*, Office of Wastewater Management, EPA 833-B-11-011, June 2011.

EPA. 2014. Water Quality Standards Handbook Chapter 5: General Policies. Environmental Protection Agency. Office of Water. EPA 820-B-14-004. September 2014. https://www.epa.gov/sites/production/files/2014-09/documents/handbook-chapter5.pdf

Appendix A. Facility Information

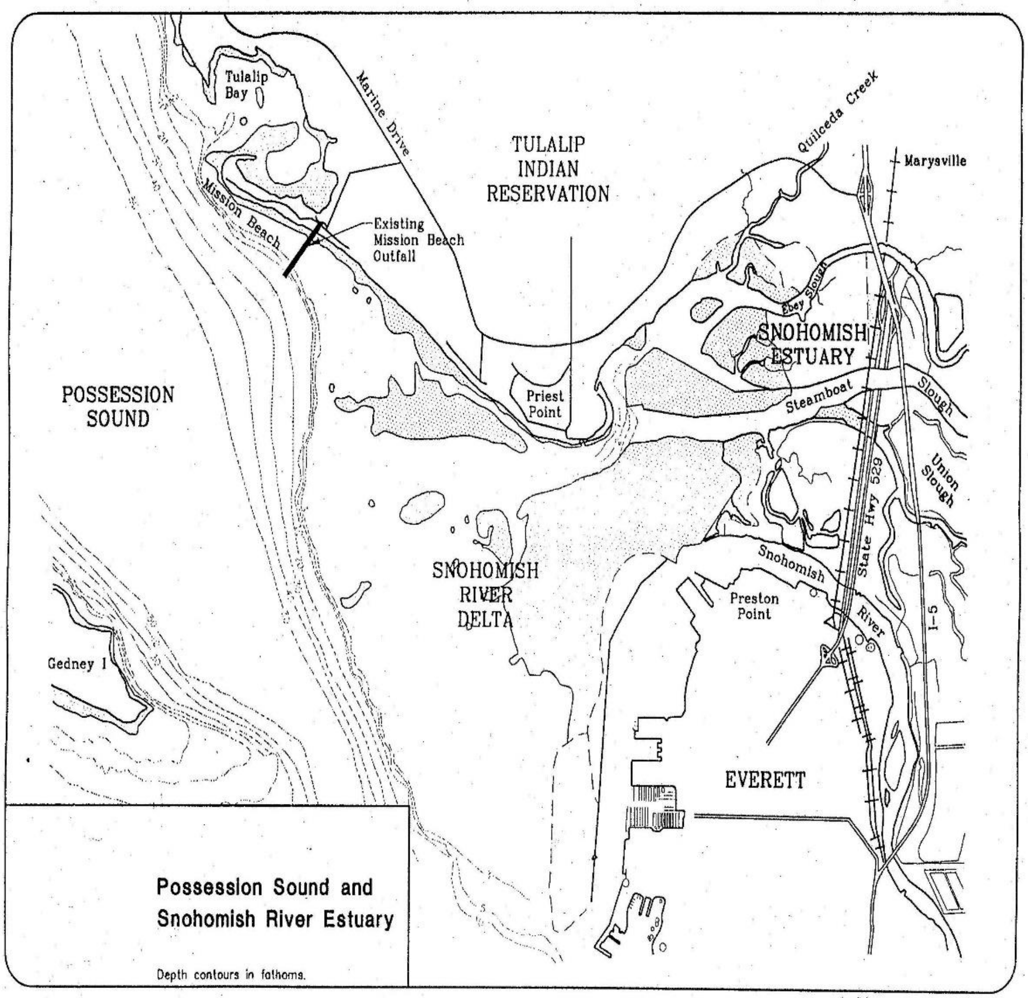

Figure A1: Location Map – Tulalip WWTP

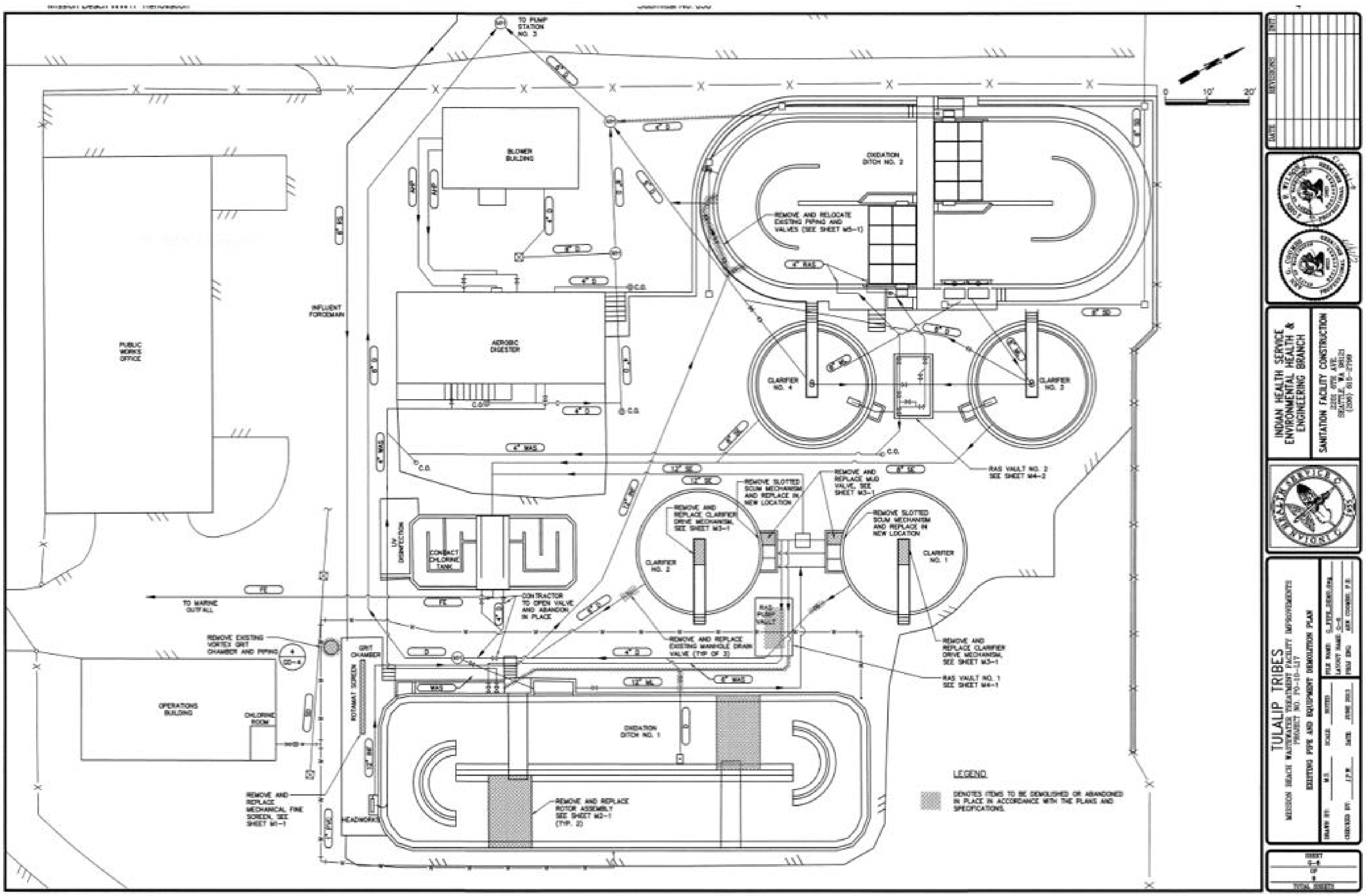

Figure A2: Schematic Diagram - Tulalip Wastewater Treatment Plant

Appendix B. Water Quality Data

A. Treatment Plant Effluent Data (DMR)

BOD5

MO AVG	5.	mg/L	12/31/2009	11.	lb/d
MO AVG	139.*	mg/L	01/31/2010	351*	lb/d
MO AVG	4.	mg/L	02/28/2010	8.	lb/d
MO AVG	5.	mg/L	03/31/2010	10.	lb/d
MO AVG	5.	mg/L	04/30/2010	10.	lb/d
MO AVG	4.	mg/L	05/31/2010	7.	lb/d
MO AVG	6.	mg/L	06/30/2010	15.	lb/d
MO AVG	4.	mg/L	07/31/2010	7.	lb/d
MO AVG	4.	mg/L	09/30/2010	7.	lb/d
MO AVG	7.	mg/L	10/31/2010	11.	lb/d
MO AVG	9.	mg/L	12/31/2010	21.	lb/d
MO AVG	7.	mg/L	01/31/2011	20.	lb/d
MO AVG	6.	mg/L	02/28/2011	13.	lb/d
MO AVG	5.	mg/L	03/31/2011	14.	lb/d
MO AVG	6.	mg/L	04/30/2011	13.	lb/d
MO AVG	5.	mg/L	05/31/2011	10.	lb/d
MO AVG	4.	mg/L	06/30/2011	7.	lb/d
MO AVG	4.	mg/L	07/31/2011	7.	lb/d
MO AVG	4.	mg/L	08/31/2011	6.	lb/d
MO AVG	4.	mg/L	09/30/2011	6.	lb/d
MO AVG	4.	mg/L	10/31/2011	6.	lb/d
MO AVG	4.	mg/L	11/30/2011	8.	lb/d
MO AVG	4.	mg/L	12/31/2011	7.	lb/d
MO AVG	4.	mg/L	01/31/2012	8.	lb/d
MO AVG	6.	mg/L	02/29/2012	15.	lb/d
MO AVG	4.	mg/L	03/31/2012	10.	lb/d
MO AVG	5.	mg/L	04/30/2012	12.	lb/d
MO AVG	5.	mg/L	05/31/2012	10.	lb/d
MO AVG	4.	mg/L	06/30/2012	9.	lb/d
MO AVG	13.	mg/L	07/31/2012	23.	lb/d
MO AVG	7.	mg/L	08/31/2012	11.	lb/d
MO AVG	6.	mg/L	09/30/2012	8.	lb/d
MO AVG	4.	mg/L	10/31/2012	7.	lb/d
MO AVG	4.	mg/L	11/30/2012	11.	lb/d
MO AVG	4.	mg/L	12/31/2012	14.	lb/d
MO AVG	4.	mg/L	01/31/2013	11.	lb/d
MO AVG	4.	mg/L	02/28/2013	9.	lb/d
MO AVG	9.	mg/L	03/31/2013	21.	lb/d
MO AVG	4.	mg/L	04/30/2013	10.	lb/d
MO AVG	5.	mg/L	05/31/2013	9.	lb/d
MO AVG	8.	mg/L	06/30/2013	16.	lb/d

MO AVG	6.	mg/L	07/31/2013	9.	lb/d
MO AVG	8.	mg/L	08/31/2013	13.	lb/d
MO AVG	11.	mg/L	09/30/2013	17.	lb/d
MO AVG	10.	mg/L	10/31/2013	15.	lb/d
MO AVG	5.	mg/L	11/30/2013	8.	lb/d
MO AVG	5.	mg/L	12/31/2013	8.	lb/d
MO AVG	4.	mg/L	01/31/2014	10.	lb/d
MO AVG	5.	mg/L	02/28/2014	10.	lb/d
MO AVG	5.	mg/L	03/31/2014	12.	lb/d
MO AVG	4.	mg/L	04/30/2014	9.	lb/d
MO AVG	4.	mg/L	05/31/2014	7.	lb/d
MO AVG	4.	mg/L	06/30/2014	7.	lb/d
MO AVG	6.	mg/L	07/31/2014	10.	lb/d
MO AVG	7.	mg/L	08/31/2014	10.	lb/d
MO AVG	5.	mg/L	09/30/2014	8.	lb/d
MO AVG	4.	mg/L	10/31/2014	8.	lb/d
MO AVG	4.	mg/L	11/30/2014	8.	lb/d
MO AVG	6.	mg/L	12/31/2014	12.	lb/d
MO AVG	6.	mg/L	01/31/2015	12.	lb/d
MO AVG	7.	mg/L	02/28/2015	16.	lb/d
MO AVG	6.	mg/L	03/31/2015	12.	lb/d
MO AVG	6.	mg/L	04/30/2015	12.	lb/d
MO AVG	9.	mg/L	05/31/2015	14.	lb/d
MO AVG	12.	mg/L	06/30/2015	20.	lb/d
MO AVG	8.	mg/L	07/31/2015	13.	lb/d
MO AVG	10.	mg/L	08/31/2015	17.	lb/d
MO AVG	7.	mg/L	09/30/2015	11.	lb/d
MO AVG	9.	mg/L	10/31/2015	13.	lb/d
MO AVG	8.	mg/L	11/30/2015	15.	lb/d
MO AVG	6.	mg/L	12/31/2015	20.	lb/d
MO AVG	5.	mg/L	01/31/2016	14.	lb/d
MO AVG	5.	mg/L	02/29/2016	11.	lb/d
MO AVG	6.	mg/L	03/31/2016	15.	lb/d
MO AVG	4.	mg/L	04/30/2016	7.	lb/d
MO AVG	6.	mg/L	05/31/2016	10.	lb/d
MO AVG	5.	mg/L	06/30/2016	7.	lb/d
MO AVG	4.	mg/L	07/31/2016	6.	lb/d
MO AVG	4.	mg/L	08/31/2016	5.	lb/d
MO AVG	6.	mg/L	09/30/2016	6.	lb/d
MO AVG	4.	mg/L	10/31/2016	10.	lb/d
MO AVG	3.	mg/L	11/30/2016	11.	lb/d
MO AVG	4.	mg/L	12/31/2016	9.	lb/d
MO AVG	4.	mg/L	01/31/2017	9.	lb/d
MO AVG	5.	mg/L	02/28/2017	11.	lb/d
MO AVG	4.	mg/L	03/31/2017	12.	lb/d
MO AVG	4.	mg/L	04/30/2017	10.	lb/d
MO AVG	5.	mg/L	05/31/2017	10.	lb/d

MO AVG	11.	mg/L	06/30/2017	18.	lb/d
MO AVG	8.	mg/L	07/31/2017	13.	lb/d
MO AVG	8.	mg/L	08/31/2017	11.	lb/d
MO AVG	6.	mg/L	09/30/2017	8.	lb/d
MO AVG	8.	mg/L	10/31/2017	12.	lb/d
MO AVG	15.	mg/L	11/30/2017	28.	lb/d
MO AVG	5.	mg/L	12/31/2017	12.	lb/d
MO AVG	5.	mg/L	01/31/2018	13.	lb/d
MO AVG	5.	mg/L	02/28/2018	12.	lb/d
MO AVG	5.	mg/L	03/31/2018	16.	lb/d
MO AVG	7.	mg/L	04/30/2018	17.	lb/d
MO AVG	12.	mg/L	05/31/2018	26.	lb/d
MO AVG	11.	mg/L	06/30/2018	17.	lb/d
MO AVG	6.	mg/L	07/31/2018	10.	lb/d
MO AVG	5.	mg/L	08/31/2018	7.	lb/d
MO AVG	7.	mg/L	09/30/2018	11.	lb/d
MO AVG	5.	mg/L	11/30/2018	12.	lb/d
MO AVG	5.	mg/L	12/31/2018	11.	lb/d
MO AVG	7.	mg/L	01/31/2019	13.	lb/d
MO AVG	5.	mg/L	02/28/2019	11.	lb/d
MO AVG	20.	mg/L	03/31/2019	35.	lb/d
MO AVG	10.	mg/L	04/30/2019	16.	lb/d
MO AVG	7.	mg/L	05/31/2019	10.	lb/d
Maximum	**20.**	**mg/L**		**35**	**lb/d**
Minimum	**3.**	**mg/L**		**5.**	**lb/d**
95th Percentile	**11.00**	**mg/L**		**20.55**	**lb/d**

Note: (*) denotes outlier not included in analysis.

WKLY AVG	10.	mg/L	12/31/2009	23.	lb/d
WKLY AVG	250.*	mg/L	01/31/2010	788*	lb/d
WKLY AVG	4.	mg/L	02/28/2010	9.	lb/d
WKLY AVG	10.	mg/L	03/31/2010	18.	lb/d
WKLY AVG	10.	mg/L	04/30/2010	18.	lb/d
WKLY AVG	6.	mg/L	05/31/2010	10.	lb/d
WKLY AVG	9.	mg/L	06/30/2010	26.	lb/d
WKLY AVG	5.	mg/L	07/31/2010	9.	lb/d
WKLY AVG	4.	mg/L	09/30/2010	62.	lb/d
WKLY AVG	14.	mg/L	10/31/2010	24.	lb/d
WKLY AVG	16.	mg/L	12/31/2010	34.	lb/d
WKLY AVG	9.	mg/L	01/31/2011	27.	lb/d
WKLY AVG	11.	mg/L	02/28/2011	26.	lb/d
WKLY AVG	9.	mg/L	03/31/2011	30.	lb/d
WKLY AVG	15.	mg/L	04/30/2011	32.	lb/d
WKLY AVG	6.	mg/L	05/31/2011	14.	lb/d
WKLY AVG	4.	mg/L	06/30/2011	8.	lb/d
WKLY AVG	4.	mg/L	07/31/2011	8.	lb/d
WKLY AVG	4.	mg/L	08/31/2011	7.	lb/d
WKLY AVG	17.	mg/L	09/30/2011	26.	lb/d

WKLY AVG	4.	mg/L	10/31/2011	7.	lb/d
WKLY AVG	4.	mg/L	11/30/2011	21.	lb/d
WKLY AVG	4.	mg/L	12/31/2011	7.	lb/d
WKLY AVG	4.	mg/L	01/31/2012	10.	lb/d
WKLY AVG	20.	mg/L	02/29/2012	45.	lb/d
WKLY AVG	4.	mg/L	03/31/2012	13.	lb/d
WKLY AVG	10.	mg/L	04/30/2012	19.	lb/d
WKLY AVG	6.	mg/L	05/31/2012	13.	lb/d
WKLY AVG	5.	mg/L	06/30/2012	11.	lb/d
WKLY AVG	23.	mg/L	07/31/2012	45.	lb/d
WKLY AVG	13.	mg/L	08/31/2012	20.	lb/d
WKLY AVG	14.	mg/L	09/30/2012	21.	lb/d
WKLY AVG	6.	mg/L	10/31/2012	9.	lb/d
WKLY AVG	7.	mg/L	11/30/2012	23.	lb/d
WKLY AVG	5.	mg/L	12/31/2012	33.	lb/d
WKLY AVG	6.	mg/L	01/31/2013	15.	lb/d
WKLY AVG	4.	mg/L	02/28/2013	14.	lb/d
WKLY AVG	23.	mg/L	03/31/2013		
WKLY AVG	6.	mg/L	04/30/2013	13.	lb/d
WKLY AVG	7.	mg/L	05/31/2013	14.	lb/d
WKLY AVG	14.	mg/L	06/30/2013		
WKLY AVG	8.	mg/L	07/31/2013	16.	lb/d
WKLY AVG	19.	mg/L	08/31/2013	29.	lb/d
WKLY AVG	15.	mg/L	09/30/2013	23.	lb/d
WKLY AVG	20.	mg/L	10/31/2013	32.	lb/d
WKLY AVG	6.	mg/L	11/30/2013	10.	lb/d
WKLY AVG	7.	mg/L	12/31/2013	13.	lb/d
WKLY AVG	6.	mg/L	01/31/2014	20.	lb/d
WKLY AVG	9.	mg/L	02/28/2014	20.	lb/d
WKLY AVG	9.	mg/L	03/31/2014	17.	lb/d
WKLY AVG	6.	mg/L	04/30/2014	10.	lb/d
WKLY AVG	4.	mg/L	05/31/2014	8.	lb/d
WKLY AVG	5.	mg/L	06/30/2014	8.	lb/d
WKLY AVG	11.	mg/L	07/31/2014	19.	lb/d
WKLY AVG	19.	mg/L	08/31/2014	27.	lb/d
WKLY AVG	8.	mg/L	09/30/2014	14.	lb/d
WKLY AVG	7.	mg/L	10/31/2014	15.	lb/d
WKLY AVG	4.	mg/L	11/30/2014	11.	lb/d
WKLY AVG	12.	mg/L	12/31/2014	26.	lb/d
WKLY AVG	11.	mg/L	01/31/2015	21.	lb/d
WKLY AVG	9.	mg/L	02/28/2015	20.	lb/d
WKLY AVG	7.	mg/L	03/31/2015	16.	lb/d
WKLY AVG	11.	mg/L	04/30/2015	20.	lb/d
WKLY AVG	20.	mg/L	05/31/2015	34.	lb/d
WKLY AVG	20.	mg/L	06/30/2015	34.	lb/d
WKLY AVG	11.	mg/L	07/31/2015	16.	lb/d
WKLY AVG	14.	mg/L	08/31/2015	23.	lb/d

WKLY AVG	13.	mg/L	09/30/2015	21.	lb/d
WKLY AVG	16.	mg/L	10/31/2015	25.	lb/d
WKLY AVG	16.	mg/L	11/30/2015	28.	lb/d
WKLY AVG	17.	mg/L	12/31/2015	71.	lb/d
WKLY AVG	8.	mg/L	01/31/2016	21.	lb/d
WKLY AVG	9.	mg/L	02/29/2016	24.	lb/d
WKLY AVG	13.	mg/L	03/31/2016	29.	lb/d
WKLY AVG	6.	mg/L	04/30/2016	9.	lb/d
WKLY AVG	11.	mg/L	05/31/2016	18.	lb/d
WKLY AVG	6.	mg/L	06/30/2016	11.	lb/d
WKLY AVG	4.	mg/L	07/31/2016	7.	lb/d
WKLY AVG	4.	mg/L	08/31/2016	6.	lb/d
WKLY AVG	17.	mg/L	09/30/2016	8.	lb/d
WKLY AVG	6.	mg/L	10/31/2016	16.	lb/d
WKLY AVG	6.	mg/L	11/30/2016	36.	lb/d
WKLY AVG	4.	mg/L	12/31/2016	12.	lb/d
WKLY AVG	4.	mg/L	01/31/2017	11.	lb/d
WKLY AVG	9.	mg/L	02/28/2017	29.	lb/d
WKLY AVG	4.	mg/L	03/31/2017	14.	lb/d
WKLY AVG	6.	mg/L	04/30/2017	11.	lb/d
WKLY AVG	7.	mg/L	05/31/2017	15.	lb/d
WKLY AVG	24.	mg/L	06/30/2017	32.	lb/d
WKLY AVG	12.	mg/L	07/31/2017	21.	lb/d
WKLY AVG	18.	mg/L	08/31/2017	26.	lb/d
WKLY AVG	8.	mg/L	09/30/2017	12.	lb/d
WKLY AVG	11.	mg/L	10/31/2017	16.	lb/d
WKLY AVG	26.	mg/L	11/30/2017	52.	lb/d
WKLY AVG	6.	mg/L	12/31/2017	23.	lb/d
WKLY AVG	7.	mg/L	01/31/2018	24.	lb/d
WKLY AVG	6.	mg/L	02/28/2018	17.	lb/d
WKLY AVG	24.	mg/L	03/31/2018	38.	lb/d
WKLY AVG	10.	mg/L	04/30/2018	28.	lb/d
WKLY AVG	26.	mg/L	05/31/2018	64.	lb/d
WKLY AVG	22.	mg/L	06/30/2018	34.	lb/d
WKLY AVG	10.	mg/L	07/31/2018	17.	lb/d
WKLY AVG	7.	mg/L	08/31/2018	10.	lb/d
WKLY AVG	11.	mg/L	09/30/2018	21.	lb/d
WKLY AVG	8.	mg/L	11/30/2018	15.	lb/d
WKLY AVG	8.	mg/L	12/31/2018	14.	lb/d
WKLY AVG	13.	mg/L	01/31/2019	26.	lb/d
WKLY AVG	8.	mg/L	02/28/2019	16.	lb/d
WKLY AVG	100.	mg/L	03/31/2019	162	lb/d
WKLY AVG	21.	mg/L	04/30/2019	34.	lb/d
WKLY AVG	10.	mg/L	05/31/2019	14.	lb/d
Maximum	**100**	**mg/L**		**162**	**lb/d**
Minimum	**4.**	**mg/L**		**6.**	**lb/d**
95th Percentile	**23.00**	**mg/L**		**45**	**lb/d**

TSS

MO AVG	4.	mg/L	02/28/2010	7.	lb/d
MO AVG	9.	mg/L	03/31/2010	18.	lb/d
MO AVG	9.	mg/L	04/30/2010	18.	lb/d
MO AVG	6.	mg/L	05/31/2010	10.	lb/d
MO AVG	5.	mg/L	09/30/2010	9.	lb/d
MO AVG	12.	mg/L	10/31/2010	20.	lb/d
MO AVG	19.	mg/L	12/31/2010	45.	lb/d
MO AVG	11.	mg/L	01/31/2011	28.	lb/d
MO AVG	8.	mg/L	02/28/2011	19.	lb/d
MO AVG	37.	mg/L	03/31/2011	23.	lb/d
MO AVG	17.	mg/L	04/30/2011	40.	lb/d
MO AVG	6.	mg/L	05/31/2011	13.	lb/d
MO AVG	4.	mg/L	06/30/2011	8.	lb/d
MO AVG	6.	mg/L	07/31/2011	8.	lb/d
MO AVG	7.	mg/L	08/31/2011	11.	lb/d
MO AVG	6.	mg/L	09/30/2011	9.	lb/d
MO AVG	3.	mg/L	10/31/2011	6.	lb/d
MO AVG	6.	mg/L	11/30/2011	18.	lb/d
MO AVG	3.	mg/L	12/31/2011	5.	lb/d
MO AVG	5.	mg/L	01/31/2012	10.	lb/d
MO AVG	6.	mg/L	02/29/2012	13.	lb/d
MO AVG	7.	mg/L	03/31/2012	17.	lb/d
MO AVG	5.	mg/L	04/30/2012	12.	lb/d
MO AVG	7.	mg/L	05/31/2012	16.	lb/d
MO AVG	9.	mg/L	06/30/2012	21.	lb/d
MO AVG	10.	mg/L	07/31/2012	18.	lb/d
MO AVG	8.	mg/L	08/31/2012	11.	lb/d
MO AVG	6.	mg/L	09/30/2012	8.	lb/d
MO AVG	4.	mg/L	10/31/2012	6.	lb/d
MO AVG	5.	mg/L	11/30/2012	12.	lb/d
MO AVG	8.	mg/L	12/31/2012	29.	lb/d
MO AVG	5.	mg/L	01/31/2013	14.	lb/d
MO AVG	4.	mg/L	02/28/2013	8.	lb/d
MO AVG	8.	mg/L	03/31/2013	18.	lb/d
MO AVG	6.	mg/L	04/30/2013	13.	lb/d
MO AVG	5.	mg/L	05/31/2013	10.	lb/d
MO AVG	8.	mg/L	06/30/2013	17.	lb/d
MO AVG	10.	mg/L	07/31/2013	17.	lb/d
MO AVG	23.	mg/L	08/31/2013	38.	lb/d
MO AVG	29.	mg/L	09/30/2013	48.	lb/d
MO AVG	22.	mg/L	10/31/2013	33.	lb/d
MO AVG	4.	mg/L	11/30/2013	6.	lb/d
MO AVG	7.	mg/L	12/31/2013	12.	lb/d
MO AVG	3.	mg/L	01/31/2014	6.	lb/d
MO AVG	5.	mg/L	02/28/2014	10.	lb/d
MO AVG	3.	mg/L	03/31/2014	8.	lb/d

MO AVG	3.	mg/L	04/30/2014	7.	lb/d
MO AVG	2.	mg/L	05/31/2014	3.	lb/d
MO AVG	2.	mg/L	06/30/2014	3.	lb/d
MO AVG	5.	mg/L	07/31/2014	7.	lb/d
MO AVG	3.	mg/L	08/31/2014	5.	lb/d
MO AVG	2.	mg/L	09/30/2014	3.	lb/d
MO AVG	2.	mg/L	10/31/2014	3.	lb/d
MO AVG	4.	mg/L	11/30/2014	8.	lb/d
MO AVG	2.	mg/L	12/31/2014	4.	lb/d
MO AVG	11.	mg/L	01/31/2015	22.	lb/d
MO AVG	17.	mg/L	02/28/2015	39.	lb/d
MO AVG	7.	mg/L	03/31/2015	13.	lb/d
MO AVG	11.	mg/L	04/30/2015	21.	lb/d
MO AVG	17.	mg/L	05/31/2015	29.	lb/d
MO AVG	30.	mg/L	06/30/2015	51.	lb/d
MO AVG	18.	mg/L	07/31/2015	30.	lb/d
MO AVG	20.	mg/L	08/31/2015	36.	lb/d
MO AVG	11.	mg/L	09/30/2015	17.	lb/d
MO AVG	12.	mg/L	10/31/2015	18.	lb/d
MO AVG	14.	mg/L	11/30/2015	27.	lb/d
MO AVG	9.	mg/L	12/31/2015	29.	lb/d
MO AVG	5.	mg/L	01/31/2016	15.	lb/d
MO AVG	3.	mg/L	02/29/2016	6.	lb/d
MO AVG	6.	mg/L	03/31/2016	14.	lb/d
MO AVG	4.	mg/L	04/30/2016	7.	lb/d
MO AVG	12.	mg/L	05/31/2016	19.	lb/d
MO AVG	3.	mg/L	06/30/2016	5.	lb/d
MO AVG	2.	mg/L	07/31/2016	4.	lb/d
MO AVG	4.	mg/L	08/31/2016	6.	lb/d
MO AVG	6.	mg/L	09/30/2016	5.	lb/d
MO AVG	6.	mg/L	10/31/2016	12.	lb/d
MO AVG	3.	mg/L	11/30/2016	9.	lb/d
MO AVG	10.	mg/L	12/31/2016	13.	lb/d
MO AVG	6.	mg/L	01/31/2017	13.	lb/d
MO AVG	8.	mg/L	02/28/2017	21.	lb/d
MO AVG	4.	mg/L	03/31/2017	13.	lb/d
MO AVG	7.	mg/L	04/30/2017	15.	lb/d
MO AVG	6.	mg/L	05/31/2017	14.	lb/d
MO AVG	27.	mg/L	06/30/2017	49.	lb/d
MO AVG	21.	mg/L	07/31/2017	30.	lb/d
MO AVG	10.	mg/L	08/31/2017	14.	lb/d
MO AVG	12.	mg/L	09/30/2017	17.	lb/d
MO AVG	24.	mg/L	10/31/2017	36.	lb/d
MO AVG	21.	mg/L	11/30/2017	37.	lb/d
MO AVG	12.	mg/L	12/31/2017	26.	lb/d
MO AVG	13.	mg/L	01/31/2018	33.	lb/d
MO AVG	11.	mg/L	02/28/2018	28.	lb/d

MO AVG	8.	mg/L	03/31/2018	16.	lb/d
MO AVG	12.	mg/L	04/30/2018	31.	lb/d
MO AVG	21.	mg/L	05/31/2018	92.	lb/d
MO AVG	15.	mg/L	06/30/2018	22.	lb/d
MO AVG	8.	mg/L	07/31/2018	14.	lb/d
MO AVG	8.	mg/L	08/31/2018	12.	lb/d
MO AVG	11.	mg/L	09/30/2018	15.	lb/d
MO AVG	11.	mg/L	11/30/2018	24.	lb/d
MO AVG	6.	mg/L	12/31/2018	13.	lb/d
MO AVG	7.	mg/L	01/31/2019	14.	lb/d
MO AVG	7.	mg/L	02/28/2019	15.	lb/d
MO AVG	15.	mg/L	03/31/2019	27.	lb/d
MO AVG	6.	mg/L	04/30/2019	13.	lb/d
MO AVG	4.	mg/L	05/31/2019	6.	lb/d
Max	**37.**	**mg/L**		**92.**	**lb/d**
Min	**2.**	**mg/L**		**3.**	**lb/d**
95th Percentile	**22.7**	**mg/L**		**39.7**	**lb/d**

pH

DAILY MX	7.55	SU	12/31/2009		DAILY MN	7.19	SU
DAILY MX	7.58	SU	01/31/2010		DAILY MN	7.33	SU
DAILY MX	12.7	SU	02/28/2010		DAILY MN	10.5	SU
DAILY MX	13.5	SU	03/31/2010		DAILY MN	11.6	SU
DAILY MX	7.69	SU	04/30/2010		DAILY MN	7.47	SU
DAILY MX	7.7	SU	05/31/2010		DAILY MN	7.37	SU
DAILY MX	6.5	SU	06/30/2010		DAILY MN	5.04	SU
DAILY MX	6.8	SU	07/31/2010		DAILY MN	4.52	SU
DAILY MX	7.84	SU	09/30/2010		DAILY MN	7.19	SU
DAILY MX	7.91	SU	10/31/2010		DAILY MN	6.9	SU
DAILY MX	7.45	SU	12/31/2010		DAILY MN	6.75	SU
DAILY MX	7.97	SU	01/31/2011		DAILY MN	7.17	SU
DAILY MX	7.83	SU	02/28/2011		DAILY MN	6.85	SU
DAILY MX	8.	SU	03/31/2011		DAILY MN	7.25	SU
DAILY MX	8.2	SU	04/30/2011		DAILY MN	7.01	SU
DAILY MX	7.91	SU	05/31/2011		DAILY MN	4.46	SU
DAILY MX	8.24	SU	06/30/2011		DAILY MN	7.17	SU
DAILY MX	7.88	SU	07/31/2011		DAILY MN	6.86	SU
DAILY MX	7.31	SU	08/31/2011		DAILY MN	6.67	SU
DAILY MX	7.	SU	09/30/2011		DAILY MN	6.77	SU
DAILY MX	7.45	SU	10/31/2011		DAILY MN	6.42	SU
DAILY MX	8.01	SU	11/30/2011		DAILY MN	6.46	SU
DAILY MX	6.8	SU	12/31/2011		DAILY MN	6.26	SU
DAILY MX	6.86	SU	01/31/2012		DAILY MN	5.96	SU
DAILY MX	6.89	SU	02/29/2012		DAILY MN	6.34	SU
DAILY MX	7.09	SU	03/31/2012		DAILY MN	6.28	SU
DAILY MX	6.88	SU	04/30/2012		DAILY MN	6.46	SU
DAILY MX	6.72	SU	05/31/2012		DAILY MN	5.86	SU

DAILY MX	6.85	SU	06/30/2012		DAILY MN	5.65	SU
DAILY MX	7.3	SU	07/31/2012		DAILY MN	6.87	SU
DAILY MX	7.25	SU	08/31/2012		DAILY MN	6.38	SU
DAILY MX	7.18	SU	09/30/2012		DAILY MN	6.49	SU
DAILY MX	7.63	SU	10/31/2012		DAILY MN	6.82	SU
DAILY MX	8.	SU	11/30/2012		DAILY MN	6.48	SU
DAILY MX	7.21	SU	12/31/2012		DAILY MN	6.92	SU
DAILY MX	7.31	SU	01/31/2013		DAILY MN	6.58	SU
DAILY MX	7.44	SU	02/28/2013		DAILY MN	6.72	SU
DAILY MX	7.47	SU	03/31/2013		DAILY MN	6.48	SU
DAILY MX	7.6	SU	04/30/2013		DAILY MN	7.16	SU
DAILY MX	7.7	SU	05/31/2013		DAILY MN	7.2	SU
DAILY MX	7.74	SU	06/30/2013		DAILY MN	7.42	SU
DAILY MX	7.88	SU	07/31/2013		DAILY MN	6.4	SU
DAILY MX	7.24	SU	08/31/2013		DAILY MN	5.83	SU
DAILY MX	6.77	SU	09/30/2013		DAILY MN	5.64	SU
DAILY MX	7.61	SU	10/31/2013		DAILY MN	5.81	SU
DAILY MX	7.51	SU	11/30/2013		DAILY MN	7.33	SU
DAILY MX	8.02	SU	12/31/2013		DAILY MN	7.16	SU
DAILY MX	7.57	SU	01/31/2014		DAILY MN	7.14	SU
DAILY MX	8.18	SU	02/28/2014		DAILY MN	7.35	SU
DAILY MX	7.77	SU	03/31/2014		DAILY MN	7.37	SU
DAILY MX	7.93	SU	04/30/2014		DAILY MN	7.51	SU
DAILY MX	8.05	SU	05/31/2014		DAILY MN	7.31	SU
DAILY MX	7.62	SU	06/30/2014		DAILY MN	7.22	SU
DAILY MX	7.98	SU	07/31/2014		DAILY MN	7.15	SU
DAILY MX	7.84	SU	08/31/2014		DAILY MN	7.39	SU
DAILY MX	7.89	SU	09/30/2014		DAILY MN	7.14	SU
DAILY MX	7.91	SU	10/31/2014		DAILY MN	7.51	SU
DAILY MX	7.87	SU	11/30/2014		DAILY MN	7.4	SU
DAILY MX	7.89	SU	12/31/2014		DAILY MN	6.21	SU
DAILY MX	7.66	SU	01/31/2015		DAILY MN	6.25	SU
DAILY MX	7.54	SU	02/28/2015		DAILY MN	5.96	SU
DAILY MX	7.98	SU	03/31/2015		DAILY MN	6.71	SU
DAILY MX	8.17	SU	04/30/2015		DAILY MN	4.7	SU
DAILY MX	8.13	SU	05/31/2015		DAILY MN	4.45	SU
DAILY MX	7.26	SU	06/30/2015		DAILY MN	4.11	SU
DAILY MX	7.41	SU	07/31/2015		DAILY MN	5.28	SU
DAILY MX	6.	SU	08/31/2015		DAILY MN	4.93	SU
DAILY MX	6.49	SU	09/30/2015		DAILY MN	4.02	SU
DAILY MX	7.07	SU	10/31/2015		DAILY MN	6.16	SU
DAILY MX	7.51	SU	11/30/2015		DAILY MN	6.56	SU
DAILY MX	7.5	SU	12/31/2015		DAILY MN	6.6	SU
DAILY MX	7.55	SU	01/31/2016		DAILY MN	4.02	SU
DAILY MX	7.89	SU	02/29/2016		DAILY MN	5.57	SU
DAILY MX	7.3	SU	03/31/2016		DAILY MN	5.62	SU
DAILY MX	7.49	SU	04/30/2016		DAILY MN	6.33	SU
DAILY MX	7.66	SU	05/31/2016		DAILY MN	3.32	SU

DAILY MX	7.73	SU	06/30/2016		DAILY MN	6.98	SU
DAILY MX	7.64	SU	07/31/2016		DAILY MN	7.22	SU
DAILY MX	7.78	SU	08/31/2016		DAILY MN	6.17	SU
DAILY MX	7.2	SU	09/30/2016		DAILY MN	4.83	SU
DAILY MX	6.52	SU	10/31/2016		DAILY MN	4.93	SU
DAILY MX	7.41	SU	11/30/2016		DAILY MN	5.31	SU
DAILY MX	7.5	SU	01/31/2017		DAILY MN	5.91	SU
DAILY MX	7.	SU	03/31/2017		DAILY MN	6.03	SU
DAILY MX	7.71	SU	04/30/2017		DAILY MN	7.11	SU
DAILY MX	6.36	SU	05/31/2017		DAILY MN	4.74	SU
DAILY MX	3.8	SU	06/30/2017		DAILY MN	6.86	SU
DAILY MX	6.98	SU	07/31/2017		DAILY MN	5.81	SU
DAILY MX	7.38	SU	08/31/2017		DAILY MN	5.21	SU
DAILY MX	7.57	SU	09/30/2017		DAILY MN	4.09	SU
DAILY MX	7.19	SU	10/31/2017		DAILY MN	4.43	SU
DAILY MX	6.87	SU	11/30/2017		DAILY MN	4.94	SU
DAILY MX	6.72	SU	12/31/2017		DAILY MN	6.4	SU
DAILY MX	6.78	SU	01/31/2018		DAILY MN	6.	SU
DAILY MX	7.34	SU	02/28/2018		DAILY MN	5.64	SU
DAILY MX	7.19	SU	03/31/2018		DAILY MN	5.69	SU
DAILY MX	6.94	SU	04/30/2018		DAILY MN	5.16	SU
DAILY MX	7.06	SU	05/31/2018		DAILY MN	5.44	SU
DAILY MX	5.96	SU	06/30/2018		DAILY MN	4.26	SU
DAILY MX	6.79	SU	08/31/2018		DAILY MN	4.69	SU
DAILY MX	6.56	SU	09/30/2018		DAILY MN	4.65	SU
DAILY MX	7.25	SU	01/31/2019		DAILY MN	6.46	SU
DAILY MX	7.03	SU	04/30/2019		DAILY MN	6.6	SU
DAILY MX	7.24	SU	05/31/2019		DAILY MN	6.22	SU
Max	**13.5**	**SU**			**Min**	**3.32**	**SU**
95th Percentile	**8.164**	**SU**			**5th Percentile**	**4.29**	**SU**

Fecal Coliform

MO GEO	13.1	#/100mL	09/30/2010		WKLY GEO	18.4	#/100mL
MO GEO	5.1	#/100mL	10/31/2010		WKLY GEO	35.	#/100mL
MO GEO	10.3	#/100mL	12/31/2010		WKLY GEO	29.6	#/100mL
MO GEO	1.9	#/100mL	01/31/2011		WKLY GEO	2.9	#/100mL
MO GEO	1.5	#/100mL	02/28/2011		WKLY GEO	2.8	#/100mL
MO GEO	3.7	#/100mL	03/31/2011		WKLY GEO	7.	#/100mL
MO GEO	1.7	#/100mL	04/30/2011		WKLY GEO	1.7	#/100mL
MO GEO	2.17	#/100mL	05/31/2011		WKLY GEO	3.	#/100mL
MO GEO	2.	#/100mL	06/30/2011		WKLY GEO	2.	#/100mL
MO GEO	1.1	#/100mL	07/31/2011		WKLY GEO	1.1	#/100mL
MO GEO	2.	#/100mL	08/31/2011		WKLY GEO	2.	#/100mL
MO GEO	3.	#/100mL	10/31/2011		WKLY GEO	3.	#/100mL
MO GEO	22.	#/100mL	11/30/2011		WKLY GEO	11.	#/100mL
MO GEO	3.2	#/100mL	02/29/2012		WKLY GEO	7.	#/100mL

MO GEO	2.	#/100mL	03/31/2012		WKLY GEO	2.	#/100mL
MO GEO	9.8	#/100mL	04/30/2012		WKLY GEO	11.2	#/100mL
MO GEO	3.12	#/100mL	05/31/2012		WKLY GEO	24.	#/100mL
MO GEO	1.3	#/100mL	06/30/2012		WKLY GEO	1.3	#/100mL
MO GEO	1.9	#/100mL	07/31/2012		WKLY GEO	9.	#/100mL
MO GEO	1.1	#/100mL	08/31/2012		WKLY GEO	1.1	#/100mL
MO GEO	1.1	#/100mL	10/31/2012		WKLY GEO	1.1	#/100mL
MO GEO	1.4	#/100mL	12/31/2012		WKLY GEO	2.4	#/100mL
MO GEO	1.1	#/100mL	01/31/2013		WKLY GEO	1.1	#/100mL
MO GEO	1.	#/100mL	02/28/2013		WKLY GEO	1.	#/100mL
MO GEO	1.2	#/100mL	03/31/2013		WKLY GEO	8.9	#/100mL
MO GEO	1.1	#/100mL	04/30/2013		WKLY GEO	1.1	#/100mL
MO GEO	3.49	#/100mL	05/31/2013		WKLY GEO	3.49	#/100mL
MO GEO	1.7	#/100mL	06/30/2013		WKLY GEO	1.7	#/100mL
MO GEO	1.2	#/100mL	07/31/2013		WKLY GEO	1.2	#/100mL
MO GEO	3.22	#/100mL	08/31/2013		WKLY GEO	3.22	#/100mL
MO GEO	1.2	#/100mL	09/30/2013		WKLY GEO	1.2	#/100mL
MO GEO	1.4	#/100mL	10/31/2013		WKLY GEO	1.4	#/100mL
MO GEO	1.	#/100mL	11/30/2013		WKLY GEO	1.	#/100mL
MO GEO	1.	#/100mL	12/31/2013		WKLY GEO	1.	#/100mL
MO GEO	1.3	#/100mL	02/28/2014		WKLY GEO	5.	#/100mL
MO GEO	1.	#/100mL	03/31/2014		WKLY GEO	1.	#/100mL
MO GEO	1.2	#/100mL	05/31/2014		WKLY GEO	1.2	#/100mL
MO GEO	1.4	#/100mL	07/31/2014		WKLY GEO	2.9	#/100mL
MO GEO	1.5	#/100mL	08/31/2014		WKLY GEO	1.5	#/100mL
MO GEO	1.2	#/100mL	09/30/2014		WKLY GEO	5.	#/100mL
MO GEO	1.	#/100mL	10/31/2014		WKLY GEO	1.2	#/100mL
MO GEO	1.4	#/100mL	12/31/2014		WKLY GEO	1.4	#/100mL
MO GEO	1.2	#/100mL	01/31/2015		WKLY GEO	1.7	#/100mL
MO GEO	3.3	#/100mL	02/28/2015		WKLY GEO	3.3	#/100mL
MO GEO	1.5	#/100mL	03/31/2015		WKLY GEO	2.4	#/100mL
MO GEO	1.9	#/100mL	04/30/2015		WKLY GEO	4.3	#/100mL
MO GEO	4.1	#/100mL	05/31/2015		WKLY GEO	4.1	#/100mL
MO GEO	1.6	#/100mL	06/30/2015		WKLY GEO	2.5	#/100mL
MO GEO	5.3	#/100mL	07/31/2015		WKLY GEO	18.8	#/100mL
MO GEO	6.1	#/100mL	08/31/2015		WKLY GEO	14.1	#/100mL
MO GEO	3.5	#/100mL	09/30/2015		WKLY GEO	11.	#/100mL
MO GEO	1.1	#/100mL	10/31/2015		WKLY GEO	1.4	#/100mL
MO GEO	1.3	#/100mL	11/30/2015		WKLY GEO	3.	#/100mL
MO GEO	1.1	#/100mL	12/31/2015		WKLY GEO	1.4	#/100mL
MO GEO	1.	#/100mL	02/29/2016		WKLY GEO	1.	#/100mL
MO GEO	1.3	#/100mL	03/31/2016		WKLY GEO	4.8	#/100mL
MO GEO	1.3	#/100mL	04/30/2016		WKLY GEO	1.8	#/100mL
MO GEO	3.6	#/100mL	05/31/2016		WKLY GEO	14.2	#/100mL
MO GEO	2.	#/100mL	06/30/2016		WKLY GEO	2.	#/100mL
MO GEO	1.1	#/100mL	07/31/2016		WKLY GEO	1.5	#/100mL
MO GEO	1.9	#/100mL	08/31/2016		WKLY GEO	4.	#/100mL
MO GEO	1.3	#/100mL	09/30/2016		WKLY GEO	2.6	#/100mL

MO GEO	2.2	#/100mL	10/31/2016		WKLY GEO	6.7	#/100mL
MO GEO	1.2	#/100mL	11/30/2016		WKLY GEO	1.4	#/100mL
MO GEO	1.1	#/100mL	12/31/2016		WKLY GEO	1.2	#/100mL
MO GEO	1.1	#/100mL	02/28/2017		WKLY GEO	1.1	#/100mL
MO GEO	1.1	#/100mL	04/30/2017		WKLY GEO	1.2	#/100mL
MO GEO	2.4	#/100mL	05/31/2017		WKLY GEO	6.9	#/100mL
MO GEO	2.8	#/100mL	06/30/2017		WKLY GEO	17.7	#/100mL
MO GEO	10.1	#/100mL	07/31/2017		WKLY GEO	29.5	#/100mL
MO GEO	4.7	#/100mL	08/31/2017		WKLY GEO	12.	#/100mL
MO GEO	3.29	#/100mL	09/30/2017		WKLY GEO	20.8	#/100mL
MO GEO	5.2	#/100mL	10/31/2017		WKLY GEO	10.6	#/100mL
MO GEO	6.7	#/100mL	11/30/2017		WKLY GEO	11.9	#/100mL
MO GEO	1.7	#/100mL	12/31/2017		WKLY GEO	25.6	#/100mL
MO GEO	20.7	#/100mL	01/31/2018		WKLY GEO	37.4	#/100mL
MO GEO	5.2	#/100mL	02/28/2018		WKLY GEO	47.3	#/100mL
MO GEO	3.5	#/100mL	03/31/2018		WKLY GEO	6.4	#/100mL
MO GEO	1.1	#/100mL	04/30/2018		WKLY GEO	1.2	#/100mL
MO GEO	1.5	#/100mL	05/31/2018		WKLY GEO	3.4	#/100mL
MO GEO	2.14	#/100mL	06/30/2018		WKLY GEO	4.1	#/100mL
MO GEO	4.6	#/100mL	07/31/2018		WKLY GEO	36.	#/100mL
MO GEO	2.1	#/100mL	08/31/2018		WKLY GEO	5.1	#/100mL
MO GEO	1.9	#/100mL	09/30/2018		WKLY GEO	2.7	#/100mL
MO GEO	1.2	#/100mL	11/30/2018		WKLY GEO	2.3	#/100mL
MO GEO	1.3	#/100mL	01/31/2019		WKLY GEO	3.2	#/100mL
MO GEO	1.6	#/100mL	03/31/2019		WKLY GEO	5.8	#/100mL
MO GEO	1.2	#/100mL	04/30/2019		WKLY GEO	2.	#/100mL
MO GEO	1.6	#/100mL	05/31/2019		WKLY GEO	3.1	#/100mL
Max	**22.**	**#/100mL**			**Max**	**47.3**	**#/100mL**
Min	**1.**	**#/100mL**			**Min**	**2.**	**#/100mL**
95th Percentile	**10.0**	**#/100mL**			**95th Percentile**	**29.6**	**#/100mL**

Alkalinity

DAILY MX	92.	mg/L as $CaCO_3$	10/31/2010
DAILY MX	75.	mg/L as $CaCO_3$	09/30/2011
DAILY MX	54.	mg/L as $CaCO_3$	01/31/2019
Max	**92.**	**mg/L** as $CaCO_3$	
Min	**54.**	**mg/L** as $CaCO_3$	

Temperature

DAILY MX	20.7	deg C	11/30/2011	DAILY MX	19.2	deg C	10/31/2015
DAILY MX	13.	deg C	12/31/2011	DAILY MX	16.5	deg C	11/30/2015
DAILY MX	12.7	deg C	01/31/2012	DAILY MX	14.	deg C	12/31/2015
DAILY MX	12.4	deg C	02/29/2012	DAILY MX	12.7	deg C	01/31/2016
DAILY MX	12.4	deg C	03/31/2012	DAILY MX	13.9	deg C	02/29/2016
DAILY MX	14.5	deg C	04/30/2012	DAILY MX	14.1	deg C	03/31/2016
DAILY MX	18.9	deg C	05/31/2012	DAILY MX	15.7	deg C	04/30/2016
DAILY MX	18.7	deg C	06/30/2012	DAILY MX	17.8	deg C	05/31/2016

DAILY MX	21.4	deg C	07/31/2012	DAILY MX	19.6	deg C	06/30/2016
DAILY MX	20.5	deg C	08/31/2012	DAILY MX	21.1	deg C	07/31/2016
DAILY MX	19.7	deg C	09/30/2012	DAILY MX	21.2	deg C	08/31/2016
DAILY MX	18.	deg C	10/31/2012	DAILY MX	19.8	deg C	09/30/2016
DAILY MX	16.	deg C	11/30/2012	DAILY MX	17.9	deg C	10/31/2016
DAILY MX	14.2	deg C	12/31/2012	DAILY MX	16.9	deg C	11/30/2016
DAILY MX	11.7	deg C	01/31/2013	DAILY MX	14.2	deg C	12/31/2016
DAILY MX	10.1	deg C	02/28/2013	DAILY MX	12.2	deg C	01/31/2017
DAILY MX	13.7	deg C	03/31/2013	DAILY MX	13.1	deg C	02/28/2017
DAILY MX	14.	deg C	04/30/2013	DAILY MX	16.5	deg C	03/31/2017
DAILY MX	16.1	deg C	05/31/2013	DAILY MX	14.9	deg C	04/30/2017
DAILY MX	19.4	deg C	06/30/2013	DAILY MX	17.7	deg C	05/31/2017
DAILY MX	22.2	deg C	07/31/2013	DAILY MX	20.4	deg C	06/30/2017
DAILY MX	21.9	deg C	08/31/2013	DAILY MX	18.	deg C	07/31/2017
DAILY MX	20.7	deg C	09/30/2013	DAILY MX	19.8	deg C	08/31/2017
DAILY MX	17.7	deg C	10/31/2013	DAILY MX	21.1	deg C	09/30/2017
DAILY MX	15.9	deg C	11/30/2013	DAILY MX	19.	deg C	10/31/2017
DAILY MX	13.8	deg C	12/31/2013	DAILY MX	16.1	deg C	11/30/2017
DAILY MX	12.3	deg C	01/31/2014	DAILY MX	13.5	deg C	12/31/2017
DAILY MX	11.3	deg C	02/28/2014	DAILY MX	12.9	deg C	01/31/2018
DAILY MX	12.7	deg C	03/31/2014	DAILY MX	12.7	deg C	02/28/2018
DAILY MX	14.1	deg C	04/30/2014	DAILY MX	13.4	deg C	03/31/2018
DAILY MX	17.1	deg C	05/31/2014	DAILY MX	15.4	deg C	04/30/2018
DAILY MX	19.6	deg C	06/30/2014	DAILY MX	19.1	deg C	05/31/2018
DAILY MX	20.9	deg C	07/31/2014	DAILY MX	20.6	deg C	06/30/2018
DAILY MX	21.4	deg C	08/31/2014	DAILY MX	21.9	deg C	07/31/2018
DAILY MX	20.5	deg C	09/30/2014	DAILY MX	23.1	deg C	08/31/2018
DAILY MX	20.3	deg C	10/31/2014	DAILY MX	20.5	deg C	09/30/2018
DAILY MX	16.7	deg C	11/30/2014	DAILY MX	16.7	deg C	11/30/2018
DAILY MX	14.3	deg C	12/31/2014	DAILY MX	15.5	deg C	12/31/2018
DAILY MX	13.5	deg C	01/31/2015	DAILY MX	13.21	deg C	01/31/2019
DAILY MX	14.2	deg C	02/28/2015	DAILY MX	8.5	deg C	02/28/2019
DAILY MX	14.7	deg C	03/31/2015	DAILY MX	14.3	deg C	03/31/2019
DAILY MX	16.2	deg C	04/30/2015	DAILY MX	15.2	deg C	04/30/2019
DAILY MX	19.5	deg C	05/31/2015	DAILY MX	17.7	deg C	05/31/2019
DAILY MX	21.6	deg C	06/30/2015	**Maximum**	**23.1**	**deg C**	
DAILY MX	22.2	deg C	07/31/2015	**Minimum**	**8.5**	**deg C**	
				95th percentile	**21.8**	**deg C**	

Ammonia

MO AVG	.12	mg/L as N	09/30/2010				
MO AVG	.1	mg/L as N	10/31/2010				
MO AVG	.16	mg/L as N	12/31/2010				
MO AVG	.077	mg/L as N	01/31/2011				
MO AVG	.1	mg/L as N	02/28/2011				
MO AVG	.076	mg/L as N	03/31/2011	MO AVG	.82	mg/L as N	06/30/2015

MO AVG	.26	mg/L as N	04/30/2011	MO AVG	4.1	mg/L as N	07/31/2015
MO AVG	.21	mg/L as N	05/31/2011	MO AVG	1.2	mg/L as N	08/31/2015
MO AVG	.055	mg/L as N	06/30/2011	MO AVG	.32	mg/L as N	09/30/2015
MO AVG	.31	mg/L as N	07/31/2011	MO AVG	2.1	mg/L as N	10/31/2015
MO AVG	.28	mg/L as N	08/31/2011	MO AVG	2.5	mg/L as N	11/30/2015
MO AVG	.096	mg/L as N	09/30/2011	MO AVG	.11	mg/L as N	12/31/2015
MO AVG	.067	mg/L as N	10/31/2011	MO AVG	.12	mg/L as N	01/31/2016
MO AVG	.063	mg/L as N	11/30/2011	MO AVG	.38	mg/L as N	02/29/2016
MO AVG	.061	mg/L as N	12/31/2011	MO AVG	.14	mg/L as N	03/31/2016
MO AVG	.046	mg/L as N	01/31/2012	MO AVG	.14	mg/L as N	04/30/2016
MO AVG	.01	mg/L as N	02/29/2012	MO AVG	.51	mg/L as N	05/31/2016
MO AVG	.1	mg/L as N	03/31/2012	MO AVG	.1	mg/L as N	06/30/2016
MO AVG	.094	mg/L as N	06/30/2012	MO AVG	.65	mg/L as N	07/31/2016
MO AVG	1.	mg/L as N	07/31/2012	MO AVG	.43	mg/L as N	08/31/2016
MO AVG	.3	mg/L as N	08/31/2012	MO AVG	1.5	mg/L as N	09/30/2016
MO AVG	.2	mg/L as N	09/30/2012	MO AVG	.88	mg/L as N	10/31/2016
MO AVG	.25	mg/L as N	10/31/2012	MO AVG	.32	mg/L as N	11/30/2016
MO AVG	.14	mg/L as N	11/30/2012	MO AVG	.1	mg/L as N	12/31/2016
MO AVG	.26	mg/L as N	12/31/2012	MO AVG	.001	mg/L as N	03/31/2017
MO AVG	.15	mg/L as N	01/31/2013	MO AVG	.0001	mg/L as N	04/30/2017
MO AVG	.073	mg/L as N	02/28/2013	MO AVG	.0001	mg/L as N	05/31/2017
MO AVG	11.	mg/L as N	03/31/2013	MO AVG	1.2	mg/L as N	06/30/2017
MO AVG	6.8	mg/L as N	04/30/2013	MO AVG	1.3	mg/L as N	07/31/2017
MO AVG	8.6	mg/L as N	05/31/2013	MO AVG	.56	mg/L as N	08/31/2017
MO AVG	8.5	mg/L as N	07/31/2013	MO AVG	12.	mg/L as N	09/30/2017
MO AVG	1.2	mg/L as N	08/31/2013	MO AVG	1.	mg/L as N	10/31/2017
MO AVG	2.	mg/L as N	09/30/2013	MO AVG	1.	mg/L as N	11/30/2017
MO AVG	11.	mg/L as N	10/31/2013	MO AVG	.12	mg/L as N	12/31/2017
MO AVG	1.8	mg/L as N	11/30/2013	MO AVG	.14	mg/L as N	01/31/2018
MO AVG	.18	mg/L as N	12/31/2013	MO AVG	.0001	mg/L as N	02/28/2018
MO AVG	.24	mg/L as N	01/31/2014	MO AVG	.17	mg/L as N	03/31/2018
MO AVG	1.5	mg/L as N	02/28/2014	MO AVG	2.8	mg/L as N	06/30/2018
MO AVG	.51	mg/L as N	03/31/2014	MO AVG	.0001	mg/L as N	09/30/2018
MO AVG	.59	mg/L as N	04/30/2014	MO AVG	4.1	mg/L as N	12/31/2018
MO AVG	.5	mg/L as N	05/31/2014	MO AVG	2.2	mg/L as N	01/31/2019
MO AVG	.21	mg/L as N	06/30/2014	MO AVG	.35	mg/L as N	04/30/2019
MO AVG	3.2	mg/L as N	07/31/2014	**Max**	**12.**	**mg/L** as N	
MO AVG	1.6	mg/L as N	08/31/2014	**Min**	**.0001**	**mg/L** as N	
MO AVG	.21	mg/L as N	09/30/2014	**95th percentile**	**7.735**	**mg/L** as N	
MO AVG	.3	mg/L as N	10/31/2014	**Count (N)**	**90**		
MO AVG	.36	mg/L as N	11/30/2014	**Standard Deviation**	**2.471**		
MO AVG	.056	mg/L as N	12/31/2014	**Mean**	**1.255**	**mg/L** as N	
MO AVG	.069	mg/L as N	01/31/2015	**CV**	**1.97**		
MO AVG	.12	mg/L as N	02/28/2015				
MO AVG	3.2	mg/L as N	03/31/2015				
MO AVG	.38	mg/L as N	04/30/2015				
MO AVG	.82	mg/L as N	05/31/2015				

B. Receiving Water Data

Dissolved Oxygen

From Ecology's monitoring station, PSS019, there are 32,634 data points for DO of the marine water taken throughout the depth of the water column from 1/25/1999 to 12/7/2017. The results of this data set show the following summary:

Maximum	15.3870	mg/L
Minimum	2.0385	mg/L
95th Percentile	9.9570	mg/L
Average	6.8775	mg/L

pH

From Ecology's monitoring station, PSS019, there are 6,368 data points for pH of the marine water taken throughout the depth of the water column from 10/19/2011 to 11/21/2016. The results of this data set show the following summary:

Maximum	8.7341	S.U.
Minimum	7.0320	S.U.
95th Percentile	8.2080	S.U.
Average	7.6235	S.U.

Temperature

From Ecology's monitoring station, PSS019, there are 33,143 data points for temperature of the marine water taken throughout the depth of the water column from 1/25/1999 to 12/7/2017. The results of this data set show the following summary:

Maximum	18.6166	Deg C
Minimum	4.8567	Deg C
90^{th} Percentile	11.9250	Deg C
95th Percentile	12.3298	Deg C
Average	10.098	Deg C

Fecal Coliform

From Ecology's monitoring station, SAR003, there are 144 data points for Fecal Coliform from 2/12/1990 to 11/2/2005. The results of this data set show the following summary:

Maximum	6	#/100mL
Minimum	0	#/100mL
95th Percentile	1	#/100mL
Average	1.06	#/100mL

Ammonia

From Ecology's monitoring station, Snodry35 - Everett Harbor, there are the following data points for ammonia in the marine water: The results of this data set are as follows:

Ammonia	8/16/1993	0.013	mg/L
Ammonia	8/16/1993	0.012	mg/L

Ammonia	8/17/1993	0.019	mg/L
Ammonia	8/17/1993	0.014	mg/L
Ammonia	8/27/1996	0.01	mg/L
Ammonia	8/27/1996	0.01	mg/L
Ammonia	8/28/1996	0.018	mg/L
Ammonia	8/28/1996	0.01	mg/L
	Maximum	**0.0190**	**mg/L**
	Minimum	**0.0100**	**mg/L**
	95th Percentile	**0.0187**	**mg/L**
	Average	**0.0133**	**mg/L**

Appendix C. Reasonable Potential and Dilution Factors Calculations

Part A of this appendix explains the process EPA used to determine if the discharge authorized in the draft permit has the reasonable potential to cause or contribute to a violation of Washington's federally approved WQS. Part B demonstrates how the dilution factors are calculated using Visual Plumes.

A. Reasonable Potential Analysis

EPA uses the process described in the *Technical Support Document for Water Quality-based Toxics Control* (EPA, 1991) to determine reasonable potential. To determine if there is reasonable potential for the discharge to cause or contribute to an exceedance of water quality criteria for a given pollutant, EPA compares the maximum projected receiving water concentration to the water quality criteria for that pollutant. If the projected receiving water concentration exceeds the criteria, there is reasonable potential, and a WQBEL must be included in the permit. In this case, EPA completed reasonable potential analysis for Ammonia. EPA determined that Ammonia would not exceed Washington WQS based on reasonable potential analysis. The analysis incorporated Ecology's mixing zone policy, as discussed in Appendix C, and, authorization of the mixing zone is subject to Ecology's approval.

Maximum Projected Effluent Concentration

When determining the projected receiving water concentration downstream of the effluent discharge, EPA's Technical Support Document for Water Quality-based Toxics Controls (TSD, 1991) recommends using the maximum projected effluent concentration (Ce) in the mass balance calculation. To determine the maximum projected effluent concentration (Ce) EPA has developed a statistical approach to better characterize the effects of effluent variability. The approach combines knowledge of effluent variability as estimated by a coefficient of variation (CV) with the uncertainty due to a limited number of data to project an estimated maximum concentration for the effluent. Once the CV for each pollutant parameter has been calculated, the reasonable potential multiplier (RPM) used to derive the maximum projected effluent concentration (Ce) can be calculated using the following equations:

First, the percentile represented by the highest reported concentration is calculated.

$$p_n = (1 - \text{confidence level})^{1/n}$$

where,

p_n = the percentile represented by the highest reported concentration
n = the number of samples
confidence level = 99% = 0.99

and

$$\text{RPM} = \frac{C_{99}}{C_{P_n}} = \frac{e^{Z_{99} \times \sigma - 0.5 \times \sigma^2}}{e^{Z_{P_n} \times \sigma - 0.5 \times \sigma^2}}$$

Where,

σ^2	=	$\ln(CV^2 + 1)$
Z_{99}	=	2.326 (z-score for the 99th percentile)
Z_{Pn}	=	z-score for the P_n percentile (inverse of the normal cumulative distribution function at a given percentile)
CV	=	coefficient of variation (standard deviation ÷ mean)

The maximum projected effluent concentration is determined by simply multiplying the maximum reported effluent concentration by the RPM:

$$C_e = (RPM)(MRC)$$

where MRC = Maximum Reported Concentration

Maximum Projected Effluent Concentration at the Edge of the Mixing Zone

Once the maximum projected effluent concentration is calculated, the maximum projected effluent concentration at the edge of the acute and chronic mixing zones is calculated using the mass balance equations presented previously.

Reasonable Potential

The discharge has reasonable potential to cause or contribute to an exceedance of water quality criteria if the maximum projected concentration of the pollutant at the edge of the mixing zone exceeds the most stringent criterion for that pollutant.

For this permit, Ammonia is the only parameter of concern applicable for a reasonable potential analysis because this parameter is present in the waste stream and has a WQ-based standard. Using a spreadsheet shown below, EPA analyzed if reasonable potential existed to exceed Washington State WQS for Ammonia.

For Ammonia, EPA assumed the 95th percentile concentration of the ambient receiving water as 18.7 µg/l, based on data obtained from the Ecology's monitoring station, Snodry35 - Everett Harbor, located near the discharge.

Results of the reasonable potential analyses for Ammonia is shown in Appendix D based on the Visual Plumes modeling to determine the dilution factors as shown below.

B. Output of Visual Plumes Modeling

The output Visual Plumes modeling to determine the dilution factors are shown below.

Table C-1: Visual Plumes Output For Acute Scenario

```
/ Windows UM3. 5/26/2009 11:31:57 AM
Case 1; ambient file F:\KSHUM\TulalipWWTP\TulalipVP.acute.052609.001.db; Diffuser table record 1: ----------------------------------
      Depth    Amb-cur    Amb-dir    Amb-sal    Amb-tem    Amb-pol      Decay    Far-spd    Far-dir    Disprsn
          m        m/s        deg        psu          C      kg/kg        s-1        m/s        deg   m0.67/s2
        0.0       0.05      225.0      25.97       16.3        0.0        0.0       0.05      225.0     0.0003
        1.5       0.05      225.0      25.97       16.3        0.0        0.0       0.05      225.0     0.0003
        2.0       0.05      225.0      26.08      16.16        0.0        0.0       0.05      225.0     0.0003
        3.0       0.05      225.0      26.06      16.12        0.0        0.0       0.05      225.0     0.0003
        4.0       0.05      225.0      26.06      16.09        0.0        0.0       0.05      225.0     0.0003
        5.0       0.05      225.0       26.1      16.03        0.0        0.0       0.05      225.0     0.0003
        6.0       0.05      225.0      26.67      15.03        0.0        0.0       0.05      225.0     0.0003
        7.0       0.05      225.0      26.86      14.24        0.0        0.0       0.05      225.0     0.0003
        8.0       0.05      225.0      26.76      14.03        0.0        0.0       0.05      225.0     0.0003
       10.0       0.05      225.0      26.85      13.56        0.0        0.0       0.05      225.0     0.0003
       12.0       0.05      225.0      27.44      12.71        0.0        0.0       0.05      225.0     0.0003
       14.0       0.05      225.0      27.52      12.56        0.0        0.0       0.05      225.0     0.0003
       15.0       0.05      225.0      27.49      12.45        0.0        0.0       0.05      225.0     0.0003
       15.5       0.05      225.0      27.48      12.41        0.0        0.0       0.05      225.0     0.0003
   P-dia  P-elev V-angle H-angle   Ports AcuteMZ ChrncMZ P-depth Ttl-flo Eff-sal    Temp Polutnt
    (in)     (m)   (deg)   (deg)      ()    (ft)    (ft)    (ft)   (MGD)   (psu)     (C)   (ppm)
    12.0     0.5   -45.0   225.0     1.0    25.1   251.0    51.0   0.594     0.0    16.0   100.0
Froude number:      2.596
        Depth  Amb-cur    P-dia  Polutnt  4/3Eddy   Dilutn   x-posn   y-posn
Step     (ft)    (m/s)     (in)    (ppm)    (ppm)       ()     (ft)     (ft)
   0     51.0     0.05    9.372    100.0    100.0      1.0      0.0      0.0;
Potential for more dilution
  55    51.87     0.05    19.14    54.12    54.12    1.829   -0.975   -0.975; bottom hit,
  70    51.92     0.05    20.62    50.62    50.62    1.955    -1.16    -1.16; begin overlap,
  81    51.93     0.05    21.42    48.66    48.66    2.033   -1.289   -1.289; local maximum rise or fall,
 100    51.89     0.05    22.35    45.91    45.91    2.153    -1.51    -1.51;
 117    51.81     0.05    22.89    43.48    43.48    2.272   -1.717   -1.717; end overlap,
 200     48.2     0.05    31.98    18.21    18.21    5.397   -3.706   -3.706;
 300    29.56     0.05    114.8    2.513    2.513    38.98   -8.535   -8.535; axial vel  0.0121
 311    26.48     0.05    139.2    2.021    2.021    48.46   -9.559   -9.559; trap level,
4/3 Power Law.  Farfield dispersion based on wastefield width of       3.53 m
    conc  dilutn   width distnce    time
   (ppm)             (m)     (m)   (hrs) (kg/kg)   (s-1)   (m/s)(m0.67/s2)
 1.97094   48.49  3.901      7.4  0.0182     0.0     0.0    0.05 3.00E-4  Shows the Acute Dilution Factor is 48.49
 0.52234   50.14   4.769     14.8  0.0593     0.0     0.0    0.05 3.00E-4
 0.18091   53.97   5.693     22.2     0.1     0.0     0.0    0.05 3.00E-4
 9.63E-2   58.27   6.671     29.6   0.142     0.0     0.0    0.05 3.00E-4
 6.18E-2   62.56   7.698     37.0   0.183     0.0     0.0    0.05 3.00E-4
 4.38E-2   66.69   8.774     44.4   0.224     0.0     0.0    0.05 3.00E-4
 3.30E-2   70.64   9.895     51.8   0.265     0.0     0.0    0.05 3.00E-4
```

```
 2.60E-2   74.43   11.06    59.2   0.306     0.0      0.0    0.05 3.00E-4
 2.11E-2   78.05   12.27    66.6   0.347     0.0      0.0    0.05 3.00E-4
 1.75E-2   81.53   13.52    74.0   0.388     0.0      0.0    0.05 3.00E-4
 1.47E-2   84.88   14.81    81.4   0.429     0.0      0.0    0.05 3.00E-4
count: 11; 11:32:02 AM. amb fills: 2
```

Table C-2: Visual Plumes Output for Chronic Scenario

```
/ Windows UM3. 5/26/2009 12:02:45 PM
Case 1; ambient file F:\KSHUM\TulalipWWTP\vp.chronic.052609.001.db; Diffuser table record 1: ----------------------------------
      Depth    Amb-cur    Amb-dir    Amb-sal    Amb-tem    Amb-pol      Decay    Far-spd    Far-dir    Disprsn
          m        m/s        deg        psu          C      kg/kg        s-1        m/s        deg   m0.67/s2
        0.0       0.05      225.0      25.97       16.3        0.0        0.0        0.1      225.0     0.0003
        1.5       0.05      225.0      25.97       16.3        0.0        0.0        0.1      225.0     0.0003
        2.0       0.05      225.0      26.08      16.16        0.0        0.0        0.1      225.0     0.0003
        3.0       0.05      225.0      26.06      16.12        0.0        0.0        0.1      225.0     0.0003
        4.0       0.05      225.0      26.06      16.09        0.0        0.0        0.1      225.0     0.0003
        5.0       0.05      225.0       26.1      16.03        0.0        0.0        0.1      225.0     0.0003
        6.0       0.05      225.0      26.67      15.03        0.0        0.0        0.1      225.0     0.0003
        7.0       0.05      225.0      26.86      14.24        0.0        0.0        0.1      225.0     0.0003
        8.0       0.05      225.0      26.76      14.03        0.0        0.0        0.1      225.0     0.0003
       10.0       0.05      225.0      26.85      13.56        0.0        0.0        0.1      225.0     0.0003
       12.0       0.05      225.0      27.44      12.71        0.0        0.0        0.1      225.0     0.0003
       14.0       0.05      225.0      27.52      12.56        0.0        0.0        0.1      225.0     0.0003
       15.0       0.05      225.0      27.49      12.45        0.0        0.0        0.1      225.0     0.0003
       15.5       0.05      225.0      27.48      12.41        0.0        0.0        0.1      225.0     0.0003
   P-dia  P-elev V-angle H-angle   Ports AcuteMZ ChrncMZ P-depth Ttl-flo Eff-sal    Temp Polutnt
    (in)     (m)   (deg)   (deg)      ()    (ft)    (ft)    (ft)   (MGD)   (psu)     (C)   (ppm)
    12.0     0.5   -45.0   225.0     1.0    25.1   251.0    51.0   0.289     0.0    16.0   100.0
Froude number:      1.263
        Depth  Amb-cur    P-dia  Polutnt  4/3Eddy   Dilutn   x-posn   y-posn
Step     (ft)    (m/s)     (in)    (ppm)    (ppm)       ()     (ft)     (ft)
   0     51.0     0.05    9.372    100.0    100.0      1.0      0.0      0.0;
Potential for more dilution
  20    51.16     0.05    11.52    86.69    86.69     1.15   -0.141   -0.141; begin overlap,
  77    51.27     0.05    13.77    78.03    78.03    1.275   -0.394   -0.394; local maximum rise or fall,
 100    51.26     0.05    13.79    76.71    76.71    1.297   -0.487   -0.487;
 144    51.09     0.05    13.27    70.74    70.74    1.405   -0.707   -0.707; end overlap,
 200    49.51     0.05    16.29     35.6     35.6     2.77   -1.402   -1.402;
 300    40.04     0.05    51.89    4.914    4.914    19.94   -3.621   -3.621;
 343    32.46     0.05    96.25    2.097    2.097     46.7   -5.658   -5.658; axial vel 0.00765 trap level,
4/3 Power Law.  Farfield dispersion based on wastefield width of       2.44 m
   conc  dilutn   width distnce    time
  (ppm)             (m)     (m)    (hrs)  (kg/kg)    (s-1)    (m/s)(m0.67/s2)
 2.04887   46.72   2.689     7.4  0.0138     0.0      0.0     0.1 3.00E-4
 1.01263   47.34   3.068    14.8  0.0343     0.0      0.0     0.1 3.00E-4
 0.39238   49.19   3.463    22.2  0.0549     0.0      0.0     0.1 3.00E-4
  0.2077   51.62   3.874    29.6  0.0754     0.0      0.0     0.1 3.00E-4
 0.13212   54.25     4.3    37.0   0.096     0.0      0.0     0.1 3.00E-4
 9.34E-2   56.92    4.74    44.4   0.117     0.0      0.0     0.1 3.00E-4
 7.04E-2   59.56   5.195    51.8   0.137     0.0      0.0     0.1 3.00E-4
```

5.55E-2	62.14	5.663	59.2	0.158	0.0	0.0	0.1	3.00E-4	
4.52E-2	64.65	6.144	66.6	0.178	0.0	0.0	0.1	3.00E-4	
3.76E-2	**67.1**	6.639	74.0	0.199	0.0	0.0	0.1	3.00E-4	**Shows the Chronic Dilution Factor is 67.1**
3.19E-2	69.47	7.145	81.4	0.219	0.0	0.0	0.1	3.00E-4	

count: 11

;12:02:50 PM. amb fills: 2

Appendix D. Reasonable Potential Calculations

A. Reasonable Potential Calculation for Ammonia

The analysis below shows no reasonable potential to violate WQS for Ammonia.

Dilution Factors:	Acute	Chronic
Aquatic Life	48.5	67.1
Human Health Carcinogenic		67.1
Human Health Non-Carcinogenic		67.1

Pollutant, CAS No. & NPDES Application Ref. No.			AMMONIA, Criteria as Total NH_3
Effluent Data	# of Samples (n)		90
	Coeff of Variation (Cv)		1.97
	Effluent Concentration, ug/L (Max. or 95th Percentile)		12,000
	Calculated 50th percentile Effluent Conc. (when n>10)		
Receiving Water Data	95th Percentile Conc., ug/L		18.7
	Geo Mean, ug/L		
Water Quality Criteria	Aquatic Life Criteria, ug/L	Acute	6,422
		Chronic	965
	WQ Criteria for Protection of Human Health, ug/L		-
	Metal Criteria Translator, decimal	Acute	-
		Chronic	-
	Carcinogen?		N

Aquatic Life Reasonable Potential

Effluent percentile value			0.990
s	$s^2=\ln(CV^2+1)$		1.259
Pn	$Pn=(1\text{-confidence level})^{1/n}$		0.950
Multiplier			2.36
Max concentration (ug/L) at edge of...		Acute	601
		Chronic	440
Reasonable Potential? Limit Required?			**NO**

B. Reasonable Potential Calculation for pH

The analysis shows no reasonable potential to violate WQS for pH.

The Washington water quality criterion for Excellent quality marine water specifies a pH range of 7.0 to 8.5 standard units, with human-caused variation within the above range of less than 0.5 units (WAC 173-201A-210(1)(f)).

(i) Using the maximum permitted pH of 9.0 s.u., maximum alkalinity of effluent and the maximum background pH of 8.73 s.u., the calculation shows that Washington WQS would be met at the edge of the mixing zone at 8.73 s.u., with no predicted variation with ambient pH.

Calculation of pH of a Mixture in Marine Water
Based on the CO2SYS program (Lewis and Wallace, 1998);
http://cdiac.esd.ornl.gov/oceans/co2rprt.html

INPUT	
1. MIXING ZONE BOUNDARY CHARACTERISTICS	
	67.1
Depth at plume trapping level (m)	15.54
2. BACKGROUND RECEIVING WATER CHARACTERISTICS	
Temperature (deg C):	12.33
pH:	8.73
Salinity (psu):	29.90
Total alkalinity (meq/L)	2.32
3. EFFLUENT CHARACTERISTICS	
Temperature (deg C):	23.10
pH:	9.00
Salinity (psu)	12.00
Total alkalinity (meq/L):	1.84
4. CLICK THE 'Calculate" BUTTON TO UPDATE OUTPUT RESULTS -->	Calcula
OUTPUT	
CONDITIONS AT THE MIXING ZONE BOUNDARY	
Temperature (deg C):	12.49
Salinity (psu)	29.63
Density (kg/m^3)	1022
Alkalinity (mmol/kg-SW):	2.26
Total Inorganic Carbon (mmol/kg-SW):	2
pH at Mixing Zone Boundary:	**8.73**

(ii) Using the minimum permitted pH of 6.0, lowest effluent alkalinity, and the lowest background pH of 7.0320 s.u., the calculation below shows that Washington WQS would be met at the edge of the mixing zone at a pH of 7.00 s.u. with a variation of 0.032 s.u.

Instructions: Enter data on 'Input 1' tab and below with yellow fields.
-- Click here for more details --

Calculation of pH of a Mixture in Marine Water

Based on the CO2SYS program (Lewis and Wallace, 1998).
http://cdiac.esd.ornl.gov/oceans/co2rprt.html

INPUT	
1. MIXING ZONE BOUNDARY CHARACTERISTICS	
	67.1
Depth at plume trapping level (m)	15.54
2. BACKGROUND RECEIVING WATER CHARACTERISTICS	
Temperature (deg C):	12.33
pH:	7.032
Salinity (psu):	29.90
Total alkalinity (meq/L)	2.32
3. EFFLUENT CHARACTERISTICS	
Temperature (deg C):	23.10
pH:	6.00
Salinity (psu)	12.00
Total alkalinity (meq/L):	1.08
4. CLICK THE 'Calculate" BUTTON TO UPDATE OUTPUT RESULTS -->	Calcula
OUTPUT	
CONDITIONS AT THE MIXING ZONE BOUNDARY	
Temperature (deg C):	12.49
Salinity (psu)	29.63
Density (kg/m^3)	1022
Alkalinity (mmol/kg-SW):	2.25
Total Inorganic Carbon (mmol/kg-SW):	2
pH at Mixing Zone Boundary:	**7.00**

C. Reasonable Potential Calculation for Temperature

The analysis shows no reasonable potential to violate WQS for temperature.

In WAC 173-201A-210(1)(c), the Washington water quality criteria limit the ambient water temperature to 16.0ºC (1-day Maximum) for Excellent Quality marine water; when natural conditions exceed 16.0 ºC, no temperature increases will be allowed which will raise the receiving water temperature by greater than 0.3º C.

The reasonable potential calculation below shows that incremental temperature increase is 0.15°C, which is less than the allowable WQS of 0.3°C. Therefore, the discharge has no reasonable potential to violate WQS for temperature, and no effluent limit for temperature is required.

Marine Temperature Reasonable Potential and Limit Calculation

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

INPUT	Annual
1. Chronic Dilution Factor at Mixing Zone Boundary	67.1
2. Annual max 1DADMax Ambient Temperature (Background 90th percentile)	11.9 °C
3. 1DADMax Effluent Temperature (95th percentile)	21.8 °C
4. Aquatic Life Temperature WQ Criterion	16.0 °C
OUTPUT	
5. Temperature at Chronic Mixing Zone Boundary:	12.07 °C
6. Incremental Temperature Increase or decrease:	0.15 °C
7. Incremental Temperature Increase 12/(T-2) if T ≤ crit:	1.21 °C
8. Maximum Allowable Temperature at Mixing Zone Boundary:	13.13 °C
A. If ambient temp is warmer than WQ criterion	
9. Does temp fall within this warmer temp range?	NO
10. Temp increase allowed at mixing zone boundary, if required:	---
B. If ambient temp is cooler than WQ criterion but within $12/(T_{crit}-2)$ and within 0.3 °C of	
11. Does temp fall within this incremental temp. range?	NO
12. Temp increase allowed at mixing zone boundary, if required:	---
C. If ambient temp is cooler than (WQ criterion-0.3) but within $12/(T_{crit}-2)$ of the criterion	
13. Does temp fall within this Incremental temp. range?	NO
14. Temp increase allowed at mixing zone boundary, if required:	---
D. If ambient temp is cooler than (WQ criterion - $12/(T_{crit}-2)$)	
15. Does temp fall within this Incremental temp. range?	YES
16. Temp increase allowed at mixing zone boundary, if required:	NO LIMIT
RESULTS	
17. Do any of the above cells show a temp increase?	**NO**
18. Temperature Limit if Required?	**NO LIMIT**

D. Reasonable Potential Calculation for Fecal Coliform Bacteria

The analysis shows no reasonable potential to violate WQS for fecal coliform bacteria.

EPA modeled the numbers of fecal coliform by simple mixing analysis using the technology-based limit of 400 organisms per 100 mL and a dilution factor of 67.1. The predicted fecal coliform count at the edge of the Chronic mixing zone is 12 organisms/100mL, which is below the WQS for Shellfish Harvesting of 14 organisms/100mL, therefore, Ecology's TBEL is appropriate, and would not violate Ecology's WQS for Shellfish Harvesting.

Calculation of Fecal Coliform at Chronic Mixing Zone

INPUT	
Chronic Dilution Factor	67.1
Receiving Water Fecal Coliform, #/100 ml	6
Effluent Fecal Coliform - worst case, #/100 ml	400
Surface Water Criteria, #/100 ml	*14*
OUTPUT	
Fecal Coliform at Mixing Zone Boundary, #/100 ml	**12**
Difference between mixed and ambient, #/100 ml	6

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

E. Antidegradation Analysis

The antidegradation policy of a state's WQS represents a three-tiered approach to protecting and maintaining current water quality and uses into the future [40 CFR 131.12]. Tier I of antidegradation protection applies to all water bodies under the CWA and ensures that existing in-stream water uses and the water quality necessary to protect those uses will be maintained and protected. Tier II protection applies to any water bodies considered to be high quality waters (where the water quality exceeds levels necessary to support propagation of fish, shellfish, wildlife, and recreation in and on the water) and provides that water quality will be maintained and protected unless allowing for lower water quality is deemed by the state as necessary to accommodate important economic or social development in the area. In allowing any lowering of water quality, the state must ensure adequate water quality to fully protect existing uses, as well as designated uses. Tier III protection applies to water bodies that have been designated by the state as outstanding national resource waters and provides that water quality is to be maintained and protected.

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.
- 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 Tier II analysis is necessary when all three of the following conditions are met:
• The facility is planning a new or expanded action.
• Ecology regulates or authorizes the action.
• The action has the potential to cause measurable degradation to existing water quality at the edge of a chronic mixing zone.

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

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

• For waters that do not meet assigned criteria, or protect existing or designated uses, Ecology will take appropriate and definitive steps to bring the water quality back into compliance with the WQS.

All the effluent limits in the Draft Permit are as stringent as the previous permit, and beneficial uses will not be impaired by the facility. For nutrients, the Draft Permit has also included additional monitoring and loading calculations that would characterize nutrients in the effluent so that additional appropriate measures could be considered.

Pertaining to the criteria above, the facility meets Tier I, and the facility does not meet the conditions that requires a further Tier II analysis. The facility is not planning a new or expanded action. The analysis described demonstrates that the proposed permit conditions will protect existing and designated uses of the receiving water. Therefore, the Draft Permit meets the criteria for Tier I, and Ecology's Antidegradation policy.