Revised 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:

City of Wapato Wastewater Treatment Plant

Public Comment Start Date: April 13, 2023

Public Comment Expiration Date: May 15, 2023

Technical Contact: Abigail Conner
(206) 553-6358
800-424-4372, ext. 6358 (within Alaska, Idaho, Oregon, and Washington)
conner.abigail@epa.gov

EPA Proposes to Reissue the NPDES Permit

EPA proposes to reissue the NPDES permit for the facility referenced above. The proposed 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 (FS) 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

As described under “public comment” below, EPA is only accepting comments on aspects of the revised draft permit that are different from those in the draft permit that was issued for public comment on June 27, 2022.

CWA § 401 Certification

Since this facility discharges to Yakama Nation tribal waters and the Yakama Nation does not have Treatment as a State (TAS), EPA is the certifying authority for the permit. See FS

Section V.C. and Appendix F. Comments regarding the intent to certify should be directed to the EPA technical contact listed above.

PUBLIC COMMENT

EPA proposed the draft permit for public comment on June 27, 2022. EPA received comments from the City of Wapato during the original comment period. The comment period ended on August 11, 2022. Following the public comment period, the City of Wapato submitted additional effluent monitoring data. As a result of this additional monitoring data, the effluent limits in the draft permit changed. EPA is also incorporating Per- and Polyfluorinated Substances (PFAS) monitoring requirements in accordance with EPA guidance and including an additional list of pollutants that must be reported on the application that are subject to water quality standards (40 CFR 122.21(j)(4)(iv)). EPA is providing an opportunity for public comment on the changes.

Pursuant to 40 CFR 124.14(c), EPA is only accepting comments on aspects of the revised draft permit that are different from those in the draft permit that was issued for public comment on June 27, 2022. These changes are as follows:

- Zinc effluent limits have been revised to an average monthly limit of 25 mg/L and a maximum daily limit of 52 mg/L. These are the same limits that were in the previous permit.
- Copper effluent limits have been removed.
- Silver effluent limits have been removed.
- Monthly silver effluent monitoring has been removed.
- A typo in the mass based average monthly mercury limit has been corrected, changing the limit from 0.00008 lbs/day to 0.00007 lbs/day.
- The frequency for observation of the receiving water has been specified as once a week.
- The required monitoring for biochemical oxygen demand (BOD) and total suspended solids (TSS) in the receiving water has been removed.
- The required temperature monitoring of the receiving water has been modified from continuous monitoring to daily sampling, Monday through Friday, between April 1 and October 31, between 5pm and 6pm.
- The compliance schedule interim dates have been changed to allow the permittee 12 months to complete the Mercury Minimization Plan and 12 months to acquire facility funding.
- The requirement in the Mercury Minimization Plan to evaluate past and present WWTP operations to determine which operating procedures maximize mercury removal was removed.
- PFAS monitoring has been added.
- Additional pollutants that are subject to Washington water quality standards have been added to the list of pollutants required to be reported on the NPDES permit application.

- Additional details and clarifications of submittals have been added to the Nutrient Optimization Plan.
- All notifications and submittals have been changed from paper copies to electronic delivery
- The administrative penalty amounts have been updated to reflect current penalty amounts.

All comments on EPA's proposed permit or requests for a public hearing should be submitted via email to Abigail Conner (conner.abigail@epa.gov). If you are unable to submit comments via email, please call (206) 553-6358.

Persons wishing to comment on or request a Public Hearing for the proposed permit for this facility may do so in writing 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 in writing and should 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 proposed 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 proposed permit, this Fact Sheet and the Public Notice can also be found by visiting the Region 10 website at https://www.epa.gov/npdes-permits/about-region-10s-npdes-permit-program.

The draft Administrative Record for this action contains any documents listed in the References section. The Administrative Record or documents from it are available electronically upon request by contacting Abigail Conner.

For technical questions regarding the Fact Sheet, contact Abigail Conner at (206) 553-6358 or conner.abigail@epa.gov. Services can be made available to persons with disabilities by contacting Audrey Washington at (206) 553-0523.

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Acronyms

1Q10	1-day, 10-year low flow
7Q10	7-day, 10-year low flow
30B3	Biologically based design flow intended to ensure an excursion frequency of less than once every three years, for a 30-day average flow.
30Q10	30-day, 10-year low flow
AML	Average Monthly Limit
BO or BiOp	Biological Opinion
BOD_5	Biochemical oxygen demand, five-day
BOD_{5u}	Biochemical oxygen demand, ultimate
BMP	Best Management Practices
°C	Degrees Celsius
C BOD_5	Carbonaceous Biochemical Oxygen Demand
CFR	Code of Federal Regulations
CFS	Cubic Feet per Second
CV	Coefficient of Variation
CWA	Clean Water Act
DMR	Discharge Monitoring Report
DO	Dissolved oxygen
EFH	Essential Fish Habitat
EPA	U.S. Environmental Protection Agency
ESA	Endangered Species Act
FR	Federal Register
ICIS	Integrated Compliance Information System
LA	Load Allocation
lbs/day	Pounds per day
LC	Lethal Concentration
LC_{50}	Concentration at which 50% of test organisms die in a specified time period
LD_{50}	Dose at which 50% of test organisms die in a specified time period
LOEC	Lowest Observed Effect Concentration
LTA	Long Term Average
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
MPN	Most Probable Number

N	Nitrogen
NEPA	National Environmental Policy Act
NOAA	National Oceanic and Atmospheric Administration
NOEC	No Observable Effect Concentration
NOI	Notice of Intent
NPDES	National Pollutant Discharge Elimination System
O&M	Operations and maintenance
POTW	Publicly owned treatment works
PSES	Pretreatment Standards for Existing Sources
PSNS	Pretreatment Standards for New Sources
QAP	Quality assurance plan
RP	Reasonable Potential
RPM	Reasonable Potential Multiplier
RWC	Receiving Water Concentration
SPCC	Spill Prevention and Control and Countermeasure
SS	Suspended Solids
SSO	Sanitary Sewer Overflow
s.u.	Standard Units
TKN	Total Kjeldahl Nitrogen
TMDL	Total Maximum Daily Load
TRC	Total Residual Chlorine
TRE	Toxicity Reduction Evaluation
TSD	Technical Support Document for Water Quality-based Toxics Control (EPA/505/2-90-001)
TSS	Total suspended solids
TU_a	Toxic Units, Acute
TU_c	Toxic Units, Chronic
USFWS	U.S. Fish and Wildlife Service
USGS	United States Geological Survey
WD	Water Division
WET	Whole Effluent Toxicity
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 proposed NPDES permit for the following entity:

Table 1. General Facility Information

NPDES Permit #:	WA0050229
Applicant:	City of Wapato City of Wapato Wastewater Treatment Plant
Type of Ownership	Municipal
Physical Address:	69172 Highway 97 Wapato, WA 98951
Mailing Address:	City of Wapato 205 E. Third St. Wapato, WA 98951-1326
Facility Contact:	Jeff Schumacker Public Works Director jschumacker@wapato-city.org (509) 853-8013
Operator Name:	Jeff Schumacker
Facility Location:	46.434326°N 120.422001°W
Receiving Water	WIP Drainage Way No.2
Facility Outfall	46.433056°N 120.421389°W

B. PERMIT HISTORY

The most recent NPDES permit for the City of Wapato Wastewater Treatment Plant (WWTP) was issued on September 12, 2011, became effective on November 1, 2011, and expired on October 31, 2016. An NPDES permit application was submitted by the permittee on May 31, 2016. By letter on June 9, 2016, EPA requested additional information to complete the application, and requested submittal by September 1, 2016. The permittee submitted supplemental materials on August 31, 2016. EPA determined that the application was timely and complete. Therefore, pursuant to 40 Code of Federal Regulations (CFR) 122.6, the permit has been administratively continued and remains fully effective and enforceable.

C. TRIBAL CONSULTATION

EPA met with the Yakama Nation (YN) on September 21, 2021 to understand tribal concerns with the reissuance of the permit. On May 24, 2022, prior to public notice, EPA shared the preliminary proposed permit and draft fact sheet with YN for their review.

At the start of the comment period, EPA sent a letter to YN offering the opportunity for them to request Tribal Consultation on the proposed permit.

II. FACILITY INFORMATION

A. TREATMENT PLANT DESCRIPTION

A description of the facility is provided in the Fact Sheet, dated June 27, 2022, issued during the initial public comment period (June 2022 fact sheet).

During the initial public comment period on the proposed permit, the City of Wapato (City) stated that comminutors (grinders) are not used at the WWTP. EPA notes this correction to the facility description.

B. EFFLUENT CHARACTERIZATION

Effluent characterization is summarized in the June 2022 fact sheet.

Hardness data are used to calculate hardness-dependent water quality criteria. In the June 2022 draft permit, due to the lack of available effluent hardness data, the receiving water hardness was used to calculate hardness-dependent effluent limits. However, following the initial public comment period, the City provided historical effluent hardness data for the facility. The hardness data are listed in Table 1, below:

Table 1. Effluent Hardness Samples

Date	Hardness (mg/L as $CaCO_3$)		
	Sample 1	Sample 2	Sample 3
May 2022	75	83	100
Feb 2022	61	61	61
Dec 2021	61	72	67
Oct 2021	67	67	64
April 2021	61	78	61
Jan 2021	53	56	61
Nov 2020	61	61	61
May 2020	68	63	65
April 2020	63	68	65
Dec 2019	65	70	70
Oct 2019	65	70	65
April 2019	55	60	60
Aug 2018	60	65	40
March 2018	62	71	67
Jan 2018	76	73	78
Dec 2017	76	73	78
Oct 2017	72	79	75
Sept 2017	71	77	90
July 2016	65	-	69

EPA has now reevaluated the reasonable potential analysis and water quality-based effluent limit calculations using the effluent hardness data that the City submitted. The 5th percentile of the effluent hardness, 54.7 mg/L, is the effluent hardness used to calculate limits in the revised draft permit.

III. EFFLUENT LIMITATIONS AND MONITORING

Table 2 below presents the effluent limits and monitoring requirements in the revised draft permit. Effluent limits and monitoring requirements that differ from those in the draft permit issued for public comment on June 27, 2022 are in bold type. EPA requests comments on only these revised effluent limits and monitoring requirements.

Table 2. Effluent Limits and Monitoring Requirements

Parameter	Average Monthly	Average Weekly	Maximum Daily	Sample Location	Sample Frequency	Sample Type
Flow, mgd	---	---	---	Influent or Effluent	Continuous	Meter
Temperature, ºC[3]	---	---	---	Effluent	Daily or Continuous	Grab or Meter
Biological Oxygen Demand (BOD_5)	30 mg/l	45 mg/l	---	Influent and Effluent	1/week	24-hour composite
	290 lbs/day	435 lbs/day				Calculation[1]
Total Suspended Solids (TSS)	30 mg/l	45 mg/l	---	Influent and Effluent	1/week	24-hour composite
	290 lbs/day	435 lbs/day				Calculation[1]
BOD_5 and TSS Percent Removal	85% Minimum	---	---	---	1/month	Calculation[2]
Dissolved Oxygen, mg/L	---	---	---	Effluent	1/week	Grab
E. *coli* Bacteria	100/100 ml	---	200/100 ml	Effluent	5/month	Grab
Total Ammonia as N, applies from Apr 1 – Oct 31	0.7 mg/L	---	2.6 mg/L	Effluent	1/week	24-hour composite
	7.0 lbs/day		25.0 lbs/day			Calculation[1]
Total Ammonia as N, applies from Nov 1 – Mar 31	1.1 mg/L	---	5.4 mg/L	Effluent	1/week	24-hour composite
	10.4 lbs/day		52.3 lbs/day			Calculation[1]
Copper, total recoverable, µg/L	**---**	**---**	**---**	Effluent	**1/month**	24-hour composite
	---	**---**	**---**			Calculation[1]
Mercury, total recoverable, µg/L	0.008 µg/L	---	0.022 µg/L	Effluent	1/month	24-hour composite

	0.00007 lbs/day	**---**	0.00021 lbs/day			
Silver	**---**	**---**	**---**	**---**	**---**	**---**
Zinc	**25 µg/L**	**---**	**52 µg/L**	Effluent	1/week	24-hour composite
	0.24 lbs/day	**---**	**0.5 lbs/day**			Calculation[1]
Phosphorus, total	**---**	---	**---**	Effluent	1/month	24-hour composite
Nitrogen, total	**---**	---	**---**	Effluent	1/month	24-hour composite
Per-and Polyfluoroalkyl Substances (PFAS)[5]	**ng/L**	**Report**	**--**	**Report**	**Influent and effluent**	**2/year**
	mg/kg dry weight	**--**	**--**	**Report**	**Sludge**	**2/year**
WET	**---**	---	**---**	Effluent	1/year[4,6]	24-hour composite
Permit Application Effluent Testing Data[6]	--	--	--	Effluent	1/year	--
Permit Application Additional Effluent Testing[7]	--	--	--	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. See Permit Parts I.B.3 and I.B.4.
4. Monitoring must occur yearly. See Permit Part I.C.
5. See Permit Part I.B.12
6. Effluent Testing Data - See NPDES Permit Application Form 2A, Table B for the list of pollutants to be included in this testing. The Permittee must use sufficiently sensitive analytical methods in accordance with Permit Part I.B.8.
7. Additional Effluent Testing - See NPDES Permit Application Form 2A, Table C**, Table E, and Permit Part I.B.10.** for the list of pollutants to be included in this testing. Testing must be conducted annually during alternating quarters. The additional effluent testing must occur on the same day as a whole effluent toxicity testing. Quarters are defined as: January 1 to March 31; April 1 to June 30; July 1 to September 30; and, October 1 to December 31. The Permittee must use sufficiently sensitive analytical methods in accordance with Permit Part I.B.8.

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 effluent limits (TBELs) or water quality-based effluent limits (WQBELs). TBELs are set according to the level of treatment that is achievable using available technology. WQBELs are designed to ensure that the Water Quality Standards (WQS) applicable to a waterbody are being met and may be more stringent than TBELs.

1. Pollutants of Concern

Pollutants of concern are discussed in the June 2022 fact sheet.

2. Technology-Based Effluent Limits (TBELs)

TBELs for this facility are discussed in the June 2022 fact sheet.

3. Water Quality-Based Effluent Limits (WQBELs)

Except for the zinc, silver, and copper limits, the WQBELs are unchanged from those in the June 2022 draft permit. As previously stated, EPA is not accepting comments on the limits that have not changed between the June 2022 draft permit and the revised draft permit.

CWA § 301(b)(1)(C) requires the development of limitations in permits necessary to meet WQS. Discharges to State or Tribal waters must also comply with conditions imposed by the State or Tribe as part of its certification of NPDES permits under CWA § 401. 40 CFR 122.44(d)(1) implementing CWA § 301(b)(1)(C) 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 WQS, 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 originates, which may include downstream States (40 CFR 122.4(d), 122.44(d)(4), see also CWA § 401(a)(2)).

The 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 WQS are met and must be consistent with any available wasteload allocation (WLA) for the discharge in an approved total maximum daily load (TMDL). If there are no approved TMDLs that specify WLAs for this discharge all of the WQBELs are calculated directly from the applicable WQS.

a. Reasonable Potential Analysis and Need for WQBELs

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 WQBEL must be included in the permit.

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.

As explained in the June 2022 fact sheet, the facility discharges to tribal waters on the YN Reservation. Since there are no tribal WQS the Washington WQS were used as reference for setting permit limits.

The Washington WQS at WAC 173-201A-400 provides Washington's mixing zone policy for point source discharges. As explained in the June 2022 fact sheet, EPA proposes to use a mixing zone of 25% per Washington WQS during irrigation season. During non-irrigation season when there is no receiving water, there is no authorized mixing zone, and the dilution factors are 1.0. The proposed mixing zones are summarized in Table 3. All dilution factors are calculated with the effluent flow rate set equal to the design flow of 1.16 mgd. There are no changes in the proposed mixing zones or dilution factors from the June 2022 draft permit.

Table 3. Mixing Zones (Irrigation Season)

Criteria Type	Mixing Zone (% of Critical Low Flow)	Critical Low Flow Irrigation Season (cfs)	Dilution Factor Irrigation Season
Acute Aquatic Life	25	20	3.7
Chronic Aquatic Life (except ammonia)	25	44	6.9
Chronic Aquatic Life (ammonia)	25	48	7.4
Human Health Noncarcinogen	25	94	13.6
Human Health Carcinogen	25	94	13.6

The reasonable potential analysis and WQBEL calculations were based on mixing zones shown in Table 3.

The equations used to conduct the reasonable potential analysis and calculate the WQBELs are provided in Appendix C.

b. Reasonable Potential and WQBELs

The reasonable potential and WQBEL for specific parameters are discussed in the June 2022 fact sheet. Except for the copper effluent limits, silver effluent limits, and maximum daily effluent limit for zinc, the effluent limits remain unchanged from the June 2022 draft permit.

Copper

The Washington WQS at WAC 173-201A-240 establish hardness-dependent acute and chronic copper criteria for the protection of aquatic life and human health criteria for consumption of water and fish and water only. During critical conditions (non-irrigation season), there is no dilution of the effluent. The calculated water quality criteria for copper during the critical conditions (non-irrigation season) using the 5th percentile of the revised effluent hardness are 9.6 mg/L acute and 6.8 mg/L chronic. The human health criterion for copper is 1,300 µg/L.

Using the revised effluent hardness, the facility does not have reasonable potential to exceed the water quality standards or human health criterion for copper. Therefore, the revised draft permit does not include effluent limits for copper. The effluent monitoring requirements for copper have been reduced to monthly. See Appendices C and D for reasonable potential and effluent limit calculations for copper.

The 2011 permit included copper effluent limits of a monthly average limit of 3.4 ug/L and a maximum daily limit of 5.5 ug/L. When relaxing limits, the facility must meet antibacksliding requirements consistent with CWA section 303(d)(4) or 402(o)(2) and antidegradation requirements. As described below in Section III.3.c. and III.3.d of this Fact Sheet, EPA has determined that the removal of the copper limits meets an exception to antibacksliding and antidegradation requirements, thus, the copper limits can be removed.

Silver

The Washington WQS include hardness-dependent acute criteria for protection of aquatic life. Effluent limits for silver were re-calculated based on the effluent hardness described in Section II.B. During critical conditions (non-irrigation season), there is no dilution of the effluent. Therefore, the hardness used to calculate limits is the 5th percentile of the effluent hardness, 54.7 mg/L. Using a 5th percentile hardness of 54.7 mg/L, the acute water quality criterion is 1.22 µg/L.

Using information submitted by the permittee with the permit application and the revised effluent hardness, EPA determined that the facility does not have reasonable potential to exceed the aquatic life water quality criterion for silver. Therefore, EPA removed the effluent limits for silver in the revised draft permit. See Appendices C and D for reasonable potential and effluent limit calculations for silver. It should be noted that the 2011 permit did not contain silver limits; therefore, there are no backsliding concerns.

Zinc

The Washington WQS at WAC 173-201A-240 establish hardness-dependent acute and chronic zinc criteria for the protection of aquatic life and human health criteria for consumption of water and fish and water only. Effluent limits for zinc were re-calculated based on the revised hardness described in Section II.B above. During critical conditions (non-irrigation season), there is no dilution of the effluent. Therefore, the hardness used to calculate limits is the 5th percentile of the effluent hardness, 54.7 mg/L. Using a 5th percentile hardness of 54.7 mg/L, the hardness-dependent calculated acute and chronic aquatic life criteria are 68.6 µg/L and 62.7 µg/L, for acute and chronic respectively. The human health criterion is 2,300 µg/L.

Using facility effluent monitoring data for zinc and the mixing zones described in Section III.A.3.a. above, EPA conducted a reasonable potential analysis. EPA determined there is reasonable potential to exceed the aquatic life criteria for zinc on an annual basis. There is no reasonable potential to exceed the human health criteria for zinc.

The calculated monthly average and maximum daily limits for zinc using the revised effluent hardness are less stringent than the limits in the 2011 permit. When relaxing limits, the facility must meet antibacksliding requirements consistent with CWA section 303(d)(4) or 402(o)(2) and antidegradation requirements as described in Section III.A.3.c of the June 2022 Fact Sheet.

EPA evaluated the limits in accordance with antidegradation requirements and found the calculated limits would result in a measurable change in the effluent concentration downstream of the facility. Therefore, the revised draft permit maintains the zinc effluent limits in the 2011 permit; an average monthly limit of 25 µg/L (0.24 lbs/day) and a maximum daily limit of 52 µg/L (0.50 lbs/day). See Appendices C and D for reasonable potential and effluent limit calculations for zinc.

c. Antibacksliding

As described in the June 2022 fact sheet, WQBELs may be relaxed as long as either the 402(o)(2) exceptions or the requirements of 303(d)(4) are satisfied and there doing so will not result in violations of WQS or effluent limit guidelines.

One of the exceptions for antibacksliding is if the revision is based on information not available at the time of permit issuance. As described in Section II.B. of this Fact Sheet, the revised copper limits are based on effluent hardness data that was not available when the last permit was issued; therefore, an exception to antibacksliding is met and the permit limits can be relaxed as long as antidegradation requirements are met. .

d. Antidegradation

As described in the June 2022 Fact Sheet, Washington's antidegradation policy contains three tiers of protection for surface waters of the state. This discharge must meet Tier I and Tier II requirements. The revised draft permit proposes to remove the copper effluent limits, which must meet antidegradation requirements.

Copper effluent limits are not included in the revised draft permit because EPA has determined that there is not reasonable potential to exceed water quality criteria. Since there is no reasonable potential to exceed water quality criteria, the existing and designated uses are maintained and protected in accordance with Tier I and Tier II requirements, and EPA can remove the copper effluent limit.

B. MONITORING REQUIREMENTS

CWA § 308 and federal regulation 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 Tables B, C, D, and E of the NPDES Form 2A application, so that these data will be available when the permittee applies for a renewal of its NPDES permit. See also Appendix J to 40 CFR Part 122.

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

1. Effluent Monitoring

EPA requests comments on the revised effluent monitoring requirements described below:

Additional Application Monitoring

EPA has added additional pollutants to the list of pollutants the permittee is required to report on the application in accordance with 40 CFR 122.21(j)(4)(iv)). POTW applicants with a design flow of at least 1 mgd must sample and analyze for any pollutants with applicable water quality standards, in addition to the pollutants listed in Tables C and D of NPDES Application Form 2A. Table 2 of the draft permit lists the pollutants with applicable numeric water quality criteria that are not listed in Table B or C of Form 2A. The permittee must sample and analyze for the pollutants listed in Table 2 of the draft permit and report the results in Table D of Form 2A.

PFAS Monitoring

In accordance with the December 2022 EPA guidance entitled "Addressing PFAS Discharges in NPDES Permits Through the Pretreatment Program

and Monitoring Programs" EPA is adding monitoring of PFAS to the revised draft permit. The purpose of these monitoring and reporting requirements is to better understand potential discharges of PFAS from this facility and to inform future permitting decisions, including the potential development of water quality-based effluent limits. EPA is authorized to require this monitoring and reporting by CWA section 308(a). The permit conditions reflect EPA's commitments in the PFAS Strategic Roadmap, which directs the Office of Water to leverage NPDES permits to reduce PFAS discharges to waterways "at the source and obtain more comprehensive information through monitoring on the sources of PFAS and quantity of PFAS discharged by these sources."

PFAS are a group of synthetic chemicals that have been in use since the 1940s. PFAS are found in a wide array of consumer and industrial products. Due to their widespread use and persistence in the environment, most people in the United States have been exposed to PFAS. Discharges of PFAS above certain levels may cause adverse effects to human health or aquatic life.[1,2]

Since PFAS chemicals are persistent in the environment and may lead to adverse human health and environmental effects, the draft permit requires that the permittee conduct twice yearly influent, effluent, and sludge sampling for PFAS chemicals. This will result in 10 samples being collected over the 5-year permit term. 10 results are the minimum sample size necessary to calculate the standard deviation and mean of the data with sufficient confidence (USEPA, 1991).

The draft permit also requires that the permittee inventory the industrial users (IUs) of the treatment works, to identify IUs of the POTW that may discharge PFAS chemicals to the collection system. Industry sectors known or suspected to discharge PFAS include, but are not limited to, organic chemicals, plastics & synthetic fibers (OCPSF); metal finishing; electroplating; electric and electronic components; landfills; pulp, paper & paperboard; leather tanning & finishing; plastics molding & forming; textile

[1] EPA, *EPA's Per- and Polyfluoroalkyl Substances (PFAS) Action Plan*, EPA 823R18004, February 2019. Available at: https://www.epa.gov/sites/production/files/2019-02/documents/pfas_action_plan_021319_508compliant_1.pdf

[2] EPA, *Fact Sheet: Draft 2022 Aquatic Life Ambient Water Quality Criteria for Perfluorooctanoic acid (PFOA) and Perfluorooctane Sulfonic Acid (PFOS).* Available at: https://www.epa.gov/system/files/documents/2022-04/pfoa-pfos-draft-factsheet-2022.pdf

mills; paint formulating, and airports.[3,4] EPA's website has public databases such as Enforcement and Compliance History Online (ECHO) (https://echo.epa.gov/) and Envirofacts (https://enviro.epa.gov/) which may be useful in identifying such industrial users.

If PFAS chemicals are detected in the influent, effluent, or sludge in the first year of sampling, then the permittee must sample the IUs identified as potential PFAS sources at least once during the following calendar year.

There is currently no analytical method approved in 40 CFR Part 136 for PFAS. As stated in 40 CFR 122.44(i)(1)(iv)(B), in the case of pollutants or pollutant parameters for which there are no approved methods under 40 CFR Part 136 or methods are not otherwise required under 40 CFR chapter I, subchapter N or O, monitoring shall be conducted according to a test procedure specified in the permit for such pollutants or pollutant parameters. Therefore, the Permit specifies that until there is an analytical method approved in 40 CFR Part 136 for PFAS, monitoring shall be conducted using Draft Method 1633.

2. Receiving Water 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.

EPA requests comments on the revised receiving water monitoring requirements described below:

BOD_5 and TSS Receiving Water Monitoring

In its comments on the June 2022 draft permit, the City requested that the upstream and downstream surface water monitoring frequency for BOD_5 and TSS be removed or decreased to once a month. The City stated that the MBR effluent is inherently low in BOD_5 and TSS, and ambient monitoring for the parameter is not common in Washington State at the weekly frequency. EPA agrees and has removed the receiving water monitoring for BOD_5 and TSS.

[3] EPA, "Addressing PFAS Discharges in NPDES Permits and Through the Pretreatment Program and Monitoring Programs." Available at: https://www.epa.gov/system/files/documents/2022-12/NPDES_PFAS_State%20Memo_December_2022.pdf.

[4] A spreadsheet listing industries that may discharge PFAS, including Standard Industrial Classification (SIC) and North American Industry Classification System (NAICS) codes, and a spreadsheet listing Superfund sites with PFAS detections, are available on EPA's website at: https://echo.epa.gov/tools/data-downloads/national-pfas-datasets#about.

Temperature Receiving Water Monitoring

In its comments on the June 2022 draft permit, the City requested that ambient temperature monitoring be reduced to once per day from continuous in the June 2022 draft permit, citing difficulties in location, maintenance, and permitting to implement a continuous temperature monitor in Wapato Irrigation Project No. 2. In consideration of this comment, the revised draft permit requires the permittee to take temperature grab samples once a day. According to EPA's *Spatial and Temporal Patterns of Stream Temperature, Revised*, summertime stream temperatures typically reach their warmest in mid-to-late afternoon. Therefore, the permit requires temperature monitoring of the receiving water five times a week for the duration of the permit, during the irrigation season from April 1 through October 31, between 5pm and 6pm.

Visual Observation of the Receiving Water

In its comments on the June 2022 draft permit, the City requested the permit include a specification for the frequency of the requirement to observe the surface of the receiving water. The revised draft permit specifies that the surface of the receiving water must be observed weekly.

IV. Other Permit Conditions

A. COMPLIANCE SCHEDULES

Compliance schedules are authorized by 40 CFR 122.47 and Washington WQS WAC 173-201A-510(4). Compliance schedules allow a discharger to phase in, over time, compliance with WQBELs when limitations are in the permit for the first time.

In the June 2022 fact sheet, EPA found that a compliance schedule was appropriate for the new water quality-based effluent limits for mercury. EPA proposed a compliance schedule that begins with source reduction achieved through a Mercury Minimization Plan (MMP), followed by facility improvement if effluent limits are not met within the time specified in the compliance schedule.

In their comments on the June 2022 draft permit, the City stated that the requirement in the MMP to determine which operating procedures would maximize mercury removal would entail significant expense that would be better put toward evaluation of source control and requested removal of this requirement. EPA agrees and has removed the requirement to evaluate operations to determine which procedures maximize mercury removal in the draft permit.

In their comments on the June 2022 draft permit, the City also made two comments on the timeline for the compliance schedule. They requested that the deadline for the submission of the MMP be extended to 12 months. The draft permit allowed 6 months for the submission of the MMP. In consideration of this request, EPA has revised the compliance schedule to allow the permittee 12 months to complete the MMP in the revised draft permit. Additionally, the City commented that in the case that Ecology denies the facility's request for funding, they will require more time to obtain design and construction funding.

In response to this comment, EPA revised the draft permit to allow six additional months, for a total of one year, for the City to obtain funding.

Allowing additional time for these two activities delays the due date for subsequent tasks and allows an additional one year overall for the permittee to meet the final effluent limit.

Table 4. Compliance Schedule for Mercury

Task No.	Due By	Task Activity
1	12 months from the effective date of the permit	**Mercury Minimization Plan** The permittee must complete a Mercury Minimization Plan as described in permit Section II.E. Deliverable: The permit must submit the Mercury Minimization Plan to EPA. The permittee must submit the plan as an electronic attachment to the DMR. The file name of the electronic attachment must be as follows: YYYY_MM_DD_WA0050229_Mercury_Minimization_Plan_CS011, where YYYY_MM_DD is the date that the permittee submits the document.
2	18 months from the effective date of the permit	**Annual Status Report** Deliverable: The permit must submit the annual status report to EPA. The permittee must submit the plan as an electronic attachment to the DMR. The file name of the electronic attachment must be as follows: YYYY_MM_DD_WA0050229_Mercury_Annual_Report_CS010, where YYYY_MM_DD is the date that the permittee submits the document.
4	32 months from the effective date of this permit	**Annual Status Report** Deliverable: The permit must submit the annual status report to EPA. The permittee must submit the plan as an electronic attachment to the DMR. The file name of the electronic attachment must be as follows: YYYY_MM_DD_WA0050229_Mercury_Annual_Report_CS010, where YYYY_MM_DD is the date that the permittee submits the document.

Task No.	Due By	Task Activity
5	44 months from the effective date of this permit	**Annual Status Report** Deliverable: The permit must submit the annual status report to EPA. The permittee must submit the plan as an electronic attachment to the DMR. The file name of the electronic attachment must be as follows: YYYY_MM_DD_WA0050229_Mercury_Annual_Report_CS010, where YYYY_MM_DD is the date that the permittee submits the document.
6	56 months from the effective date of this permit	**Facility Planning** The permittee must develop a facility plan that evaluates alternatives to meet the final effluent limitations for mercury and select a preferred alternative. The facility plan will include a cost estimate for design and construction of the preferred alternative. If final effluent limitations are met through source reduction efforts, facility may submit supporting documentation instead of proceeding with compliance schedule requirements. Deliverable: The permit must submit the facility plan to EPA. The permittee must submit the plan as an electronic attachment to the DMR. The file name of the electronic attachment must be as follows: YYYY_MM_DD_WA0050229_Mercury_Facility_Plan_CS011, where YYYY_MM_DD is the date that the permittee submits the document.
7	68 months from the effective date of this permit	**Facility Funding** The permittee must acquire the funds necessary to complete all facility upgrades/changes in facility operations outlined in the facility plan required to meet the final effluent limitations for mercury by the end of this schedule. Deliverable: The permit must submit the funding plan to EPA. The permittee must submit the plan as an electronic attachment to the DMR. The file name of the electronic attachment must be as follows: YYYY_MM_DD_WA0050229_Mercury_Funding_Plan_CS011, where YYYY_MM_DD is the date that the permittee submits the document.

Task No.	Due By	Task Activity
8	80 months from the effective date of this permit	**Final Design** The permittee must complete design of the selected alternative for meeting the final mercury effluent limitations. Deliverable: The permit must submit the final design to EPA. The permittee must submit the plan as an electronic attachment to the DMR. The file name of the electronic attachment must be as follows: YYYY_MM_DD_WA0050229_Mercury_Final_Design_CS011, where YYYY_MM_DD is the date that the permittee submits the document.
9	86 months from the effective date of this permit	**Award Bid for Construction** Deliverable: The permit must submit a letter to EPA certifying that the facility has awarded a bid for construction for meeting the mercury effluent limits. The permittee must submit the plan as an electronic attachment to the DMR. The file name of the electronic attachment must be as follows: YYYY_MM_DD_WA0050229_Mercury_Construction_Bid _Certification_CS011, where YYYY_MM_DD is the date that the permittee submits the document.
10	94 months from the effective date of this permit	**Construction Complete** The permittee must complete construction to achieve the mercury effluent limitations. Deliverable: The permit must submit a letter to EPA certifying that the facility has completed construction for meeting the final mercury effluent limits. The permittee must submit the plan as an electronic attachment to the DMR. The file name of the electronic attachment must be as follows: YYYY_MM_DD_WA0050229_Mercury_Construction_ Complete_Certification_CS016, where YYYY_MM_DD is the date that the permittee submits the document.

Task No.	Due By	Task Activity
11	110 months from the effective date of the permit	**Meet Effluent Limitation for Mercury** Training and optimization of process such that compliance with the mercury effluent limitations are achieved. Deliverable: The permittee must provide written notice to EPA that the mercury effluent limitations are achieved. The permittee may submit the written notification as an electronic attachment to the DMR. The file name of the electronic attachment must be as follows: YYYY_MM_DD_WA0050229_Limits_FELMC_CS017, where YYYY_MM_DD is the date that the permittee submits the written notification.
Note: If compliance with the final mercury effluent limits is achieved sooner than the listed deadlines, the permittee may submit the supporting documentation earlier than the dates listed above. The permittee must provide written notice to EPA that the mercury limitations are achieved.		

B. NUTRIENT OPTIMIZATION PLAN

As described in the June 2022 Fact Sheet and draft permit, the City is required to complete a Nutrient Optimization Plan. EPA has revised this plan in the revised draft permit and is taking comment on the new version of the plan. The revisions provide clarification of the requirements of the plan and due dates for submittal.

The City must submit a complete Nutrient Optimization Plan within 48 months of the effective date of the permit, complete and submit a treatment process performance assessment within 18 months of the effective date of the permit and identify and submit the optimization strategy selected for implementation within 2 years of the effective date of the permit. The Nutrient Optimization Plan must evaluate and implement operational strategies for maximizing nitrogen and phosphorus removal from the existing treatment plant during the permit term. The plan must be submitted to EPA and the YN.

V. REFERENCES

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Wise, D.R., Zuroske, M.L., Carpenter, K.D., and Kiesling, R.L. 2009. Assessment of eutrophication in the Lower Yakima River Basin, Washington, 2004–07: U.S. Geological Survey Scientific Investigations Report 2009–5078. 108 p. https://pubs.usgs.gov/sir/2009/5078/pdf/sir20095078.pdf

Appendix A. **Facility Information**

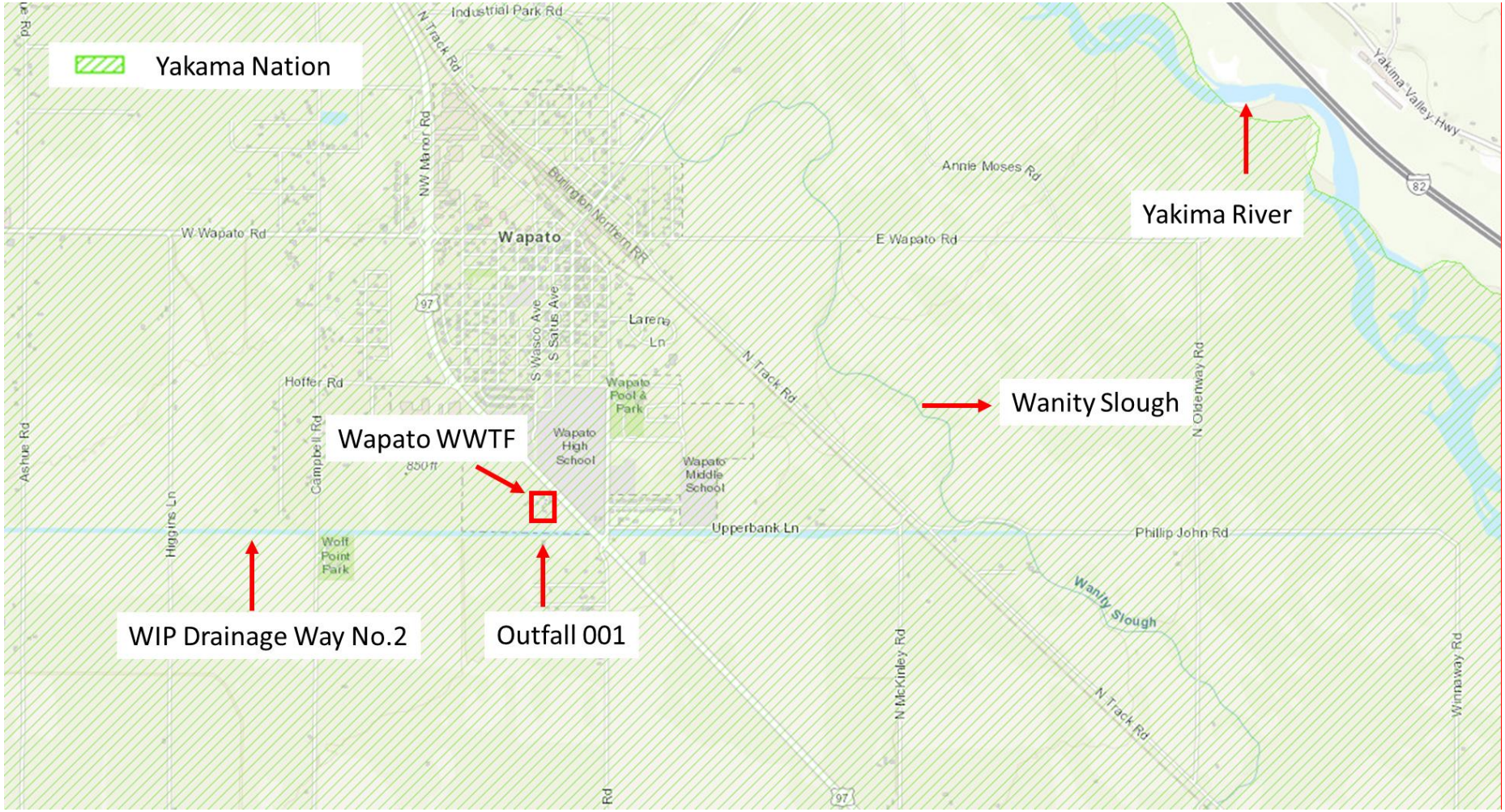

Figure 1 Wapato Area Map

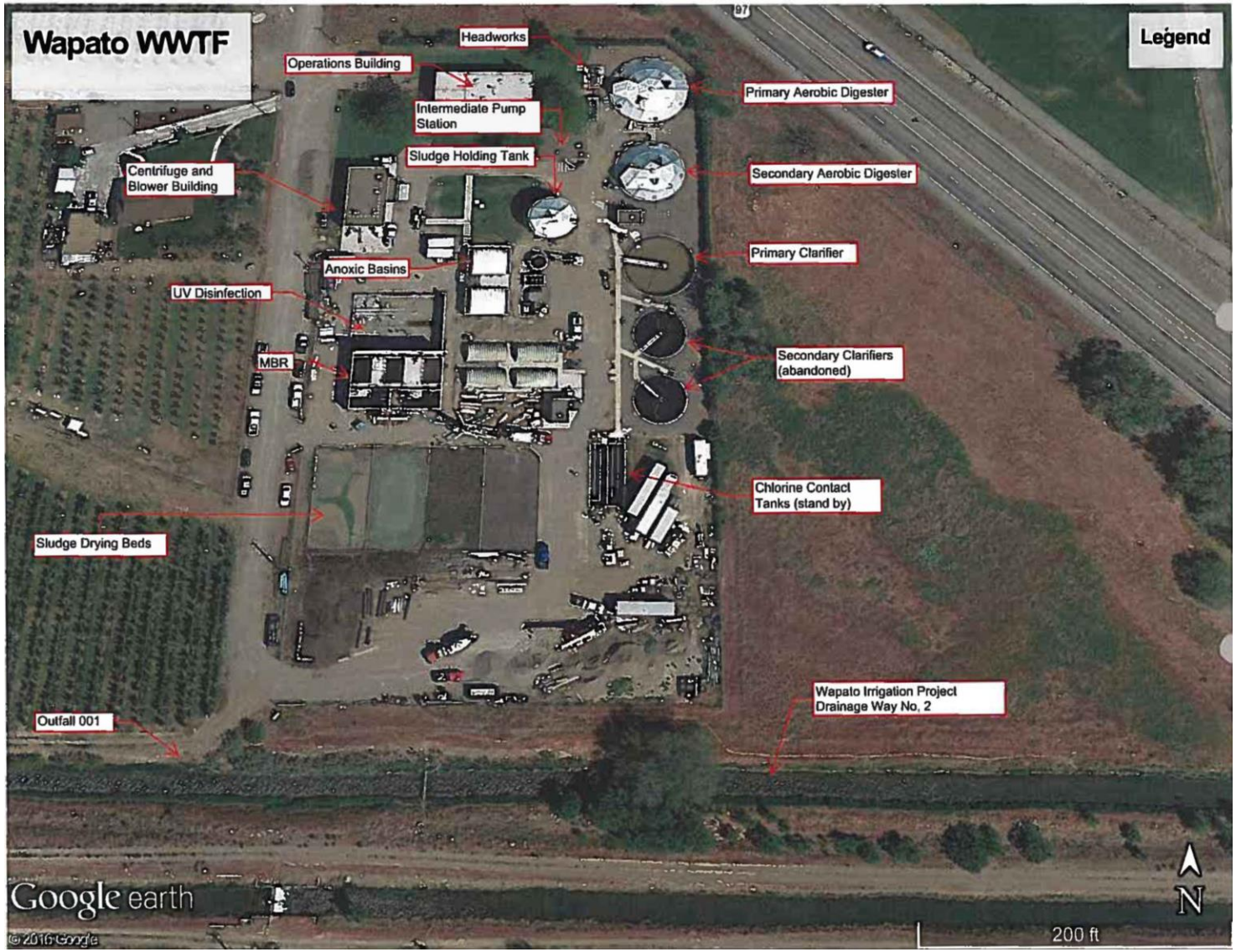

Figure 2 Facility Layout Diagram

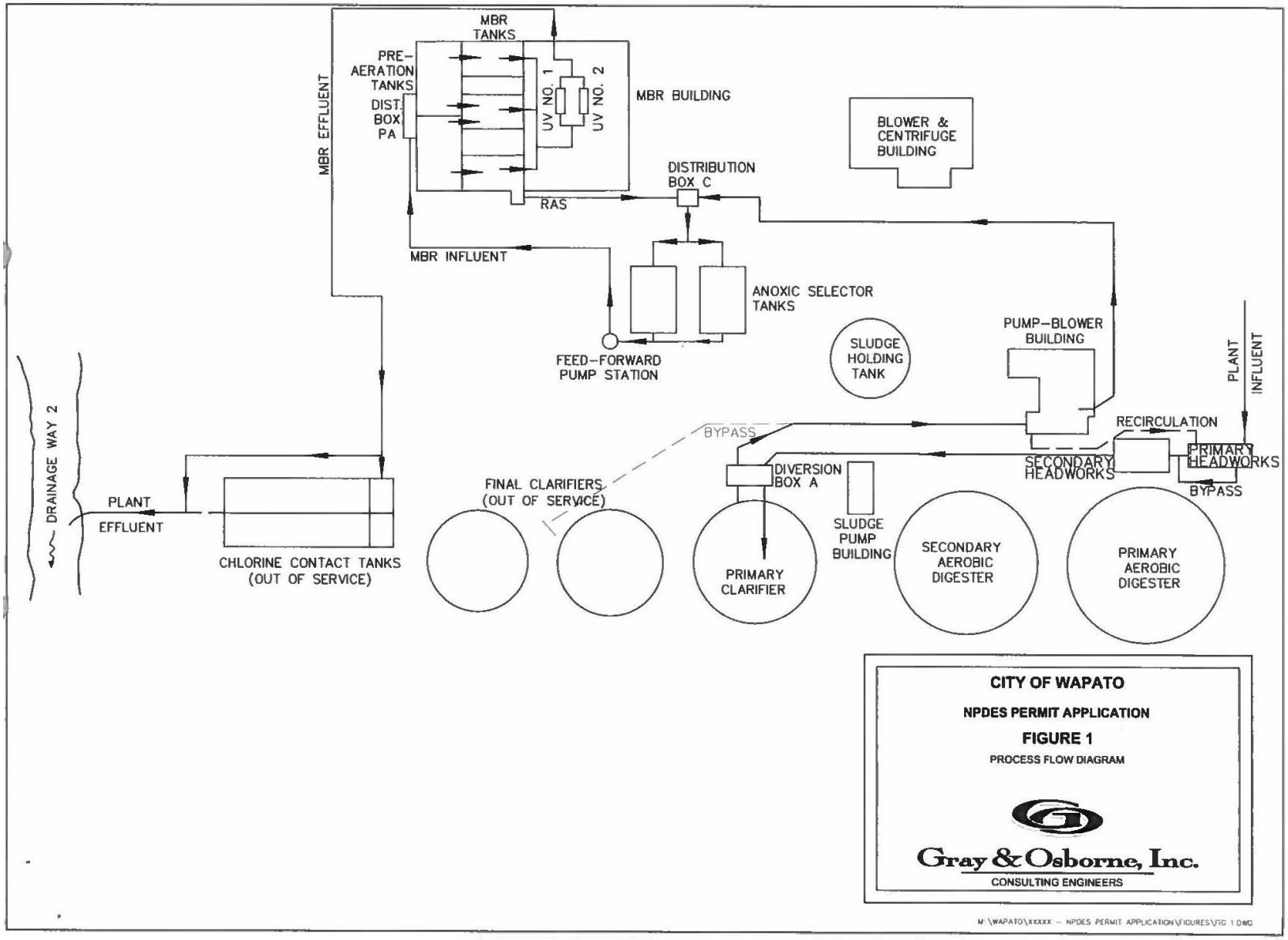

Figure 3 Process Flow Diagram

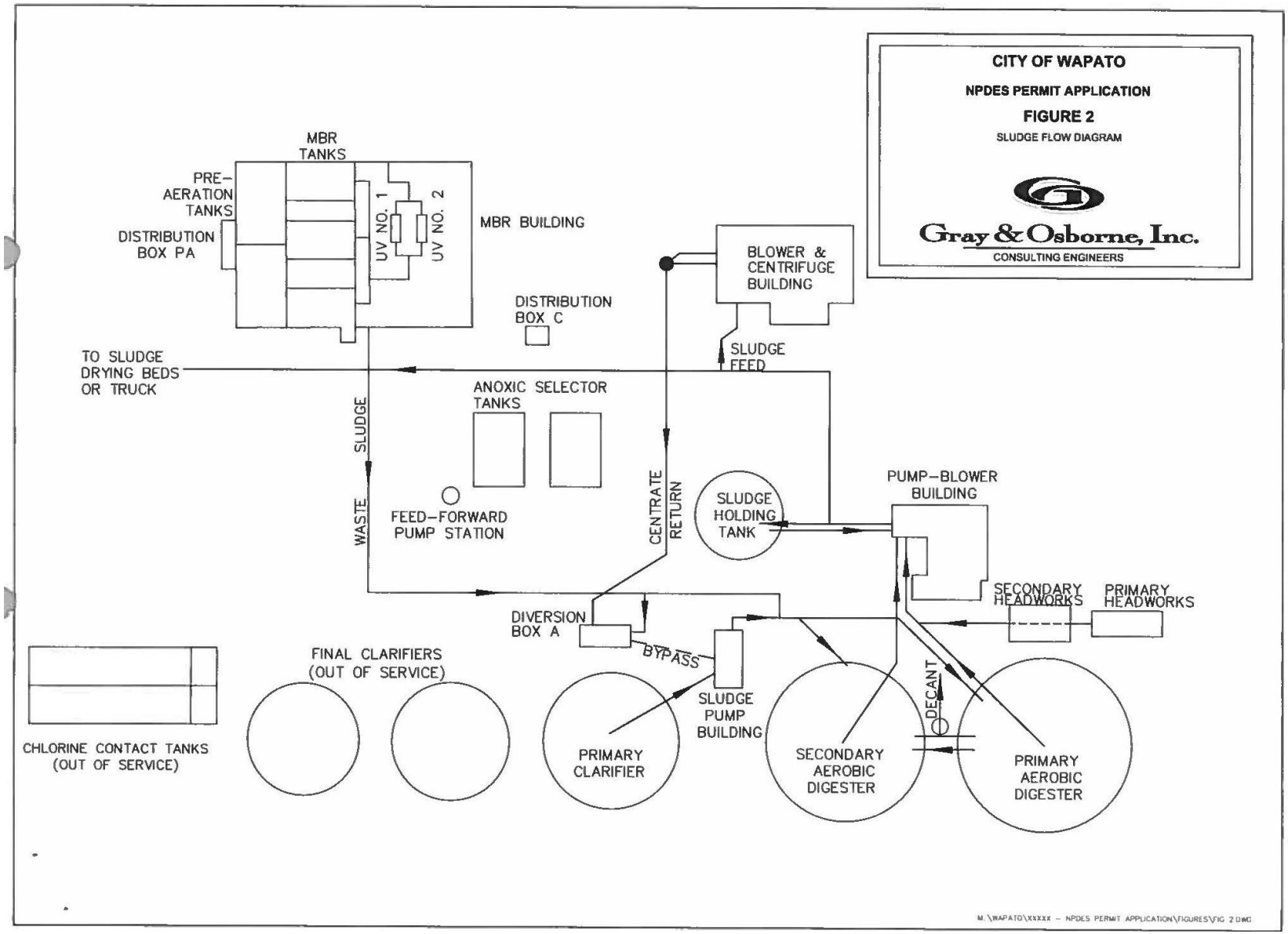

Figure 4 Sludge Flow Diagram

Appendix B. **Water Quality Data**

Treatment Plant Effluent Data

	BOD, 5-day, 20 deg. C					BOD, 5-day, percent removal	Cadmium, total recoverable	Copper, total recoverable			
	Effluent Gross		Raw Sewage Influent			Percent Removal	Effluent Gross	Effluent Gross			
	MO AVG		MO AVG	WKLY AVG		MO AV MN	MO MAX	DAILY MX		MO AVG	
Date	Milligrams per Liter	Pounds per Day	Milligrams per Liter	Milligrams per Liter	Pounds per Day	Percent	Micrograms per Liter	Micrograms per Liter	Pounds per Day	Micrograms per Liter	Pounds per Day
4/1/2017	0.73	3.1	242	0.9	4.2	99.6	0.3	4.4	0.02	3.33	0.01
5/1/2017	0.73	3.3	248	1.2	5	98	0.3	4.3	0.02	3.2	0.01
6/1/2017	0.52	2.8	206	0.8	4	98	0.3	2.8	0.02	2.56	0.01
7/1/2017											
8/1/2017	0.24	1.2	160	0.4	2	99	0.3	2.3	0.01	2.13	0.01
9/1/2017	0.78	5	187	1.6	11	99	0.3	2.7	0.02	2.54	0.02
10/1/2017	0.93	4.8	229	1.6	8	98.8	0.3	3.3	0.02	2.74	0.01
11/1/2017	0.1	0.4	215	0.1	0.5	99.9	0.3	3.7	0.02	2.77	0.01
12/1/2017	0.1	0.4	233	0.1	0.4	99.9	0.3	2.6	0.01	2.45	0.01
1/1/2018											
2/1/2018	1.4	6.5	261	3.5	16	98.7	0.3	2	0.01	2	0.01
3/1/2018	1.08	4.7	253	3.3	14	98.7	0.3	3.4	0.02	3.35	0.01
4/1/2018	1.05	4.9	246	1.2	5.7	99	0.3	2	0.01	2	0.01
5/1/2018	2.2	9.3	226	4.3	18	98	0.3	2	0.01	2	0.0009
6/1/2018	0.94	4.6	230	1	5	99	0.3	2	0.01	2	0.01
7/1/2018	0.64	3	199	1.2	5.8	96.6	0.3	2	0.01	2	0.01
8/1/2018	2.16	10.8	244	5	29	98	0.3	2.4	0.02	2.3	0.013
9/1/2018	1	5.9	219	1.5	7.6	99	0.3	2	0.01	2	0.01
10/1/2018	1.3	6.5	230	2.1	9	99		10.2	0.04	6.43	0.025
11/1/2018	3.29	15.1	208	7.35	35	96.9	0.3	4.8	0.02	4.75	0.02
12/1/2018	0.8	2.6	217	1.7	7.5	99	0.3	2.9	0.008	2.2	0.008
1/1/2019	0.82	3.4	209	2	8.34	99	0.3	5.3	0.02	3.44	0.014
2/1/2019	3.97	18.6	229	5.9	28	98.3	0.3	4.6	0.02	3.08	0.01
3/1/2019	1.33	6.6	251	2.1	10.5	99	0.3	2	0.01	2	0.01
4/1/2019	1.51	7.3	236	2.3	11.2	99	0.3	2	0.01	2	0.01
5/1/2019	1.86	8.4	230	3	14	98.8	0.3	6.6	0.03	2.9	0.01
6/1/2019	1.13	5.6	188	1.6	7.9	99		2	0.01	2	0.01
7/1/2019	2.37	10.1	203	4.5	23	98	0.3	2.9	0.002	2.52	0.00125
8/1/2019	1.73	9.5	208	4.2	22	98	0.3	2	0.012	2	0.0106
9/1/2019	3.15	19.8	218	4.35	24.4	98	0.3	3	0.02	2.33	0.013
10/1/2019	2.34	13.3	219	3.09	22	98.6	0.3	2.1	0.014	2.04	0.01

11/1/2019	0.9	3.6	215	1.8	6.67	99	0.3	2.3	0.001	2.09	0.001
12/1/2019	2.45	9.2	219	3.21	11.97	98.6	0.3	2	0.007	2	0.0065
1/1/2020	3.41	14.8	222	5.1	24	97.8	0.3	2	0.01	2	0.01
2/1/2020	2.65	13.4	214	3.7	19	98	0.3	2	0.01	2	0.01
3/1/2020	0.93	3.5	231	1.2	6	99	0.3	2	0.01	2	0.01
4/1/2020	1.25	6.8	241	2.61	13	98.8	0.3	2	0.01	2	0.0097
5/1/2020	2.31	11.9	249	3.9	19.5	98	0.3	2	0.01	2	0.01
6/1/2020	1.44	8.4	231	1.8	11.26	99.2	0.3	2	0.01	2	0.01
7/1/2020	4.48	28.5	230	5.16	33.4	98	0.3	2	0.01	2	0.01
8/1/2020	1.37	10.4	230	1.5	12.2	99.3	0.3	2	0.016	2	0.014
9/1/2020	1.1	8.7	141	1.98	15	98.6	0.3	2	0.02	2	0.02
10/1/2020	0.74	4.1	174	2.13	10.4	98.9	0.3	2	0.02	2	0.0125
11/1/2020	0.263	1.2	214	0.45	2.14	99.9	0.03	2	0.01	2	0.01
12/1/2020	1.5	5.9	244	2.55	10.6	98.9	0.3	2	0.01	2	0.008
1/1/2021	1.3	5.5	237	1.8	6.8	99.1	0.3	2	0.01	2	0.01
2/1/2021	1.77	8.2	223	2.9	12.5	98.6	0.3	2	0.01	2	0.01
3/1/2021	3.36	16.1	242	4.5	21	98.2	0.3	2	0.01	2	0.01
4/1/2021	2.45	11.7	231	4.17	18.4	98	0.3	2	0.01	2	0.0097
5/1/2021	1.76	8.4	238	2.7	13.4	98.9	0.3	2	0.01	2	0.01
6/1/2021	3.87	20.2	233	4.56	23	98	0.3	2	0.01	2	0.01
7/1/2021	3.5	17.9	224	7.3	35.4	97	0.9	2.4	0.01	2.13	0.01
8/1/2021	4.16	23.8	207	5.88	32.9	97.1	0.03	2	0.013	2	0.0115
9/1/2021	1.21	5.6	208	1.7	7.8	99	0.4	2	0.01	2	0.0092
10/1/2021	0.9	4.7	242	1.8	8.7	99	0.3	2	0.012	2	0.01
11/1/2021	1.05	4.8	257	1.71	8.24	99.3	0.4	2	0.01	2	0.01
12/1/2021	2.36	11.5	214	3.3	15.7	98.6	0.03	0.9	0.004	0.9	0.004
1/1/2022	1.62	7.2	225	2.28	10.4	99	0.3	2	0.01	1.5	0.008
2/1/2022	2.36	11	236	3.3	14.9	98	0.3	4	0.02	2.31	0.01
3/1/2022											
Average	**1.696**	**8.500**	**223.088**	**2.752**	**13.742**	**98.589**	**0.300**	**2.665**	**0.013**	**2.316**	**0.010**
Minimum	**0.1**	**0.4**	**141**	**0.1**	**0.4**	**96.6**	**0.03**	**0.9**	**0.001**	**0.9**	**0.0009**
Maximum	**4.48**	**28.5**	**261**	**7.35**	**35.4**	**99.9**	**0.9**	**10.2**	**0.04**	**6.43**	**0.025**
Count	**57**	**57**	**57**	**57**	**57**	**57**	**55**	**57**	**57**	**57**	**57**
Std Dev	**1.07262576**	**5.87513344**	**22.31063054**	**1.68678456**	**8.79597142**	**0.699544767**	**0.104333223**	**1.427240157**	**0.006537766**	**0.779653584**	**0.003925602**
CV	**0.63250332**	**0.69119217**	**0.100008331**	**0.61286793**	**0.64005818**	**0.007095532**	**0.347988313**	**0.535567406**	**0.490978463**	**0.3366941**	**0.379349479**
95th	**3.989**	**20.56**	**253.4**	**6.04**	**33.56**	**99.9**	**0.4**	**5.43**	**0.021**	**3.571**	**0.02**
5th	**0.226**	**1.12**	**172.6**	**0.37**	**1.85**	**96.99**	**0.03**	**2**	**0.0038**	**1.95**	**0.001225**
90th	**3.428**	**18.04**	**248.2**	**5.112**	**28.2**	**99.3**	**0.3**	**4.44**	**0.02**	**3.226**	**0.014**
50th	**1.37**	**6.8**	**229**	**2.28**	**11.26**	**98.8**	**0.3**	**2.00**	**0.01**	**2**	**0.01**

	E. coli, MTEC-MF		Flow, in conduit or thru treatment plant		Mercury, total recoverable	Nitrogen, ammonia total [as N]			
	Effluent Gross		Effluent Gross		Effluent Gross	Effluent Gross			
	DAILY MX	MO AVG	DAILY MX	MO AVG	MO MAX	DAILY MX		MO AVG	
Date	Number per 100 Milliliters	Number per 100 Milliliters	Million Gallons per Day	Million Gallons per Day	Micrograms per Liter	Milligrams per Liter	Pounds per Day	Milligrams per Liter	Pounds per Day
4/1/2017	1	1	0.546	0.495		1.05	4.9	0.6	2.7
5/1/2017	1	1	0.587	0.492	0.00110	0.886	3.7	0.62	2.7
6/1/2017	1	1	0.714	0.612		1.02	5.4	0.7	3.4
7/1/2017									
8/1/2017	1	1	0.889	0.715		1.2	6.9	0.65	3.8
9/1/2017	1	1	0.838	0.73		0.862	5.7	0.26	1.8
10/1/2017	1	1	0.643	0.55	0.00180	0.461	2.3	0.16	0.8
11/1/2017	1	1	0.584	0.495		0.921	3.7	0.24	1
12/1/2017	1	1	0.709	0.512		0.107	0.4	0.07	0.3
1/1/2018									
2/1/2018	1	1	0.575	0.518		0.192	0.9	0.12	0.6
3/1/2018	1	1	0.577	0.51		0.675	3.1	0.21	0.9
4/1/2018	1	1	0.601	0.507	0.01800	0.172	0.4	0.08	0.34
5/1/2018	2	1.15	0.577	0.47		0.08	0.3	0.03	0.1
6/1/2018	2	1.15	0.798	0.594	0.00180	0.04	0.2	0.03	0.12
7/1/2018	2	1.15	0.699	0.597	0.00690	0.08	0.4	0.06	0.3
8/1/2018	2	1.15	0.854	0.656		0.15	0.8	0.1	0.56
9/1/2018	2	1.15	0.883	0.705		0.79	5.3	0.34	2.2
10/1/2018	2	1.15	0.621	0.535		0.181	0.8	0.09	0.4
11/1/2018	1	1	0.593	0.508		0.07	0.32	0.05	0.21
12/1/2018	2	1.15	0.576	0.449	0.00014	0.77	0.3	0.46	0.22
1/1/2019	2	1.15	0.56	0.489		0.05	0.195	0.04	0.162
2/1/2019	3	1.43	0.736	0.502		0.984	5.2	0.41	2.03
3/1/2019	2	1.32	0.613	0.514	0.00110	0.477	2.4	0.19	0.9
4/1/2019	2	1.32	0.62	0.545		0.421	2	0.33	1.55
5/1/2019	2	1.52	0.608	0.524		0.1	0.1	0.07	0.3
6/1/2019	2	1.68	0.686	0.573	0.00190	0.128	0.5	0.08	0.325
7/1/2019	2	1.74	0.716	0.613		0.067	0.3	0.06	0.275
8/1/2019	1	1	0.787	0.682	0.00560	0.08	0.4	0.05	0.26
9/1/2019	2	1.32	0.919	0.769		0.072	0.5	0.05	0.3
10/1/2019	1	1	0.933	0.644		0.05	0.28	0.04	0.23

11/1/2019	2	1.32	0.769	0.484	0.00098	0.044	0.181	0.03	0.147
12/1/2019	2	1.41	0.505	0.436		0.044	0.171	0.04	0.146
1/1/2020	2	1.32	0.635	0.561		0.057	0.28	0.04	0.168
2/1/2020	1	1	0.624	0.553	0.001	0.033	0.17	0.02	0.09
3/1/2020	2	1.322	0.623	0.556		0.152	0.188	0.06	0.123
4/1/2020	2	1.32	0.662	0.573		0.443	2.2	0.32	0.15
5/1/2020	2	1.52	0.665	0.59	0.0011	0.09	0.4	0.06	0.3
6/1/2020	2	1.32	0.754	0.659		0.045	0.28	0.04	0.23
7/1/2020	2	1.52	0.788	0.729		0.044	0.28	0.03	0.21
8/1/2020	2	1.41	1.02	0.867	0.0011	0.4	2.8	0.11	0.78
9/1/2020	2	1.41	1.02	0.922		0.044	0.4	0.04	0.3
10/1/2020	2	1.74	0.914	0.698		0.093	0.65	0.04	0.264
11/1/2020	2	1.68	0.602	0.536	0.0011	0.061	0.28	0.04	0.19
12/1/2020	2	1.52	0.695	0.513		0.113	0.5	0.09	0.37
1/1/2021	3	1.89	0.562	0.503		0.049	0.2	0.04	0.15
2/1/2021	2	1.41	0.63	0.522		0.042	0.2	0.02	0.11
3/1/2021	2	1.15	0.636	0.541	0.0013	0.861	4.1	0.7	3.3
4/1/2021	2	1.52	0.792	0.562		0.063	0.3	0.06	0.3
5/1/2021	2	1.41	0.613	0.532		0.06	0.3	0.04	0.19
6/1/2021	1	1	0.663	0.594		0.512	2.7	0.34	1.7
7/1/2021	2	1.52	0.7	0.604	0.0011	0.081	0.4	0.06	0.3
8/1/2021	2	1.41	0.767	0.652		0.046	0.26	0.04	0.23
9/1/2021	2	1.15	0.924	0.732	0.0015	0.061	0.3	0.04	0.19
10/1/2021	2	1.15	0.731	0.609		0.047	0.2	0.04	0.2
11/1/2021	2	1.41	0.629	0.519	0.0011	0.048	0.2	0.04	0.185
12/1/2021	2	1.32	0.569	0.475		0.089	0.4	0.06	0.27
1/1/2022	2	1.32	0.658	0.529		0.082	0.4	0.06	0.3
2/1/2022	1	1	0.624	0.538		0.067	0.3	0.05	0.225
3/1/2022									
Average	**1.737**	**1.263**	**0.699**	**0.581**	**0.003**	**0.279**	**1.346**	**0.153**	**0.700**
Minimum	**1**	**1**	**0.505**	**0.436**	**0.00014**	**0.033**	**0.1**	**0.02**	**0.09**
Maximum	**3**	**1.89**	**1.02**	**0.922**	**0.018**	**1.2**	**6.9**	**0.700**	**3.8**
Count	**57**	**57**	**57**	**57**	**18**	**57**	**57**	**57**	**57**
Std Dev	**0.513888369**	**0.233976415**	**0.124276729**	**0.099000418**	**0.004453369**	**0.33654701**	**1.77796434**	**0.187357743**	**0.916897113**
CV	**0.295875122**	**0.185226183**	**0.177912738**	**0.170515013**	**1.369799192**	**1.205958355**	**1.320700689**	**1.221898326**	**1.309853019**
95th	**2.1**	**1.74**	**0.9417**	**0.7788**	**#NUM!**	**1.023**	**5.43**	**0.6550**	**3.31**
5th	**1**	**1**	**0.5586**	**0.4679**	**#NUM!**	**0.0418**	**0.1709**	**0.029**	**0.109**
90th	**2**	**1.552**	**0.915**	**0.7292**	**0.0117**	**0.893**	**4.96**	**0.488**	**2.3**
50th	**2**	**1.32**	**0.662**	**0.55**	**0.0012**	**0.089**	**0.4**	**0.060**	**0.3**

	Nitrogen, total [as N]	Oxygen, dissolved [DO]	pH		Phosphorus, total [as P]	Solids, suspended percent removal	Solids, total suspended			
	Effluent Gross	Effluent Gross	Effluent Gross		Effluent Gross	Percent Removal	Effluent Gross		Raw Sewage Influent	
	MO MAX	MO MIN	INST MAX	INST MIN	MO MAX	MO AV MN	MO AVG		MO AVG	WKLY AVG
Date	Milligrams per Liter	Milligrams per Liter	Standard Units	Standard Units	Milligrams per Liter	Percent	Milligrams per Liter	Pounds per Day	Milligrams per Liter	Milligrams per Liter
4/1/2017	3.85	7.9	7.6	6.9	5.13	99	1.75	8.25	223.5	2
5/1/2017	3.26	6.2	7.5	7.0	5.25	99	1.5	7	258.3	2
6/1/2017	2.42	6.1	7.5	6.7	3.19	99	2.2	11.4	223.8	3
7/1/2017										
8/1/2017	0.3	5.8	7.8	7.0	3.71	99	1	7	226.6	1
9/1/2017	10.1	6.2	7.5	7.2	3.9	97	3	18.3	220.5	8
10/1/2017	10.3	6.6	7.7	7.2	3.88	98.6	1.5	7.5	227	3
11/1/2017	10.2	7.7	7.7	6.9		98.7	2.2	9.4	211.2	3
12/1/2017	4.9	7.9	7.5	7.0	3.52	99	1.25	5.75	226.5	2
1/1/2018										
2/1/2018	3.4	7.9	7.5	7.0	5.36	98	1.75	8.25	265.5	3
3/1/2018	2.28	7.8	7.7	7.1	3.87	99	1.6	7.4	283.6	2
4/1/2018	0.9	7.1	7.3	6.9	3.07	98	3.3	14.4	377	5
5/1/2018	1.28	7.2	7.4	7.0	2.53	96.2	4.4	19.8	289	19.8
6/1/2018	2.1	7.1	7.4	7.1	7.1	98.4	1.8	9.6	247	4
7/1/2018	2.3	6.1	7.7	7.0	1.32	99.3	1.3	7	278	2
8/1/2018	2.9	6.8	7.8	6.9	3.17	99	1.9	10.3	271	2.7
9/1/2018	7.48	7.2	7.4	6.8	2.71	98	3.9	24	413	6.8
10/1/2018		7	7.6	7.0		99.2	1.5	7.08	235	2.8
11/1/2018	21.5	7.3	7.4	6.9	3.97	99.2	2.08	9.48	439.6	3.45
12/1/2018	10.6	7.4	7.4	7.0	7.59	99	1.49	6.28	283	2.6
1/1/2019	4.04	8.3	7.5	7.0	3.3	94.7	1.59	6.71	365.8	2.13
2/1/2019	2.88	7.2	7.8	7.0	2.43	98.8	2.77	12.6	316	3.5
3/1/2019	2.44	7.4	7.4	7.0	3.68	98	4.5	21.7	271.5	7
4/1/2019	2.96	6.8	7.9	7.0	0.76	98.8	2.2	10.58	291	3.3
5/1/2019	3.3	7.4	7.4	7.0	0.28	98.6	3.14	14	375	5
6/1/2019		8	7.4	7.0		98	2.6	12.7	375	5
7/1/2019	8.62	6.6	7.8	7.0	21.1	98	1.45	7.54	313	2.6
8/1/2019	5.29	8	7.9	7.0	3.67	98	3.16	18.9	384	8.8
9/1/2019	5.78	6.8	7.7	7.1	2.85	99.5	1.49	9.83	354.5	2.2
10/1/2019	5.42	7.1	7.4	7.0	3.22	98.6	1.6	9.56	485.6	2.22

11/1/2019	5.4	8	7.8	6.7	3.2	97.8	2.97	12.99	273.5	5
12/1/2019	3.4	6.1	7.4	7.1	2.36	99.4	1.76	6.7	464	2.5
1/1/2020	2.95	7.1	7.5	7.0	1.43	99.1	1.5	7.26	429.8	2.22
2/1/2020	2.99	7.3	7.4	6.9	0.66	99	1.36	6.73	308.5	2.2
3/1/2020	2.91	7.5	7.3	7.0	0.62	98	2.31	11.26	329.3	4.08
4/1/2020	2.48	6.6	7.3	7.0	2.06	98.6	1.94	9.69	428.1	2.5
5/1/2020	1.9	7.1	7.4	7.0	0.35	98	1.69	8.77	235	2.4
6/1/2020	1.81	6.9	7.2	6.9	0.32	99.4	1.85	10.52	505.3	2.5
7/1/2020	1.91	8	7.2	7.0	1.19	99.3	1.85	11.86	380.6	2.66
8/1/2020	2.37	7.6	7.4	7.0	1.35	98.8	2.3	18.05	310	4.2
9/1/2020	3.48	7	7.4	7.0	0.28	99	2.1	17.4	291.3	2.5
10/1/2020	4.81	7.2	7.4	7.0	4.27	97.9	2.6	16.01	204.6	4
11/1/2020	3.8	8	7.4	7.0	3.28	99.3	2.32	10.92	357.1	3.33
12/1/2020	0.5	7.7	7.2	7.0	2.68	98	3.04	11.9	243	5
1/1/2021	3.6	8.8	7.3	7.0	2.18	98.8	2.25	9.25	382.5	3.6
2/1/2021	1.84	7.9	7.4	7.0	2.16	98	3.15	14.9	259	4.3
3/1/2021	1.45	7.6	7.6	7.1	0.42	99.4	1.75	8.49	499.3	3.33
4/1/2021	2.7	7	7.6	7.0	2.73	99.2	1.75	8.64	342.2	2.35
5/1/2021	2.72	6.8	8.1	6.8	0.99	97.5	3.9	18.7	340	8
6/1/2021	3.82	7.1	7.6	7.0	2.63	92.5	10.3	53.65	361.4	30
7/1/2021	2.4	7.9	7.6	7.0	0.36	99	2.8	14.5	424	5
8/1/2021	3.36	8.1	7.7	6.9	0.76	98.2	2.4	14.05	307	3.53
9/1/2021	1.02	7.8	7.6	7.1	0.12	99	1.86	8.68	254	3.2
10/1/2021	0.58	7.9	7.2	6.8	0.36	99	1.8	8.5	282.3	3
11/1/2021	2.88	8.1	7.4	6.8	2.15	98.7	2.12	9.57	316	2.5
12/1/2021	2.1	8.1	7.2	6.9	1.28	98.7	1.86	9.08	330.4	3
1/1/2022	6.24	7.9	7.2	7.0	2.15	98.8	7.2	8.68	371	3.3
2/1/2022	5.06	8	7.2	7.0	0.67	99	2.1	9.6	281.8	3.2
3/1/2022										
Average	**4.023**	**7.333**	**7.502**	**6.977**	**2.844**	**98.439**	**2.434**	**11.906**	**320.026**	**4.268**
Minimum	**0.3**	**5.8**	**7.2**	**6.7**	**0.12**	**92.5**	**1**	**5.75**	**204.6**	**1**
Maximum	**21.5**	**8.8**	**8.1**	**7.2**	**21.1**	**99.5**	**10.3**	**53.65**	**505.3**	**30**
Count	**55**	**57**	**57**	**57**	**54**	**57**	**57**	**57**	**57**	**57**
Std Dev	**3.418979143**	**0.646266832**	**0.20561523**	**0.09736447**	**3.024926333**	**1.13751875**	**1.45742256**	**6.989**	**77.330**	**4.354**
CV	**0.849800492**	**0.088127295**	**0.02740895**	**0.01395468**	**1.06365841**	**0.011555617**	**0.598724943**	**0.587**	**0.242**	**1.020**
95th	**10.36**	**8.12**	**7.9**	**7.11**	**7.2225**	**99.4**	**4.77**	**21.93**	**486.97**	**9.9**
5th	**0.564**	**6.1**	**7.2**	**6.79**	**0.28**	**96.05**	**1.295**	**6.658**	**219.57**	**2**
90th	**9.212**	**8.02**	**7.8**	**7.1**	**5.19**	**99.3**	**3.9**	**18.74**	**431.76**	**7.2**
50th	**2.96**	**7.3**	**7.4**	**7**	**2.58**	**98.8**	**2.08**	**9.6**	**308.5**	**3**

		Temperature, water deg. centigrade	Toxicity [acute], Ceriodaphnia dubia		Pimephales promelas [Fathead Minnow]		Zinc, total recoverable			
		Effluent Gross	See Comments		Toxicity [acute],		Effluent Gross			
		DAILY MX	DAILY MX	MO AVG	DAILY MX	MO AVG	DAILY MX		MO AVG	
Date	Pounds per Day	Degrees Centigrade	Toxicity Units	Toxicity Units	Toxicity Units	Toxicity Units	Micrograms per Liter	Pounds per Day	Micrograms per Liter	Pounds per Day
4/1/2017	10	18	1	1	1	1	126	0.6	94.25	0.4
5/1/2017	11	22					77.5	0.3	69.88	0.3
6/1/2017	18	23	1	1	1	1	94.5	0.6	69.2	0.4
7/1/2017										
8/1/2017	9	25					94	0.5	67.9	0.4
9/1/2017	48	23					58	0.4	57.7	0.4
10/1/2017	15	20	1	1	1	1	65.5	0.3	61.63	0.3
11/1/2017	14	18					78.5	0.4	71.9	0.3
12/1/2017	9	15	1	1	1	1	74.5	0.4	65	0.3
1/1/2018										
2/1/2018	14	15					76.5	0.4	63.75	0.3
3/1/2018	10	16	1	1	1	1	114	0.5	72.1	0.3
4/1/2018	21	20					73	0.4	62.4	0.325
5/1/2018	53	20					148	0.7	117.6	0.5
6/1/2018	22	22			1	1	126	0.6	67.4	0.3
7/1/2018	12	25	1	1			58	0.3	56	0.27
8/1/2018	15.7	26					63.5	0.3	53.2	0.3
9/1/2018	42	22					53	0.3	45.1	0.25
10/1/2018	13	20	1	1	1	1	61.5	0.3	57	0.25
11/1/2018	15.8	20					189	0.8	136.5	0.6
12/1/2018	11.6	16					105	3.9	74	2.88
1/1/2019	9.3	14					91.5	3.96	63.16	2.6
2/1/2019	15.4	14					154	0.6	100.5	0.44
3/1/2019	34	15					97	4.8	77.3	3.8
4/1/2019	15.6	19					168	0.8	88.4	0.42
5/1/2019	24	21					75	3.2	63	2.8
6/1/2019	24	21					62	0.33	60.6	0.31
7/1/2019	13.7	23					68	0.03	51.75	0.0225
8/1/2019	56	25					51	0.3	43.9	0.026
9/1/2019	15	23					42.4	0.3	39.53	0.26
10/1/2019	16.27	20					63.5	0.305	45.76	0.256

11/1/2019	24.5	18					62.5	0.03	55.25	0.225
12/1/2019	10.4	15					87	0.3	70.7	0.24
1/1/2020	11.39	15					106	0.5	61.9	0.3
2/1/2020	10.7	16					49.4	0.2	45.8	0.2
3/1/2020	20	17					51.1	0.245	48.96	0.235
4/1/2020	12.62	18					53.5	0.25	41.64	0.2
5/1/2020	12.3	17					54.5	0.3	49.4	0.25
6/1/2020	13	22					62.5	0.39	49.3	0.27
7/1/2020	16.8	23					54	0.33	48.16	0.29
8/1/2020	34.7	24					58.5	0.48	42.1	0.33
9/1/2020	20	21					31.6	0.26	30.7	0.25
10/1/2020	26.9	21.8					51.5	0.36	45.8	0.3
11/1/2020	15.42	18					120	0.57	74.1	0.3
12/1/2020	17	18.1					124	0.5	90.1	0.36
1/1/2021	13.5	15.1					94.5	0.4	82.6	0.325
2/1/2021	21	14.5					74	0.36	61.25	0.29
3/1/2021	16.2	17					64	0.33	56.7	0.275
4/1/2021	12	16.5					128	0.6	96	0.47
5/1/2021	39.6	21.9					81	0.4	67	0.35
6/1/2021	156.6	24.7					56.5	0.3	49.6	0.25
7/1/2021	26	24.8					62	0.3	52.6	0.3
8/1/2021	19.93	27					48.8	0.27	34	0.195
9/1/2021	14.7	22					62.5	0.3	44.34	0.22
10/1/2021	16	19					75.5	0.36	56.5	0.29
11/1/2021	11.07	18	1	1	1	1	69	0.3	55	0.25
12/1/2021	15	16.8					50	0.2	45.06	0.2
1/1/2022	15.3	17.1					51	0.2	50	0.2
2/1/2022	14	14.4					60	0.3	50.25	0.23
3/1/2022										
Average	**21.474**	**19.539**	**1.000**	**1.000**	**1.000**	**1.000**	**79.847**	**0.631**	**62.302**	**0.484**
Minimum	**9**	**14**	**1**	**1**	**1**	**1**	**31.6**	**0.03**	**30.7**	**0.0225**
Maximum	**156.6**	**27**	**1**	**1**	**1**	**1**	**189**	**4.8**	**136.5**	**3.8**
Count	**57**	**57**	**8**	**8**	**8**	**8**	**57**	**57**	**57**	**57**
Std Dev	**20.937**	**3.509**	**0.000**	**0.000**	**0.000**	**0.000**	**32.912**	**0.941**	**19.622**	**0.713**
CV	**0.975**	**0.180**	**0.000**	**0.000**	**0.000**	**0.000**	**0.412**	**1.491**	**0.315**	**1.473**
95th	**53.3**	**25.1**	**1**	**1**	**1**	**1**	**155.4**	**3.906**	**102.21**	**2.808**
5th	**9.27**	**14.36**	**1**	**1**	**1**	**1**	**48.16**	**0.183**	**38.977**	**0.1781**
90th	**40.08**	**24.84**	**1**	**1**	**1**	**1**	**126.4**	**0.8**	**90.93**	**0.52**
50th	**15.42**	**20**	**1**	**1**	**1**	**1**	**68**	**0.36**	**57.7**	**0.3**

Receiving Water Data

Upstream

	Receiving water (cfs)	BOD (mg/L)	TSS (mg/L)	DO (mg/L)	Phosphorus (mg/L)	Nitrogen (mg/L)	Temp (°C)	PH (S.U)	Hardness (mg/L)
Average	121.5	2.0	9.3	9.2	0.07	0.57	18.1	7.9	45.5
Minimum	20.0	0.1	1.0	8.0	0.05	0.10	9.1	7.0	24.0
5th percentile	29.0	0.5	1.0	8.1	0.07	0.15	12.5	7.2	24.0
95th percentile	205.0	5.7	21.0	10.6	0.09	1.43	23.1	9.1	77.8
Count	660	130	53	132	35	35	659	69	34

Downstream

	Receiving water (cfs)	BOD (mg/L)	TSS (mg/L)	DO (mg/L)	Phosphorus (mg/L)	Nitrogen (mg/L)	Temp (°C)	PH (S.U)	Hardness (mg/L)
Average	121.5	1.8	8.4	9.3	0.11	0.57	18.0	7.7	45.8
Minimum	20.0	0.1	1.0	8.0	0.07	0.16	9.1	6.4	28.0
5th percentile	28.5	0.2	1.0	8.2	0.07	0.17	12.7	7.2	29.4
95th percentile	205.0	5.4	22.8	10.8	0.44	1.26	22.8	8.8	77.3
Count	659	130	44	138	34	35	660	64	33

Appendix C. **Reasonable Potential and WQBEL Formulae**

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.

1. Mass Balance

For discharges to flowing water bodies, the maximum projected receiving water concentration is determined using the following mass balance equation:

$$C_d Q_d = C_e Q_e + C_u Q_u \qquad \textit{Equation 1}$$

where,

C_d	=	Receiving water concentration downstream of the effluent discharge (that is, the concentration at the edge of the mixing zone)
C_e	=	Maximum projected effluent concentration
C_u	=	95th percentile measured receiving water upstream concentration
Q_d	=	Receiving water flow rate downstream of the effluent discharge = Q_e+Q_u
Q_e	=	Effluent flow rate (set equal to the design flow of the WWTP)
Q_u	=	Receiving water low flow rate upstream of the discharge (1Q10, 7Q10 or 30B3)

When the mass balance equation is solved for C_d, it becomes:

$$C_d = \frac{C_e \times Q_e + C_u \times Q_u}{Q_e + Q_u} \qquad \textit{Equation 2}$$

The above form of the equation assumes that the discharge is rapidly and completely mixed with 100% of the receiving stream.

If the mixing zone is based on less than complete mixing with the receiving water, the equation becomes:

$$C_d = \frac{C_e \times Q_e + C_u \times (Q_u \times \%MZ)}{Q_e + (Q_u \times \%MZ)} \qquad \textit{Equation 3}$$

Where:

% MZ = the percentage of the receiving water flow available for mixing.

If a mixing zone is not allowed, dilution is not considered when projecting the receiving water concentration and,

$$C_d = C_e \qquad \textit{Equation 4}$$

A dilution factor (D) can be introduced to describe the allowable mixing. Where the dilution factor is expressed as:

$$D = \frac{Q_e + Q_u \times \%MZ}{Q_e} \qquad \textit{Equation 5}$$

After the dilution factor simplification, the mass balance equation becomes:

$$C_d = \frac{C_e - C_u}{D} + C_u \qquad \textit{Equation 6}$$

If the criterion is expressed as dissolved metal, the effluent concentrations are measured in total recoverable metal and must be converted to dissolved metal as follows:

$$C_d = \frac{CF \times C_e - C_u}{D} + C_u \qquad \textit{Equation 7}$$

Where C_e is expressed as total recoverable metal, C_u and C_d are expressed as dissolved metal, and CF is a conversion factor used to convert between dissolved and total recoverable metal.

The above equations for C_d are the forms of the mass balance equation which were used to determine reasonable potential and calculate wasteload allocations.

2. 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 (see equation 3, page C-5). 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.

$$p_n = (1 - \text{confidence level})^{1/n} \qquad \textit{Equation 8}$$

where,

p_n = the percentile represented by the highest reported concentration

n = the number of samples

confidence level = 99% = 0.99

and

$$RPM = \frac{C_{99}}{C_{P_n}} = \frac{e^{Z_{99} \times \sigma - 0.5 \times \sigma^2}}{e^{Z_{P_n} \times \sigma - 0.5 \times \sigma^2}} \qquad \textit{Equation 9}$$

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:

$$C_e = (RPM)(MRC) \qquad \textit{Equation 10}$$

where MRC = Maximum Reported Concentration

3. 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.

4. 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.

B. WQBEL Calculations

1. Calculate the Wasteload Allocations (WLAs)

   Wasteload allocations (WLAs) are calculated using the same mass balance equations used to calculate the concentration of the pollutant at the edge of the mixing zone in the reasonable potential analysis. To calculate the wasteload allocations, C_d is set equal to the acute or chronic criterion and the equation is solved for C_e. The calculated C_e is the acute or chronic WLA. Equation 6 is rearranged to solve for the WLA, becoming:

$$C_e = WLA = D \times (C_d - C_u) + C_u \qquad \textit{Equation 11}$$

   Some quality criteria for some metals are expressed as the dissolved fraction, but the Federal regulation at 40 CFR 122.45(c) requires that effluent limits be expressed as total recoverable metal. Therefore, EPA must calculate a wasteload allocation in total recoverable metal that will be protective of the dissolved criterion. This is accomplished by dividing the WLA expressed as dissolved by the

criteria translator, as shown in equation __. As discussed in Appendix ___, the criteria translator (CT) is equal to the conversion factor, because site-specific translators are not available for this discharge.

$$C_e = WLA = \frac{D \times (C_d - C_u) + C_u}{CT}$$ *Equation 12*

The next step is to compute the "long term average" concentrations which will be protective of the WLAs. This is done using the following equations from EPA's *Technical Support Document for Water Quality-based Toxics Control* (TSD):

$$LTA_a = WLA_a \times e^{(0.5\sigma^2 - z\,\sigma)}$$ *Equation 13*

$$LTA_c = WLA_c \times e^{(0.5\sigma_4^2 - z\sigma_4)}$$ *Equation 14*

where,

σ^2 = $\ln(CV^2 + 1)$

Z_{99} = 2.326 (z-score for the 99th percentile probability basis)

CV = coefficient of variation (standard deviation ÷ mean)

σ_4^2 = $\ln(CV^2/4 + 1)$

For ammonia, because the chronic criterion is based on a 30-day averaging period, the Chronic Long Term Average (LTAc) is calculated as follows:

$$LTA_c = WLA_c \times e^{(0.5\sigma_{30}^2 - z\sigma_{30})}$$ *Equation 15*

where,

σ_{30}^2 = $\ln(CV^2/30 + 1)$

The LTAs are compared and the more stringent is used to develop the daily maximum and monthly average permit limits as shown below.

2. Derive the maximum daily and average monthly effluent limits

Using the TSD equations, the MDL and AML effluent limits are calculated as follows:

$$\mathrm{MDL} = \mathrm{LTA} \times e^{(z_m\sigma - 0.5\sigma^2)}$$ *Equation 16*

$$\mathrm{AML} = \mathrm{LTA} \times e^{(z_a\sigma_n - 0.5\sigma_n^2)}$$ *Equation 17*

where σ, and σ² are defined as they are for the LTA equations above, and,

σ_n^2 = $\ln(CV^2/n + 1$

z_a = 1.645 (z-score for the 95th percentile probability basis)

z_m = 2.326 (z-score for the 99th percentile probability basis)

n = number of sampling events required per month. With the exception of ammonia, if the AML is based on the

LTA_c, i.e., $LTA_{minimum} = LTA_c$), the value of ‘‘n’’ should is set at a minimum of 4. For ammonia, In the case of ammonia, if the AML is based on the LTA_c, i.e., $LTA_{minimum} = LTA_c$), the value of ‘‘n’’ should is set at a minimum of 30.

C. Critical Low Flow Conditions

The low flow conditions of a water body are used to determine WQBELs. In general, Washington's WQS require criteria be evaluated at the following low flow receiving water conditions (See Table 12. Applicable Criteria/Design Conditions for Determining the Acute and Chronic Dilution Factors for Aquatic Life, Department of Ecology Water Quality Program Permit Writer's Manual page 190 at https://apps.ecology.wa.gov/publications/summarypages/92109.html) as defined below:

Acute aquatic life	1Q10 or 1B3
Chronic aquatic life	7Q10 or 4B3
Non-carcinogenic human health criteria	30Q5
Carcinogenic human health criteria	Harmonic Mean Flow
Ammonia	30B3 or 30Q10

1. The 7Q10 represents lowest average 7 consecutive day flow with an average recurrence frequency of once in 10 years.
2. The 30Q5 represents the lowest average 30 consecutive day flow with an average recurrence frequency of once in 5 years.
3. The harmonic mean is a long-term mean flow value calculated by dividing the number of daily flow measurements by the sum of the reciprocals of the flows.

Appendix D. **Reasonable Potential and WQBEL Calculations**

Pollutants of Concern			AMMONIA, default: cold water, fish early life stages present	AMMONIA, default: cold water, fish early life stages present	ZINC - SEE Toxic BiOp	COPPER - SEE Toxic BiOp	MERCURY - SEE Toxic BiOp	CADMIUM	LEAD - SEE Toxic BiOp	BIS(2-ETHYLHEXYL) PHTHALATE	TOLUENE	CHLOROFORM
			Non Irrigation	Irrigation	Year-round	Year-round	Year-round	Year-round	Year-round	Year-round	Year-round	Year-round
Effluent Data	Number of Samples in Data Set (n)		22	36	58	58	19	56	1	2	2	2
	Coefficient of Variation (CV) = Std. Dev./Mean (default CV = 0.6)		1.937	0.962	0.329	0.3668	1.507	0	0.6	0.6	0.6	0.6
	Effluent Concentration, µg/L (Max. or 95th Percentile) - (C_e)		892.500	627.500	107.005	4.6225	0.00801	0.3	0.068	1.98	0.43	1.48
	Calculated 50th % Effluent Conc. (when n>10), Human Health Only		0.135	0.105	63.455	2.065	0.0011	0.3		1.036	0.29	1.48
Receiving Water Data	90th Percentile Conc., µg/L - (C_u)					0	0	0	0	0	0	0
	Geometric Mean, µg/L, Human Health Criteria Only					0	0	0	0	0	0	0
Applicable Water Quality Criteria	Aquatic Life Criteria, µg/L	Acute	8,107	885	68.644	9.63	2.1	.784	33.291			
	Aquatic Life Criteria, µg/L	Chronic	1,353	105	62.682	6.778	.012	.4017	1.2973			
	Human Health Water and Organism, µg/L		--	--	2,300.	1,300.	.14	-	Narrative	.23	180.	260.
	Human Health, Organism Only, µg/L		--	--		--	.15	-	Narrative	.25	410.	1,200.
	Metals Criteria Translator, decimal (or default use	Acute			.87	.789	.85	.943	.466			.97
	Conversion Factor)	Chronic			.87	.789	--	.943	.466			.97
	Carcinogen (Y/N), Human Health Criteria Only		--	--	N	N	N	N	N	Y	N	Y
Percent River Flow Default Value = 25%	Aquatic Life - Acute	1Q10	0%	25%	0%	0%	0%	0%	25%	25%	25%	25%
	Aquatic Life - Chronic	7Q10 or 4B3			0%	0%	0%	0%	25%	25%	25%	25%
		30B3 or 30Q10/30Q5			0%	0%	0%	0%	25%	25%	25%	25%
	Human Health - Non-Carcinogen	Harmonic Mean	0%	25%	0%	0%	0%	0%	25%	25%	25%	25%
	Human Health - Carcinogen	Harmonic Mean			0%	0%	0%	0%	25%	25%	25%	25%
Calculated Dilution Factors (DF) (or enter Modeled DFs)	Aquatic Life - Acute	1Q10	1.0	3.8	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
	Aquatic Life - Chronic	7Q10 or 4B3			1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
	Aquatic Life - Chronic Ammonia	30B3 or 30Q10/30Q5	1.0	7.7	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
	Human Health - Non-Carcinogen	Harmonic Mean			1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
	Human Health - Carcinogen	Harmonic Mean			1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Aquatic Life Reasonable Potential Analysis												
σ	$\sigma^2=\ln(CV^2+1)$		1.248	0.809	0.321	0.355	1.089	--	0.555	0.555	0.555	0.555
P_n	=(1-confidence level)$^{1/n}$, where confidence level =	99%	0.811	0.880	0.924	0.924	0.785	0.921	0.010	0.100	0.100	0.100
Multiplier (TSD p. 57)	$=\exp(z\sigma-0.5\sigma^2)/\exp[\text{normsinv}(P_n)\sigma-0.5\sigma^2]$, where	99%	6.1	2.5	1.33	1.37	5.33	1.00	13.2	7.4	7.4	7.4
Statistically projected critical discharge concentration (C_d)			5416	1594	142.62	6.36	0.043	0.30	0.90	14.64	3.18	10.94
Predicted max. conc.(ug/L) at Edge-of-Mixing Zone		Acute	5416	421	124.04	5.02	0.036	0.28	0.42	14.64	3.18	10.61
(note: for metals, concentration as dissolved using conversion factor as translator)		Chronic	5416	207	124.04	5.02	0.043	0.28	0.42	14.64	3.18	10.61
Reasonable Potential to exceed Aquatic Life Criteria			YES	YES	YES	NO	YES	NO	NO	NA	NA	NA
Aquatic Life Effluent Limit Calculations												
Number of Compliance Samples Expected per month (n)			4	4	4	4	1		4	1	4	4
n used to calculate AML (if chronic is limiting then use min=4 or for ammonia min=30)			30	30	4	--	4	--	--	--	--	--
LTA Coeff. Var. (CV), decimal	(Use CV of data set or default = 0.6)		1.937	0.962	0.329	--	1.507	--	--	--	--	--
Permit Limit Coeff. Var. (CV), decimal	(Use CV from data set or default = 0.6)		1.937	0.962	0.329	--	1.507	--	--	--	--	--
Acute WLA, ug/L	$C_a = (\text{Acute Criteria} \times MZ_a) - C_u \times (MZ_a\text{-}1)$	Acute	8,107	3,351	68.6	--	2.1	--	--	--	--	--
Chronic WLA, ug/L	$C_d = (\text{Chronic Criteria} \times MZ_c) - C_u \times (MZ_c\text{-}1)$	Chronic	1,353	807	62.7	--	0.012	--	--	--	--	--
Long Term Ave (LTA), ug/L	WLAa x $\exp(0.5\sigma^2\text{-}z\sigma)$, Acute	99%	968	707	34.3	--	0.302	--	--	--	--	--
(99th % occurrence prob.)	WLAc x $\exp(0.5\sigma^2\text{-}z\sigma)$; ammonia n=30, Chronic	99%	646	546	43.4	--	0.0032	--	--	--	--	--
Limiting LTA, ug/L	used as basis for limits calculation		646	546	34.3	--	0.0032	--	--	--	--	--
Applicable Metals Criteria Translator (metals limits as total recoverable)			1.0	1.0	0.8697	--	--	--	--	--	--	--
Average Monthly Limit (AML), ug/L	where % occurrence prob =	95%	1,071	717	50.9	--	0.008	--	--	--	--	--
Maximum Daily Limit (MDL), ug/L	where % occurrence prob =	99%	5,407	2,588	78.9	--	0.0220	--	--	--	--	--
Average Monthly Limit (AML), mg/L			1.1	0.7	0.051	--	0.000008	--	--	--	--	--
Maximum Daily Limit (MDL), mg/L			5.4	2.6	0.079	--	0.000022	--	--	--	--	--
Average Monthly Limit (AML), lb/day			10.4	6.9	0.492	--	0.00007	--	--	--	--	--
Maximum Daily Limit (MDL), lb/day			52.3	25.0	0.764	--	0.00021	--	--	--	--	--
Human Health Reasonable Potential Analysis												
σ	$\sigma^2=\ln(CV^2+1)$				0.321	0.355	1.089	--	0.555	0.555	0.555	0.555
P_n	=(1-confidence level)$^{1/n}$ where confidence level =	95%			0.950	0.950	0.854	0.948	0.050	0.224	0.224	0.224
Multiplier	$=\exp(2.326\sigma\text{-}0.5\sigma^2)/\exp[\text{invnorm}(P_N\sigma\text{-}0.5\sigma^2]$, prob. =	50%			0.591	0.558	0.317	1.000	2.490	1.524	1.524	1.524
Dilution Factor (for Human Health Criteria)					1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Max Conc. at edge of Chronic Zone, ug/L (C_d)					63.455	2.065	0.001	0.300	0.169	1.036	0.290	1.480
Reasonable Potential to exceed HH Water & Organism					NO	NO	NO	NO	NO	YES	NO	NO
Reasonable Potential to exceed HH Organism Only					NO	NO	NO	NO	NO	YES	NO	NO
Human Health, Water + Organism, Effluent Limit Calculations												
Number of Compliance Samples Expected per month (n)										1		
Average Monthly Effluent Limit, ug/L	equals wasteload allocation		--	--	--	--	--	--	--	**0.23**	--	--
Maximum Daily Effluent Limit, ug/L	TSD Multiplier, Table 5-3, using 99th and 95th %		--	--	--	--	--	--	--	**0.34**	--	--
Average Monthly Limit (AML), lb/day			--	--	--	--	--	--	--	**0.002**	--	--
Maximum Daily Limit (MDL), lb/day			--	--	--	--	--	--	--	**0.003**	--	--
Human Health, Organism Only, Effluent Limit Calculations												
Number of Compliance Samples Expected per month (n)										1		
Average Monthly Effluent Limit, ug/L	equals wasteload allocation		--	--	--	--	--	--	--	**0.25**	--	--
Maximum Daily Effluent Limit, ug/L	TSD Multiplier, Table 5-3, using 99th and 95th %		--	--	--	--	--	--	--	**0.36**	--	--
Average Monthly Limit (AML), lb/day			--	--	--	--	--	--	--	**0.002**	--	--
Maximum Daily Limit (MDL), lb/day			--	--	--	--	--	--	--	**0.004**	--	--

Pollutants of Concern			THALLIUM	SILVER	SELENIUM	NICKEL	CHROMIUM	BERYLLIUM	ARSENIC	ANTIMONY
			Year-round	Year-round	Year-round	Year-round	Year-round	Year-round	Year-round	Year-round
Effluent Data	**Number of Samples in Data Set (n)**		1	3	2	1	1	1	1	1
	Coefficient of Variation (CV) = Std. Dev./Mean (default CV = 0.6)		0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6
	Effluent Concentration, µg/L (Max. or 95th Percentile) - (C_e)		0.13	0.16	0.44	1.78	0.54	0.011	0.95	0.36
	Calculated 50th % Effluent Conc. (when n>10), Human Health Only		0.13	0.04	0.318	1.78	0.54	0.011	0.95	0.36
Receiving Water Data	**90th Percentile Conc., µg/L - (C_u)**		0	0	0	0	0	0	0	0
	Geometric Mean, µg/L, Human Health Criteria Only		0	0	0	0	0	0	0	0
Applicable Water Quality Criteria	Aquatic Life Criteria, µg/L	Acute		1.22	20.	281.062	16.		360.	--
	Aquatic Life Criteria, µg/L	Chronic			5.	31.2173	11.		190.	--
	Human Health Water and Organism, µg/L		.24		120.	58.	--	--	10.	12.
	Human Health, Organism Only, µg/L		.27		480.	100.	--	--	10.	180.
	Metals Criteria Translator, decimal (or default use	Acute		.85		.998	.98		1.	
	Conversion Factor)	Chronic				.997	.96		1.	
	Carcinogen (Y/N), Human Health Criteria Only		N	N	--	--	--	Y	--	--
Percent River Flow Default Value = **25%**	**Aquatic Life - Acute**	**1Q10**	25%	25%	25%	25%	25%	25%	25%	25%
	Aquatic Life - Chronic	7Q10 or 4B3	25%	25%	25%	25%	25%	25%	25%	25%
		30B3 or 30Q10/30Q5	25%	25%	25%	25%	25%	25%	25%	25%
	Human Health - Non-Carcinogen	Harmonic Mean	25%	25%	25%	25%	25%	25%	25%	25%
	Human Health - Carcinogen	Harmonic Mean	25%	25%	25%	25%	25%	25%	25%	25%
Calculated Dilution Factors (DF) (or enter Modeled DFs)	Aquatic Life - Acute	1Q10	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
	Aquatic Life - Chronic	7Q10 or 4B3	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
	Aquatic Life - Chronic Ammonia	30B3 or 30Q10/30Q5	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
	Human Health - Non-Carcinogen	Harmonic Mean	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
	Human Health - Carcinogen	Harmonic Mean	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Aquatic Life Reasonable Potential Analysis										
σ	$\sigma^2=\ln(CV^2+1)$		0.555	0.555	0.555	0.555	0.555	0.555	0.555	0.555
P_n	$=(1\text{-confidence level})^{1/n}$, where confidence level =	**99%**	0.010	0.215	0.100	0.010	0.010	0.010	0.010	0.010
Multiplier (TSD p. 57)	$=\exp(z\sigma-0.5\sigma^2)/\exp[\text{normsinv}(P_n)\sigma-0.5\sigma^2]$, where	**99%**	13.2	5.6	7.4	13.2	13.2	13.2	13.2	13.2
Statistically projected critical discharge concentration (C_e)			1.72	0.90	3.25	23.49	7.13	0.15	12.54	4.75
Predicted max. conc.(ug/L) at Edge-of-Mixing Zone		Acute	1.72	0.76	3.25	23.44	6.98	0.15	12.54	4.75
(note: for metals, concentration as dissolved using conversion factor as translator)		Chronic	1.72	0.90	3.25	23.42	6.84	0.15	12.54	4.75
Reasonable Potential to exceed Aquatic Life Criteria			**NA**	**NO**	**NO**	**NO**	**NO**	**NA**	**NO**	**--**
Human Health Reasonable Potential Analysis										
σ	$\sigma^2=\ln(CV^2+1)$		0.555	0.555	0.555	0.555	0.555	0.555	0.555	0.555
P_n	$=(1\text{-confidence level})^{1/n}$ where confidence level =	**95%**	0.050	0.368	0.224	0.050	0.050	0.050	0.050	0.050
Multiplier	$=\exp(2.326\sigma-0.5\sigma^2)/\exp[\text{invnorm}(P_{99}\sigma-0.5\sigma^2]$, prob. =	**50%**	2.490	1.205	1.524	2.490	2.490	2.490	2.490	2.490
Dilution Factor (for Human Health Criteria)			1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Max Conc. at edge of Chronic Zone, ug/L (C_d)			0.130	0.040	0.318	1.780	0.540	0.011	0.950	0.360
Reasonable Potential to exceed HH Water & Organism			**NO**	**NO**	**NO**	**NO**	**--**	**--**	**NO**	**NO**
Reasonable Potential to exceed HH Organism Only			**NO**	**NO**	**NO**	**NO**	**--**	**--**	**NO**	**NO**