RESOLUTION NO. 1538
CITY OF PRINEVILLE, OREGON

A RESOLUTION APPROVING LOCAL LIMITS REPORT

Whereas, as part of the City of Prineville's ("City") Industrial Pretreatment Program, it is required to develop the maximum allowable headworks loadings ("MAHLs") and maximum allowable industrial loadings ("MAILs") for pollutants of concern ("POC").

Whereas, The development of MAHLs and MAILs allows the City to determine whether the implementation of local limits would be required to adequately protect the City's wastewater treatment facility ("WWTF") from potential treatment inhibition or POC introduction in quantities that may pass through the WWTF and cause violation of the City's National Pollutant Discharge Elimination System permit.

Whereas, Anderson Perry has prepared a Local Limits Report, dated September 2020, attached hereto and incorporated herein, that developed local limits for the City. These limits will be used when issuing industrial wastewater permits under the pretreatment program.

Whereas, a public hearing was held September 27, 2022, at the Prineville City Council meeting to allow an opportunity for any interested person to appear and present comment.

Whereas, City staff believes it is in the best interest of the City to approve the attached Local Limits Report.

NOW, THEREFORE, the City of Prineville resolves that the attached Local Limits Report, dated September 2020, is hereby accepted and approved.

Approved by the City Council this 11th day of October, 2022.

Rodney J. Beebe, Mayor

ATTEST:

Lisa Morgan, City Recorder

LOCAL LIMITS REPORT

SEPTEMBER 2020

Prepared for the
City of Prineville, Oregon

anderson perry

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LOCAL LIMITS REPORT

FOR

CITY OF PRINEVILLE, OREGON

SEPTEMBER 2020

ANDERSON PERRY & ASSOCIATES, INC.

La Grande, Redmond, and Hermiston, Oregon
Walla Walla, Washington

Job No. 1260-05

Table of Contents

Introduction

The purpose of this Report is to present the development of maximum allowable headworks loadings (MAHLs) and maximum allowable industrial loadings (MAILs) for pollutants of concern (POC) to the City of Prineville, Oregon, as part of the City's Industrial Pretreatment Program (IPP). The development of MAHLs and MAILs allows the City to determine whether the implementation of local limits would be required to adequately protect the City's wastewater treatment facility (WWTF) from potential treatment inhibition or POC introduction in quantities that may pass through the WWTF and cause violation of the City's National Pollutant Discharge Elimination System (NPDES) permit.

Background

Wastewater Treatment Facility Description

This section provides a general overview of the City's WWTF. Wastewater from the collection system undergoes influent screening and grit removal. Following preliminary treatment, wastewater flow is split to either Plants 1 or 2, as shown on Figure 1 - Treatment Process Flow Schematic, in Appendix A. Below are descriptions of the treatment processes performed by Plants 1 and 2.

Plant 1

Plant 1 features a partially aerated primary lagoon followed by a secondary lagoon. Following the secondary lagoon, chlorine is injected into the oxidized wastewater, which then flows through the chlorine contact chamber and to an irrigation storage lagoon (referred to as the "Golf Course Irrigation Storage Lagoon"). Treated wastewater from the Golf Course Irrigation Storage Lagoon is then beneficially reused as irrigation water at the City-owned Meadow Lakes Golf Course located nearby.

Plant 2

Plant 2 features two aerated primary lagoons in series followed by a secondary lagoon. After the secondary lagoon, chlorine is injected into the oxidized wastewater, which then flows through the chlorine contact chamber and into an irrigation storage lagoon (referred to as the "Kidney Pond"). Treated wastewater in the Kidney Pond is then either beneficially reused for irrigation at nearby pastureland or flows to bentonite-lined treatment wetlands for additional treatment. After receiving additional treatment, the treated wastewater is indirectly discharged to the Crooked River via unlined disposal wetlands. Both plants are connected by piping for operational flexibility.

Regulatory Water Quality and Sludge Standards

The WWTF's NPDES Permit contains discharge limits for the following parameters: five-day biochemical oxygen demand (BOD_5), total suspended solids (TSS), pH, and E. coli bacteria. For many of the POCs resulting from industrial practices, the City's NPDES Permit requires the WWTF to "comply with any applicable effluent standards or prohibitions established under Oregon Administrative Rule (OAR) 340-041-0033 and section 307(a) of the federal Clean Water Act for toxic pollutants." The OAR contains reference to multiple tables with water quality criteria for multiple pollutants (see Appendix B). These water quality criteria are based on acute and chronic toxicity to

aquatic wildlife and for human consumption. Three tables establish these water quality criteria as follows:

- Table 30 lists water quality criteria for aquatic species as established by the Environmental Protection Agency (EPA).
- Table 31 lists water quality criteria for aquatic species used by the Oregon Department of Environmental Quality for permitting. These criteria include more compounds than Table 30 and have tighter standards for some of the parameters listed on Table 30.
- Table 40 lists water quality criteria for human health as approved by the EPA in April 2014.

Because the City indirectly discharges to the Crooked River via disposal wetlands, groundwater quality criteria also apply to the City's effluent. Tables with reference levels for groundwater quality are found in OAR 340-40-0030. The three tables that establish groundwater quality references are as follows (see Appendix B):

- Table 1 lists numerical groundwater quality reference levels for inorganic contaminants.
- Table 2 lists numerical groundwater quality reference levels for organic contaminants.
- Table 3 lists numerical groundwater quality reference levels for miscellaneous contaminants.

Sampling and Analysis Plan Summary

To have sound, technically based local limits, the City developed a sampling and analysis plan (SAP). The SAP was developed to obtain quantitative information regarding the concentration, loads, and seasonal fluctuations of specific pollutants entering the City's collection system and WWTF. Results from the SAP were used to quantify pollutant concentrations in the following areas:

1. WWTF headworks, effluent, and unit operations for both treatment plants to determine the removal efficiencies of each POC throughout each plant.
2. Significant industrial user (SIU) process wastewater discharge locations to determine existing discharge concentrations from SIUs.
3. An area of the collection system not impacted by industrial users to determine background concentrations of pollutants from unregulated residential and commercial zones.

Pollutants monitored under the SAP included 14 of the 15 national POCs, as listed below. Ammonia, the fifteenth national POC, was excluded from sampling because it is not known to be contributed by industrial sources.

- Arsenic
- BOD_5
- Cadmium
- Chromium
- Copper

- Cyanide
- Lead
- Mercury
- Molybdenum
- Nickel
- Selenium
- Silver
- TSS
- Zinc

Monitoring Results

Sampling results at the various locations have been summarized and are included in Appendix C. The results were compiled by the City and entered into a spreadsheet, which was sent to Anderson Perry & Associates, Inc., for analysis. Table 1 below shows the number of samples collected at each sampling point.

TABLE 1
SAMPLING LOCATIONS AND FREQUENCY

Location	Number of Samples
Influent	8
Plant 1 Primary Effluent	7
Plant 2 Primary Effluent	7
Plant 1 Effluent	7
Plant 2 Effluent	7
Apple Effluent	8
Facebook Effluent	7
Manhole 857 Domestic Non-industrial	7
Plant 1 Pretreatment Sludge	2
Plant 2 Pretreatment Sludge	2
Plant 1 Sludge	2
Plant 2 Sludge	2

Conventional Pollutants

Conventional pollutants include BOD_5, TSS, and fats, oils, and grease (FOG). Though the WWTF is approaching treatment capacity for BOD_5, the total flow coming from the currently permitted Industrial Users (IUs) equates to approximately 0.06 million gallons per day, or 6 percent of the entire contributing flow to the WWTF. Furthermore, these IUs are not industries that produce excessive quantities of these pollutants. In addition, FOG has historically been managed through best management practices (BMPs)

via the use of grease traps and/or grease interceptors. BMPs will continue to be implemented and monitored for the control of FOG.

For these reasons, no numeric local limits are established in this Report for conventional pollutants. However, to ensure that any existing industrial or commercial users that contribute BOD_5 loads in concentrations higher than the typical domestic load are equitably charged for the extra WWTF capacity consumed by their load, the City has elected to establish a "soft" BOD_5 and TSS limit of 400 milligrams per liter (mg/L). Users that exceed this limit may be subject to additional charges based on the amount of extra load in their discharged wastewater.

The 400 mg/L limit was determined based on the measured concentrations for BOD_5 and TSS in the City's domestic waste stream. Average domestic concentration for BOD_5 and TSS during the City's sampling were approximately 275 mg/L and 200 mg/L, respectively, with maximum domestic concentrations for BOD_5 and TSS reaching approximately 335 mg/L and 340 mg/L, respectively. To determine the 400 mg/L limits, the maximum sample concentrations were multiplied by a 10 percent safety factor then rounded up to the nearest 50 mg/L.

Local limits for conventional pollutants may need to be reevaluated should an industry with high conventional pollutant loading (e.g., brewery, slaughterhouse, or other food processing industry) connect to the City's collection system.

Maximum Allowable Headworks Load Development

Removal Efficiencies

In developing the MAIL, removal efficiencies for the pollutants found in the liquid stream were calculated through the entirety of the WWTF and through the primary treatment lagoon. These removal efficiencies were calculated for all monitored pollutants. Removal efficiencies were calculated using the Mean Removal Efficiency method (described in Chapter 5 of EPA Local Limits Guidance) as shown in Equation 1.

Equation 1: Mean Removal Efficiency

$$\%Removal = \frac{Avg.Influent_{Conc.} - Avg.Effluent_{Conc.}}{AvgInfluent_{Conc.}}$$

This method was chosen because it dampens daily variability in removal efficiency when limited sample quantities are available. Appendix C includes the average influent and effluent concentrations for the overall plant and for the primary treatment.

Negative Removal Efficiencies

While calculating removal efficiencies, some efficiency values were negative for a POC.

For the average cyanide samples, the average influent concentration was lower than the effluent concentration through Plant 1's secondary treatment. The lower effluent concentration resulted in a negative average removal efficiency of approximately 18 percent for Plant 1. Review of the sampling results in Appendix C revealed that the cyanide result at the Plant 1 effluent for December 17, 2018, was an order of magnitude higher than any other sample

results in the data set. The extreme difference between this one sample and all other cyanide samples at all other locations in Plant 1 suggests that this result may be inaccurate. All samples taken after this date were close to or below the minimum detection limit for cyanide. Due to the limited number of positive detections, this negative removal efficiency was kept to provide a conservative method of calculating the allowable headworks loading (AHL).

The average selenium influent concentration was lower than the effluent concentration through Plant 1's secondary treatment. This lower effluent concentration resulted in a negative average removal efficiency of approximately 57 percent for Plant 1. Review of the sampling results in Appendix C revealed that the cyanide result at the Plant 1 effluent for April 9, 2019, was approximately an order of magnitude higher than any other Plant 1 effluent sample result. The overall negative removal rate through Plant 1 for April 9, 2019, was approximately 546 percent, suggesting that this sample result may be inaccurate. Removing the sample results for this date results in an overall average removal efficiency of approximately 45 percent for Plant 1; however, the overall local limit for selenium would be minimally impacted due to the low overall removal efficiency through Plant 2. For this reason, the negative removal efficiency for selenium was kept to provide a conservative method of calculating the AHL.

Allowable Headworks Loading Calculations

AHL calculations were performed for the applicable criteria of water quality and unit operation inhibition. The City's WWTF is a lagoon system and, therefore, does not regularly waste its sludge. For this reason, AHL calculations were not performed based on sludge quality. In addition, the WWTF is not currently regulated for air pollution and does not have required air emission standards. Consequently, air quality-based AHLs were not developed in this analysis.

Water Quality-based Allowable Headworks Loadings

Though the City's NPDES Permit does not specifically list pollutant concentrations for many of the POCs for the industrial pretreatment program, the Permit does require that "no waste shall be discharged or activities conducted that cause or contribute to a violation of water quality standards." Because the City's effluent is considered indirect discharge, there is no mixing zone study available. For this reason, groundwater quality standards were used in developing the water quality-based AHLs. Tables 1 and 3 from OAR 340-040-0030 were used as reference levels for the available POCs. For POCs that did not have reference levels available in OAR 340-040-0030, the federal Water Quality Criteria for Human Health were used. Table 2 shows the water quality reference levels used for determining the AHL.

Table 2
Groundwater Quality Reference Levels

Pollutant	Groundwater Quality Criteria (µg/L)
Antimony	5.1
Arsenic	50
Barium	1,000
Cadmium	10
Chromium	50

Pollutant	Groundwater Quality Criteria (µg/L)
Copper	1,000
Cyanide	130
Iron	300
Lead	50
Mercury	2
Molybdenum	N/A
Nickel	140
Selenium	10
Silver	50
Thallium	0.043
Zinc	2,100

µg/L = micrograms per liter

Two different equations are typically used for determining the AHL based on water quality criteria. One of these equations is more adapted to direct discharge to a stream and requires the receiving stream background concentration and flow rate. The other equation (Equation 2) allows the calculation of the AHL based on an NPDES Permit limit. Though the City's current NPDES Permit does not have limits set for the POCs, Equation 2 was used to determine the water quality AHLs by substituting the groundwater quality reference levels on Table 2 for the NPDES Permit limits, as seen in Equation 2 below.

Equation 2: Water Quality-Based AHL Formula

$$AHL = \frac{(8.34)(C_{GWR})(Q_{WWTF})}{(1 - R_{WWTF})}$$

Where:

AHL = AHL based on groundwater quality reference levels
C_{GWR} = Groundwater quality reference levels
Q_{WWTF} = WWTF average flow rate, million gallons per day (MGD)
R_{WWTF} = WWTF removal efficiency from headworks to plant effluent, as decimal
8.34 = Conversion factor

Inhibition-based Allowable Headworks Loadings

Though the WWTF has not yet had any reported significant disruptions of biological processes (inhibition) due to pollutant levels in the wastewater, inhibition-based AHLs developed to help protect future pollutant loadings from negatively impacting treatment operations. Since the WWTF has not experienced past inhibition, there are no site-specific inhibition concentrations to use for AHL calculations. Due to this lack of site-specific inhibition concentrations, literature concentrations from Attachment G of the EPA Local Limits Development Guidance were used. Though the City's WWTF is a lagoon process, inhibition concentrations for an activated sludge process were used due to the lack of available lagoon inhibition concentrations and the

conservative nature of the activated sludge inhibition values. Equation 3 was used to calculate the AHL for treatment inhibition.

Equation 3: AHL for Treatment Inhibition

$$AHL = \frac{8.34(C_{INHIB})(Q_{WWTF})}{1 - R_{WWTF}}$$

Where:

AHL = Allowable headworks loading for activated sludge inhibition (pounds per day [lbs/day])
C_{INHIB} = Concentration of pollutant for inhibition (mg/L)
Q_{WWTF} = WWTF average flow rate (MGD)
R_{WWTF} = Removal efficiency of pollutant through primary treatment (as decimal)

Maximum Allowable Headworks Loading

The MAHL for any given POC is the lowest AHL from those calculated for that pollutant. MAHLs for the POCs were calculated for both Plants 1 and 2 by calculating AHLs for both plants. Table 3 shows the AHL from each criterion and the MAHL. This table also shows the current loading at the headworks divided by the MAHL. Inhibition AHLs were not calculated for selenium and silver because literature inhibition concentrations were not available for these POCs.

TABLE 3
MAXIMUM ALLOWABLE HEADWORKS LOADING DETERMINATION

Pollutant	Average Loading at Headworks (lbs/day)	Pass Through AHL (lbs/day)	Inhibition AHL (lbs/day)	MAHL (lbs/day)	Average Loading vs. MAHL (percent)
Plant 1					
Arsenic	0.018	0.610	0.988	0.610	3
Cadmium	0.001	0.501	18.01	0.501	0
Chromium	0.011	1.312	3.958	1.312	1
Copper	0.120	39.3	0.972	0.972	12
Cyanide	0.024	0.647	0.706	0.647	4
Lead	0.005	1.282	2.591	1.282	0
Mercury	0.000	0.086	1.850	0.086	0
Nickel	0.014	1.322	1.597	1.322	1
Selenium	0.006	0.037	NA	0.037	16
Silver	0.001	0.596	NA	0.596	0
Zinc	0.597	95.8	1.461	1.461	41
Plant 2					
Arsenic	0.010	0.243	0.406	0.243	4
Cadmium	0.000	0.230	12.1	0.230	0
Chromium	0.007	0.707	0.841	0.707	1

Pollutant	Average Loading at Headworks (lbs/day)	Pass Through AHL (lbs/day)	Inhibition AHL (lbs/day)	MAHL (lbs/day)	Average Loading vs. MAHL (percent)
Copper	0.069	20.7	0.530	0.530	13
Cyanide	0.014	0.547	0.484	0.484	3
Lead	0.003	0.185	1.635	0.185	2
Mercury	0.000	0.051	1.146	0.051	0
Nickel	0.008	0.655	1.118	0.655	1
Selenium	0.003	0.034	NA	0.034	10
Silver	0.000	0.633	NA	0.633	0
Zinc	0.345	26.1	0.814	0.814	42

Maximum Allowable Industrial Loading

Local limits are developed by multiplying MAHL times a safety factor then subtracting the uncontrolled loading (or residential and unregulated commercial loading) as well as any loading that the City would like to reserve for future industries that may move to the area (see Equation 4).

Equation 4: Maximum Allowable Industrial Loading Formula

$$MAIL = MAHL(1 - SF) - (L_{UNC} + HW + GA)$$

Where:

MAIL = Maximum allowable industrial loading (lbs/day)
MAHL = Maximum allowable headworks loading (lbs/day)
SF = Safety factor (decimal)
L_{UNC} = Loading from uncontrolled sources or background (lbs/day)
HW = Loading from hauled waste (lbs/day) (Assumed to be zero for Prineville)
GA = Growth allowance (lbs/day)

The result of this calculation is the total maximum industrial loading for all current industries in pounds per day. Table 4 shows these calculations for the POCs.

TABLE 4
MAXIMUM ALLOWABLE INDUSTRIAL LOADING CALCULATIONS

Pollutant	Uncontrolled Loading (lbs/day)	Future Growth Allocation (percent)	Safety Factor (percent)	Maximum Industrial Loading (lbs/day)
Plant 1				
Arsenic	0.072	30	10	0.293
Cadmium	0.001	30	10	0.300
Chromium	0.018	30	10	0.769
Copper	0.215	30	10	0.368
Cyanide	0.014	30	10	0.374

Pollutant	Uncontrolled Loading (lbs/day)	Future Growth Allocation (percent)	Safety Factor (percent)	Maximum Industrial Loading (lbs/day)
Lead	0.013	30	10	0.756
Mercury	0.000	30	10	0.051
Nickel	0.061	30	10	0.732
Selenium	0.006	30	10	0.017
Silver	0.002	30	10	0.356
Zinc	0.523	30	10	0.304
Plant 2				
Arsenic	0.042	30	10	0.104
Cadmium	0.000	30	10	0.138
Chromium	0.010	30	10	0.414
Copper	0.124	30	10	0.194
Cyanide	0.355	30	10	0.282
Lead	0.008	30	10	0.103
Mercury	0.000	30	10	0.031
Nickel	0.035	30	10	0.357
Selenium	0.003	30	10	0.017
Silver	0.001	30	10	0.378
Zinc	0.331	30	10	0.157

The future growth allocation is based on the anticipated growth projections for the City of Prineville as presented in the 2018 Wastewater Facilities Plan (WWFP). The WWFP took into account projected growth from 2017 to 2037, along with anticipated improvements and urban growth boundary connections during the same time period. In addition to the future growth allocation percentage, a 10 percent safety factor was used for all parameters based on the EPA's minimum recommendation. The minimum recommended safety factor was used due to the conservative approaches taken throughout the calculation process as previously mentioned in this document.

Local Limits Distribution

Typical methods for allocating local limits to the City's controlled dischargers are outlined in the EPA Local Limits Development Guidelines. In the City's situation, uniformly allocating all pollutants to each of the IUs is preferred due to the ease of administrating the local limits. In addition, the discharges from both SIUs is similar enough in composition that developing limits based on contributory flow would not be effective. Equation 5 shows the formula used to determine this distribution.

Equation 5: Uniform Concentration Limit

$$C_{Lim} = \frac{MAIL}{Q_{CONT} \times 8.34}$$

Where:

C_{Lim} = Concentration limit for a given industrial user (mg/L)
$MAIL$ = Maximum allowable industrial loading (lbs/day)
Q_{CONT} = Total flow rate for all industrial users (MGD)

Table 5 contains a summary of the suggested local limits based on the calculations performed using Equation 5.

TABLE 5
SUGGESTED LOCAL LIMITS

Pollutant	Limit (mg/L)
Arsenic	0.54
Cadmium	0.72
Chromium	2.16
Copper	1.01
Cyanide	1.15
Lead	0.54
Mercury	0.16
Nickel	1.86
Selenium	0.05
Silver	1.09
Zinc	0.82

Based on the results from the City's sampling results, there do not appear to be any existing IUs that will have trouble meeting any of these calculated local limits as long as existing site pretreatment processes and BMPs continue to be properly maintained and operated. When comparing the suggested local limits to the monitoring results of the City's SIUs, most average SIU POC concentrations were less than 5 percent of the suggested local limits, with most maximum POC concentrations below 10 percent of the suggested local limits. Zinc was the only POC that consistently had higher SIU concentrations, with SIU averages of approximately 20 percent of the suggested local limit.

Additional Recommendations

Municipal Code Modifications

The City's municipal code will require modifications to incorporate the new numeric local limits. During the initial stages of the development of Prineville's IPP and Local Limits, Chapter 53 of the City's municipal code was written to establish legal authority for the IPP. Though Chapter 53 implements the City's IPP and Local Limits, the City's preexisting sewer code, Chapter 51, was never updated to reflect the addition of Chapter 53 nor the development of these Local Limits. The City is currently in the process of updating Chapter 51 of its municipal code to reflect the implementation of Chapter 53. In addition, Chapter 53 will be updated to include the City of

Prineville's Local Limits, and a chapter will be written to address the implementation of an extra strength charge for users who discharge wastewater with concentrations of BOD_5 or TSS that are higher than 400 mg/L.

Fats, Oils, and Grease

Historically, the City of Prineville has not had concerns with FOG in the collection system or at the WWTF. However, during the analysis of the industrial user survey results, it was unclear whether some restaurants had properly maintained grease traps and/or grease interceptors. It is recommended that the City follow up with these restaurants to ensure that properly maintained pretreatment devices (grease trap or grease interceptor as applicable) are implemented at these restaurants to help protect the collection system and WWTF from FOG.

Amalgam

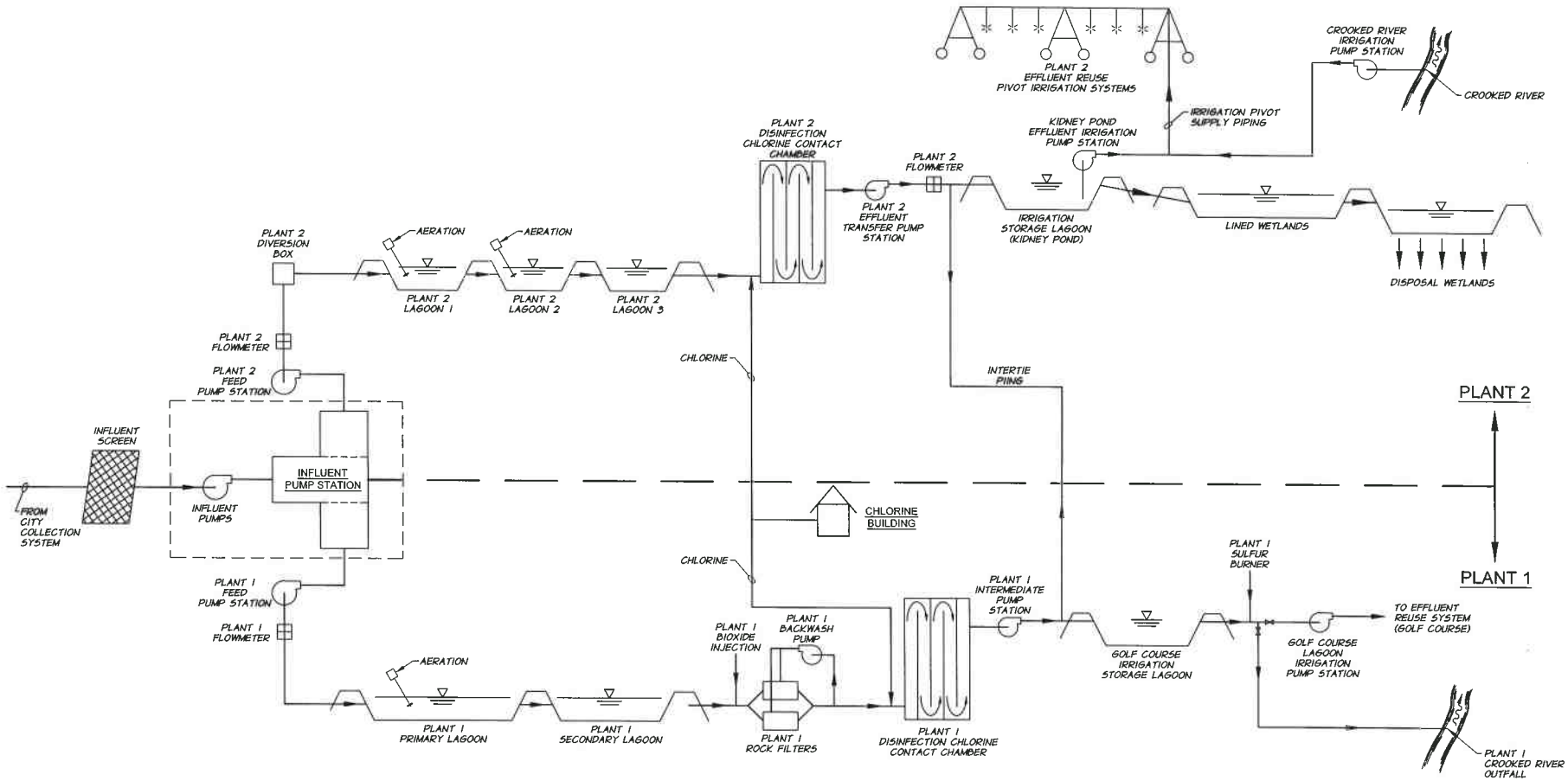
There are dentist offices in Prineville that produce wastewater containing amalgam. Amalgam is an alloy of mercury and silver that is used in the dental business. Based on the wastewater survey results, the dentist offices in Prineville have regularly maintained amalgam separators. It is recommended that the City require periodic documentation of the maintenance performed on the amalgam separators to help ensure the proper function of the separators.

Conclusion

With the development of local limits, the City can now update its municipal code and develop protocol for administering its pretreatment program. These limits will be used when issuing IU wastewater permits under the pretreatment program. These local limits will need to be reviewed and may be updated if the City's industrial growth exceeds that planned for during the development of these limits.

Appendices Table of Contents

APPENDIX A
Treatment Process Flow Schematic



NOTE:
INTERCONNECTION EXIST BETWEEN PLANTS.

anderson perry & associates, inc.

CITY OF
PRINEVILLE, OREGON
LOCAL LIMITS REPORT

TREATMENT PROCESS FLOW SCHEMATIC

FIGURE
1

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APPENDIX B
Oregon Administrative Rules
Water Quality Tables

OAR 340-041-8033
Table 30
Aquatic Life Water Quality Criteria for Toxic Pollutants

The concentration for each compound listed in Table 30 is a criterion established for waters of the state in order to protect aquatic life. The aquatic life criteria apply to waterbodies where the protection of fish and aquatic life is a designated use. All values are expressed as micrograms per liter (µg/L). Compounds are listed in alphabetical order with the corresponding information: the Chemical Abstract Service (CAS) number, whether there is a human health criterion for the pollutant (i.e. "y"= yes, "n" = no), and the associated aquatic life freshwater and saltwater acute and chronic criteria. *Italicized* pollutants are not identified as priority pollutants by EPA. Dashes in the table column indicate that there is no aquatic life criterion.

Unless otherwise noted in the table below, the acute criterion is the Criterion Maximum Concentration (CMC) applied as a one-hour average concentration, and the chronic criterion is the Criterion Continuous Concentration (CCC) applied as a 96-hour (4 days) average concentration. The CMC and CCC criteria may not be exceeded more than once every three years. Footnote A, associated with eleven pesticide pollutants in Table 30, describes the exception to the frequency and duration of the toxics criteria stated in this paragraph.

OAR 340-041-8033
Table 30
Aquatic Life Water Quality Criteria for Toxic Pollutants

No.	Pollutant	CAS Number	Human Health Criterion	Freshwater (µg/L)		Saltwater (µg/L)	
				Acute Criterion (CMC)	Chronic Criterion (CCC)	Acute Criterion (CMC)	Chronic Criterion (CCC)
1	Aldrin	309002	y	3 [A]	--	1.3 [A]	--
[A] *See expanded endnote A at bottom of Table 30 for alternate frequency and duration of this criterion.*							
2	*Alkalinity*		n	--	20,000 [B]	--	--
[B] *Criterion shown is the minimum (i.e. CCC in water may not be below this value in order to protect aquatic life).*							

OAR 340-041-8033
Table 30
Aquatic Life Water Quality Criteria for Toxic Pollutants

No.	Pollutant	CAS Number	Human Health Criterion	Freshwater (µg/L)		Saltwater (µg/L)	
				Acute Criterion (CMC)	Chronic Criterion (CCC)	Acute Criterion (CMC)	Chronic Criterion (CCC)
3	*Ammonia*	7664417	n	*The ammonia criteria are pH and temperature dependent — See ammonia criteria Tables 30(a)-(c) at end of Table 30.* [M]		*The ammonia criteria are pH, temperature and salinity dependent. Values for saltwater criteria (total ammonia) can be calculated from the tables specified in Ambient Water Quality Criteria for Ammonia (Saltwater)—1989 (EPA 440/5-88-004) See DEQ's calculator for calculating saltwater ammonia criteria at: http://www.deq.state.or.us/wq/standards/toxics.htm*	
[M] *The acute criteria in Table 30(a) apply in waterbodies where salmonids are a designated use in OAR 340-041-0101 through OAR 340-041-0340. The acute criteria in Table 30(b) apply in waterbodies where salmonids are not a designated use. The chronic criteria in Table 30(c) apply where fish and aquatic life is a designated use. It is not necessary to account for the presence or absence of salmonids or the presence of any early life stage of fish for the chronic criteria. Refer to DEQ's beneficial use website at: http://www.deq.state.or.us/wq/standards/uses.htm for additional information on salmonid beneficial use designations, including tables and maps.*							
4	Arsenic	7440382	y	340 [C, D]	150 [C, D]	69 [C, D]	36 [C, D]
[C] *Criterion is expressed in terms of "dissolved" concentrations in the water column.* [D] *Criterion is applied as total inorganic arsenic (i.e. arsenic (III) + arsenic (V)).*							
5	BHC Gamma (Lindane)	58899	y	0.95	0.08 [A]	0.16 [A]	--
[A] *See expanded endnote A at bottom of Table 30 for alternate frequency and duration of this criterion.*							
6	Cadmium	7440439	n	*See* **E**	*See* **C, F**	40 [C]	8.8 [C]
[C] *Criterion is expressed in terms of "dissolved" concentrations in the water column.*							

OAR 340-041-8033
Table 30
Aquatic Life Water Quality Criteria for Toxic Pollutants

No.	Pollutant	CAS Number	Human Health Criterion	Freshwater (µg/L)		Saltwater (µg/L)	
				Acute Criterion (CMC)	Chronic Criterion (CCC)	Acute Criterion (CMC)	Chronic Criterion (CCC)
[E] *The freshwater criterion for this metal is expressed as "total recoverable" and is a function of hardness (mg/L) in the water column. To calculate the criterion, use formula under expanded endnote E at bottom of Table 30.*							
[F] *The freshwater criterion for this metal is expressed as a function of hardness (mg/L) in the water column. To calculate the criterion, use formula under expanded endnote F at bottom of Table 30.*							
7	Chlordane	57749	y	2.4 [A]	0.0043 [A]	0.09 [A]	0.004 [A]
[A] *See expanded endnote A at bottom of Table 30 for alternate frequency and duration of this criterion.*							
8	*Chloride*	16887006	n	860,000	230,000	--	--
9	*Chlorine*	7782505	n	19	11	13	7.5
10	*Chlorpyrifos*	2921882	n	0.083	0.041	0.011	0.0056
11	Chromium III	16065831	n	*See* **C, F**	*See* **C, F**	--	--
[C] *Criterion is expressed in terms of "dissolved" concentrations in the water column.* [F] *The freshwater criterion for this metal is expressed as a function of hardness (mg/L) in the water column. To calculate the criterion, use formula under expanded endnote F at bottom of Table 30.*							
12	Chromium VI	18540299	n	16 [C]	11 [C]	1100[C]	50[C]
[C] *Criterion is expressed in terms of "dissolved" concentrations in the water column.*							
13	Copper	7440508	y	*See* **C, N**	*See* **C, N**	4.8 [C]	3.1 [C]

[C] *Criterion is expressed in terms of "dissolved" concentrations in the water column.*

[N] *The freshwater criterion for copper is a function of the concentration of ions, alkalinity, organic carbon, pH and temperature in the water column. To calculate the criterion, use the Biotic Ligand Model referenced in endnote N at the bottom of Table 30. The acute copper criterion (CMC) is applied as a one-hour average concentration. The chronic criterion (CCC) is applied as a 96-hour (4 days) average concentration. See endnote N also for procedures and information.*

OAR 340-041-8033
Table 30
Aquatic Life Water Quality Criteria for Toxic Pollutants

No.	Pollutant	CAS Number	Human Health Criterion	Freshwater (µg/L)		Saltwater (µg/L)	
				Acute Criterion (CMC)	Chronic Criterion (CCC)	Acute Criterion (CMC)	Chronic Criterion (CCC)
*[**Note**: The Environmental Quality Commission adopted these revised copper criteria on 11/02/2016. However, the revised criteria become effective for federal Clean Water Act purposes upon approval by the U.S. Environmental Protection Agency.]*							
14	Cyanide	57125	y	22 [J]	5.2 [J]	1 [J]	1 [J]
[J] *This criterion is expressed as µg free cyanide (CN)/L.*							
15	DDT 4,4'	50293	y	1.1 [A, G]	0.001 [A, G]	0.13 [A, G]	0.001 [A, G]
[A] *See expanded endnote A at bottom of Table 30 for alternate frequency and duration of this criterion.* [G] *This criterion applies to DDT and its metabolites (i.e. the total concentration of DDT and its metabolites should not exceed this value).*							
16	*Demeton*	8065483	n	--	0.1	--	0.1
17	Dieldrin	60571	y	0.24	0.056	0.71[A]	0.0019[A]
[A] *See expanded endnote A at bottom of Table 30 for alternate frequency and duration of this criterion.*							
18	Endosulfan	115297	n	0.22 [A, H]	0.056 [A, H]	0.034 [A, H]	0.0087 [A, H]
[A] *See expanded endnote A at bottom of Table 30 for alternate frequency and duration of this criterion.* [H] *This value is based on the criterion published in Ambient Water Quality Criteria for Endosulfan (EPA 440/5-80-046) and should be applied as the sum of alpha- and beta-endosulfan.*							
19	Endosulfan Alpha	959988	y	0.22 [A]	0.056 [A]	0.034 [A]	0.0087 [A]
[A] *See expanded endnote A at bottom of Table 30 for alternate frequency and duration of this criterion.*							
20	Endosulfan Beta	33213659	y	0.22 [A]	0.056 [A]	0.034 [A]	0.0087 [A]
[A] *See expanded endnote A at bottom of Table 30 for alternate frequency and duration of this criterion.*							
21	Endrin	72208	y	0.086	0.036	0.037 [A]	0.0023 [A]
[A] *See expanded endnote A at bottom of Table 30 for alternate frequency and duration of this criterion.*							
22	*Guthion*	86500	n	--	0.01	--	0.01

OAR 340-041-8033
Table 30
Aquatic Life Water Quality Criteria for Toxic Pollutants

No.	Pollutant	CAS Number	Human Health Criterion	Freshwater (µg/L)		Saltwater (µg/L)	
				Acute Criterion (CMC)	Chronic Criterion (CCC)	Acute Criterion (CMC)	Chronic Criterion (CCC)
23	Heptachlor	76448	y	0.52 [A]	0.0038 [A]	0.053 [A]	0.0036 [A]
[A] *See expanded endnote A at bottom of Table 30 for alternate frequency and duration of this criterion.*							
24	Heptachlor Epoxide	1024573	y	0.52 [A]	0.0038 [A]	0.053 [A]	0.0036 [A]
[A] *See expanded endnote A at bottom of Table 30 for alternate frequency and duration of this criterion.*							
25	*Iron (total)*	7439896	n	--	1000	--	--
26	Lead	7439921	n	*See* **C , F**	*See* **C , F**	210 [C]	8.1 [C]
[C] *Criterion is expressed in terms of "dissolved" concentrations in the water column.* [F] *The freshwater criterion for this metal is expressed as a function of hardness (mg/L) in the water column. To calculate the criterion, use formula under expanded endnote F at bottom of Table 30.*							
27	*Malathion*	121755	n	--	0.1	--	0.1
28	Mercury (total)	7439976	n	2.4	0.012	2.1	0.025
29	*Methoxychlor*	72435	y	--	0.03	--	0.03
30	*Mirex*	2385855	n	--	0.001	--	0.001
31	Nickel	7440020	y	*See* **C , F**	*See* **C , F**	74 [C]	8.2 [C]
[C] *Criterion is expressed in terms of "dissolved" concentrations in the water column.* [F] *The freshwater criterion for this metal is expressed as a function of hardness (mg/L) in the water column. To calculate the criterion, use formula under expanded endnote F at bottom of Table 30.*							
32	*Parathion*	56382	n	0.065	0.013	--	--
33	Pentachlorophenol	87865	y	*See* **I**	*See* **I**	13	7.9
[I] *Freshwater aquatic life values for pentachlorophenol are expressed as a function of pH, and are calculated as follows: CMC=(exp(1.005(pH)-4.869); CCC=exp(1.005(pH)-5.134).*							
34	*Phosphorus Elemental*	7723140	n	--	--	--	0.1

OAR 340-041-8033
Table 30
Aquatic Life Water Quality Criteria for Toxic Pollutants

No.	Pollutant	CAS Number	Human Health Criterion	Freshwater (µg/L)		Saltwater (µg/L)	
				Acute Criterion (CMC)	Chronic Criterion (CCC)	Acute Criterion (CMC)	Chronic Criterion (CCC)
35	Polychlorinated Biphenyls (PCBs)	NA	y	2 [K]	0.014 [K]	10 [K]	0.03 [K]
[K] *This criterion applies to total PCBs (e.g.* determined as Aroclors or congeners)							
36	Selenium	7782492	y	*See* **C , L**	4.6 [C]	290 [C]	71 [C]
[C] *Criterion is expressed in terms of "dissolved" concentrations in the water column.* [L] *The CMC=(1/[(f1/CMC1)+(f2/CMC2)]µg/L) * CF where f1 and f2 are the fractions of total selenium that are treated as selenite and selenate, respectively, and CMC1 and CMC2 are 185.9 µg/L and 12.82 µg/L, respectively. See expanded endnote F for the Conversion Factor (CF) for selenium.*							
37	Silver	7440224	n	*See* **C , F**	0.10 [C]	1.9 [C]	--
[C] *Criterion is expressed in terms of "dissolved" concentrations in the water column.* [F] *The freshwater acute criterion for this metal is expressed as a function of hardness (mg/L) in the water column. To calculate the criterion, use formula under expanded endnote F at bottom of Table 30.*							
38	*Sulfide Hydrogen Sulfide*	7783064	n	--	2	--	2
39	Toxaphene	8001352	y	0.73	0.0002	0.21	0.0002
40	*Tributyltin (TBT)*	688733	n	0.46	0.063	0.37	0.01
41	Zinc	7440666	y	*See* **C , F**	*See* **C , F**	90 [C]	81 [C]
[C] *Criterion is expressed in terms of "dissolved" concentrations in the water column.* [F] *The freshwater criterion for this metal is expressed as a function of hardness (mg/L) in the water column. To calculate the criterion, use formula under expanded endnote F at bottom of Table 30.*							

Expanded Endnotes A, E, F, N

Endnote A: Alternate Frequency and Duration for Certain Pesticides

This criterion is based on EPA recommendations issued in 1980 that were derived using guidelines that differed from EPA's 1985 Guidelines which update minimum data requirements and derivation procedures. The CMC may not be exceeded at any time and the CCC may not be exceeded based on a 24-hour average. The CMC may be applied using a one hour averaging period not to be exceeded more than once every three years, if the CMC values given in Table 30 are divided by 2 to obtain a value that is more comparable to a CMC derived using the 1985 Guidelines.

Endnote E: Equation for Hardness-Dependent Freshwater Cadmium Acute Criteria

The freshwater criterion for this metal is expressed as total recoverable with two significant figures, and is a function of hardness (mg/L) in the water column. Criteria values based on hardness are calculated using the following formula (CMC refers to the acute criterion):

$$\mathbf{CMC} = (\exp(m_A * [\ln(\text{hardness})] + b_A))$$

Chemical	m_A	b_A	m_C	b_C
Cadmium	1.128	-3.828	N/A	N/A

Endnote F: Equations for Hardness-Dependent Freshwater Metals Criteria and Conversion Factor Table

The freshwater criterion for this metal is expressed as dissolved with two significant figures, and is a function of hardness (mg/L) in the water column. Criteria values based on hardness are calculated using the following formulas (CMC refers to the acute criterion; CCC refers to the chronic criterion):

$$\textbf{CMC} = (\exp(m_A*[\ln(\text{hardness})] + b_A))*CF$$

$$\textbf{CCC} = (\exp(m_C*[\ln(\text{hardness})] + b_C))*CF$$

"CF" is the conversion factor used for converting a metal criterion expressed as the total recoverable fraction in the water column to a criterion expressed as the dissolved fraction in the water column.

Values for Calculating Hardness-Dependent Metals Criteria				
Chemical	**m_A**	**b_A**	**m_C**	**b_C**
Cadmium	N/A	N/A	0.7409	-4.719
Chromium III	0.8190	3.7256	0.8190	0.6848
Lead	1.273	-1.460	1.273	-4.705
Nickel	0.8460	2.255	0.8460	0.0584
Silver	1.72	-6.59	--	--
Zinc	0.8473	0.884	0.8473	0.884

The conversion factors (CF) below must be used in the equations above for the hardness-dependent metals in order to convert total recoverable metals criteria to dissolved metals criteria. For metals that are not hardness-dependent (i.e. arsenic, chromium VI, selenium, and silver (chronic)), or are saltwater criteria, the criterion value associated with the metal in Table 30 already reflects a dissolved criterion based on its conversion factor below.

Conversion Factor (CF) Table for Dissolved Metals				
Chemical	Freshwater		Saltwater	
	Acute	Chronic	Acute	Chronic
Arsenic	1.000	1.000	1.000	1.000
Cadmium	N/A	1.101672-[(ln hardness)(0.041838)]	0.994	0.994
Chromium III	0.316	0.860	--	--
Chromium VI	0.982	0.962	0.993	0.993
Copper	N/A	N/A	0.83	0.83
Lead	1.46203-[(ln hardness)(0.145712)]	1.46203-[(ln hardness)(0.145712)]	0.951	0.951
Nickel	0.998	0.997	0.990	0.990
Selenium	0.996	0.922	0.998	0.998
Silver	0.85	0.85	0.85	--
Zinc	0.978	0.986	0.946	0.946

Endnote N: Deriving freshwater copper criteria

The freshwater copper criteria at any time are the Biotic Ligand Model (BLM) derived Instantaneous Water Quality Criteria (IWQC) output based on a concurrently measured set of model input parameter values. The Biotic Ligand Model uses multiple ambient water quality parameters to derive 1-hour acute exposure (CMC) and 96-hour chronic exposure (CCC) water quality criteria (IWQC) for copper based on the site specific water chemistry that determines the toxicity of copper to aquatic life. If measured data for one or more of the model input parameters used to derive the acute and chronic IWQC is not available, the procedures in section (1) or (2) of this endnote will be used as specified to substitute an estimate or a default value for the missing input parameter. BLM results (IWQC) based on sufficient measured input parameter data are more accurate and supersede results based on estimates or default values. The acceptable BLM software to calculate the IWQC include version 2.2.3, referenced in "Aquatic Life Ambient Freshwater Quality Criteria – Copper": EPA-822-R-07-001, February 2007, and version 2.2.4. The criteria are expressed as dissolved copper in micrograms per liter (to the nearest one-tenth).

(1) Input Parameter Substitution and Estimation Procedures to Derive BLM Criteria (IWQC)

If the measured value for any input parameter needed to derive an IWQC using the BLM is not available, DEQ will substitute an estimated input parameter value according to the procedures described in this section [Endnote N (1)]. If the data required to determine the estimated parameter value is not available, DEQ will use default values derived according to the procedures in Endnote N (2).

(a) Total recoverable concentration measurements will be substituted for dissolved concentration measurements that are not available. For alkalinity, calcium, chloride, magnesium, potassium, sodium and sulfate, total recoverable concentration measurements will be used as a direct substitute for dissolved concentration measurements. Total organic carbon (TOC) measurements will be multiplied by 0.83 to convert the TOC value to an equivalent dissolved organic carbon (DOC) value; except where sufficient TOC and DOC data are available for a site, DEQ will calculate and apply a site-specific translator in place of 0.83 to convert TOC values to DOC for use in the BLM.

(b) Alkalinity, calcium, chloride, magnesium, potassium, sodium and sulfate:
If data for any of these BLM input parameters are missing from a particular dataset, DEQ will estimate its value based on the relationship of the ion or alkalinity to specific conductance measurements for that data set using the regression analysis equations in Table 1. Specific conductance measurements must be concurrent with the other BLM input parameters dataset.

Table N-1	
Parameter	**Regression Equation**
Alkalinity	$Alk. = \exp^{(0.88 \cdot [\ln(SpC)] - 0.41)}$
Calcium	$Ca = \exp^{(0.96 \cdot [\ln(SpC)] - 2.29)}$
Chloride	$Cl = \exp^{(1.15 \cdot [\ln(SpC)] - 3.82)}$
Magnesium	$Mg = \exp^{(0.91 \cdot [\ln(SpC)] - 3.09)}$
Potassium	$K = \exp^{(0.84 \cdot [\ln(SpC)] - 3.74)}$
Sodium	$Na = \exp^{(0.86 \cdot [\ln(SpC)] - 2.22)}$
Sulfate	$SO_4 = \exp^{(1.45 \cdot [\ln(SpC)] - 5.59}$

Where, "SpC" is a measurement of specific conductance in µmhos/cm, "ln" is the natural logarithm, and "exp" is a mathematical constant that is the base of the natural logarithm.

(c) pH
If concurrent pH data is missing from the sample dataset, DEQ will use a representative pH value determined by interpolating from data available for the site or proximate monitoring locations where conditions (such as type of water body, stream flow and geology) are similar to the site. DEQ will use the available data and methods to produce the best practicable estimate of pH for the site and time for which the IWQC is being derived.

(d) Temperature
If concurrent temperature data is missing from the sample dataset, DEQ will use a monthly mean temperature based on data available for the site or proximate monitoring locations where conditions (such as type of water body and stream flow) are similar to the site.

(e) Humic Acid
If sufficient high quality data on the percentage of humic acid as a proportion of DOC is available for a site, DEQ will use that value in the BLM in place of the default value of 10% used in the model.

(2) Default Action Values

If the measured value for DOC, alkalinity, calcium, chloride, magnesium, potassium, sodium or sulfate is not available to derive an IWQC using the BLM, and the parameter value cannot be estimated as specified in section (1) above, DEQ will use a conservative input value for the missing parameter as described in this section [Endnote N (2)] to derive a default action value using the Biotic Ligand Model. The default action value will be used for Clean Water Act purposes until measured or estimated input parameter data are available to derive accurate copper criteria (IWQC) based on site specific water chemistry.

(a) The default input parameter values for DOC, alkalinity calcium, chloride, magnesium, potassium, sodium and sulfate will be the percentile value from the distribution of the high quality data available for surface waters in the region as shown in Table N-2.

Table N-2 Percentile of data distribution to be used as default value by region		
Region	**DOC** percentile	**Alkalinity and Ions** percentile
Willamette	20th	20th
Coastal	20th	20th
Cascades	20th	20th
Eastern	15th	15th
Columbia River	20th	20th

(b) The regional default values for each parameter and region will be updated periodically as additional high quality data becomes available and is added to DEQ's database.
(c) The regional default values for each parameter are available on DEQ's website.
(d) The regions listed in Table N-2 are comprised of the following EPA Level III ecoregions or waterbody:
(i) Willamette: the Willamette Valley
(ii) Coastal: Coast Range and Klamath Mountains
(iii) Cascades: Cascades
(iv) Eastern: Eastern Cascades Slopes and Foothills, Columbia Plateau, Blue Mountains, Northern Basin and Range and Snake River Plain
(v) Columbia River: Columbia River mainstem in Oregon

(3) General Policies
(a) The copper BLM derives instantaneous criteria results (IWQC) that vary at a site over time reflecting the effect of local water chemistry on copper toxicity to aquatic organisms. DEQ will apply the BLM criteria for Clean Water Act purposes to protect the water body during the most bioavailable or toxic conditions.
(b) For assessing waters of the state, DEQ will use approaches that give preference to the use of BLM criteria derived with site-specific measured input parameter data.

Table 30(a): Ammonia Acute Criteria Values (One-hour Average)—Salmonid Species Present
Temperature and pH-Dependent and expressed as Total Ammonia Nitrogen (mg/L TAN)

Criteria cannot be exceeded more than once every three years

$$Acute\ Criterion = MIN\left(\left(\frac{0.275}{1+10^{7.204-pH}}+\frac{39.0}{1+10^{pH-7.204}}\right),\left(0.7249\times\left(\frac{0.0114}{1+10^{7.204-pH}}+\frac{1.6181}{1+10^{pH-7.204}}\right)\times\left(23.12\times 10^{0.036\times(20-T)}\right)\right)\right)$$

	Temperature (°C)																
pH	**0-14**	**15**	**16**	**17**	**18**	**19**	**20**	**21**	**22**	**23**	**24**	**25**	**26**	**27**	**28**	**29**	**30**
6.5	33	33	32	29	27	25	23	21	19	18	16	15	14	13	12	11	9.9
6.6	31	31	30	28	26	24	22	20	18	17	16	14	13	12	11	10	9.5
6.7	30	30	29	27	24	22	21	19	18	16	15	14	13	12	11	9.8	9.0
6.8	28	28	27	25	23	21	20	18	17	15	14	13	12	11	10	9.2	8.5
6.9	26	26	25	23	21	20	18	17	15	14	13	12	11	10	9.4	8.6	7.9
7.0	24	24	23	21	20	18	17	15	14	13	12	11	10	9.4	8.6	8.0	7.3
7.1	22	22	21	20	18	17	15	14	13	12	11	10	9.3	8.5	7.9	7.2	6.7
7.2	20	20	19	18	16	15	14	13	12	11	9.8	9.1	8.3	7.7	7.1	6.5	6.0
7.3	18	18	17	16	14	13	12	11	10	9.5	8.7	8.0	7.4	6.8	6.3	5.8	5.3
7.4	15	15	15	14	13	12	11	9.8	9.0	8.3	7.7	7.0	6.5	6.0	5.5	5.1	4.7
7.5	13	13	13	12	11	10	9.2	8.5	7.8	7.2	6.6	6.1	5.6	5.2	4.8	4.4	4.0
7.6	11	11	11	10	9.3	8.6	7.9	7.3	6.7	6.2	5.7	5.2	4.8	4.4	4.1	3.8	3.5
7.7	9.6	9.6	9.3	8.6	7.9	7.3	6.7	6.2	5.7	5.2	4.8	4.4	4.1	3.8	3.5	3.2	3.0
7.8	8.1	8.1	7.9	7.2	6.7	6.1	5.6	5.2	4.8	4.4	4.0	3.7	3.4	3.2	2.9	2.7	2.5
7.9	6.8	6.8	6.6	6.0	5.6	5.1	4.7	4.3	4.0	3.7	3.4	3.1	2.9	2.6	2.4	2.2	2.1
8.0	5.6	5.6	5.4	5.0	4.6	4.2	3.9	3.6	3.3	3.0	2.8	2.6	2.4	2.2	2.0	1.9	1.7
8.1	4.6	4.6	4.5	4.1	3.8	3.5	3.2	3.0	2.7	2.5	2.3	2.1	2.0	1.8	1.7	1.5	1.4
8.2	3.8	3.8	3.7	3.5	3.1	2.9	2.7	2.4	2.3	2.1	1.9	1.8	1.6	1.5	1.4	1.3	1.2
8.3	3.1	3.1	3.1	2.8	2.6	2.4	2.2	2.0	1.9	1.7	1.6	1.4	1.3	1.2	1.1	1.0	0.96
8.4	2.6	2.6	2.5	2.3	2.1	2.0	1.8	1.7	1.5	1.4	1.3	1.2	1.1	1.0	0.93	0.86	0.79
8.5	2.1	2.1	2.1	1.9	1.8	1.6	1.5	1.4	1.3	1.2	1.1	0.98	0.90	0.83	0.77	0.71	0.65
8.6	1.8	1.8	1.7	1.6	1.5	1.3	1.2	1.1	1.0	0.96	0.88	0.81	0.75	0.69	0.63	0.59	0.54
8.7	1.5	1.5	1.4	1.3	1.2	1.1	1.0	0.94	0.87	0.80	0.74	0.68	0.62	0.57	0.53	0.49	0.45
8.8	1.2	1.2	1.2	1.1	1.0	0.93	0.86	0.79	0.73	0.67	0.62	0.57	0.52	0.48	0.44	0.41	0.37
8.9	1.0	1.0	1.0	0.93	0.85	0.79	0.72	0.67	0.61	0.56	0.52	0.48	0.44	0.40	0.37	0.34	0.32
9.0	0.88	0.88	0.86	0.79	0.73	0.67	0.62	0.57	0.52	0.48	0.44	0.41	0.37	0.34	0.32	0.29	0.27

Table 30(b): Ammonia Acute Criteria Values (One-hour Average*)—Salmonid Species Absent
Temperature and pH-Dependent and expressed as Total Ammonia Nitrogen (mg/L TAN)

Criteria cannot be exceeded more than once every three years

$$Acute\ Criterion = 0.7249 \times \frac{0.0114}{1+10^{7.204-pH}} + \frac{1.6181}{1+10^{pH-7.204}} \times MIN\left(51.93, 23.12 \times 10^{0.036\times(20-T)}\right)$$

	Temperature (°C)																				
pH	**0-10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**	**21**	**22**	**23**	**24**	**25**	**26**	**27**	**28**	**29**	**30**
6.5	51	48	44	41	37	34	32	29	27	25	23	21	19	18	16	15	14	13	12	11	9.9
6.6	49	46	42	39	36	33	30	28	26	24	22	20	18	17	16	14	13	12	11	10	9.5
6.7	46	44	40	37	34	31	29	27	24	22	21	19	18	16	15	14	13	12	11	9.8	9.0
6.8	44	41	38	35	32	30	27	25	23	21	20	18	17	15	14	13	12	11	10	9.2	8.5
6.9	41	38	35	32	30	28	25	23	21	20	18	17	15	14	13	12	11	10	9.4	8.6	7.9
7.0	38	35	33	30	28	25	23	21	20	18	17	15	14	13	12	11	10	9.4	8.6	7.9	7.3
7.1	34	32	30	27	25	23	21	20	18	17	15	14	13	12	11	10	9.3	8.5	7.9	7.2	6.7
7.2	31	29	27	25	23	21	19	18	16	15	14	13	12	11	9.8	9.1	8.3	7.7	7.1	6.5	6.0
7.3	27	26	24	22	20	18	17	16	14	13	12	11	10	9.5	8.7	8.0	7.4	6.8	6.3	5.8	5.3
7.4	24	22	21	19	18	16	15	14	13	12	11	9.8	9.0	8.3	7.7	7.0	6.5	6.0	5.5	5.1	4.7
7.5	21	19	18	17	15	14	13	12	11	10	9.2	8.5	7.8	7.2	6.6	6.1	5.6	5.2	4.8	4.4	4.0
7.6	18	17	15	14	13	12	11	10	9.3	8.6	7.9	7.3	6.7	6.2	5.7	5.2	4.8	4.4	4.1	3.8	3.5
7.7	15	14	13	12	11	10	9.3	8.6	7.9	7.3	6.7	6.2	5.7	5.2	4.8	4.4	4.1	3.8	3.5	3.2	2.9
7.8	13	12	11	10	9.3	8.5	7.9	7.2	6.7	6.1	5.6	5.2	4.8	4.4	4.0	3.7	3.4	3.2	2.9	2.7	2.5
7.9	11	9.9	9.1	8.4	7.7	7.1	6.6	3.0	5.6	5.1	4.7	4.3	4.0	3.7	3.4	3.1	2.9	2.6	2.4	2.2	2.1
8.0	8.8	8.2	7.6	7.0	6.4	5.9	5.4	5.0	4.6	4.2	3.9	3.6	3.3	3.0	2.8	2.6	2.4	2.2	2.0	1.9	1.7
8.1	7.2	6.8	6.3	5.8	5.3	4.9	4.5	4.1	3.8	3.5	3.2	3.0	2.7	2.5	2.3	2.1	2.0	1.8	1.7	1.5	1.4
8.2	6.0	5.6	5.2	4.8	4.4	4.0	3.7	3.4	3.1	2.9	2.7	2.4	2.3	2.1	1.9	1.8	1.6	1.5	1.4	1.3	1.2
8.3	4.9	4.6	4.3	3.9	3.6	3.3	3.1	2.8	2.6	2.4	2.2	2.0	1.9	1.7	1.6	1.4	1.3	1.2	1.1	1.0	0.96
8.4	4.1	3.8	3.5	3.2	3.0	2.7	2.5	2.3	2.1	2.0	1.8	1.7	1.5	1.4	1.3	1.2	1.1	1.0	0.93	0.86	0.79
8.5	3.3	3.1	2.9	2.7	2.4	2.3	2.1	1.9	1.8	1.6	1.5	1.4	1.3	1.2	1.1	0.98	0.90	0.83	0.77	0.71	0.65
8.6	2.8	2.6	2.4	2.2	2.0	1.9	1.7	1.6	1.5	1.3	1.2	1.1	1.0	0.96	0.88	0.81	0.75	0.69	0.63	0.58	0.54
8.7	2.3	2.2	2.0	1.8	1.7	1.6	1.4	1.3	1.2	1.1	1.0	0.94	0.87	0.80	0.74	0.68	0.62	0.57	0.53	0.49	0.45
8.8	1.9	1.8	1.7	1.5	1.4	1.3	1.2	1.1	1.0	0.93	0.86	0.79	0.73	0.67	0.62	0.57	0.52	0.48	0.44	0.41	0.37
8.9	1.6	1.5	1.4	1.3	1.2	1.1	1.0	0.93	0.85	0.79	0.72	0.67	0.61	0.56	0.52	0.48	0.44	0.40	0.37	0.34	0.32
9.0	1.4	1.3	1.2	1.1	1.0	0.93	0.86	0.79	0.73	0.67	0.62	0.57	0.52	0.48	0.44	0.41	0.37	0.34	0.32	0.29	0.27

Table 30(c): Ammonia Chronic Criteria Values (30-day Rolling Average*)

Temperature and pH-Dependent and expressed as Total Ammonia Nitrogen (mg/L TAN)

* The highest four-day average within the 30-day averaging period must not be more than 2.5 times the chronic value

Criteria cannot be exceeded more than once every three years

$$Chronic\ Criterion = 0.8876 \times \left(\frac{0.0278}{1 + 10^{7.688-pH}} + \frac{1.1994}{1 + 10^{pH-7.688}}\right) \times \left(2.126 \times 10^{0.028\times(20-MAX(T,7))}\right)$$

	Temperature (°C)																							
pH	**0-7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**	**21**	**22**	**23**	**24**	**25**	**26**	**27**	**28**	**29**	**30**
6.5	4.9	4.6	4.3	4.1	3.8	3.6	3.3	3.1	2.9	2.8	2.6	2.4	2.3	2.1	2.0	1.9	1.8	1.6	1.5	1.5	1.4	1.3	1.2	1.1
6.6	4.8	4.5	4.3	4.0	3.8	3.5	3.3	3.1	2.9	2.7	2.5	2.4	2.2	2.1	2.0	1.8	1.7	1.6	1.5	1.4	1.3	1.3	1.2	1.1
6.7	4.8	4.5	4.2	3.9	3.7	3.5	3.2	3.0	2.8	2.7	2.5	2.3	2.2	2.1	1.9	1.8	1.7	1.6	1.5	1.4	1.3	1.2	1.2	1.1
6.8	4.6	4.4	4.1	3.8	3.6	3.4	3.2	3.0	2.8	2.6	2.4	2.3	2.1	2.0	1.9	1.8	1.7	1.6	1.5	1.4	1.3	1.2	1.1	1.1
6.9	4.5	4.2	4.0	3.7	3.5	3.3	3.1	2.9	2.7	2.5	2.4	2.2	2.1	2.0	1.8	1.7	1.6	1.5	1.4	1.3	1.2	1.2	1.1	1.0
7.0	4.4	4.1	3.8	3.6	3.4	3.2	3.0	2.8	2.6	2.4	2.3	2.2	2.0	1.9	1.8	1.7	1.6	1.5	1.4	1.3	1.2	1.1	1.1	0.99
7.1	4.2	3.9	3.7	3.5	3.2	3.0	2.8	2.7	2.5	2.3	2.2	2.1	1.9	1.8	1.7	1.6	1.5	1.4	1.3	1.2	1.2	1.1	1.0	0.95
7.2	4.0	3.7	3.5	3.3	3.1	2.9	2.7	2.5	2.4	2.2	2.1	2.0	1.8	1.7	1.6	1.5	1.4	1.3	1.3	1.2	1.1	1.0	0.96	0.90
7.3	3.8	3.5	3.3	3.1	2.9	2.7	2.6	2.4	2.2	2.1	2.0	1.8	1.7	1.6	1.5	1.4	1.3	1.3	1.2	1.1	1.0	0.97	0.91	0.85
7.4	3.5	3.3	3.1	2.9	2.7	2.5	2.4	2.2	2.1	2.0	1.8	1.7	1.6	1.5	1.4	1.3	1.3	1.2	1.1	1.0	0.96	0.90	0.85	0.79
7.5	3.2	3.0	2.8	2.7	2.5	2.3	2.2	2.1	1.9	1.8	1.7	1.6	1.5	1.4	1.3	1.2	1.2	1.1	1.0	0.95	0.89	0.83	0.78	0.73
7.6	2.9	2.8	2.6	2.4	2.3	2.1	2.0	1.9	1.8	1.6	1.5	1.4	1.4	1.3	1.2	1.1	1.1	0.98	0.92	0.86	0.81	0.76	0.71	0.67
7.7	2.6	2.4	2.3	2.2	2.0	1.9	1.8	1.7	1.6	1.5	1.4	1.3	1.2	1.1	1.1	1.0	0.94	0.88	0.83	0.78	0.73	0.68	0.64	0.60
7.8	2.3	2.2	2.1	1.9	1.8	1.7	1.6	1.5	1.4	1.3	1.2	1.2	1.1	1.0	0.95	0.89	0.84	0.79	0.74	0.69	0.65	0.61	0.57	0.53
7.9	2.1	1.9	1.8	1.7	1.6	1.5	1.4	1.3	1.2	1.2	1.1	1.0	0.95	0.89	0.84	0.79	0.74	0.69	0.65	0.61	0.57	0.53	0.50	0.47
8.0	1.8	1.7	1.6	1.5	1.4	1.3	1.2	1.1	1.1	1.0	0.94	0.88	0.83	0.78	0.73	0.68	0.64	0.60	0.56	0.53	0.50	0.44	0.44	0.41
8.1	1.5	1.5	1.4	1.3	1.2	1.1	1.1	0.99	0.92	0.87	0.81	0.76	0.71	0.67	0.63	0.59	0.55	0.52	0.49	0.46	0.43	0.40	0.38	0.35
8.2	1.3	1.2	1.2	1.1	1.0	0.96	0.90	0.84	0.79	0.74	0.70	0.65	0.61	0.57	0.54	0.50	0.47	0.44	0.42	0.39	0.37	0.34	0.32	0.30
8.3	1.1	1.1	0.99	0.93	0.87	0.82	0.76	0.72	0.67	0.63	0.59	0.55	0.52	0.49	0.46	0.43	0.40	0.38	0.35	0.33	0.31	0.29	0.27	0.26
8.4	0.95	0.89	0.84	0.79	0.74	0.69	0.65	0.61	0.57	0.53	0.50	0.47	0.44	0.41	0.39	0.36	0.34	0.32	0.30	0.28	0.26	0.25	0.23	0.22
8.5	0.80	0.75	0.71	0.67	0.62	0.58	0.55	0.51	0.48	0.45	0.42	0.40	0.37	0.35	0.33	0.31	0.29	0.27	0.25	0.24	0.22	0.21	0.20	0.18
8.6	0.68	0.64	0.60	0.56	0.53	0.49	0.46	0.43	0.41	0.38	0.36	0.33	0.31	0.29	0.28	0.26	0.24	0.23	0.21	0.20	0.19	0.18	0.16	0.15
8.7	0.57	0.54	0.51	0.47	0.44	0.42	0.39	0.37	0.34	0.32	0.30	0.28	0.27	0.25	0.23	0.22	0.21	0.19	0.18	0.17	0.16	0.15	0.14	0.13
8.8	0.49	0.46	0.43	0.40	0.38	0.35	0.33	0.31	0.29	0.27	0.26	0.24	0.23	0.21	0.20	0.19	0.17	0.16	0.15	0.14	0.13	0.13	0.12	0.11
8.9	0.42	0.39	0.37	0.34	0.32	0.30	0.28	0.27	0.25	0.23	0.22	0.21	0.19	0.18	0.17	0.16	0.15	0.14	0.13	0.12	0.12	0.11	0.10	0.09
9.0	0.36	0.34	0.32	0.30	0.28	0.26	0.24	0.23	0.21	0.20	0.19	0.18	0.17	0.16	0.15	0.14	0.13	0.12	0.11	0.11	0.10	0.09	0.09	0.08

OAR 340-041-8033
TABLE 31
Aquatic Life Water Quality Guidance Values for Toxic Pollutants

State of Oregon Department of Environmental Quality

Effective April 18, 2014

Water Quality Guidance Values Summary [A]

The concentration for each compound listed in Table 31 is a guidance value that DEQ may use in application of Oregon's Toxic Substances Narrative (340-041-0033(2)) to waters of the state in order to protect aquatic life. All values are expressed as micrograms per liter (µg/L) except where noted. Compounds are listed in alphabetical order with the corresponding EPA number (from National Recommended Water Quality Criteria: 2002, EPA-822-R-02-047), corresponding Chemical Abstract Service (CAS) number, aquatic life freshwater acute and chronic guidance values, and aquatic life saltwater acute and chronic guidance values.

OAR 340-041-8033
Table 31
Aquatic Life Water Quality Guidance Values for Toxic Pollutants

EPA No.	Pollutant	CAS Number	Freshwater		Saltwater	
			Acute	Chronic	Acute	Chronic
56	Acenaphthene	83329	1,700	520	970	710
17	Acrolein	107028	68	21	55	
18	Acrylonitrile	107131	7,550	2,600		
1	Antimony	7440360	9,000	1,600		
19	Benzene	71432	5,300		5,100	700
59	Benzidine	92875	2,500			
3	Beryllium	7440417	130	5.3		
19 B	BHC (Hexachlorocyclohexane-Technical)	319868	100		0.34	
21	Carbon Tetrachloride	56235	35,200		50,000	

OAR 340-041-8033
Table 31
Aquatic Life Water Quality Guidance Values for Toxic Pollutants

EPA No.	Pollutant	CAS Number	Freshwater		Saltwater	
			Acute	Chronic	Acute	Chronic
	Chlorinated Benzenes		250	50	160	129
	Chlorinated naphthalenes		1,600		7.5	
	Chloroalkyl Ethers		238,000			
26	Chloroform	67663	28,900	1,240		
45	Chlorophenol 2-	95578	4,380	2,000		
	Chlorophenol 4-	106489			29,700	
52	Methyl-4-chlorophenol 3-	59507	30			
5a	Chromium (III)	16065831			10,300	
109	DDE 4,4'-	72559	1,050		14	
110	DDD 4,4'-	72548	0.06		3.6	
	Diazinon	333415	0.08	0.05		
	Dichlorobenzenes		1,120	763	1,970	
29	Dichloroethane 1,2-	107062	118,000	20,000	113,000	
	Dichloroethylenes		11,600		224,000	
46	Dichlorophenol 2,4-	120832	2,020	365		
31	Dichloropropane 1,2-	78875	23,000	5,700	10,300	3,040
32	Dichloropropene 1,3-	542756	6,060	244	790	
47	Dimethylphenol 2,4-	105679	2,120			
	Dinitrotoluene		330	230	590	370
16	Dioxin (2,3,7,8-TCDD)	1746016	0.01	38 pg/L		
85	Diphenylhydrazine 1,2-	122667	270			

OAR 340-041-8033
Table 31
Aquatic Life Water Quality Guidance Values for Toxic Pollutants

EPA No.	Pollutant	CAS Number	Freshwater		Saltwater	
			Acute	Chronic	Acute	Chronic
33	Ethylbenzene	100414	32,000		430	
86	Fluoranthene	206440	3,980		40	16
	Haloethers		360	122		
	Halomethanes		11,000		12,000	6,400
89	Hexachlorobutadiene	87683	90	9.3	32	
90	Hexachlorocyclopentadiene	77474	7	5.2	7	
91	Hexachloroethane	67721	980	540	940	
93	Isophorone	78591	117,000		12,900	
94	Naphthalene	91203	2,300	620	2,350	
95	Nitrobenzene	98953	27,000		6,680	
	Nitrophenols		230	150	4,850	
26 B	Nitrosamines	35576911	5,850		3,300,000	
	Pentachlorinated ethanes		7,240	1,100	390	281
54	Phenol	108952	10,200	2,560	5,800	
	Phthalate esters		940	3	2,944	3.4
	Polynuclear Aromatic Hydrocarbons				300	
	Tetrachlorinated Ethanes		9,320			
37	Tetrachloroethane 1,1,2,2-	79345		2,400	9,020	
	Tetrachloroethanes		9,320			

OAR 340-041-8033
Table 31
Aquatic Life Water Quality Guidance Values for Toxic Pollutants

EPA No.	Pollutant	CAS Number	Freshwater		Saltwater	
			Acute	Chronic	Acute	Chronic
38	Tetrachloroethylene	127184	5,280	840	10,200	450
	Tetrachlorophenol 2,3,5,6					440
12	Thallium	7440280	1,400	40	2,130	
39	Toluene	108883	17,500		6,300	5,000
	Trichlorinated ethanes		18,000			
41	Trichloroethane 1,1,1-	71556			31,200	
42	Trichloroethane 1,1,2-	79005		9,400		
43	Trichloroethylene	79016	45,000	21,900	2,000	
55	Trichlorophenol 2,4,6-	88062		970		

The following chemicals/compounds/classes are of concern due to the potential for toxic effects to aquatic organisms; however, no guidance values are designated. If these compounds are identified in the waste stream, then a review of the scientific literature may be appropriate for deriving guidance values.

- ❑ Polybrominated diphenyl ethers (PBDE)
- ❑ Polybrominated biphenyls (PBB)
- ❑ Pharmaceuticals
- ❑ Personal care products
- ❑ Alkyl Phenols
- ❑ Other chemicals with Toxic effects

Footnotes:

A Values in Table 31 are applicable to all basins.

B This number was assigned to the list of non-priority pollutants in National Recommended Water Quality Criteria: 2002 (EPA-822-R-02-047).

State of Oregon
Department of
Environmental
Quality

OAR 340-041-8033
TABLE 40
Human Health Water Quality Criteria for Toxic Pollutants

Effective April 18, 2014

Human Health Criteria Summary

The concentration for each pollutant listed in Table 40 was derived to protect Oregonians from potential adverse health impacts associated with long-term exposure to toxic substances associated with consumption of fish, shellfish, and water. The "organism only" criteria are established to protect fish and shellfish consumption and apply to waters of the state designated for fishing. The "water + organism" criteria are established to protect the consumption of drinking water, fish, and shellfish, and apply where both fishing and domestic water supply (public and private) are designated uses. All criteria are expressed as micrograms per liter (µg/L), unless otherwise noted. Pollutants are listed in alphabetical order. Additional information includes the Chemical Abstract Service (CAS) number, whether the criterion is based on carcinogenic effects (can cause cancer in humans), and whether there is an aquatic life criterion for the pollutant (i.e. "y"= yes, "n" = no). All the human health criteria were calculated using a fish consumption rate of 175 grams per day unless otherwise noted. A fish consumption rate of 175 grams per day is approximately equal to 23 8-ounce fish meals per month. For pollutants categorized as carcinogens, values represent a cancer risk of one additional case of cancer in one million people (i.e. 10^{-6}), unless otherwise noted. All metals criteria are for total metal concentration, unless otherwise noted. Italicized pollutants represent non-priority pollutants. The human health criteria revisions established by OAR 340-041-0033 and shown in Table 40 do not become applicable for purposes of ORS chapter 468B or the federal Clean Water Act until approved by EPA pursuant to 40 CFR 131.21 (4/27/2000).

OAR 340-041-8033
Table 40
Human Health Water Quality Criteria for Toxic Pollutants

No.	Pollutant	CAS Number	Carcinogen	Aquatic Life Criterion	Human Health Criteria for the Consumption of:	
					Water + Organism (µg/L)	Organism Only (µg/L)
1	Acenaphthene	83329	n	n	95	99
2	Acrolein	107028	n	n	0.88	0.93
3	Acrylonitrile	107131	y	n	0.018	0.025
4	Aldrin	309002	y	y	0.0000050	0.0000050
5	Anthracene	120127	n	n	2900	4000
6	Antimony	7440360	n	n	5.1	64
7	Arsenic (inorganic) [A]	7440382	y	y	2.1	2.1(freshwater) 1.0 (saltwater)
[A] *The arsenic criteria are expressed as total inorganic arsenic. The "organism only" freshwater criterion is based on a risk level of approximately 1 x 10^{-5}, and the "water + organism" criterion is based on a risk level of 1 x 10^{-4}.*						
8	Asbestos [B]	1332214	y	n	7,000,000 fibers/L	--
[B] *The human health risks from asbestos are primarily from drinking water, therefore no "organism only" criterion was developed. The "water + organism" criterion is based on the Maximum Contaminant Level (MCL) established under the Safe Drinking Water Act.*						
9	*Barium* [C]	7440393	n	n	1000	--
[C] *The human health criterion for barium is the same as originally published in the 1976 EPA Red Book which predates the 1980 methodology and did not utilize the fish ingestion BCF approach. This same criterion value was also published in the 1986 EPA Gold Book. Human health risks are primarily from drinking water, therefore no "organism only" criterion was developed. The "water + organism" criterion is based on the Maximum Contaminant Level (MCL) established under the Safe Drinking Water Act.*						
10	Benzene	71432	y	n	0.44	1.4
11	Benzidine	92875	y	n	0.000018	0.000020
12	Benz(a)anthracene	56553	y	n	0.0013	0.0018
13	Benzo(a)pyrene	50328	y	n	0.0013	0.0018

OAR 340-041-8033
Table 40
Human Health Water Quality Criteria for Toxic Pollutants

No.	Pollutant	CAS Number	Carcinogen	Aquatic Life Criterion	Human Health Criteria for the Consumption of:	
					Water + Organism (µg/L)	Organism Only (µg/L)
14	Benzo(b)fluoranthene 3,4	205992	y	n	0.0013	0.0018
15	Benzo(k)fluoranthene	207089	y	n	0.0013	0.0018
16	BHC Alpha	319846	y	n	0.00045	0.00049
17	BHC Beta	319857	y	n	0.0016	0.0017
18	BHC Gamma (Lindane)	58899	n	y	0.17	0.18
19	Bromoform	75252	y	n	3.3	14
20	Butylbenzyl Phthalate	85687	n	n	190	190
21	Carbon Tetrachloride	56235	y	n	0.10	0.16
22	Chlordane	57749	y	y	0.000081	0.000081
23	Chlorobenzene	108907	n	n	74	160
24	Chlorodibromomethane	124481	y	n	0.31	1.3
25	Chloroethyl Ether bis 2	111444	y	n	0.020	0.053
26	Chloroform	67663	n	n	260	1100
27	Chloroisopropyl Ether bis 2	108601	n	n	1200	6500
28	Chloromethyl ether, bis	542881	y	n	0.000024	0.000029
29	Chloronaphthalene 2	91587	n	n	150	160
30	Chlorophenol 2	95578	n	n	14	15
31	Chlorophenoxy Herbicide (2,4,5,-TP) [D]	93721	n	n	10	--

OAR 340-041-8033

Table 40

Human Health Water Quality Criteria for Toxic Pollutants

No.	Pollutant	CAS Number	Carcinogen	Aquatic Life Criterion	Human Health Criteria for the Consumption of:	
					Water + Organism (µg/L)	Organism Only (µg/L)
	[D] *The Chlorophenoxy Herbicide (2,4,5,-TP) criterion is the same as originally published in the 1976 EPA Red Book which predates the 1980 methodology and did not utilize the fish ingestion BCF approach. This same criterion value was also published in the 1986 EPA Gold Book. Human health risks are primarily from drinking water, therefore no "organism only" criterion was developed. The "water + organism" criterion is based on the Maximum Contaminant Level (MCL) established under the Safe Drinking Water Act.*					
32	Chlorophenoxy Herbicide (2,4-D) [E]	94757	n	n	100	--
	[E] *The Chlorophenoxy Herbicide (2,4-D) criterion is the same as originally published in the 1976 EPA Red Book which predates the 1980 methodology and did not utilize the fish ingestion BCF approach. This same criterion value was also published in the 1986 EPA Gold Book. Human health risks are primarily from drinking water, therefore no "organism only" criterion was developed. The "water + organism" criterion is based on the Maximum Contaminant Level (MCL) established under the Safe Drinking Water Act.*					
33	Chrysene	218019	y	n	0.0013	0.0018
34	Copper [F]	7440508	n	y	1300	--
	[F] *Human health risks from copper are primarily from drinking water, therefore no "organism only" criterion was developed. The "water + organism" criterion is based on the Maximum Contaminant Level (MCL) established under the Safe Drinking Water Act.*					
35	Cyanide [G]	57125	n	y	130	130
	[G] *The cyanide criterion is expressed as total cyanide (CN)/L.*					
36	DDD 4,4'	72548	y	n	0.000031	0.000031
37	DDE 4,4'	72559	y	n	0.000022	0.000022
38	DDT 4,4'	50293	y	y	0.000022	0.000022
39	Dibenz(a,h)anthracene	53703	y	n	0.0013	0.0018
40	Dichlorobenzene(m) 1,3	541731	n	n	80	96
41	Dichlorobenzene(o) 1,2	95501	n	n	110	130

OAR 340-041-8033
Table 40
Human Health Water Quality Criteria for Toxic Pollutants

No.	Pollutant	CAS Number	Carcinogen	Aquatic Life Criterion	Human Health Criteria for the Consumption of:	
					Water + Organism (µg/L)	Organism Only (µg/L)
42	Dichlorobenzene(p) 1,4	106467	n	n	16	19
43	Dichlorobenzidine 3,3'	91941	y	n	0.0027	0.0028
44	Dichlorobromomethane	75274	y	n	0.42	1.7
45	Dichloroethane 1,2	107062	y	n	0.35	3.7
46	Dichloroethylene 1,1	75354	n	n	230	710
47	Dichloroethylene trans 1,2	156605	n	n	120	1000
48	Dichlorophenol 2,4	120832	n	n	23	29
49	Dichloropropane 1,2	78875	y	n	0.38	1.5
50	Dichloropropene 1,3	542756	y	n	0.30	2.1
51	Dieldrin	60571	y	y	0.0000053	0.0000054
52	Diethyl Phthalate	84662	n	n	3800	4400
53	Dimethyl Phthalate	131113	n	n	84000	110000
54	Dimethylphenol 2,4	105679	n	n	76	85
55	Di-n-butyl Phthalate	84742	n	n	400	450
56	Dinitrophenol 2,4	51285	n	n	62	530
57	*Dinitrophenols*	25550587	n	n	62	530
58	Dinitrotoluene 2,4	121142	y	n	0.084	0.34
59	Dioxin (2,3,7,8-TCDD)	1746016	y	n	0.00000000051	0.00000000051

OAR 340-041-8033
Table 40
Human Health Water Quality Criteria for Toxic Pollutants

No.	Pollutant	CAS Number	Carcinogen	Aquatic Life Criterion	Human Health Criteria for the Consumption of:	
					Water + Organism (µg/L)	Organism Only (µg/L)
60	Diphenylhydrazine 1,2	122667	y	n	0.014	0.020
61	Endosulfan Alpha	959988	n	y	8.5	8.9
62	Endosulfan Beta	33213659	n	y	8.5	8.9
63	Endosulfan Sulfate	1031078	n	n	8.5	8.9
64	Endrin	72208	n	y	0.024	0.024
65	Endrin Aldehyde	7421934	n	n	0.030	0.030
66	Ethylbenzene	100414	n	n	160	210
67	Ethylhexyl Phthalate bis 2	117817	y	n	0.20	0.22
68	Fluoranthene	206440	n	n	14	14
69	Fluorene	86737	n	n	390	530
70	Heptachlor	76448	y	y	0.0000079	0.0000079
71	Heptachlor Epoxide	1024573	y	y	0.0000039	0.0000039
72	Hexachlorobenzene	118741	y	n	0.000029	0.000029
73	Hexachlorobutadiene	87683	y	n	0.36	1.8
74	*Hexachlorocyclo-hexane-Technical*	608731	y	n	0.0014	0.0015
75	Hexachlorocyclopentadiene	77474	n	n	30	110
76	Hexachloroethane	67721	y	n	0.29	0.33
77	Indeno(1,2,3-cd)pyrene	193395	y	n	0.0013	0.0018

OAR 340-041-8033
Table 40
Human Health Water Quality Criteria for Toxic Pollutants

No.	Pollutant	CAS Number	Carcinogen	Aquatic Life Criterion	Human Health Criteria for the Consumption of:	
					Water + Organism (µg/L)	Organism Only (µg/L)
78	Isophorone	78591	y	n	27	96
79	Manganese [H]	7439965	n	n	--	100
[H] *The "fish consumption only" criterion for manganese applies only to salt water and is for total manganese. This EPA recommended criterion predates the 1980 human health methodology and does not utilize the fish ingestion BCF calculation method or a fish consumption rate.*						
80	Methoxychlor [I]	72435	n	y	100	--
[I] *The human health criterion for methoxychlor is the same as originally published in the 1976 EPA Red Book which predates the 1980 methodology and did not utilize the fish ingestion BCF approach. This same criterion value was also published in the1986 EPA Gold Book. Human health risks are primarily from drinking water, therefore no "organism only" criterion was developed. The "water + organism" criterion is based on the Maximum Contaminant Level (MCL) established under the Safe Drinking Water Act.*						
81	Methyl Bromide	74839	n	n	37	150
82	Methyl-4,6-dinitrophenol 2	534521	n	n	9.2	28
83	Methylene Chloride	75092	y	n	4.3	59
84	Methylmercury (mg/kg) [J]	22967926	n	n	--	0.040 mg/kg
[J] *This value is expressed as the fish tissue concentration of methylmercury. Contaminated fish and shellfish is the primary human route of exposure to methylmercury.*						
85	Nickel	7440020	n	y	140	170
86	Nitrates [K]	14797558	n	n	10000	--
[K] *The human health criterion for nitrates is the same as originally published in the 1976 EPA Red Book which predates the 1980 methodology and did not utilize the fish ingestion BCF approach. This same criterion value was also published in the 1986 EPA Gold Book. Human health risks are primarily from drinking water, therefore no "organism only" criterion was developed. The "water + organism" criterion is based on the Maximum Contaminant Level (MCL) established under the Safe Drinking Water Act.*						
87	Nitrobenzene	98953	n	n	14	69

OAR 340-041-8033
Table 40
Human Health Water Quality Criteria for Toxic Pollutants

No.	Pollutant	CAS Number	Carcinogen	Aquatic Life Criterion	Human Health Criteria for the Consumption of:	
					Water + Organism (µg/L)	Organism Only (µg/L)
88	Nitrosamines	35576911	y	n	0.00079	0.046
89	Nitrosodibutylamine, N	924163	y	n	0.0050	0.022
90	Nitrosodiethylamine, N	55185	y	n	0.00079	0.046
91	Nitrosodimethylamine, N	62759	y	n	0.00068	0.30
92	Nitrosodi-n-propylamine, N	621647	y	n	0.0046	0.051
93	Nitrosodiphenylamine, N	86306	y	n	0.55	0.60
94	Nitrosopyrrolidine, N	930552	y	n	0.016	3.4
95	Pentachlorobenzene	608935	n	n	0.15	0.15
96	Pentachlorophenol	87865	y	y	0.15	0.30
97	Phenol	108952	n	n	9400	86000
98	Polychlorinated Biphenyls (PCBs) [L]	NA	y	y	0.0000064	0.0000064
	[L] *This criterion applies to total PCBs (e.g. determined as Aroclors or congeners).*					
99	Pyrene	129000	n	n	290	400
100	Selenium	7782492	n	y	120	420
101	Tetrachlorobenzene, 1,2,4,5-	95943	n	n	0.11	0.11
102	Tetrachloroethane 1,1,2,2	79345	y	n	0.12	0.40
103	Tetrachloroethylene	127184	y	n	0.24	0.33
104	Thallium	7440280	n	n	0.043	0.047

OAR 340-041-8033

Table 40

Human Health Water Quality Criteria for Toxic Pollutants

No.	Pollutant	CAS Number	Carcinogen	Aquatic Life Criterion	Human Health Criteria for the Consumption of:	
					Water + Organism (µg/L)	Organism Only (µg/L)
105	Toluene	108883	n	n	720	1500
106	Toxaphene	8001352	y	y	0.000028	0.000028
107	Trichlorobenzene 1,2,4	120821	n	n	6.4	7.0
108	Trichloroethane 1,1,2	79005	y	n	0.44	1.6
109	Trichloroethylene	79016	y	n	1.4	3.0
110	Trichlorophenol 2,4,6	88062	y	n	0.23	0.24
111	Trichlorophenol, 2, 4, 5-	95954	n	n	330	360
112	Vinyl Chloride	75014	y	n	0.023	0.24
113	Zinc	7440666	n	y	2100	2600

State of Oregon Department of Environmental Quality

OAR 340-040-0030 - Tables

TABLE 1
(OAR 340-40-020)

Numerical Groundwater Quality Reference Levels:[1]

Inorganic Contaminants	Reference Level (mg/L)
Arsenic	0.05
Barium	1.0
Cadmium	0.01
Chromium	0.05
Fluoride	4.0
Lead	0.05
Mercury	0.002
Nitrate-N	10.0
Selenium	0.01
Silver	0.05

[1]All reference levels are for total (unfiltered) concentrations unless otherwise specified by the Department.

TABLE 2
(OAR 340-40-020)

Numerical Groundwater Quality Reference Levels (Continued):[1]

Organic Contaminants	Reference Level (mg/L)
Benzene	0.005
Carbon Tetrachloride	0.005
p-Dichlorobenzene	0.075
1,2-Dichloroethane	0.005
1,1-Dichloroethylene	0.007
1,1,1-Trichloroethane	0.200
Trichloroethylene	0.005
Total Trihalomethanes (the sum of concentrations bromodichloromethane, dibromochloromethane, tribromomethane (bromoform), and trichloromethane (chloroform))	0.100
Vinyl Chloride	0.002
2,4-D	0.100
Endrin	0.0002
Lindane	0.004
Methoxychlor	0.100
Toxaphene	0.005
2,4,5-TP Silvex	0.010

[1]All reference levels are for total (unfiltered) concentrations unless otherwise specified by the Department.

TABLE 3
(OAR 340-40-020)

Numerical Groundwater Quality Guidance Levels:[1]

Miscellaneous Contaminants	Guidance Level (mg/L)[2]
Chloride	250
Color	15 Color Units
Copper	1.0
Foaming agents	0.5
Iron	0.3
Manganese	0.05
Odor	3 Threshold odor number
pH	6.5-8.5
Sulfate	250
Total dissolved solids	500
Zinc	5.0

[1]All guidance levels except total dissolved solids and are for total (unfiltered) concentrations unless otherwise specified by the Department.

[2]Unless otherwise specified, except pH.

APPENDIX C
Wastewater Sampling Results

DEVELOPMENT OF LOCAL LIMITS
SAMPLING AND ANALYSIS PLAN

Influent

Lqioxhqw	BOD_5	TSS	Arsenic	Cadmium	Chromium	Copper	Lead	Molybdenum	Nickel	Selenium	Silver	Zinc	Cyanide	Mercury
	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	ng/L
Minimum Detection Limit			0.00000825	0.00000168	0.0000289	0.0000251	0.00000508	0.00000349	0.0000161	0.0000466	0.00000247	0.000486	0.00228	
Minimum Recording Limit	4	7	0.0005	0.000100	0.000400	0.0005	0.00010	0.00050	0.0005	0.00050	0.000100	0.0050	0.00300	0.5
December 17, 2018	217	186	0.0032	0.000117	0.001860	0.0199	0.00075	0.02400	0.0023	0.00124	0.000106	0.0895	0.00410	ND
March 19, 2019	171	118	0.0024	0.000229	0.001160	-	0.00070	0.01070	0.0026	0.00111	0.000044	0.0637	ND	14.2
April 9, 2019	168	128	0.0032	0.000094	0.001730	-	0.00062	0.01040	0.0028	0.00123	0.000062	0.0659	ND	11.6
June 18, 2019	230	132	0.0049	0.000174	0.003000	0.0267	0.00117	0.01330	0.0037	0.00151	0.000203	0.2760	ND	14.5
June 27, 2019	104	112	0.0026	0.000107	0.002510	0.0251	0.00096	0.00598	0.0027	0.00103	0.000100	0.0967	ND	10.9
August 1, 2019	317	192	0.0034	0.000139	0.002180	0.0218	0.00133	0.00945	0.0018	0.00081	0.000084	0.1020	ND	17.0
August 11, 2019	100	118	0.0027	0.000092	0.001610	0.0188	0.00114	0.00454	0.0005	0.00059	0.000069	0.0708	ND	20.0
December 11, 2019	106	130	0.0024	0.000222	0.001460	0.0105	0.00076	0.00191	0.0024	0.00070	0.000041	0.0513	ND	11.0
Average	177	140	0.0031	0.000147	0.001939	0.0205	0.00093	0.01004	0.0023	0.00103	0.000089	0.1020	0.00410	14.2

BOD_5 = five-day biochemical oxygen demand
mg/L = milligrams per liter
ND = non-detect
ng/L = nanogram per liter
TSS = total suspended solids

DEVELOPMENT OF LOCAL LIMITS
SAMPLING AND ANALYSIS PLAN

Plant 1 - Primary Effluent

Lqioxhqw	BOD_5	TSS	Arsenic	Cadmium	Chromium	Copper	Lead	Molybdenum	Nickel	Selenium	Silver	Zinc	Cyanide	Mercury
	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	ng/L
Minimum Detection Limit			0.00000825	0.00000168	0.0000289	0.0000251	0.00000508	0.00000349	0.0000161	0.0000466	0.00000247	0.000486	0.00228	
Minimum Recording Limit	4	7	0.0005	0.000100	0.000400	0.0005	0.00010	0.00050	0.0005	0.00050	0.000100	0.0050	0.00300	0.5
December 17, 2018	8	17	0.0026	0.000036	0.000911	0.0057	0.00048	0.00562	0.0024	0.00132	0.000090	0.0256	0.00330	5.3
March 19, 2019	8	44	0.0019	0.000052	0.000446	-	0.00024	0.00512	0.0023	0.00113	0.000026	0.0168	ND	4.6
April 9, 2019	15	23	0.0021	0.000064	0.000868	-	0.00023	0.00539	0.0025	0.00111	0.000042	0.0235	0.00350	2.8
June 27, 2019	164	56	0.0015	0.000017	0.001150	0.0033	0.00018	0.00289	0.0021	0.00110	0.000007	0.0188	ND	3.3
August 1, 2019	78	32	0.0015	0.000103	0.000556	0.0154	0.00555	0.00244	0.0021	0.00059	0.000163	0.1130	ND	7.5
August 11, 2019	103	18	0.0016	0.000025	0.000517	0.0027	0.00034	0.00265	ND	0.00054	0.000091	0.0132	ND	4.9
December 11, 2019	105	62	0.0017	0.000037	0.000571	0.0038	0.00034	0.00319	0.0016	0.00069	0.000080	0.0179	ND	3.0
Average	69	36	0.0018	0.000048	0.000717	0.0062	0.00105	0.00390	0.0022	0.00093	0.000071	0.0327	0.00340	4.5

BOD_5 = five-day biochemical oxygen demand
mg/L = milligrams per liter
ND = non-detect
ng/L = nanogram per liter
TSS = total suspended solids

DEVELOPMENT OF LOCAL LIMITS
SAMPLING AND ANALYSIS PLAN

Plant 2 - Primary Effluent

Influent	BOD_5	TSS	Arsenic	Cadmium	Chromium	Copper	Lead	Molybdenum	Nickel	Selenium	Silver	Zinc	Cyanide	Mercury
	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	ng/L
Minimum Detection Limit			0.00000825	0.00000168	0.0000289	0.0000251	0.00000508	0.00000349	0.0000161	0.0000466	0.00000247	0.000486	0.00228	
Minimum Recording Limit	4	7	0.0005	0.000100	0.000400	0.0005	0.00010	0.00050	0.0005	0.00050	0.000100	0.0050	0.00300	0.5
December 17, 2018	10	31	0.0031	0.000044	0.001260	0.0079	0.00049	0.00837	0.0024	0.00114	0.000042	0.0569	0.00340	5.1
March 19, 2019	12	68	0.0034	0.000068	0.008260	-	0.00476	0.00704	0.0041	0.00104	0.000052	0.0416	ND	7.9
April 9, 2019	28	68	0.0001	0.000005	ND	-	0.00001	0.00029	0.0001	ND	ND	0.0022	0.00240	4.5
June 27, 2019	112	60	0.0026	0.000027	0.000621	0.0052	0.00029	0.00635	0.0022	0.00092	0.000009	0.0350	ND	1.8
August 1, 2019	95	106	0.0031	0.000043	0.000423	0.0073	0.00051	0.00654	0.0018	0.00067	0.000044	0.0362	ND	3.1
August 11, 2019	101	98	0.0029	0.000037	0.000524	0.0052	0.00021	0.00587	0.0002	0.00074	0.000031	0.0215	ND	2.6
December 11, 2019	96	54	0.0030	0.000064	0.000617	0.0072	0.00045	0.00498	0.0018	0.00069	0.000057	0.0442	0.00280	4.3
Average	65	69	0.0026	0.000041	0.001951	0.0065	0.00096	0.00563	0.0018	0.00087	0.000039	0.0339	0.00287	4.2

BOD_5 = five-day biochemical oxygen demand
mg/L = milligrams per liter
ND = non-detect
ng/L = nanogram per liter
TSS = total suspended solids

DEVELOPMENT OF LOCAL LIMITS
SAMPLING AND ANALYSIS PLAN

Golf Course Pond - Plant 1 Final Effluent

Influent	BOD_5	TSS	Arsenic	Cadmium	Chromium	Copper	Lead	Molybdenum	Nickel	Selenium	Silver	Zinc	Cyanide	Mercury
	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	ng/L
Minimum Detection Limit			0.00000825	0.00000168	0.0000289	0.0000251	0.00000508	0.00000349	0.0000161	0.0000466	0.00000247	0.000486	0.00228	
Minimum Recording Limit	4	7	0.0005	0.000100	0.000400	0.0005	0.00010	0.00050	0.0005	0.00050	0.000100	0.0050	0.00300	0.5
December 17, 2018	2	6	0.0024	0.000031	0.000783	0.0039	0.00046	0.00310	0.0024	0.00174	0.000102	0.0218	0.01180	5.7
March 19, 2019	2	40	0.0013	0.000013	0.000080	-	0.00018	0.00203	0.0016	0.00062	0.000018	0.0057	ND	1.0
April 9, 2019	40	60	0.0017	0.000012	0.000574	-	0.00010	0.00290	0.0020	0.00795	0.000042	0.0120	0.00270	ND
June 27, 2019	188	4	0.0009	0.000008	0.000455	0.0021	0.00014	0.00114	0.0009	0.00031	ND	0.0089	ND	1.0
August 1, 2019	18	18	0.0014	0.000010	0.000317	0.0031	0.00028	0.00141	0.0006	0.00016	0.000028	0.0203	ND	1.1
August 11, 2019	18	24	0.0013	0.000029	0.000404	0.0029	0.00017	0.00129	ND	0.00019	0.000048	0.0109	0.00250	1.6
December 11, 2019	4	11	0.0015	0.000017	0.000414	0.0032	0.00016	0.00182	0.0011	0.00029	0.000023	0.0120	0.00230	1.2
Average	39	23	0.0015	0.000017	0.000432	0.0030	0.00021	0.00196	0.0015	0.00161	0.000044	0.0131	0.00483	1.9

BOD_5 = five-day biochemical oxygen demand
mg/L = milligrams per liter
ND = non-detect
ng/L = nanogram per liter
TSS = total suspended solids

DEVELOPMENT OF LOCAL LIMITS
SAMPLING AND ANALYSIS PLAN

Horse Shoe / Kidney Pond - Plant 2 Final Effluent

Influent	BOD_5	TSS	Arsenic	Cadmium	Chromium	Copper	Lead	Molybdenum	Nickel	Selenium	Silver	Zinc	Cyanide	Mercury
	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	ng/L
Minimum Detection Limit			0.00000825	0.00000168	0.0000289	0.0000251	0.00000508	0.00000349	0.0000161	0.0000466	0.00000247	0.000486	0.00228	
Minimum Recording Limit	4	7	0.0005	0.000100	0.000400	0.0005	0.00010	0.00050	0.0005	0.00050	0.000100	0.0050	0.00300	0.5
December 17, 2018	8	11	0.0026	0.000021	0.000746	0.0040	0.00426	0.00272	0.0023	0.00167	0.000044	0.0638	ND	ND
March 19, 2019	7	14	0.0018	0.000023	0.000180	-	0.00038	0.00392	0.0022	0.00140	0.000021	0.0170	ND	2.3
April 9, 2019	8	8	0.0025	0.000022	0.000600	-	0.00031	0.00504	0.0024	0.00136	0.000033	0.0273	0.00330	2.4
June 27, 2019	11	2	0.0018	0.000024	0.000521	0.0030	0.00024	0.00415	0.0016	0.00093	0.000017	0.0398	ND	1.7
August 1, 2019	18	11	0.0022	0.000021	0.000239	0.0041	0.00034	0.00443	0.0015	0.00058	0.000012	0.0112	ND	1.0
August 11, 2019	18	14	0.0021	0.000016	0.000480	0.0024	0.00027	0.00411	0.0000	0.00060	0.000010	0.0170	ND	1.7
December 11, 2019	6	5	0.0022	0.000024	0.000483	0.0034	0.00016	0.00440	0.0018	0.00064	0.000029	0.0187	ND	2.1
Average	11	9	0.0022	0.000022	0.000464	0.0034	0.00085	0.00411	0.0017	0.00103	0.000024	0.0278	0.00330	1.9

BOD_5 = five-day biochemical oxygen demand
mg/L = milligrams per liter
ND = non-detect
ng/L = nanogram per liter
TSS = total suspended solids

DEVELOPMENT OF LOCAL LIMITS
SAMPLING AND ANALYSIS PLAN

Apple

Influent	BOD_5	TSS	Arsenic	Cadmium	Chromium	Copper	Lead	Molybdenum	Nickel	Selenium	Silver	Zinc	Cyanide	Mercury
	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	ng/L
Minimum Detection Limit			0.00000825	0.00000168	0.0000289	0.0000251	0.00000508	0.00000349	0.0000161	0.0000466	0.00000247	0.000486	0.00228	
Minimum Recording Limit	4	7	0.0005	0.000100	0.000400	0.0005	0.00010	0.00050	0.0005	0.00050	0.000100	0.0050	0.00300	0.5
March 26, 2019	917	1582	-	-	-	-	-	-	-	-	-	-	-	-
March 20, 2019	-	-	0.0034	0.000655	0.013200	-	0.00502	0.00696	0.0147	0.00264	0.000310	0.4920	ND	55.5
April 9, 2019	294	200	0.0027	0.000104	0.003650	-	0.00036	0.00443	0.0034	0.00173	0.000046	0.1180	0.01860	19.3
June 18, 2019	486	400	0.0034	0.000142	0.004350	0.0733	0.00058	0.00372	0.0057	0.00192	0.000340	0.1810	ND	18.6
June 27, 2019	528	142	0.0036	0.000224	0.003190	0.0531	0.00040	0.00688	0.0043	0.00206	0.000031	0.1640	ND	28.0
August 1, 2019	340	92	0.0030	0.000153	0.001770	0.0647	0.00706	0.00402	0.0030	0.00106	0.000028	0.1900	ND	7.4
August 11, 2019	450	60	0.0033	0.000032	0.001590	0.0242	0.00022	0.00361	0.0008	0.00103	0.000052	0.0337	ND	6.2
December 11, 2019	262	96	0.0015	0.000025	0.000826	0.0324	0.00016	0.00133	0.0055	0.00065	0.000011	0.0293	ND	5.7
Average	468	367	0.0030	0.000191	0.004082	0.0495	0.00197	0.00442	0.0053	0.00158	0.000117	0.1726	0.01860	20.1

BOD_5 = five-day biochemical oxygen demand
mg/L = milligrams per liter
ND = non-detect
ng/L = nanogram per liter
TSS = total suspended solids

DEVELOPMENT OF LOCAL LIMITS
SAMPLING AND ANALYSIS PLAN

Facebook

Lqioxhqw	BOD_5	TSS	Arsenic	Cadmium	Chromium	Copper	Lead	Molybdenum	Nickel	Selenium	Silver	Zinc	Cyanide	Mercury
	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	ng/L
Minimum Detection Limit			0.00000825	0.00000168	0.0000289	0.0000251	0.00000508	0.00000349	0.0000161	0.0000466	0.00000247	0.000486	0.00228	
Minimum Recording Limit	4	7	0.0005	0.000100	0.000400	0.0005	0.00010	0.00050	0.0005	0.00050	0.000100	0.0050	0.00300	0.5
December 18, 2018	190	108	0.0049	0.000471	0.005120	0.0222	0.00056	-	0.0024	0.00453	0.000031	0.1040	ND	11.7
March 20, 2019	302	270	0.0025	0.000241	0.003690	-	0.00045	0.05620	0.0032	0.00350	0.000065	0.1890	ND	36.5
April 9, 2019	195	120	0.0046	0.001920	0.002540	-	0.00026	0.12700	0.0019	0.00279	0.000050	0.0631	ND	15.2
June 27, 2019	266	210	0.0030	0.000468	0.003400	0.0399	0.00062	0.24100	0.0041	0.00315	0.000039	0.1550	ND	38.9
August 1, 2019	370	180	0.0028	0.000255	0.002050	0.0311	0.00226	0.18300	0.0016	0.00122	0.000043	0.1340	ND	11.3
August 11, 2019	362	236	0.0025	0.000276	0.003110	0.0295	0.00057	0.11300	0.0013	0.00122	0.000073	0.1230	0.00260	16.9
December 11, 2019	167	128	0.0023	0.000054	0.001700	0.0223	0.00028	0.00354	0.0015	0.00119	0.000021	0.0673	ND	9.1
Average	265	179	0.0032	0.000526	0.003087	0.0290	0.00071	0.12062	0.0023	0.00251	0.000046	0.1193	0.00260	19.9

BOD_5 = five-day biochemical oxygen demand
mg/L = milligrams per liter
ND = non-detect
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TSS = total suspended solids

DEVELOPMENT OF LOCAL LIMITS
SAMPLING AND ANALYSIS PLAN

Manhole 857 - Domestic Wastewater

Influent	BOD_5	TSS	Arsenic	Cadmium	Chromium	Copper	Lead	Molybdenum	Nickel	Selenium	Silver	Zinc	Cyanide	Mercury
	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	ng/L
Minimum Detection Limit			0.00000825	0.00000168	0.0000289	0.0000251	0.00000508	0.00000349	0.0000161	0.0000466	0.00000247	0.000486	0.00228	
Minimum Recording Limit	4	7	0.0005	0.000100	0.000400	0.0005	0.00010	0.00050	0.0005	0.00050	0.000100	0.0050	0.00300	0.5
December 18, 2018	303	242	0.0755	0.000250	0.011500	0.1100	0.00409	0.00585	0.0627	0.00121	0.000539	0.1580	ND	83.6
March 20, 2019	268	176	0.0025	0.000074	0.001870	-	0.00100	0.00175	0.0033	0.00111	0.000894	0.0648	ND	78.7
April 9, 2019	257	100	0.0028	0.000092	0.002010	-	0.00758	0.00232	0.0033	0.00114	0.000405	0.0776	0.00260	80.2
June 27, 2019	174	338	0.0033	0.000127	0.002420	0.0241	0.00106	0.00324	0.0032	0.00146	0.000232	0.1360	ND	25.0
August 1, 2019	332	156	0.0029	0.000091	0.002120	0.0225	0.00121	0.00261	0.0025	0.00071	0.000107	0.1100	ND	33.3
August 11, 2019	311	200	0.0024	0.000086	0.001720	0.0155	0.00079	0.00214	0.0007	0.00067	0.000208	0.0937	ND	35.7
December 11, 2019	260	142	0.0024	0.000091	0.001110	0.0218	0.00074	0.00174	0.0020	0.00078	0.000371	0.0850	0.00250	30.1
Average	272	193	0.0131	0.000116	0.003250	0.0388	0.00235	0.00281	0.0111	0.00101	0.000394	0.1036	0.00255	52.4

BOD_5 = five-day biochemical oxygen demand
mg/L = milligrams per liter
ND = non-detect
ng/L = nanogram per liter
TSS = total suspended solids