State of Oregon
Department of
Environmental
Quality

National Pollutant Discharge Elimination System
Permit Fact Sheet
City of Vernonia STP

Final: December 19, 2024

Permittee	City of Vernonia Vernonia STP 605 California Avenue Vernonia, OR 97064
Existing Permit Information	File Number: 92773 Permit Number: 101094 EPA Reference Number: OR0022560 Category: Domestic Class: Minor Expiration Date: May 31, 2011
Permittee Contact	Jeff Burch Public Works Foreman (503) 429-5291 101 Bridge St Vernonia, OR 97064
Receiving Water Information	Water Body Name: Nehalem River River Mile: 91.7 Assessment Unit ID: OR_SR_1710020201_05_106441 Sub Basin Name: Nehalem Basin Name: North Coast
Proposed Action	Permit Renewal Application Number: 968051 Date Application Received: April 19, 2017
Permit Writer	Aliana Britson 503 229-6044 Date Prepared: October 31, 2024

NPDES Permit Fact Sheet
City of Vernonia

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1. Introduction

As required by Oregon Administrative Rule 340-045-0035, this fact sheet describes the basis and methodology used in developing the permit. The permit is divided into several sections:

Schedule A – Waste discharge limitations
Schedule B – Minimum monitoring and report requirements
Schedule C – Compliance conditions and schedules
Schedule D – Special conditions
Schedule E – Pretreatment conditions
Schedule F – General conditions

A summary of the major changes to the permit are listed below:

- Addition of Outfall 003 to permit with limits
- Updated BOD_5 and TSS limits and mass loads
- Updated lower pH limit to 6.3
- Updated temperature ETLL in permit Nov 15th-May 15th
- Allow permittee to discharge during May 16th-Nov 14th time period if river is above minimum of 33 cfs, with limits for BOD_5, TSS, pH, *E. coli*, chlorine, temperature, and ammonia
- Removed Outfall 002 and Cell 3 exfiltration from permitted features
- Removed groundwater wells MW-3 and MW-4 from permitted features

2. Facility Description

2.1 Wastewater Facility

The City of Vernonia operates a lagoon treatment system located in Vernonia, Oregon. Influent to the plant flows from the influent manhole to the headworks, which consists of a fine screen with a manual bar screen bypass. From the headworks, wastewater flows through two facultative lagoons cells (No. 1 and No. 2) in series, followed by a third facultative lagoon (No. 3) for storage. Effluent is disinfected via a chlorine contact tank as it flows from Cell No. 2 to Cell No. 3. Dechlorination is achieved through dissipation in Cell No. 3. During the winter, flow from Cell No. 3 is discharged to the Nehalem River at river mile 91.7 through Outfall 001. Flow from Cell No.3 can also be diverted to a transfer pump station that pumps the lagoon effluent to the circular DAF/filter system to remove additional solids from the lagoon effluent if needed.

Effluent that has been treated by the DAF/filter system can either be discharged through Outfall 001 during the winter, or the hyporheic discharge system during the summer.

Cells No. 2 and 3 were constructed in 1960 while Cell No. 1 was added in 1984. Cell No. 3 was intended to serve as an exfiltration pond but was insufficient to meet system demand due to infiltration and inflow. In 1994 the city completed further improvements which included chlorine disinfection, an influent structure with Parshall flume for flow measurement, an effluent measuring Parshall flume, and a submerged outfall with a single port diffuser (Outfall 001). Since the most recent permit renewal (2007) the facility has undergone further upgrades. These include lining Cell No. 3 to prevent leakage, a DAF/filter system, insertion of a flow meter, raising the lagoon berms to prevent flooding, removing emergency Outfall 002, and a subsurface discharge system (Outfall 003) that runs 700 ft parallel to the Nehalem River 8 ft underneath the Banks-Vernonia Trail (17- 36 m from the banks of the Nehalem).

The Outfall 003 consists of 3 parallel 8" diameter pipes perforated with 3/8" diameter holes at the crown of the pipe in 7 ft intervals. The system is designed to discharge to the vadose zone with an infiltration rate of 200 gpd/ft. The wastewater then percolates into the groundwater, which flows towards the Nehalem River. The Outfall 003 is classified as a UIC under OAR Division 44 rules and therefore will need to meet UIC regulations (see Appendix A). Further groundwater studies will be needed to establish limits in accordance with groundwater regulations (see Schedule D). Therefore, no discharge will be allowed out of Outfall 003 until the necessary studies are completed and the permit is either modified or renewed.

Because Cell No. 3 has been lined and additional studies will be required to use Outfall 003 the groundwater wells MW-3 and MW-4 and the groundwater monitoring plan will be removed from this permit.

The current permit only allows for the permittee to discharge from Outfall 001 between the dates of Nov 15-May 15, with any summer discharges allowed at the discretion of DEQ. In the past, the Vernonia has requested and been granted summer discharges in 2014, 2015, and 2022. Because Outfall 003 cannot generally be used until July due to high groundwater elevation, discharging effluent can only be done at the discretion of DEQ during this time period, especially during wet years. To allow for the facility to discharge as needed during the summer during wet years, a permit condition will be added so that between May 16 and Nov 14 the facility will be able to discharge when the river is at or above 33 cfs. Due to the higher river flow, the effluent will have a de minimis impact on the Nehalem River (see section 3.5). The facility also has a known Inflow and Infiltration issue (see section 3.2) which will be required to be managed through a Schedule D requirement (see section 7.1).

The Vernonia WWTP currently manages all of its wastewater solids in its facultative lagoons until they need to be removed from the lagoons to maintain treatment capacity and performance of the lagoons. During 2013, the WWTP's lagoons were cleaned of backlogged wastewater solids and these solids were treated and land applied as Class B biosolids on farmland in eastern Oregon. Based on current knowledge, it is doubtful that the WWTP will need to remove any solids from the facility's lagoons in the next five or more years. At this time, the permittee does not land apply or irrigate any Recycled Water and is not authorized to accept hauled waste.

Figure 2-1: Vernonia STP Site Map

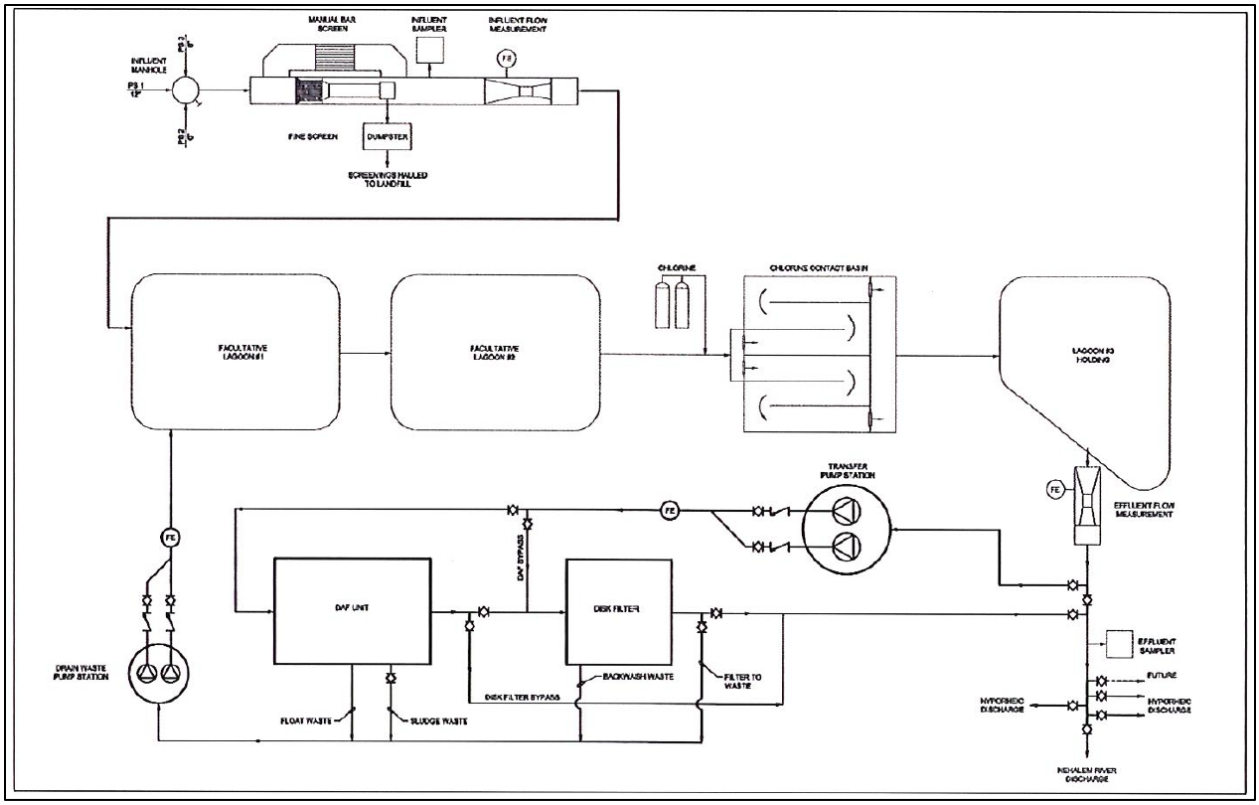

Figure 2-2: Vernonia Treatment System Line Drawing

Table 2-1: List of Outfalls

Outfall Number	Type of Waste	Lat/Long	Design Flow[1] (mgd)	Existing Flow[2] (mgd)
001 – to Nehalem River	Treated Effluent	45.854115/-123.187162	0.56	0.92
003 – to Subsurface	Treated Effluent	45.853766/-123.186516	0.28	Unknown

1. Design Flow = design average dry weather flow
2. Existing Flow = existing average flow per discharge (based on permit renewal application)

2.2 Compliance History

The facility was last inspected on April 18, 2023. No violations were found. Within the last 5 years the facility has received the following letters for compliance issues:

- A pre-enforcement notice on January 28, 2022 relating to a sanitary sewer overflow and included a class I violation for causing pollution to waters of the state, a class II violation for failure to submit a report of an SSO, and a class II violation for the sanitary sewer overflow.
- A warning letter with opportunity to correct on March 30, 2022 for failing to meet BOD and TSS limits in November 2021; December 2021; and January, 2022 (class II and III violations).

- A warning letter on January 20, 2023 for failing to report monitoring data required in Schedule B of the permit (class I violation).

2.3 Stormwater

Stormwater is not addressed in this permit. General NPDES permits for stormwater are not required for facilities with a design flow of less than 1 MGD.

2.4 Industrial Pretreatment

The permittee does not have a DEQ-approved industrial pretreatment program. Based on current information, no industrial pretreatment program is needed. Schedule D of the proposed permit requires the permittee to perform an industrial user survey.

2.5 Wastewater Classification

OAR 340-049 requires all permitted municipal wastewater collection and treatment facilities receive a classification based on the size and complexity of the systems. DEQ evaluated the classifications for the treatment and collection system, which are publicly available at: https://www.deq.state.or.us/wq/opcert/Docs/OpcertReport.pdf.

3. Schedule A: Effluent Limit Development

Effluent limits serve as the primary mechanism in NPDES permits for controlling discharges of pollutants to receiving waters. Effluent limitations can be based on either the technology available to control the pollutants or limits that are protecting the water quality standards for the receiving water. DEQ refers to these two types of permit limits as technology-based effluent limitations (TBELs) and water quality-based effluent limits (WQBELs) respectively. When a TBEL is not restrictive enough to protect the receiving stream, DEQ must include a WQBEL in the permit.

3.1 Existing Effluent Limits

The table and notes below show the limits contained in the existing permit.

Table 3-1: Existing Effluent Limits Outfall 001

Outfall 001 (See note 1.)

Parameter	Units	Average* Monthly	Average* Weekly	Daily* Maximum
Effluent Flow (May 16 to November 14)	MGD	No discharge to waters of the state (unless approved in writing by the Department)		

Parameter	Units	Average* Monthly	Average* Weekly	Daily* Maximum
BOD_5 (November 15 to May 15)	mg/L	30	45	
	lb/day	140	210	280
	% removal	85, except when avg monthly BOD influent is less than 133 mg/L the percent removal shall not apply	-	-
TSS (November 15 to May 15)	mg/L	50	80	
	lb/day	230	350	470
	% removal	85, except when the average monthly TSS influent is less than 133 mg/L then the percent removal shall not apply	-	-
Chlorine, Total Residual	mg/L	0.01	-	0.03
pH	SU	Instantaneous limit between a daily minimum of 6.0 and a daily maximum of 9.0		
E. coli (See note 2.)	#/100 mL	Must not exceed a monthly geometric mean of 126, no single sample may exceed 406		
Human Use Allowance Maximum Change in Temperature (Max Δ T °C)	°C	Shall not exceed 0.08 °C (See note 3.)		

*Mass load limits have been individually assigned and are based upon the previous permit discharge flow of 0.56 MGD.

Emergency Overflow Outfall 002:

1. No wastes shall be discharged from the outfall except as allowed in Schedule F, Section B, Condition 6 of this permit. If an overflow occurs between May 22 and June 1, and if the permittee demonstrates to the Department's satisfaction that no increase in risk to beneficial uses occurred because of the overflow, no violation shall be triggered if the storm associated with the overflow was greater than the one-in-five-year, 24-hour duration storm.

2. No wastes shall be discharged from the outfall except as allowed in Schedule F, Section B, Condition 6 of this permit. If an overflow occurs between May 22 and June 1, and if the permittee demonstrates to the Department's satisfaction that no increase in risk to beneficial uses occurred because of the overflow, no violation shall be triggered if the storm associated with the overflow was greater than the one-in-five-year, 24-hour duration storm.

All wastewater and process related residuals shall be managed and discharged and/or disposed of in a manner that will prevent:

a) A violation of the Department's Groundwater Quality Protection Rules (OAR 340-040); and,

b) A violation of any permit-specific groundwater concentration limits, established pursuant to OAR 340-040-0030.

Groundwater

1. Groundwater concentration limits not to be exceeded at the compliance point(s) after permit issuance:

Parameter	Concentration Limit	Compliance Point*
Nitrate-N (NO_3-N)	No two consecutive samples to exceed 2 mg/L No single sample to exceed 5 mg/L	Monitoring wells MW-3 and MW-4*

*Note: The locations of the groundwater compliance points are shown in the City of Vernonia, Wastewater Facilities Plan Addendum, Volume 2 of 2, Environmental Assessment, dated August 1992.

Notes:

1. The city is required to gather water quality data and Nehalem River data for the period of discharge (November 15-May 15). Per Schedule C 2. Of the permit, the permit will be reopened to include an ammonia limit, as necessary, based on the results of a reasonable potential analysis.
2. If a single sample exceeds 406 organisms per 100 mL, then five consecutive re-samples may be taken at four-hour intervals beginning within 28 hours after the original sample was taken. If the log mean of the five re-samples is less than or equal to 126 organisms per 100 mL, a violation shall not be triggered.

3. The calculation for Human Use Allowance (Max Δ T °C) shall be as follows:

Solve for Equation 1: (Qe x Te) + (Qr x Ta)

Where Qe = is a measurement of effluent flow (mgd) x conversion factor of 1.548 cfs/mgd
Qr = is a measurement of Nehalem River flow cfs

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Ta = 13°C
Te = 7 day moving average of the effluent temperature °C

Solve for Equation 2: (Qe + Qr)

Where: Qe = is a measurement of effluent flow (mgd) x conversion factor of 1.548 cfs/mgd
Qr = is a measurement of Nehalem River flow cfs

Max. ΔT °C. = (result of Equation 1 / result of Equation 2) –Ta.

Where: Ta = 13°C

3.2 Technology-Based Effluent Limit Development

40 CFR 122.44(a)(1) requires publicly owned treatment works (POTW) to meet technology-based effluent limits, for five-day biochemical oxygen demand (BOD_5), total suspended solids (TSS) and pH (i.e., federal secondary treatment standards). Substitution of 5-day carbonaceous oxygen demand ($CBOD_5$) for BOD_5 is allowed. The numeric standards for these pollutants are contained in 40 CFR 133.102. In addition, DEQ has developed minimum design criteria for BOD_5 and TSS that apply to specific watershed basins in Oregon. These are listed in the basin-specific criteria sections under OAR 340-041-0101 to 0350. During the summer low flow months as defined by OAR, these design criteria are more stringent than the federal secondary treatment standards. The basin-specific criteria are not effluent limits but are implemented as design criteria for new or expanded wastewater treatment plants. The table below shows a comparison of the federal secondary treatment standards and the basin-specific design criteria for the North Coast basin.

Table 3-2: Comparison of TBELs for Federal Secondary Treatment Standards and Oregon Basin-Specific Design Criteria

Parameter	Federal Secondary Treatment Standards		North Coast Basin-Specific Design Criteria (OAR 340-041-0235)
	30-Day Average	7-Day Average	Monthly Average
BOD_5 (mg/L)	30	45	20 mg/L April 1 to October 31
TSS (mg/L)	30	45	20 mg/L April 1 to October 31
pH (S.U.)	6.0 – 9.0. (instantaneous)		Not applicable
BOD_5 and TSS % Removal	85%	Not applicable	Not applicable

The basin-specific design criteria included in the table above apply to new or expanded facilities (after June 30, 1992). This facility is not new or expanded, so these criteria do not apply.

40 CFR 133.105(g) allows less stringent effluent limits for POTWs using waste stabilization ponds or trickling filters as their method of treatment. These facilities are required to achieve a monthly average BOD_5 and TSS concentrations of 45 mg/L, a weekly average limit of 65 mg/L and a removal efficiency of 65%. To be eligible for discharge limitations based on equivalent to secondary standards, a POTW must meet all three of the following criteria:

1. The effluent must consistently exceed secondary treatment standards;
2. The principal treatment process must be a trickling filter or a waste stabilization pond; and
3. The POTW must provide significant biological treatment of the wastewater.

DEQ has evaluated these criteria for BOD_5 and TSS. According to 40 CFR 133.101(f), effluent concentrations considered to be consistently achievable through proper operation and maintenance are defined as the 95th percentile of the 30-day average effluent quality achieved by treatment works in a period of at least two years (excluding upsets and errors) and the 95th percentile of the 30-day average value multiplied by 1.5. These values were determined and are shown in the table below.

Table 3-3: Consistently Achievable Effluent Concentrations

Parameter	Effluent Concentrations Consistently Achievable	
	30-Day Average	7-Day Average
BOD_5 (mg/L)	29	54
TSS (mg/L)	23	46

Because the 7-day average effluent concentrations consistently achievable for BOD_5 and TSS exceed the federal secondary treatment standards of 45mg/L, the principal treatment process is a waste stabilization pond, and because the POTW provides significant biological treatment of the wastewater (average influent BOD_5 and TSS values are an order of magnitude larger than effluent values), DEQ has determined that the facility meets all three criteria for TSS and BOD_5. The previous permit also contained an adjustment to percent removal requirements allowing the permittee to not meet the 85% removal limit if the average monthly influent BOD_5 or TSS was lower than 133 mg/L. This provision will be removed, as the permittee already qualifies for a lower percent removal requirement.

Special considerations for TSS limits from waste stabilization ponds are described in 40 CFR 133.103(c). These allow less stringent TSS limits for waste stabilization ponds. In the early 1980s, DEQ determined that waste stabilization ponds west of the Cascade Mountains are capable of achieving a monthly average concentration of 50 mg/L and east of the Cascade Mountains a monthly average of 85 mg/L. EPA published these approved alternate TSS requirements in 49 Federal Register (FR) 37005, September 20, 1984. DEQ is proposing to maintain the monthly average TSS limit of 50 mg/L and the weekly limit of 80 mg/L.

The limits for BOD_5 and TSS shown in table 3-2 above are concentration-based limits. Mass-based limits are required in addition to the concentration-based limits per OAR 340-041-0061(9). For any facility that has not expanded their average dry weather treatment capacity after June 30, 1992, OAR 340-041-0061(9)(a) requires that the mass load limits be calculated using the following equations:

Monthly Avg Mass Load = Design Flow* x Monthly Concentration Limit x Unit Conversion factor

Weekly Average Mass Load = 1.5 x Monthly Average Mass Load Limit

Daily Maximum Mass Load = 2 x Monthly Average Mass Load Limit

* Design flow is the design average dry weather flow (DADWF) or the design average wet weather flow (DAWWF)

OAR 340-041-0061(9)(a)(C) allows an exception to the daily maximum mass load when the daily flow exceeds the lesser hydraulic capacity of the secondary treatment portion of the facility or twice the design average dry weather flow, the daily mass load limit does not apply. Though Vernonia STP has undergone upgrades, the average dry weather treatment capacity has not been expanded and therefore the OAR 340-041-0061(9)(a) equations apply.

The following table lists the effluent flows and concentration limits used for the calculations.

Table 3-4: Design Flows and Concentrations Limits

Season	Design Flow (mgd)	Monthly TSS Concentration Limit (mg/L)	Monthly BOD_5 Concentration Limit (mg/L)
Dry Weather	0.56	50	45
Wet Weather	0.94	50	45

In 2023, the facility provided DEQ with wet weather design flows. The previous BOD_5 and TSS limits were calculated using the dry weather design flow. Because the permittee will now be permitted to discharge during the summer through Outfall 001 when the Nehalem River is above 33 cfs, the concentration limits for BOD_5 and TSS will apply during the summer.

Dry Weather Mass Load Calculations BOD_5:

Monthly Average: 0.56 mgd x 45 mg/L x 8.34 = 210 lbs/day (Two significant figures)

Weekly Average: 210 lbs/day monthly average x 1.5 =320 lbs/day (Two significant figures)

Daily Maximum: 210 lbs/day monthly x 2 = 420 lbs/day

Dry Weather Mass Load Calculations TSS:

Monthly Average: 0.56 mgd x 50 mg/L x 8.34 = 230 lbs/day (Two significant figures)

Weekly Average: 230 lbs/day monthly average x 1.5 = 350 lbs/day (Two significant figures)

Daily Maximum: 230 lbs/day monthly x 2 = 460 lbs/day (Two significant figures)

Wet Weather Mass Load Calculations BOD_5:

Monthly Average: 0.94 mgd x 45 mg/L x 8.34 = 350 lbs/day (Two significant figures)

Weekly Average: 350 lbs/day monthly average x 1.5 =530 lbs/day

Daily Maximum: 350 lbs/day monthly x 2 = 700 lbs/day

Wet Weather Mass Load Calculations TSS:

Monthly Average: 0.94 mgd x 50 mg/L x 8.34 = 390 lbs/day (Two significant figures)

Weekly Average: 390 lbs/day monthly average x 1.5 = 585 lbs/day (Two significant figures)

Daily Maximum: 390 lbs/day monthly x 2 = 780 lbs/day (Two significant figures)

The permittee has not requested a mass load increase and therefore the current limits based on the dry weather design flow of 0.56 are retained for wet weather discharge. The previous BOD_5 monthly average limit of 30 mg/L, weekly average limit of 45 mg/L, and existing mass loads will be retained to satisfy antibacksliding and antidegradation. The permittee will need to perform an antidegradation analysis to apply for increased concentration limits and mass loads. However, the percent removal efficiency is not subject to antidegradation as it does not increase the amount of BOD_5 allowed to be discharged either by concentration or mass. The percent removal efficiency of 65% will replace the 85% removal limits for both BOD_5 and TSS in the current permit (see Section 3.4 for antibacksliding).

The proposed BOD_5 and TSS limits are listed in the following table and will be applied year-round.

Table 3-5: Technology Based Effluent Limits

Parameter	Units	Average Monthly	Average Weekly	Daily Maximum
BOD_5 (Nov. 15- May 15)	mg/L	30	45	NA
	lbs/day	140	210	280
	% removal	65	NA	NA
TSS (Nov. 15- May 15)	mg/L	50	80	NA
	lbs/day	230	350	460
	% removal	65	NA	NA
BOD_5 (May 16-Nov. 14)	mg/L	30	45	NA
	lbs/day	140	210	280
	% removal	65	NA	NA
TSS (May 16-Nov. 14)	mg/L	50	80	NA
	lbs/day	230	350	460
	% removal	65	NA	NA

3.3 Water Quality-Based Effluent Limit Development

40 CFR 122.44(d) requires that permits include limitations more stringent than technology-based requirements where necessary to meet water quality standards. Water quality-based effluent limits may be in the form of a wasteload allocation required as part of a Total Maximum Daily Load (TMDL). They may also be required if a site-specific analysis indicates the discharge has the reasonable potential to cause or contribute to an exceedance of a water quality criterion. DEQ establishes effluent limits for pollutants that have a reasonable potential to exceed a criterion. The analyses are discussed below.

3.3.1 Designated Beneficial Uses

NPDES permits issued by DEQ must protect the following designated beneficial uses of the Nehalem River These uses are listed in OAR-340-041-0230 for the North Coast Basin.

- Public and private domestic water supply
- Industrial water supply
- Irrigation and livestock watering
- Fish and aquatic life (including salmonid rearing, migration, and spawning)
- Wildlife and hunting
- Fishing
- Boating
- Water contact recreation
- Aesthetic quality

3.3.2 303d Listed Parameters and Total Maximum Daily Loads

The following table lists the parameters that are on the 2022 303(d) list (Category 5) within the discharge's stream reach. The table also lists any parameters with a TMDL wasteload allocation assigned to the facility (Category 4).

Table 3-6: 303d and TMDL Parameters

Water Quality Limited Parameters (Category 5)	
AU ID:	OR_SR_1710020201_05_106441
AU Name:	Nehalem River
AU Status:	Impaired
Year Listed	2004
Year Last Assessed	2022
303d Parameters (Category 5)	None
TMDL Parameters (Category 4)	
Temperature-year round; Temperature-spawn	

3.3.3 TMDL Wasteload Allocations

DEQ issued a TMDL for the North Coast Basin in 2003. In November 2006 modifications were made to the TMDL (Addendum #1: Modifications to North Coast Basin Temperature Waste Load and Load Allocations) due to a modification in the temperature standard. Vernonia's WLA was modified as part of this addendum. WLAs from the TMDL addendum that are applicable to the permittee are listed in the following table.

Table 3-7: Applicable WLAs

Parameter	WLA	Time Period
Temperature	8.99 x10^6 kcal/day	Sept 1- May 15
Temperature	8.97 x 10^6 kcal/day	May 16- Aug 31

The Nehalem River is designated as both Core Cold Water and spawning habitat for salmon. A Temperature WLA was developed to address the spawning habitat use and will be applied as an excess thermal load limit in the permit. A reserve capacity request was granted to address the Core Cold Water use and a temperature WLA will be applied as an excess thermal load limit in the permit.

The TMDL also addressed bacteria, but specifically mentioned that the discharges from the City of Vernonia did not need additional limitations to the existing wastewater treatment plant beyond the *E. coli* recreational contact criteria as a result of the loading model.

3.3.4 Pollutants of Concern

To ensure that a permit is protecting water quality, DEQ must identify pollutants of concern. These are pollutants that are expected to be present in the effluent at concentrations that could adversely impact water quality. DEQ uses the following information to identify pollutants of concern:

- Effluent monitoring data.
- Knowledge about the permittee's processes.
- Knowledge about the receiving stream water quality.
- Pollutants identified by applicable federal effluent limitation guidelines.

Based on EPA's NPDES permit application requirements, toxic pollutants of concern for domestic facilities are listed in the following table.

Table 3-8: Domestic Toxic Pollutants of Concern

Flow Rate	Pollutants
> 0.1 mgd and < 1.0 mgd	Total Residual Chlorine, Total Ammonia Nitrogen

DEQ identified the following pollutants of concern for this facility listed in the following table.

Table 3-9: Pollutants of Concern

Pollutant	How was pollutant identified?
pH	Effluent Monitoring
Temperature	Effluent Monitoring
E. coli	Effluent Monitoring
Total Residual Chlorine	Effluent Monitoring
Total Ammonia Nitrogen	Effluent Monitoring

The sections below discuss the analyses that were conducted for the pollutants of concern to determine if water quality based effluent limits are needed to meet water quality standards.

3.3.5 Regulatory Mixing Zone

The proposed permit contains a mixing zone as allowed per OAR 340-041-0053. The proposed mixing zone is described as follows:

> *The allowable mixing zone is that portion of the Nehalem River that extends 50 feet from the outfall. The zone of initial dilution is that part of the Nehalem River that extends 5 feet from the outfall.*

The dilutions at the edge of the zone of initial dilution and mixing zone are shown in the table below. These dilutions are based on a 2023 mixing zone analysis conducted by DEQ.

Table 3-10: Outfall 001 Dilution Summary

Dilution Summary for Nov 15 – May 15						
Water Quality Standard	**Stream Flow (cfs)**		**Effluent Flow (mgd)**		**Dilution**	**Location**
	Statistic	**Flow**	**Statistic**	**Flow**		
Aquatic Life, Acute	1Q10	24	☐ ADWDF x PF ☒ Max Daily Avg ☐ Other	1.95	2	ZID
Aquatic Life, Chronic	7Q10	26	☐ ADWDF ☒ Max Monthly Avg ☐ Other	1.3	12	MZ
Human Health, Non-Carcinogen	30Q5	58	☐ ADWDF ☒ Max Monthly Avg ☐ Other	1.3	12	MZ
ADWDF = Average dry weather design flow *PF = Peaking factor*						
Comments: CORMIX predicted centerline dilutions at the edge of the mixing zone for the 7Q10 and 30Q5 cases. A factor of 1.7 was applied to these dilutions to estimate the average dilution per guidance in the CORMIX Users Manual. Dilution at 600 feet downstream is 19.						

Dilution Summary – 33 cfs						
Water Quality Standard	**Stream Flow (cfs)**		**Effluent Flow (mgd)**		**Dilution**	**Location**
	Statistic	**Flow**	**Statistic**	**Flow**		
Aquatic Life, Acute	Minimum summer flow	33	☐ ADWDF x PF ☐ Max Daily Avg ☒ Other	0.20	4.3	ZID
Aquatic Life, Chronic	Minimum summer flow	33	☒ ADWDF ☐ Max Monthly Avg ☐ Other	0.20	21	MZ
Human Health, Non-Carcinogen	Minimum summer flow	33	☒ ADWDF ☐ Max Monthly Avg ☒ Other	0.20	21	MZ
AWWDF = Average wet weather design flow *PF = Peaking factor*						
Comments: CORMIX predicted centerline dilutions at the edge of the mixing zone for the 7Q10 and 30Q5 cases. A factor of 1.7 was applied to these dilutions to estimate the average dilution per guidance in the CORMIX User's Manual. Dilution at 600 feet downstream is 71.						

3.3.6 pH

The pH criterion for this basin is 6.5 – 8.5 per OAR 340-041-0235. DEQ determined there is reasonable potential for the discharge to exceed the lower pH criterion at the edge of the mixing zone. The lower proposed limit is 6.3 and is a WQBEL. The upper proposed limit is 9.0 and is a TBEL. This limit will cover both the winter and summer discharge periods. The DMR data provided by the permittee from 2020-2023 shows a tenth percentile minimum pH of 6.3, therefore the permittee is expected to be able to meet the limit upon permit issuance and no compliance schedule is needed. The following provides a summary of the data used for the analysis.

Table 3-11: pH Reasonable Potential Analysis

INPUT	Lower pH Criteria	Upper pH Criteria
1. Dilution at mixing zone boundary	12.0	12.0
2. Upstream characteristics		
a. Temperature (deg C)	19.8	5.7
b. pH	6.9	7.7
c. Alkalinity (mg CaCO3/L)	12.8	12.8
3. Effluent characteristics		
a. Temperature (° C)	15.1	5.9
b. pH (S.U.)	6.0	9.0
c. Alkalinity (mg CaCO3/L)	117.0	117.0
4. Applicable pH criteria	6.5	8.5
pH at mixing zone boundary	**6.3**	**7.9**
Is there reasonable potential?	**Yes**	**No**
Proposed effluent limits	**6.3**	**9.0**
Effluent data source: DMR data Jan 2020-May 2023		
Ambient data source: AWQMS 2013-2023. pH and alkalinity from stations 23273-ORDEQ and 24299-ORDEQ. Temperature data from station 34019-ORDEQ which is downstream (no upstream temperature data during discharge period).		

3.3.7 Temperature

3.3.7.1 Temperature Criteria OAR 340-041-0028

The following table summarizes the temperature criteria that apply at the discharge location along with whether the receiving stream is water quality-limited for temperature and whether a TMDL wasteload allocation has been assigned. Using this information, DEQ performed several analyses to determine if effluent limits were needed to comply with the temperature criteria.

Table 3-12: Temperature Criteria Information

Applicable Temperature Criterion	Core Cold Water 16ºC (OAR 340-041-0028(4)(b)
Applicable dates: May 16 – Aug 31	
Salmon/Steelhead Spawning 13°C? OAR 340-041-0028(4)(a)	☒Yes ☐No
Applicable dates: September 1-May 15	
WQ-limited?	☒Yes ☐No
TMDL wasteload allocation assigned?	☒Yes ☐No
Applicable dates: September 1- May 15 for spawning, May 16-Aug 31 for core cold water	
TMDL based on natural conditions criterion?	☐Yes ☒No
Cold water summer protection criterion applies?	☐Yes ☒No
Cold water spawning protection applies?	☐Yes ☒No
Comments:	

The Nehalem River is covered under the North Coast Subbasins TMDL. The TMDL gave a WLA to Vernonia WWTP of 8.99 $x10^6$ kcal/day during the spawning time period of Sept 1st- May 15th. No WLA was assigned during the core cold water time period of May 16th- August 31st because the permit did not allow Vernonia to discharge during this time period. A request to use Reserve Capacity was granted and a WLA of 8.97 $x10^6$ kcal/day was granted to Vernonia for the May 16th-August 31st time period (Appendix B). Each WLA may also be expressed as a flow-based equation as noted in the table below.

Final effluent limits are based on the WLAs and listed in the following table.

Table 3-13: Temperature Criterion Effluent Limits

Effluent limit needed? ☒Yes ☐No
TMDL WLA Limit: Option A: 8.99 $x10^6$ kcal/day (as a 7-day rolling average) Option B: $0.08 \cdot (Q_e + Q_r \cdot 0.646) \cdot 3.785$ million kcal per day (as a 7-day rolling average)
Applicable time period: Sept 1st-May 15th
TMDL WLA Limit: Option A: 8.97 X 10^6 kcal/day (as a 7-day rolling average) Option B: $0.11 \cdot (Q_e + Q_r \cdot 0.646) \cdot 3.785$ million kcal per day (as a 7-day rolling average)
Applicable time period: May 16th-August 31st

3.3.7.2 Thermal Plume OAR 340-041-0053(2)(d)

In addition to compliance with the temperature criteria, OAR 340-041-0053(2)(d) contains thermal plume limitation provisions designed to prevent or minimize adverse effects to salmonids that may result from thermal plumes. The discharge was evaluated for compliance with these provisions as follows:

- OAR 340-041-0053(2)(d)(A): Impairment of an active salmonid spawning area where spawning redds are located or likely to be located. This adverse effect is prevented or minimized by limiting potential fish exposure to temperatures of 13ºC or more for salmon and steelhead, and 9ºC or more for bull trout.

  ODFW staff confirmed that the streambed around the outfall and immediately downstream is bedrock and therefore unsuitable for spawning redds. DEQ performed an analysis of the discharge related to the spawning criterion. The result of this analysis indicates that the discharge does not have a reasonable potential to heat the receiving stream above the spawning criterion by more than an insignificant amount within 600 ft downstream of the outfall. Since the likely location of any active salmonid spawning areas has been confirmed to be outside of this range by ODFW staff, the impairment of an active spawning area is prevented or minimized.

- OAR 340-041-0053(2)(d)(B): Acute impairment or instantaneous lethality is prevented or minimized by limiting potential fish exposure to temperatures of 32ºC or more to less than 2 seconds.

  Since the maximum effluent temperature is below 32 ºC, acute impairment or instantaneous lethality is prevented or minimized.

- OAR 340-041-0053(2)(d)(C): Thermal shock caused by a sudden increase in water temperature is prevented or minimized by limiting potential fish exposure to temperatures of 25ºC or more to less than 5% of the cross-section of 100% of the 7Q10 flow of the water body.

  Since the maximum effluent temperature is below 25°C, thermal shock caused by the discharge is prevented or minimized.

- OAR 340-041-0053(2)(d)(D): Unless ambient temperature is 21ºC or greater, migration blockage is prevented or minimized by limiting potential fish exposure to temperatures of 21ºC or more to less than 25% of the cross-section of 100% of the 7Q10 flow of the water body.

  Since the maximum effluent temperature is below 21.0°C, migration blockage caused by the discharge is prevented or minimized.

There are no effluent limits needed to comply with the thermal plume requirements as shown in the following table.

Table 3-14: Thermal Plume Effluent Limit

Effluent limit needed? ☐Yes ☒No
Calculated limit: NA
Applicable timeframe: NA
Comments:

3.3.8 Bacteria

OAR 340-041-0009(6)(b) requires discharges of bacteria into freshwaters meet a monthly geometric mean of 126 *E. coli* per 100 mL, with no single sample exceeding 406 *E. coli* per 100 mL. If a single sample exceeds 406 *E. coli* per 100 mL, then the permittee may take five consecutive re-samples. If the geometric mean of the five re-samples is less than or equal to 126, a violation is not triggered. The re-sampling must be taken at four-hour intervals beginning within 28 hours after the original sample was taken. The following table includes the proposed permit limits and apply year-round.

Table 3-15: Proposed *E. coli* Limits

E. coli **(#/100 ml)**	**Geometric Mean**	**Maximum**
Existing Limit	126	406
Proposed Limit	126	406

3.3.9 Toxic Pollutants

DEQ typically performs the reasonable potential analysis for toxics according to EPA guidance provided in the Technical Support Document for Water Quality-Based Toxics Control (TSD) (Office of Water Enforcement and Permits, U.S. EPA, March 1991). The factors incorporated into this analysis include:

1. Effluent concentrations and variability
2. Water quality criteria for aquatic life and human health
3. Receiving water concentrations
4. Receiving water dilution (if applicable)

DEQ performs these analyses using spreadsheets that incorporate EPA's statistical methodology. The following sections describe the analyses for various toxic pollutants below.

3.3.9.1 Total Residual Chlorine

The existing permit contains chlorine limits. The existing chlorine limits of 0.01 mg/L AML and 0.03 mg/L MDL were evaluated to ensure they remained protective of water quality based on updated information. The analysis showed that the current limits were protective of water quality and remain unchanged in the new permit. These limits will now apply year-round when the permittee is discharging. The permittee was able to meet these limits in the previous permit and will not require a compliance schedule for chlorine.

3.3.9.2 Total Ammonia Nitrogen

DEQ's ammonia criteria vary with changes in pH and temperature. DEQ performed a reasonable potential analysis that accounts for changes in the effluent and receiving water pH and temperature to determine the appropriate ammonia criteria. The following table provides a summary of the data used for the ammonia analysis and the results of the analysis. A winter RPA was run using winter ambient and effluent data (Nov-May). No winter temperature data was found upstream of the permittee, and so downstream winter temperature data was used. The winter RPA resulted in no reasonable potential for the permittee to exceed the ammonia water quality criteria during the winter discharge period. The summer RPA showed reasonable potential to exceed the ammonia criteria. An average monthly limit of 10 mg/L and a maximum daily limit of 20 mg/L (rounded to two significant figures) will be added to the permit for the summer discharge period of May 16 - Nov 14. Current data indicates that the permittee will not be able to meet these limits upon permit issuance. Therefore, a compliance schedule will be included in the permit (Section 6).

Table 3-16: Ammonia Analysis Information - Summer

	Acute	Chronic	
		4-day	30-day
Dilution	4.3	21	21
Ammonia Criteria	4.7	2.6	1.1
Effluent Data Used			
Ammonia (mg/L)	26.0	26.0	
pH (SU)	8.0	8.0	
Temperature (ºC)	23.0	23.0	
Alkalinity (mg/L CaCO3)	134.6	134.6	
Receiving Stream Data Used			
Ammonia (mg/L)	0.0	0.0	
pH (SU)	7.7	7.7	
Temperature (ºC)	21.1	21.1	
Alkalinity (mg/L CaCO3)	23.2	23.2	
Ammonia Limit Needed?	**Yes**		
Calculated Limits	AML	MDL	
Ammonia (mg/L)	10.4	20.1	
Effluent data source			
DMR Data January 2020-May 2023 for Ammonia, pH, and Alkalinity. Summer temperature data collected from records of effluent temperature entering the subsurface discharge system.			
Ambient data source			
AWQMS 2013-2023. Stations 23273-ORDEQ and 24299-ORDEQ.			

Table 3-17: Ammonia Analysis Information - Winter

	Acute	Chronic	
		4-day	30-day
Dilution	2	12	12
Ammonia Criteria	17.5	7.1	2.8
Effluent Data Used			
Ammonia (mg/L)	26.0	26.0	
pH (SU)	7.2	7.2	
Temperature (ºC)	15.1	15.1	
Alkalinity (mg/L CaCO3)	51.8	51.8	
Receiving Stream Data Used			
Ammonia (mg/L)	0.0	0.0	
pH (SU)	7.5	7.5	
Temperature (ºC)	9.1	9.1	
Alkalinity (mg/L CaCO3)	13.8	13.8	
Ammonia Limit Needed?	**No**		
Calculated Limits	AML	MDL	
Ammonia (mg/L)	N/A	N/A	
Effluent data source			
DMR data January 2020-May 2023			
Ambient data source			
AWQMS 2013-2023. Stations 23273-ORDEQ and 24299-ORDEQ. No Winter temperature data at these stations. Using downstream temperature data from Station 34019-ORDEQ for winter data.			

3.4 Antibacksliding

The proposed permit complies with the antibacksliding provisions of CWA sections 402(o) and 303(d)(4) and 40 CFR 122.44(l). The proposed limits are the same or more stringent than the existing permit with the exception of BOD_5 and TSS percent removal. The changes in BOD_5 and TSS percent removal were based on updated information not available at the time of issuance of the current permit (40 CFR 122.44(l) and 40 CFR 122.62(a)(2)) and therefore satisfy the exception to antibacksliding. In the past, when DEQ approved summer discharges from the permittee the existing effluent limitations still applied to the discharge. Since the proposed summer limits are the same or more stringent than the existing permit's limits, the antibacksliding provision remains satisfied for the new summer discharge period outlined in the permit.

3.5 Antidegradation

DEQ must ensure the permit complies with Oregon's antidegradation policy found in OAR 340-041-0004. This policy is designed to protect water quality by limiting unnecessary degradation from new or increased sources of pollution.

The previous permit allowed for summer discharges with DEQ's approval. Because proposed summer limits are the same or more stringent than the existing permit limits the permit complies with Oregon's antidegradation policy. However, since the new permit allows the permittee to discharge on a regular basis during the summer without special approval from DEQ, an antidegradation analysis was performed for this discharge. To ensure that the summer discharge complies with the antidegradation policy it was determined that BOD_5 load within the discharge would not result in a reduction in water quality to the Nehalem River if the river flow was 22 cfs or greater (this conclusion is based on OAR 34-0141-0041(3)(c)). DEQ also determined that the summer discharge would have a de minimis TSS impact if the minimum river flow was 33 cfs or greater. The permittee was given TMDL reserve capacity for temperature within the human use allowance of 0.3 °C. As long as the permittee meets the temperature limit, the effluent will be compliant with the antidegradation policy related to temperature (OAR 34-0141-0041(3)(d)). Impacts from chlorine, pH, and ammonia are considered de minimis as long as the criteria is met at the edge of the mixing zone since these pollutants are not conservative. It was determined that the new pH limits of 6.3-9.0 and chlorine limit of 0.01 mg/L MDL and 0.03 mg/L AML would not result in an exceedance of the criteria beyond the edge of the mixing zone with a river flow of 33 cfs or greater. The permittee will be given ammonia limits of 10 mg/L AML and 20 mg/L MDL during the summer discharge to be able to meet water quality criteria at the edge of the mixing zone. Thus, the lowest river flows the permittee was allowed to discharge at was determined to be 33 cfs and the ammonia limits were included in the permit during the summer to ensure that the ammonia criteria were not exceeded beyond the edge of the mixing zone. The permittee requested that the summer effluent discharge limit be scalable with the river flow. It was determined that as long as the effluent flow was not greater than (0.6463*Qr)/106 (with Qr being the river flow in cfs) then the summer discharge would have a de minimis impact. Therefore, the summer discharge does not result in a lowering of water quality consistent with Oregon's antidegradation policy.

DEQ is not aware of any information that existing limits are not protecting the receiving stream's designated beneficial uses. DEQ is also not aware of any existing uses present within the water body that are not currently protected by standards developed to protect the designated uses. Therefore, DEQ has determined that the proposed discharge complies with DEQ's antidegradation policy. DEQ's antidegradation worksheet for this permit renewal is available upon request.

3.6 Whole Effluent Toxicity

DEQ does not require whole effluent toxicity testing (WET) for minor domestic facilities because concentrations of toxics are typically very low and WET testing is not warranted.

3.7 Groundwater

While the permittee previously had a groundwater quality protection program and monitoring limits related to Cell No. 3. This cell has been lined and no longer requires a groundwater management plan or monitoring limits for this particular discharge. An evaluation was performed on previously collected groundwater data (2011-2023) from the permittee to determine average summer background groundwater concentrations, as shown in Table 3-18. These parameters will be included as average monthly limits in the proposed permit. Before the permittee is allowed to discharge, the current temperature monitoring wells downgradient of Outfall 003 (identified as TE-102, TE-104-B, and TE-105-B in Figure 3-1) will need to be converted or the permittee will need to construct other DEQ approved groundwater monitoring wells downgradient of Outfall 003 so that the full suite of parameters can be measured. This condition will be included in Schedule D. Once the wells are converted, they will become the compliance point at which the limits will need to be met.

Because OAR 340-044-0015(2)(f) does not allow direct discharge of municipal effluent to groundwater, a condition will be included that requires the permittee to measure groundwater levels and only discharge when the groundwater is at least 1 foot or more below Outfall 003. Temperature limits will also be included that prevent the permittee from raising the groundwater temperature above background by more than 2.0 °C. This background temperature was chosen as it was the standard deviation of the background groundwater temperature data and allows for some natural variation of groundwater temperature between the background monitoring wells and compliance point while not allowing a substantial increase in temperature. Background temperature will be determined at MW-1 and MW-2 (see Figure 3-1). Nitrate-nitrite limits will be set at 10 mg/L, the groundwater reference level defined in OAR 340-040-0030 Table 1. A groundwater management plan will also be included as a Schedule D condition.

Table 3-18: Background Groundwater Concentrations

Parameter	Background Groundwater Concentration	Unit
TSS	21	mg/L
BOD_5	2	mg/L
E. *coli*	4	MPN/100
Ammonia	0.3	mg/L
Total Residual Chlorine	No Data – Assumed to be non-detect	mg/L
Specific Conductivity	145	uS/cm
pH	No Data – OAR 340-040-0030 Table 3 specifies range of 6.5-8.5	SU

Figure 3-1: Vernonia Monitoring Wells

3.8 Functional Equivalent Analysis

Due to the proximity of Outfall 003 to the Nehalem River the discharge was evaluated for the likelihood of a functional equivalent discharge under the Maui Decision using DEQ guidance "Determining if a WPCF permit should be a NPDES permit under the Maui Supreme Court Decision" (referred to as DEQ FE guidance)**.** The full analysis is documented in a Functional Equivalent Worksheet which is part of the administrative record. A summary of the analysis of the seven factors outlined in the Maui Decision are as follows:

Factor 1: Transit Time
Data from a 2011 hydrogeological assessment submitted by the permittee indicated that the groundwater flows in a south-southeast direction from the facility toward the river at a velocity that ranges from 0.6 ft/day to 2.8 ft/day. Given the distance of 120 ft to 520 ft it was estimated that the transit time varied from between 43 days to 867 days. Using the DEQ FE guidance, these transit times indicate that Outfall 003 is a likely functional equivalent discharge given the most rapid transit time of 43 days.

Factor 2: Distance
The Outfall 003 UIC is located 120 ft to 520 ft away from the river The DEQ FE guidance indicates that discharges within this distance are more likely to be functional equivalent discharges.

Factor 3: Nature of the Material Through Which the Pollutant Travels
The 2011 hydrogeologic study did multiple well borings. The logs showed there was a heterogeneous mixture of silt, gravel, and sand in the surface down to 4-9ft. Below this was a fine to course grained alluvium consisting of silt to clayey silt with variable amounts of sand and gravel. Below this was dense siltstone bedrock at an approximate elevation of 595 ft (about 19 ft below ground surface). Given the heterogeneous nature of the material, this is an ambiguous indicator of whether a functional equivalent is present.

Factor 4: The Extent to which the Pollutant is Diluted or Chemically Changed as it Travels
A 2013 memo from Tetra Tech examined the possibility of temperature from Outfall 003 to impact the Nehalem River. This modeling showed that even if Outfall 003 was operating at full capacity, temperature was attenuated before reaching the river. However, no other analytes were examined in this analysis. As a result, factor 4 is an ambiguous indicator of whether a functional equivalent is present.

Factor 5: Amount of Pollutant Entering the Navigable Waters Relative to the Amount of Pollution that Leaves the Point Source
It is estimated that all of the wastewater eventually reaches the Nehalem River since the effluent is discharged subsurface and has no other travel pathway in groundwater except towards the river. Therefore, factor 5 is a likely indicator of a functional equivalent discharge.

Factor 6: The Manner by or Area in which the Pollutant Enters the Navigable Waters
There are no known discrete channels through which the effluent can travel. Any pollutants would enter the groundwater and enter the river through travel with the groundwater through the soil, which will likely attenuate any pollutants. Therefore, factor 6 is an unlikely indicator of a functional equivalent discharge.

Factor 7 The Degree to which the Pollution (at that point) has Maintained its Specific Identity.
Data was unavailable to assess factor 7.

Final Determination
Overall, the close proximity of the UIC to the river, the rapid transit time, and the likelihood that all of the effluent eventually reaches surface water all indicate that Outfall 003 is a likely functional equivalent of a direct discharge. DEQ determined that it is appropriate to evaluate Outfall 003 to ensure any subsurface discharges will be protective of surface water quality. This approach is expected to have limited impact on facility operations and will limit the need for additional studies at this time.

Outfall 003 will be included in the NPDES permit, with limits for flow, BOD_5, TSS, pH, Nitrate as N, *E. coli*, Ammonia as N, Total Residual Chlorine, specific conductivity, and temperature in accordance with groundwater regulations (See section 3.7). Further evaluation is required to determine whether these limits meet federal and state requirements for surface water. The pollutants of concern for this facility have been identified as BOD_5, TSS, pH, temperature, bacteria, nitrate, and ammonia. The nearby assessment unit is OR_SR_1710020201_05_106441

(Nehalem River) which is listed as impaired for Temperature-Year-Round, and Temperature-spawn in the 2022 Integrated Report (See Temperature section below).

Mixing Zone
Because it is uncertain exactly where the effluent reaches the surface water, and it is likely that it reaches the surface water at multiple points, no regulatory mixing zone will be assigned to this discharge.

Compliance Point
To be protective of surface water, the water quality criteria are expected to be met by the time the effluent reaches the surface water. The soil and the groundwater through which the effluent travels are expected to have an effect on the effluent, especially for non-conservative parameters such as pH and temperature. The permittee will be required to install monitoring wells in order to use Outfall 003, and these will be the compliance points for the limits outlined below.

BOD_5 and TSS
The proposed permit contains average monthly BOD_5 limit of 2 mg/L and an average monthly TSS limit of 21 mg/L. These requirements were put in place to meet UIC rules. These limits are lower than the 30 mg/L monthly average required by federal secondary treatment standards and therefore already meet the required criteria. Federal Secondary Treatment standards require that a percent removal limit is added to the permit. The percent removal will be set at 65% in accordance with 40 CFR 133.105(g) (See section 3.2). The compliance point for percent removal will be at Outfall 003 prior to the discharge from Cell #3. OAR 340-041-0061(9)(c) states that "mass load limits as defined in this rule may be replaced by more stringent limits...if required to prevent or eliminate violations of water quality standards". Since the groundwater limits prevent violations of water quality standards, no mass loads are required for BOD_5 and TSS.

pH
The pH criteria are 6.5 to 8.5 for the Nehalem River. The proposed pH limits in the permit are 6.5-8.5 to meet groundwater reference levels. Since these limits equal the criteria the pH criteria will be met by the time the effluent reaches the surface water.

Temperature
The Nehalem River is designated as Core Cold Water (criteria of 16 °C). The proposed temperature limits in the permit do not allow the discharge from the UIC to exceed groundwater temperature values by more than 2.0 °C to allow for natural groundwater temperature variations. Background groundwater values averaged 12.0 °C based on previously collected groundwater data. Therefore, these limits are protective of the temperature criteria and also protective of any thermal plume limitations.

Bacteria
The proposed permit contains an *E. coli* limit of 4 #/100 mL. OAR 340-041-0009(6)(b) requires discharges of bacteria into freshwater meet a monthly geometric mean of 126 *E. coli* organisms per 100 mL, with no more single sample exceeding 406 *E. coli* organisms per 100 mL. The limits in the proposed permit are lower and therefore stringent enough to protect surface water criteria.

Nitrate and Ammonia
The proposed permit contains a 10 mg/L average monthly limit for nitrate and a limit of 0.3 mg/L for ammonia. These limits either are equal to or lower than the water quality criteria for nitrate and ammonia (see section 3.3.9.2) and therefore are stringent enough to protect surface water criteria.

4. Schedule A: Other Limitations

4.1 Mixing Zone

Schedule A describes the regulatory mixing zone as discussed above in section 3.

4.2 Biosolids

The WWTP currently manages all of its wastewater solids in the facility's facultative lagoons until the solids need to be removed from the lagoons to keep the lagoons properly functioning. During the term of this permit, the permit holder may transfer these wastewater solids or sewage sludges to other DEQ-approved facilities permitted to process or manage the solids or treat and land apply these solids as biosolids.

If during the term of this permit the WWTP decides that it wants to treat and land apply their wastewater solids as biosolids, the facility will need to develop a new or updated Biosolids Management Plan to replace the facility's outdated 2013 Biosolids Management Plan. At a minimum, this plan will need to detail that the facility's wastewater solids will meet biosolids pollutant limits defined in OAR 340-050 and 40 CFR Part 503 and will be treated to meet state and federal criteria for pathogen reduction (Class A or Class B biosolids) and vector attraction reduction. The plan will also be subject to public review and comment before it may be implemented.

For all Class B biosolids to be land applied under this permit, Schedule A of the permit requires the facility to apply biosolids according to their Biosolids Management Plan. In addition, Schedule A requires the following:

- The biosolids must be land applied at or below agronomic rates.
- The permittee must have written site authorization for each location from DEQ before land applying and abide by the restrictions for each site.
- Prior to application, the permittee must ensure that biosolids meet one of the pathogen reduction standards under 40 CFR 503.32 and one of the vector attraction reduction standards under 40 CFR 503.33.
- The permittee must not apply biosolids containing pollutants in excess of the ceiling concentrations for the nine metals shown in Schedule A of the permit.

It should be noted that the facility will not need to develop a Biosolids Management Plan for transfer of its wastewater solids or sewage sludge to other DEQ-approved facilities permitted to process, manage, or dispose of these types of residuals.

5. Schedule B: Monitoring and Reporting Requirements

Schedule B of the permit describes the minimum monitoring and reporting necessary to demonstrate compliance with the proposed effluent limits. In addition, monitoring for other parameters is required to better characterize the effluent quality and the receiving stream. This data will be used during the next permit renewal. Detailed monitoring frequency and reporting requirements are in Schedule B of the proposed permit. The required monitoring, reporting and frequency for many of the parameters are based on DEQ's monitoring and reporting matrix guidelines, permit writer judgment, and to ensure the needed data is available for the next permit renewal. The permittee requested a monitoring reduction for bacteria. DEQ evaluated the request in accordance with the 1996 EPA memo "Interim Guidance for Performance -Based Reductions of NPDES Permit Monitoring Frequencies" and found that the permittee was eligible for bacteria monitoring to be reduced from the 2/week frequency found in the DEQ monitoring guidelines to a 1/month frequency.

6. Schedule C: Compliance Schedule

6.1 Outfall 001

The proposed permit contains a new water quality based effluent limit for ammonia at Outfall 001. The facility is unable to meet this limit upon permit issuance. The proposed permit contains a compliance schedule that allows time for the facility to make facility modifications in order to meet the new limits for ammonia when discharging from Outfall 001. This compliance schedule lays out a series of milestones which, upon completion, will require the permittee to meet the permit's water quality-based effluent limits (see 40 CFR 122.47 and OAR 340-041-0061(12)). The proposed compliance schedule requires the permittee to meet the final limits as soon as possible.

6.2 Outfall 003

The proposed permit contains new groundwater quality based effluent limits for BOD_5, TSS, pH, ammonia, nitrate, total residual chlorine, e. *coli*, and specific conductivity as specified under OAR 340-040-0030. It is unclear whether the permittee will be able to meet these limits upon permit issuance. A compliance schedule is allowed according to OAR 340-040-0020(10). Because this discharge is also a likely functional equivalent 40 CFR 122.47 and OAR 340-041-0061(12) also apply. The compliance schedule allows time for the permittee to evaluate facility operations to ensure compliance with the new limits. The compliance schedule requires that the permittee meet the final limits within two calendar years after the construction and approval of the groundwater monitoring compliance points. Annual reports on progress towards meeting limits will be required. Two calendar years were allowed because the permittee only discharges into the subsurface system during a few months in the summer, thus making the actual window during which the permittee can test the system far less than two years. The proposed compliance schedule requires the permittee to meet the final limits as soon as possible.

7. Schedule D: Special Conditions

The proposed permit contains the following special conditions. The conditions include the following:

7.1 Inflow and Infiltration

A requirement to submit an updated inflow and infiltration plan in order to reduce groundwater and stormwater from entering the collection system.

7.2 Mixing Zone Study

A requirement to submit a mixing zone study.

7.3 Emergency Response and Public Notification Plan

A requirement to develop and submit an emergency and spill response plan or ensure the existing one is current per General Condition B.8 in Schedule F.

7.4 Exempt Wastewater Reuse at the Treatment System

A condition that exempts the permit holder from the recycled water requirements in OAR 340-055, when recycled water is used for landscape irrigation at the treatment facility or for in-plant processes, such as in plant maintenance activities.

7.5 Wastewater Solids Annual Report

This condition requires the permittee to submit a Wastewater Solids Annual Report each year documenting removal of wastewater solids from the facility during the previous calendar year.

7.6 Biosolids Management Plan

A requirement to manage all biosolids in accordance with a DEQ-approved biosolids management plan and land application plan. The biosolids management plan and the land application plan must meet the requirements in OAR 340-050-0031 and describe where and how the land application of biosolids is managed to protect public health and the environment.

7.7 Wastewater Solids Transfers

A condition that allows the facility to transfer treated or untreated wastewater solids to other in-state or out-of-state facilities that are permitted to accept the wastewater solids.

7.8 Hauled Waste Control Plan

A condition that allows the acceptance of hauled waste according to a DEQ-approved hauled waste plan. The hauled waste plan ensures waste is not accepted that could negatively impact the treatment capabilities of the facility.

7.9 Lagoon Solids

A condition requiring the permittee to submit a sludge depth survey report to ensure lagoon solids are maintained within design standards and accumulations do not negatively affect treatment capabilities.

7.10 Operator Certification

The permit holder is required to have a certified operator consistent with the size and type of treatment plant covered by the permit per OAR 340-049-0005. This special condition describes the requirements relating to operator certification.

7.11 Industrial User Survey

This condition requires the permittee to conduct or update an industrial user survey. The purpose of the survey is to identify whether there are any categorical industrial users discharging to the POTW and ensure regulatory oversight of these discharges.

7.12 Outfall Inspection

A condition that requires the permittee to inspect the outfall and submit a report regarding its condition.

7.13 Groundwater Management Plan

A condition that requires the permittee to submit a groundwater monitoring plan.

7.14 Groundwater Monitoring Well Maintenance

A condition that requires the permittee to maintain monitoring wells and requires an abandonment plan should the permittee decide to abandon a groundwater monitoring well. This is included to address the presence of groundwater monitoring wells related to previous permitted activity at the site.

7.15 Outfall 003 Compliance Point Construction

A condition that requires the permittee to either convert monitoring wells TE-102, TE-104-B, and TE-105-B or construct new groundwater monitoring wells downgradient of Outfall 003 at a DEQ approved located to be compliance points prior to the use of Outfall 003.

8. Schedule F: NPDES General Conditions

Schedule F contains the following general conditions that apply to all NPDES permittees. These conditions are reviewed by EPA on a regular basis.

- Section A. Standard Conditions
- Section B. Operation and Maintenance of Pollution Controls
- Section C. Monitoring and Records
- Section D. Reporting Requirements
- Section E. Definitions

Appendix A: UIC Memo

State of Oregon
DEQ Department of Environmental Quality

Internal Memorandum

To: NPDES Pemit Group

From: Kevin D. Weberling, RG, Senior UIC Hydrogeologist; Derek Sandoz, UIC Program Coordinator

Date: 11/07/2023

Subject: Review of Hyporheic Discharge to UIC, City of Vernonia Wastewater Treatment Plant, Columbia County

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BACKGROUND

- **Description of City of Vernonia Current Wastewater Infiltration and Injection System**

The City of Vernonia operates a municipal wastewater lagoon treatment system located along the Nehalem River in Columbia County, Oregon. The system has been in use since 1960 and has undergone various design improvements, including a subsurface infiltration trench in 1994. Wastewater disinfection occurs by influent flow through three onsite lagoons via solids settling, chlorination, and solids filtration. Chlorination occurs between lagoons two and three, with de-chlorination occurring via dissipation in lagoon three prior to effluent discharge. Currently treated effluent travels either to the Nehalem River via surface outfall in the winter months, or by discharge into the subsurface hyporheic zone during the summer months.

The subsurface discharge system consists of three 700 ft long parallel 8" diameter pipes, perforated with 3/8" diameter holes at the crown of the pipe in 7 ft intervals. The system is emplaced along the Banks-Vernonia Trail and is designed to discharge to the vadose zone with an infiltration rate of 200 gpd/linear ft. The wastewater then percolates into hyporheic groundwater that normally flows towards the Nehalem River during the summer dry season. The subsurface discharge system is classified as a UIC under OAR Division 44 rules and therefore must be permitted under a WPCF UIC permit if the current design configuration is deemed permissible under current OARs discussed below in Section 1.

- **Description of Hydrogeologic Setting**

The City of Vernonia three-tiered lagoon wastewater treatment effluent system is situated approximately 100ft north of the of the Nehalem River on the southeastern side of the facility and 500ft north of the river on the northwestern end of the facility (Figure 1). The shallow subsurface lithology underlying the facility has been characterized in borings and well logs as interbedded gravels, sands, silts, and clays associated with modern Nehalem River floodplain deposits. These deposits contain hyporheic zone waters that interchange with the surface waters in the Nehalem River and the local shallow groundwater water table.
The monitoring wells shown in Figure 1 indicate that during February and March of 1991, the static water level varied between 5 ft and 11 ft below ground surface around the lagoons. The water table fluctuates seasonally based on precipitation and flow in the adjacent Nehalem River. The historic static groundwater levels at the facility indicate the subsurface discharge UIC system buried at 8 ft below ground surface likely intersects the seasonal water table and has potential to discharge directly to groundwater.

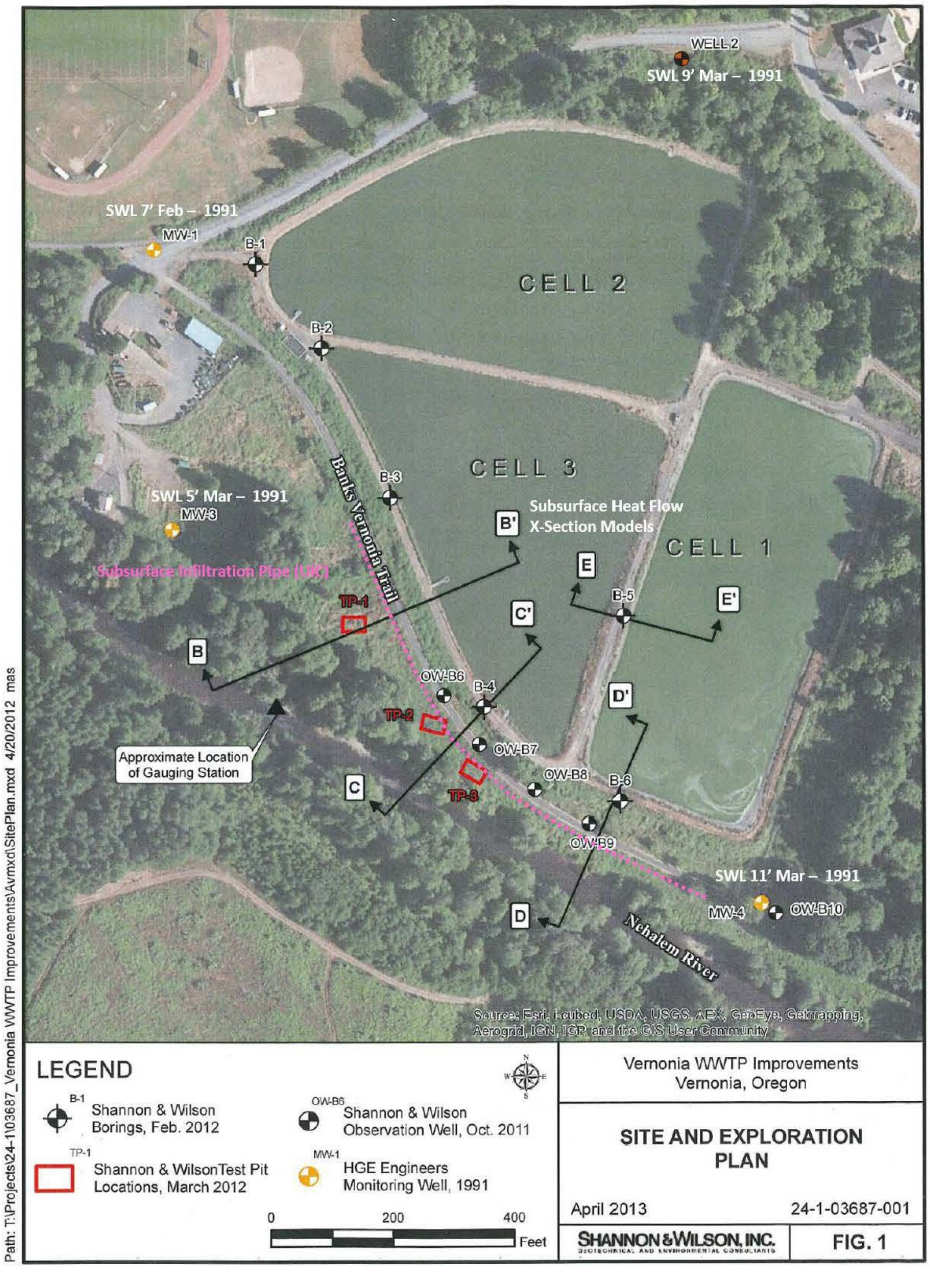

FIGURE 1

DEQ's *water.*

- **Data Limitations and Needs**

It is unclear if the historic groundwater monitoring wells are still active. Currently the City of Vernonia facility only distributes effluent to the subsurface during the summer months, however accurate static groundwater levels will need to be continuously monitored during planned injection periods for consideration of UIC WPCF permit issuance and compliance. Emplacement of fluid via UIC into the subsurface may degrade background groundwater quality and direct injection of municipal wastewater via UIC to an underground source of drinking water is prohibited via the OARs listed below. It is unclear if background groundwater quality levels were determined prior to subsurface infiltration via the UIC perforated pipe system that was emplaced along the Banks-Vernonia Trail or if they can be determined in the future given previous unregistered UIC discharge.

1) Applicable OREGON ADMINISTRATIVE RULES (OARs) - UICs and DISPOSAL of TREATED WASTEWATER

UIC Definitions 340-044-0005

(23) "Injection" or "Underground Injection" means the emplacement or discharge of fluids into the subsurface.

(24) "Injection System" or "Underground Injection System" means a well, improved sinkhole, sewage drain hole, subsurface fluid distribution system or other system or groundwater point source used for the subsurface emplacement or discharge of fluids.

(42) "Subsurface Fluid Distribution System" means an assemblage of perforated pipes, drain tiles or other mechanisms intended to distribute fluids below the surface of the ground.

(46) "Underground Source of Drinking Water" means an aquifer or groundwater source that supplies or potentially could supply drinking water for human consumption.
(51) "Well" means a bored, drilled, driven or dug hole whose depth is greater than its largest surface dimension, an improved sinkhole, a sewage drain hole, or a subsurface fluid distribution system.

(52) "WPCF Permit" means a Water Pollution Control Facilities permit as defined in OAR 340-045 to construct and operate a disposal system with no discharge to navigable waters.

COMMENTS ON UIC DEFINITIONS

The City of Vernonia currently discharges seasonally into the subsurface via buried perforated pipe. This facility is an Underground Injection Control system per the definitions listed above in the OARs and will need to be permitted through the UIC program.

The definition of a "WPCF Permit" brings into question the ability to permit the subsurface discharge portion of this facility through the UIC program as discharge to navigable waters (Nehalem River) is not allowed per current OARs.

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2) Classification of Underground Injection Systems 340-044-0011

(5) Class V. Injection systems not included in Classes I, II, III or IV that inject fluids other than hazardous waste or radioactive waste into the subsurface. Types of Class V injection systems include, but are not limited to, the following:

(a) Sanitary waste injection systems that inject sanitary waste fluids into subsurface fluid distribution or injection systems such as septic systems, drain fields, disposal trenches, seepage pits, cesspools, or sewage drain holes or drill holes

COMMENTS on UIC CLASSIFICATION

The City of Vernonia's subsurface discharge system via buried perforated pipe meets the definition of a Class V UIC per the OAR rules listed above.

3) Prohibition of Groundwater Contamination 340-044-0014

(1) No person shall construct, operate, maintain, convert, plug or abandon any injection system or conduct any injection activity that allows the direct or indirect movement of fluids containing contaminants into groundwater if the presence of that contaminant may cause a violation of any primary drinking water regulation under the federal Safe Drinking Water Act, or fails to comply with groundwater quality protection requirements specified in OAR 340-040. The person owning or operating an injection system shall have the burden of showing that these requirements are met.

(2) If an injection activity has the potential to cause or causes a violation of primary drinking water regulations, adversely impacts groundwater quality or otherwise adversely affects human health or the environment, the owner or operator of the injection system shall:

(a) Take all appropriate action including closure of the injection system if necessary to prevent the violation

(b) Apply for and obtain a permit if the injection activity was previously authorized by rule; and

(c) Be subject to enforcement action if appropriate

COMMENTS ON PROHIBITION of GROUNDWATER CONTAMINATION

It is unclear if data exists that demonstrates original background groundwater quality prior to construction of the existing subsurface discharge system to determine if the underlying aquifer is potentially an underground source of drinking water (USDW). Further water quality testing may be needed to determine background groundwater quality at this site, and if it would be considered an USDW. Treatment of effluent at surface may be required to meet background groundwater quality to continue injection activities prior to UIC WPCF permit approval.

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4) Authorization of Underground Injection 340-044-0012

(2) Permits shall not be issued for construction, maintenance, or use of an underground injection system where any other treatment or disposal method that affords better protection of public health or water resources is reasonably available or possible.

COMMENTS ON AUTHORIZATION

It is unclear if there are other methods of treatment and/or disposal that afford better protection to public health or water resources than the current subsurface injection system (UIC). It is also unclear if the current surface outfall system can handle all effluent discharge should discharge via UIC need to be discontinued.

5) Prohibited Underground Injection 340-044-0015

(2) No person shall cause or allow the following types of Class V injection systems injecting:

(f) Industrial or municipal wastewater directly into an underground source of drinking water.

COMMENTS on PROHIBITED UNDERGROUND INJECTION

It is unclear if there is data demonstrating original background groundwater quality prior to construction of the subsurface discharge system (UIC) to determine if the underlying aquifer is/was a potential underground source of drinking water (USDW). Further water quality testing may be needed to determine background groundwater quality at this site, and if it would be considered an USDW. Effluent may need to be treated at surface to meet background groundwater quality prior to injection to meet UIC WPCF permit requirements.

SUMMARY and UIC OPTIONS

The City of Vernonia municipal wastewater treatment plant discharges treated wastewater effluent via surface outfall into the Nehalem River during the winter and then discharges to the subsurface via a buried, perforated pipe system to the hyporheic zone during the dry summer months. By definitions outlined in **OAR 340-044-0005** this portion of the system is considered a UIC. The UIC is currently unregistered and may need an approved DEQ WPCF UIC Permit to continue operation. If DEQ determines that the discharge is the functional equivalent of a direct discharge, then an NPDES permit would be required to cover this discharge. Discharging to the hyporheic zone implies that, at times, there will be direct discharge to navigable waterways at this facility (the Nehalem River).

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During subsurface discharge during the dry season, the base of the of the infiltration pipe for effluent discharge may be in the vadose zone above the technical definition of the saturated, hyporheic zone. It may be possible during these periods to discharge effluent into the vadose zone; however, it would be necessary to demonstrate through vertical fate-transport modeling that the effluent from the municipal wastewater treatment facility does not degrade background groundwater quality during these discharge periods. This will also require continuous monitoring of groundwater levels to determine the potential intersection with the water table and the base of the perforated pipe (UIC). Discharge would not be allowed to UIC during the intersection of groundwater and the base of UIC, or if vertical fate and transport modeling indicates that background groundwater quality would be degraded during discharge.

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Appendix B: Reserve Capacity Memo

State of Oregon
DEQ Department of Environmental Quality

Memorandum

To: Permit #101094 Vernonia WWTP File

From: DEQ Water Quality Permitting and TMDL Programs

Date: 05/10/2024

Subject: TMDL Reserve Capacity Request for City of Vernonia WWTP Permit #101094

DEQ did not allocate a temperature Waste Load Allocation (WLA) for the Vernonia WWTP for the period of May 16th- August 31st under the 2006 North Coast Basin Temperature TMDL modification, which revised the waste load and load allocations included in the 2003 North Coast Basin Temperature TMDL. At the time of TMDL development and during the modification, DEQ's permit prohibited discharge to the Nehalem River between May 15th and Nov 15th. During permit renewal in 2023, DEQ and the permittee determined that growth and increased loading at Vernonia's WWTP will require effluent discharge of up to 0.2 MGD during the summer May 15th – Nov 14th timeframe. Therefore, DEQ's permitting program made a reserve capacity request to DEQ's TMDL program.

The 2006 North Coast Basin Temperature TMDL modification allocated point sources up 0.2°C of the human use allowance and set aside up to 0.05 °C for reserve capacity. The TMDL also states that if the maximum point source allocation is not used, the remainder would be added to the reserve capacity for future uses. Based on this, DEQ determined there is up to 0.25 °C of available reserve capacity at Vernonia WWTP's point of discharge located on the Nehalem River at approximately river mile 92. There are no point sources upstream. Downstream, RSG Forest Products discharges at Nehalem River mile 70. RSG did not have a NPDES wastewater discharge permit at the time the TMDL was developed and therefore was not provided an allocation. The NPDES permit evaluation report, dated February 2006, conducted a reasonable potential analysis and concluded that RSG's operations had no reasonable potential to exceed temperature standards. Fishhawk Lake Recreation Club discharges to Fishhawk Creek at river mile 3.8. Fishhawk Creek eventually flows to the Nahalem River at approximately river mile 67. The Fishhawk facility was allocated a portion of the human use allowance equal to approximately 0.08 °C (0.075 °C). Accounting for any potential cumulative warming from discharges downstream, DEQ estimates there is at least 0.17 °C of available reserve capacity available downstream of Fishhawk Creek. This assumes there is no heat dissipation between Vernonia WWTP's outfall moving downstream and no heat dissipation between Fishhawk Lake Recreation Club outfall on Fishhawk Creek and where Fishawk Creek flows into the Nehalem River (0.25 °C – 0.08 °C = 0.17 °C).

To estimate the amount of reserve capacity Vernonia WWTP would require, DEQ calculated the potential warming using the critical low river flow and an estimated maximum effluent temperature and flow. DEQ typically uses 7Q10 as the critical low flow. The estimated 7Q10 river flow near Vernonia is 2.3 cfs. However, in order to not violate anti-degradation rules, the permit will only authorize discharge when river flows are 33 cfs and higher and restrict effluent flows to a maximum 0.2 MGD between May 15th and November 15th. For this reason, DEQ used 33 cfs as the critical low flow estimate and 0.2 MGD as the maximum effluent flow. DEQ considered two maximum effluent temperature scenarios: a "Worst Case" and a "Probable Case". For the "Worst Case" scenario, DEQ used the 33 cfs critical low flow

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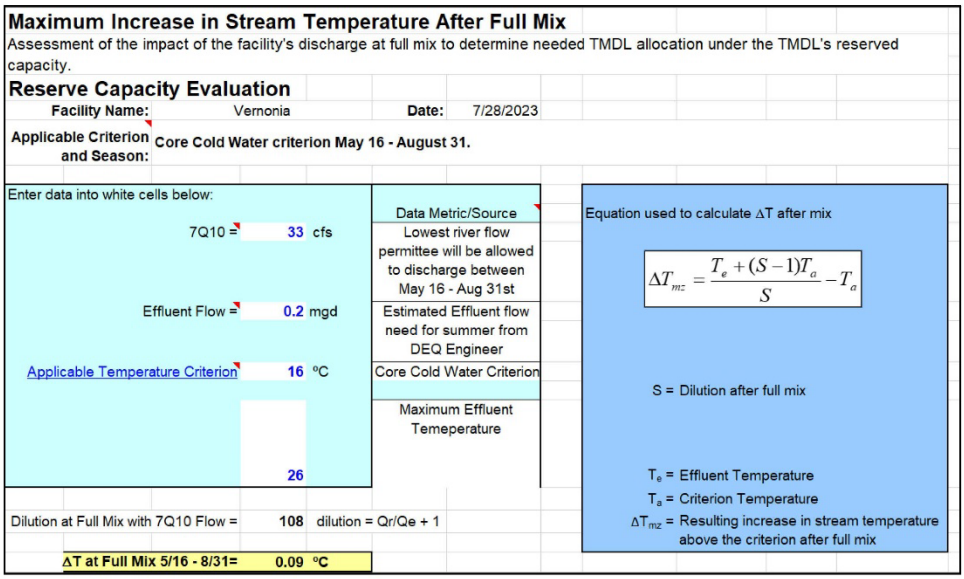
estimate, the max effluent flow of 0.2 MGD for the effluent flow, the applicable temperature criterion of 16 °C, and the maximum recorded effluent temperature of 26 °C. For the "Probable Case" scenario, DEQ used the 33 cfs critical low flow estimate, a max effluent flow of 0.2 MGD, the applicable temperature criterion of 16 °C, and the 90th percentile of the effluent temperature during the May 16th- August 31st timeframe (23.9 °C). DEQ considered the two scenarios because it is rare for the maximum discharge and the maximum effluent temperature to occur at the same time. From these analyses, DEQ determined that the effluent from Vernonia would raise the river temperature above the applicable criterion by 0.09 °C for the "Worst Case" and 0.07 °C for the "Probable Case" at full mix during critical conditions (see Figs 1 and 2).



Maximum Increase in Stream Temperature After Full Mix

Assessment of the impact of the facility's discharge at full mix to determine needed TMDL allocation under the TMDL's reserved capacity.

Reserve Capacity Evaluation

Facility Name: Vernonia **Date:** 7/28/2023

Applicable Criterion and Season: **Core Cold Water criterion May 16 - August 31.**

Enter data into white cells below:

			Data Metric/Source
7Q10 =	33	cfs	Lowest river flow permittee will be allowed to discharge between May 16 - Aug 31st
Effluent Flow =	0.2	mgd	Estimated Effluent flow need for summer from DEQ Engineer
Applicable Temperature Criterion	16	°C	Core Cold Water Criterion
	26		Maximum Effluent Temeperature

Dilution at Full Mix with 7Q10 Flow = 108 dilution = Qr/Qe + 1

ΔT at Full Mix 5/16 - 8/31= 0.09 °C

Equation used to calculate ΔT after mix

$$\Delta T_{mz} = \frac{T_e + (S-1)T_a}{S} - T_a$$

S = Dilution after full mix

T_e = Effluent Temperature

T_a = Criterion Temperature

ΔT_{mz} = Resulting increase in stream temperature above the criterion after full mix

Figure 1. "Worse Case" Temperature Analysis

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Maximum Increase in Stream Temperature After Full Mix

Assessment of the impact of the facility's discharge at full mix to determine needed TMDL allocation under the TMDL's reserved capacity.

Reserve Capacity Evaluation

Facility Name:	Vernonia	**Date:**	7/28/2023
Applicable Criterion and Season:	**Core Cold Water criterion May 16 - August 31.**		

Enter data into white cells below:			Data Metric/Source
7Q10 =	33	cfs	Lowest river flow permittee will be allowed to discharge between May 16 - Aug 31st
Effluent Flow =	0.2	mgd	Estimated Effluent flow need for summer from DEQ Engineer
Applicable Temperature Criterion	16	°C	Core Cold Water Criterion
	23.9		90th percentile Effluent Temperature
Dilution at Full Mix with 7Q10 Flow =	108		dilution = Qr/Qe + 1
ΔT at Full Mix 5/16 - 8/31=	**0.07**	**°C**	

Equation used to calculate ΔT after mix

$$\Delta T_{mz} = \frac{T_e + (S-1)T_a}{S} - T_a$$

S = Dilution after full mix

T_e = Effluent Temperature

T_a = Criterion Temperature

ΔT_{mz} = Resulting increase in stream temperature above the criterion after full mix

Figure 2. "Probable Case" Temperature Analysis

Allocation

Based on these analyses, DEQ is providing reserve capacity of 0.11 °C to the Vernonia WWTP between May 16th-Aug 31st. An allocation of 0.11 °C was selected to account for uncertainty in the effluent temperature estimate. DEQ calculated the thermal waste load allocation and allowable effluent limit for Vernonia (Table 1) using Equation 1 and Equation 2 from the 2006 TMDL modification (shown below). The values in Table 1 replaces the information in Table 12, page 12 of the 2006 TMDL modification.

The allocation is based on the maximum 0.2 MGD (0.31 cfs) effluent discharge and 33 cfs river flows. When river flows are greater than 33 cfs, the wasteload allocation and allowable effluent temperature may be recalculated using Equation 1 and Equation 2. If a future NPDES permit authorizes discharge at flows less than 33 cfs. The permit will incorporate the lower river flow when calculating the thermal limits.

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Table 1. Reserve capacity allocation for the Vernonia WWTP facility

River Flow Rate (cfs)	Facility Flow (cfs)	Period	Numeric Criterion (°C)	HUA	Allocation (kcals/day)	Allowable Effluent Temp. (°C)
33	0.31	May 16 - August 31	16	0.11	8.97E+06	27.8

$$T_{WLA} = \frac{[(Q_{PS} + Q_R) \cdot (T_R + MaxΔT)] - (Q_R \cdot T_R)}{Q_{PS}} \qquad \textbf{Equation 1}$$

$$H_{WLA} = (Q_{PS} + Q_R) \cdot (MaxΔT) \cdot C_F \qquad \textbf{Equation 2}$$

where,

T_{WLA} = Maximum allowable point source effluent temperature (deg-C).

H_{WLA} = Waste load allocation (kilocalories/day).

$MaxΔT$ = The maximum temperature increase (deg-C) above the applicable river temperature criterion using 100% of river flow.

T_R = Upstream river temperature criterion (deg-C).

Q_{PS} = The daily mean effluent discharge (cfs).
Discharge in million gallons per day (MGD) was converted to cfs by multiplying by 1.5472:

$$\frac{1{,}000{,}000\ gallons}{1\ day} \cdot \frac{0.13368 ft^3}{1\ \text{gallon}} \cdot \frac{1\ day}{86{,}400\ sec} = 1.5472$$

Q_R = The daily mean river flow rate, upstream (cfs).

C_F =

Conversion factor using flow in cubic feet per second (cfs): 2,447,592

$$\frac{1\ m^3}{35.3 ft^3} \cdot \frac{1000\ kg}{1\ m^3} \cdot \frac{86400\ sec}{1\ day} \cdot \frac{1\ kcal}{1\ kg \cdot 1°C} = 2{,}447{,}592$$

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