Fact Sheet for NPDES Permit WA0051063

The City of West Richland Publicly Owned Treatment Works

(West Richland POTW)

September 13, 2021

Purpose of this fact sheet

This fact sheet explains and documents the decisions the Department of Ecology (Ecology) made in drafting the proposed National Pollutant Discharge Elimination System (NPDES) permit for West Richland POTW.

This fact sheet complies with Section 173-220-060 of the Washington Administrative Code (WAC), which requires Ecology to prepare a draft permit and accompanying fact sheet for public evaluation before issuing an NPDES permit.

Ecology makes the draft permit and fact sheet available for public review and comment at least thirty (30) days before issuing the final permit. Copies of the fact sheet and draft permit for West Richland POTW, NPDES permit WA0051063, are available for public review and comment from July 12, 2021 until August 12, 2021. For more details on preparing and filing comments about these documents, please see **Appendix A - Public Involvement Information**.

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

After the public comment period closes, Ecology will summarize substantive comments and provide responses to them. Ecology will include the summary and responses to comments in this fact sheet as **Appendix E - Response to Comments**, and publish it when issuing the final NPDES permit. Ecology generally will not revise the rest of the fact sheet. The full document will become part of the legal history contained in the facility's permit file.

Summary

The West Richland POTW is an activated sludge wastewater treatment facility (Biolac) that discharges to the Yakima River. Ecology issued the previous permit for this facility on September 10, 2013.

The West Richland POTW is located within the City of West Richland, a 22-square mile city located in the central part of Benton County, Washington. The City is within the Tri-Cities metropolitan area that is centered around the cities of Richland, Kennewick, and Pasco. The City's population in 2010 was 11,811 (2010 Census) and currently serves an estimated population of 15,000. The plant is located within the city limits north of State Route 224 near milepost 8 and approximately half a mile south of the Yakima River.

The previous permit limits for biochemical oxygen demand (BOD) and total suspended solids (TSS) were based on engineering design criteria of 1993. The West Richland POTW has shown it can consistently meet these limits and these limits will be retained in this permit.

A chlorine residual limit was included in the previous permit to be used during emergency periods when ultra violet disinfection was not available. However, the West Richland POTW does not have any equipment installed or liquid chlorine onsite for disinfection purposes. Ecology has removed the total chlorine residual chlorine limit for this permit cycle.

Whole effluent toxicity (WET) testing was performed during the previous permit cycle and attained the performance standards. The proposed permit will require the West Richland POTW to conduct WET testing to include in the application for permit renewal.

The proposed permit contains effluent limits for 5-day biochemical oxygen demand (BOD_5), TSS, fecal coliform, ammonia, and a water quality based limit for pH. These limits are mostly unchanged from the previously issued permit.

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I. Introduction

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

The following regulations apply to domestic wastewater NPDES permits:

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

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

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

II. Background Information

Table 1 — Facility Information

Applicant:	City of West Richland 3100 Belmont Blvd West Richland, WA 99353
Facility Name and Address	West Richland POTW 320 N 46th Ave West Richland, WA 99353
Contact at Facility	Name: Dustin Miller (Sewer Operations Supervisor) Telephone #: (509) 987-4434 Randy Paulson (Utilities and Facilities Operation Manager) Telephone #: (509) 378-0995
Responsible Official	Name: Roscoe Slade III Title: Public Works Director Address: 3100 Belmont Blvd, West Richland, WA 99353 Telephone #: (509) 964-5434
Type of Treatment	Activated sludge (Biolac) extended aeration and ultraviolet disinfection
Facility Location (NAD83/WGS84 reference datum)	Latitude: 46.30568 Longitude: -119.34329
Discharge Waterbody Name and Location (NAD83/WGS84 reference datum)	Yakima River, River Mile 9.8 Latitude: 46.31130 Longitude: -119.33772

Table 2 — Permit Status

Renewal Date of Previous Permit	September 10, 2013
Application for Permit Renewal Submittal Date	October 11, 2017
Date of Ecology Acceptance of Application	November 30, 2017

Table 3 — Inspection Status

Date of Last Non-sampling Inspection Date	October 11, 2017

Figure 1 — Facility Location Map

Figure 2 — Facility Location Map with Zoom

Facility description

History

The North Wastewater Treatment Plant (WWTP) is a publicly owned treatment works (POTW) owned by the city of West Richland in Washington State. Originally built in 1962 with two facultative, evaporative lagoons and no discharge to surface water, the facility significantly modified its treatment processes in 1994. The modification involved converting a portion of the West lagoon into an activated sludge aeration basin with clarifiers, or Biolac® system. The upgrade also included a new headworks, ultraviolet (UV) disinfection improvements, effluent

pump station, and a new 18-inch effluent forcemain. The East lagoon was taken off-line at this time, though a portion of it was kept and converted into waste activated sludge (WAS) storage.

In March of 2009, the facility brought a second Biolac® aeration basin on-line. This addition doubled the facility's design capacity from 0.75 million gallons per day (MGD) to 1.5 million MGD. The West Richland POTW, by design, is classified by EPA as a major POTW.

In 2012 the City of West Richland began evaluating different long-term options for the treatment, storage, and disposal of WAS.

In March 2016, J-U-B Engineers, INC., finalized a schematic for a biosolids dewatering building and in September 2016, the facility began using screw-press dewatering and air-drying techniques to treat and remove Biosolids. Lagoon storage remains an option for emergencies only.

Collection system status

The West Richland POTW serves approximately 22 square miles within the city limits. The sewer system consists of approximately 72.6 miles of sewer pipeline. West Richland's storm water system is separate from the sewer system.

West Richland has a Sewer Main Replacement/ Relining Program to systematically re-line or replace concrete sewer mains that had outlived their useful life. As part of this program, brick sewer manholes are either replaced or lined. This program is funded through the City's monthly sewer rates.

Two lift stations (commonly known as the S. 35th Ave and Fallon Drive Lift Stations) work in concert serving a 104-acre portion of the downtown area that is predominantly north of the Columbia Irrigation District's canal and between S. 40th Ave and the Yakima River.

The S. 35th Ave Lift Station is located at the north end of S. 35th Ave, just south of the Yakima River Bridge on Van Giesen. The Fallon Drive Lift Station in located at the intersection of Fallon Drive and S. 39th Ave. The S. 35th Ave Lift Station pumps sewage through a 1,340-foot, 4" force main to the Fallon Drive Lift Station. The Fallon Drive Lift Station pumps sewage through a 650-foot, 6" force main to a sewer manhole in Fallon Drive just west of the West Richland Golf Course. A third lift station is located behind 4508 Chelan Drive and is the North Plant's influent lift station.

The sewer system also consists of three sewer main interceptors: the South Sewer Interceptor, S. 41st Ave Sewer Interceptor and the Grosscup Sewer Interceptor. The Grosscup Sewer Interceptor serves an area approximately 260 acres west of the North Plant commonly

known as the Plats of Brotherhood and Luanne Estates. The S. 41st Avenue Sewer Interceptor serves an area approximately 636 acres south of the North Plant which includes the downtown area west of S. 40th Avenue, parts of Kingview Heights and the northeast portion of the Birdhill Area. The South Sewer Interceptor varies between 8" and 24" diameter sewer pipe and serves an area approximately 2,800 acres primarily the southern portion of the city and areas west of N. 62nd Avenue. The South Sewer Interceptor was installed in 2004 with the decommissioning and abandonment of the City's South Sewer Lagoon and associated spray field.

In November 2016, an Inflow and Infiltration (I&I) analysis was conducted by the City. The purpose of the analysis was to determine if West Richland's sewer collection system is subject to excessive inflow or infiltration. According to EPA's I/I Analysis and Project Certification handbook (the Handbook, if wet weather flows (WWF) do not exceed 275 pbcd, further study of inflow correction alternatives is not necessary. The highest calculated WWF data captured in the City's analysis (October 8-9, 2016) revealed a gpcd of less than 65 gpcd indicating the City's collection system is not subject to excessive inflow, and further study was not necessary.

According to the Handbook when average daily flow (DWF) per capita is less than 120 gpcd, the amount of infiltration is considered non-excessive. The highest calculated DWF data captured in the City's analysis (September 2016) revealed a gpcd of less than 60 gpcd indicating the City's collection system is not subject to excessive infiltration, and further study was not necessary.

Industrial Process Water Treatment Facility

Wineries located in the Red Mountain American Viticulture Area discharge effluent to the West Richland POTW. A 2014 engineering report was completed by Cascade Earth Sciences, Spokane, WA, to develop a recommended approach for treating wastewater effluent from wine making facilities in the City of West Richland. The report based a 20-year design projection on five wineries existing in other geographic areas, with production rates from 84,000 to 1 million case/yr. The recommended alternative was BOD reduction with a sequencing batch reactor system for design ADF with storage and off-peak pumping of peak flows. This approach would provide a means to handle peak flows as more wineries were constructed by storage and pumping to the POTW during the diurnal low flow period.

In 2016 the city began operation of a FibrePlate^{TM} Membrane Bioreactor (MBR) process for winery effluent. The package plant is located in the collection system, northeast of the intersection of Keene Rd and W Van Giesen St. The MBR process is a wastewater treatment technology that combines suspended-growth biological treatment with immersed membrane filtration. Each membrane acts as the solid-liquid separation step in the process, in place of the secondary clarifiers and tertiary filters. The membranes also act as a barrier; rejecting solid particles while passing permeate through the membrane fibers. The result is a high quality

effluent with very low suspended solids. The final effluent is discharged into the City's sanitary sewer system which is ultimately conveyed to the West Richland POTW.

Treatment processes

West Richland's Sewer Division of the Public Works Department, currently has six employees. One operator holds a group III certification, and two other operators hold group II certifications. Two additional employees outside of the plant also hold group II operator certifications.

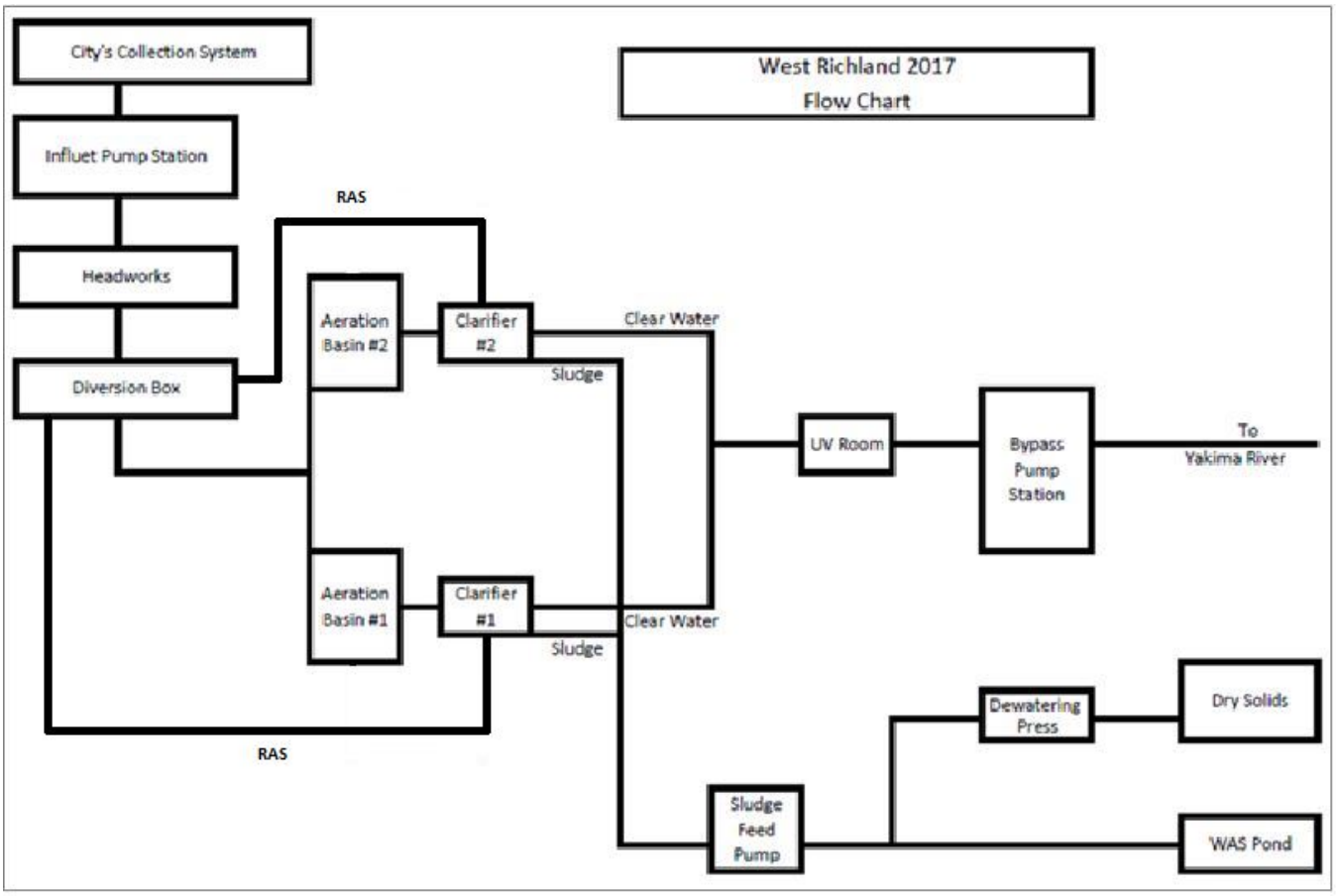
With a design flow of 1.5 MGD, the West Richland POTW is a Class III wastewater treatment plant. Based on flow data submitted in monthly DMRs, the plant currently operates at approximately 50% of its design flow capacity.

Based on information in the West Richland Wastewater Treatment Plant e-O&M Manual a general overview of the wastewater treatment train is as follows.

Raw wastewater enters the Headworks Building and passes through a perforated plate screen. Screenings are lifted out of the channel and pass through the screenings washer/compactor where they are washed to remove organic material and compacted to reduce screenings volume and weight. Screened raw wastewater flows to the flow diversion box and screenings are transported to the local landfill.

Screened wastewater enters the Biolac Treatment System after passing through a flow diversion box. The Biolac Treatment System is an activated sludge process that uses extended retention of biological solids to remove waterborne pollutants. A longer solids retention time (SRT) creates a stable environment able to withstand fluctuations in loading. The motion of fine bubble diffusers and flexible chains distribute oxygen transfer and mixing energy throughout the basin. Alternating oxic and anoxic zones within the basin allow for nitrification and denitrification of wastewater. Following the aeration basin are integral clarifiers where settable solids are collected and returned to the treatment system or wasted.

Figure 3 — Wastewater Treatment Plant Process Schematic



Solid wastes/Residual Solids

The facility is covered under General Biosolids Permit number-BA0051063 and is required to handle all Biosolids in accordance with that permit.

The facility removes solids during the treatment of the wastewater at the headworks (grit and screenings), and at the Biolac clarifiers, in addition to incidental solids (rags, scum, and other debris) removed as part of the routine maintenance of the equipment. The West Richland POTW drains grit, rags, scum, and screenings and disposes this solid waste at the local landfill.

The primary method for Biosolids removal is screw-press dewatering and air-drying. WAS is transferred from the clarifiers to the screw press via a sludge feed pump. The dewatering system is designed to include polymer injection. The City has been piloting different polymer

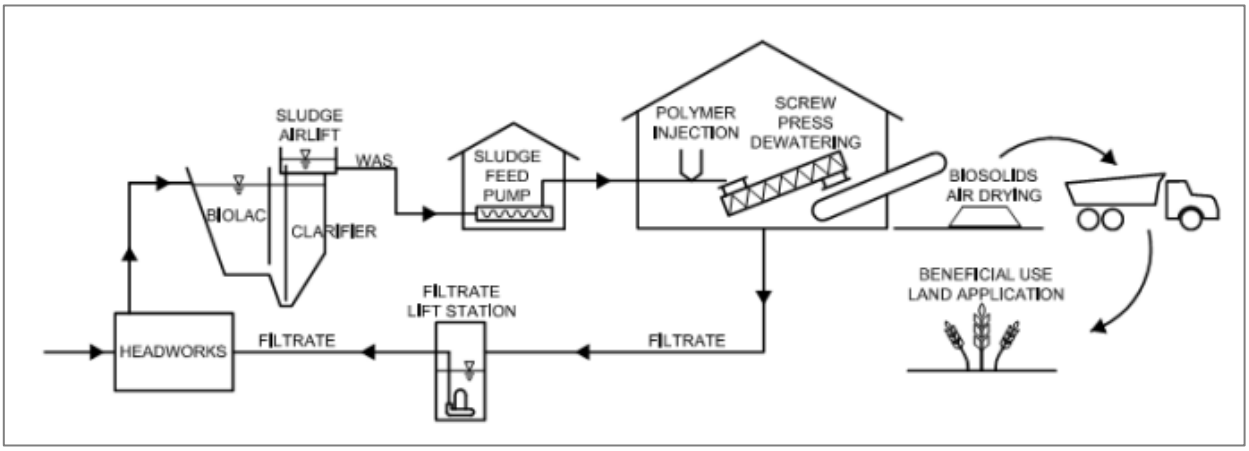
application scenarios to achieve an optimal percent of solids in the WAS. Filtrate drains from the screw press and gravity flows to the Filtrate Lift Station. It is returned to the headworks.

The City is contracted with Natural Selection Farms, a beneficial use facility, for the land application of Class B Biosolids on permitted farmland. This facility has met the solid waste requirements for screening, as required by WAC 173-308-205, by utilizing perforated plate screens with max 3/8-inch perforations.

In the event of emergency, WAS flow can be diverted to the East lagoon for storage.

Detailed information about Biosolids management procedures and equipment can be found in the City's Biosolids Management System Operation and Maintenance Manual, October 2017.

Figure 4 — Solids Handling Process Schematic Overview



Discharge outfall

An 18-inch HDPE force main originates at the North WWTP and extends approximately 1,540 feet to the river. At the point of discharge the 18-inch main branches into a manifold consisting of four 8-inch diameter effluent ports. The treated and disinfected effluent flows into the Yakima River through this manifold at an approximate average daily flow rate of 0.749 MGD. The Yakima River is split by an island into two channels immediately upriver of the outfall (see Figure 1 and 2). The south channel is estimated to contain approximately 28% of the total river flow. A sandbar splits the south channel in two sub-channels under low flow conditions. At install, the portion of the outfall within the river was encased with 6 inches of anti-flotation concrete collars spaced 5-feet on center.

An August 22, 2017, Outfall Evaluation report submitted by the facility to Ecology indicated the diffuser was free of obstructions and flowing freely.

Description of the receiving water

West Richland POTW discharges to the Yakima River approximately 9 miles upstream of the confluence with the Columbia River. Other nearby point source outfalls are Benton City which is approximately 18 miles upstream and the City of Richland which discharges to the Columbia River near the confluence with the Yakima River. There are no nearby drinking water intakes as the City of West Richland uses several groundwater wells as their water source. Significant nearby non-point sources of pollutants include sediment loading from irrigation return flows and livestock grazing. Section IIIE of this fact sheet describes any receiving water impairments.

The ambient background data used for this permit includes the following flow related data from the USGS Station 12510500, Yakima River at Kiona. WA and Ecology's Environmental Assessment Program Ambient Monitoring Station 37090 at Kiona, WA. These stations are located approximately 20 miles upstream of the West Richland POTW outfall.

Table 4 — Ambient Background Data

Parameter	Value Used
The seven-day-average low river flow with a recurrence interval of ten years (7Q10)	28% of 7Q10 (649.3 cfs) 181.8 cfs
River depth at the 7Q10 period	4.27 feet
River velocity	0.80 ft/sec
Manning roughness coefficient	0.007
Channel width	53.2 feet
Temperature 7-DADMax (90th percentile during critical season)	28.4° C
pH 90th percentile during critical season	8.87 standard units
Dissolved Oxygen (10th percentile)	9.1 mg/L
Total Ammonia-N (90th percentile)	0.024 mg/L
Fecal Coliform (10th percentile)	4.6 cfu/100 mL dry weather
Lead (90th percentile)	0.1 µg/L
Copper (90th percentile)	1.4 µg/L
Mercury (90th percentile)	0.002 µg/L
Nickel (90th percentile)	1.36 µg/L

Parameter	Value Used
Chromium (90th percentile)	0.87 µg/L
Silver (90th percentile)	0.1 µg/L

Wastewater influent characterization

West Richland POTW reported the concentration of influent pollutants in discharge monitoring reports (DMR). DMR data from January 1, 2017 through December 31, 2019, was analyzed and the influent wastewater is characterized as follows:

Table 5 — Wastewater Influent Characterization

Parameter	Units	# of Samples	Average Value	Maximum Value
Flow	MGD	1,095	0.764	0.919
Biochemical Oxygen Demand (BOD_5)	mg/L	156	229.8	400.7
Biochemical Oxygen Demand (BOD_5)	lbs/day	156	1410.6	2369.4
Total Suspended Solids (TSS)	mg/L	156	206.6	356.0
Total Suspended Solids (TSS)	lbs/day	156	1276.6	2345.5

Wastewater effluent characterization

West Richland POTW reported the concentration of pollutants in the discharge monitoring reports. The tabulated data represents the quality of the wastewater effluent discharged from January 1, 2017 to December 31, 2019. The wastewater effluent is characterized as follows:

Table 6 — Wastewater Effluent Characterization

Parameter	Units	# of Samples	Average Value	Maximum Value
Flow	MGD	1,095	0.754	0.933
Biochemical Oxygen Demand (BOD_5)	mg/L	156	3.6	7.7

Parameter	Units	# of Samples	Average Value	Maximum Value
Biochemical Oxygen Demand (BOD_5)	lbs/day	156	22.0	49.8
Total Suspended Solids (TSS)	mg/L	156	5.5	12.0
Total Suspended Solids (TSS)	lbs/day	156	34.2	74.7
Ammonia (NH_3)	mg/L	12	0.13	0.34
Ammonia (NH_3)	lbs/day	12	0.80	1.93
Dissolved Oxygen (DO)	mg/L	753	5.1	11.0
Temperature	°C	752	16.5	26.8

Parameter	Units	Average Weekly	Average Monthly
Biochemical Oxygen Demand (BOD_5) **95th percentile**	mg/L	7.4	5.6
Biochemical Oxygen Demand (BOD_5) **95th percentile**	lbs/day	44.1	34.2
Total Suspended Solids (TSS) **95th percentile**	mg/L	11.3	8.6
Total Suspended Solids (TSS) **95th percentile**	lbs/day	69.3	54.3

Parameter	Units	# of Samples	Maximum Monthly Geometric Mean	Maximum Weekly Geometric Mean
Fecal Coliforms	cfu/100mL	36	36.5	98.0

Parameter	Units	# of Samples	Minimum Value	Maximum Value
pH	standard units	752	6.17	8.86

Summary of compliance with previous permit issued

The previous permit placed effluent limits on BOD, TSS, pH, total residual chlorine, ammonia, dissolved oxygen and fecal coliform bacteria.

The West Richland POTW has complied with the effluent limits and permit conditions throughout the duration of the permit issued on September 10, 2013. Ecology assessed compliance based on its review of the facility's information in the Ecology Permitting and Reporting Information System (PARIS), discharge monitoring reports (DMRs) and on inspections.

The following table summarizes the violations that occurred during the permit term.

Table 7 — Violations

Date	Parameter	Violation	Units	Value	Limit Min/Max
4/1/2014	Ammonia	Numeric Effluent Violation	mg/L	1.77	1
2/1/2020	BOD_5	Numeric Effluent Violation	lbs/day	137.26	125
2/1/2020	BOD_5	Numeric Effluent Violation	mg/L	11.8	10
2/1/2020	BOD_5	Numeric Effluent Violation	mg/L	22.7	10
2/1/2020	Fecal Coliform	Numeric Effluent Violation	cfu/100mL	540	200
2/13/2020	BOD_5	Analysis Not Conducted	lbs/day	-	-
2/13/2020	BOD_5	Analysis Not Conducted	mg/L	-	-
2/13/2020	BOD_5	Analysis Not Conducted	mg/L	-	-
2/13/2020	BOD_5	Analysis Not Conducted	lbs/day	-	-
2/13/2020	BOD_5	Analysis Not Conducted	% Removal	-	-

Date	Parameter	Violation	Units	Value	Limit Min/Max
4/1/2020	TSS	Numeric Effluent Violation	mg/L	36	15
4/1/2020	BOD_5	Numeric Effluent Violation	mg/L	18	10
4/1/2020	TSS	Numeric Effluent Violation	lbs/day	239.29	187.7
4/1/2020	BOD_5	Numeric Effluent Violation	mg/L	12.4	10
4/1/2020	TSS	Numeric Effluent Violation	mg/L	19.8	15

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

Table 8 — Permit Submittals

Permit Section	Submittal	Submittal Date
S2.A.2	Critical Season Temperature Data Logger Report	1/12/15, 10/6/16, 1/18/17, 12/18/18, 10/10/19
S2.A.4	Priority Pollutant Scans	2/12/16, 1/12/17
S4.E.4	Infiltration and Inflow Evaluation	11/17/16
S4.F	Wasteload Assessment	11/21/16
S5.H	Collection System Exfiltration Prevention Plan	11/1/16
S6.E	Industrial User Survey Submittal	7/11/14
S8	Spill Control Plan	10/31/14
S9	Application for Permit Renewal	10/11/17
S10.A2	Acute Toxicity Effluent Test Results	7/9/15, 8/28/15, 12/1/15, 11/21/16
S11.A2	Chronic Toxicity Effluent Test Results	7/9/15, 8/28/15, 12/1/15, 11/21/16
S13	Outfall Inspection	11/1/17, 6/5/18

State environmental policy act (SEPA) compliance

State law exempts the issuance, reissuance or modification of any wastewater discharge permit from the SEPA process as long as the permit contains conditions that are no less stringent than federal and state rules and regulations (RCW 43.21C.0383). The exemption applies only to existing discharges, not to new discharges.

III. Proposed Permit Limits

Federal and state regulations require that effluent limits in an NPDES permit must be either technology- or water quality-based.

- Technology-based limits are based upon the treatment methods available to treat specific pollutants. Technology-based limits are set by the EPA and published as a regulation, or Ecology develops the limit on a case-by-case basis (40 CFR 125.3, and chapter 173-220 WAC).
- Water quality-based limits are calculated so that the effluent will comply with the Surface Water Quality Standards (chapter 173-201A WAC), Ground Water Standards (chapter 173-200 WAC), Sediment Quality Standards (chapter 173-204 WAC), or the Federal Water Quality Criteria Applicable to Washington (40 CFR 131.45)
- Ecology must apply the most stringent of these limits to each parameter of concern. These limits are described below.

The limits in this permit reflect information received in the application and from supporting reports (engineering, hydrogeology, etc.). Ecology evaluated the permit application and determined the limits needed to comply with the rules adopted by the state of Washington. Ecology does not develop effluent limits for all reported pollutants. Some pollutants are not treatable at the concentrations reported, are not controllable at the source, are not listed in regulation, and do not have a reasonable potential to cause a water quality violation.

Ecology does not usually develop limits for pollutants not reported in the permit application but may be present in the discharge. The permit does not authorize discharge of the non-reported pollutants. During the five-year permit term, the facility's effluent discharge conditions may change from those conditions reported in the permit application. The facility must notify Ecology if significant changes occur in any constituent [40 CFR 122.42(a)]. Until Ecology modifies the permit to reflect additional discharge of pollutants, a permitted facility could be violating its permit.

Design criteria

Under WAC 173-220-150 (1)(g), flows and waste loadings must not exceed approved design criteria. Ecology approved design criteria for this facility's treatment plant in the City of West Richland WWTP Expansion Facilities Plan dated September 2005 and prepared by HDR Engineering, Inc. The table below includes design criteria from the referenced report.

Table 9 — Design Criteria for West Richland POTW

Parameter	Design Quantity
Maximum Month Design Flow (MMDF)	1.50 MGD
BOD_5 Loading for Maximum Month	3,128 lb/day
TSS Loading for Maximum Month	3,128 lb/day
Total Kjeldahl Nitrogen	438 lb/day

Technology-based effluent limits

Federal and state regulations define technology-based effluent limits for domestic wastewater treatment plants. These effluent limits are given in 40 CFR Part 133 (federal) and in chapter 173-221 WAC (state). These regulations are performance standards that constitute all known, available, and reasonable methods of prevention, control, and treatment (AKART) for domestic wastewater.

The table below identifies technology-based limits for pH, fecal coliform, BOD_5, and TSS, as listed in chapter 173-221 WAC. Section III.F of this fact sheet describes the potential for water quality-based limits.

The limits in the current permit were more stringent than the conventional technology-based limits. The more stringent limits were based on engineering design and the West Richland POTW had previously shown it can meet the design criteria as well as the technology-based limits that are not covered in the design, i.e., pH, and fecal coliform. Table 6 of this fact sheet shows the performance of the West Richland POTW continues to consistently meet the previous issued limits. The following table below constitutes the performance-based technology limits of the proposed permit.

Table 10 — Technology-based Limits

Parameter	Average Monthly Limit	Average Weekly Limit
BOD_5 (concentration)	10 mg/L	10 mg/L

BOD_5 (concentration): In addition, the BOD_5 effluent concentration must not exceed fifteen percent (15%) of the average influent concentration.

Parameter	Average Monthly Limit	Average Weekly Limit
TSS (concentration)	15 mg/L	15 mg/L

TSS (concentration): In addition, the TSS effluent concentration must not exceed fifteen percent (15%) of the average influent concentration.

Parameter	Monthly Geometric Mean Limit	Weekly Geometric Mean Limit
Fecal Coliform Bacteria	100 organisms/100 mL	200 organisms/100 mL

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

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

Ave Monthly BOD	10 x 1.5 x 8.34 = 125
Ave Weekly BOD	10 x 1.5 x 8.34 = 125
Ave Monthly TSS	15 x 1.5 x 8.34 = 187.7
Ave Weekly TSS	15 x 1.5 x 8.34 = 187.7

Table 11 — Technology-based Mass Limits

Parameter	Concentration Limit (mg/L)	Mass Limit (lbs/day)
BOD_5 Monthly Average	10	125
BOD_5 Weekly Average	10	125
TSS Monthly Average	15	187.7
TSS Weekly Average	15	187.7

Surface water quality-based effluent limits

The Washington State surface water quality standards (chapter 173-201A WAC) are designed to protect existing water quality and preserve the beneficial uses of Washington's surface waters. Waste discharge permits must include conditions that ensure the discharge will meet the surface water quality standards (WAC 173-201A-510). Water quality-based effluent limits may be based on an individual waste load allocation or on a waste load allocation developed during a basin wide total maximum daily load study (TMDL).

Numerical criteria for the protection of aquatic life and recreation

Numerical water quality criteria are listed in the water quality standards for surface waters (chapter 173-201A WAC). They specify the maximum levels of pollutants allowed in receiving water to protect aquatic life and recreation in and on the water. Ecology uses numerical criteria along with chemical and physical data for the wastewater and receiving water to derive the effluent limits in the discharge permit. When surface water quality-based limits are more stringent or potentially more stringent than technology-based limits, the discharge must meet the water quality-based limits.

Numerical criteria for the protection of human health

In 1992, U.S. EPA published 91 numeric water quality criteria for the protection of human health that are applicable to dischargers in Washington State in its National Toxics Rule 40 CFR 131.36 (EPA, 1992). Ecology submitted a standards revision for 192 new human health criteria for 97 pollutants to EPA on August 1, 2016. In accordance with requirements of CWA section 303(c)(2)(B), EPA finalized 144 new and revised Washington specific human health criteria for priority pollutants, to apply to waters under Washington's jurisdiction. EPA approved 45 human health criteria as submitted by Washington. The EPA took no action on Ecology submitted criteria for arsenic, dioxin, and thallium. The existing criteria for these three pollutants remain in effect and were included in 40 CFR 131.45, Revision of certain Federal Water quality criteria applicable to Washington.

These newly adopted criteria, located in WAC 173-201A-240, are designed to protect humans from exposure to pollutants linked to cancer and other diseases, based on consuming fish and shellfish and drinking contaminated surface waters. The water quality standards also include radionuclide criteria to protect humans from the effects of radioactive substances.

Narrative criteria

Narrative water quality criteria (e.g., WAC 173-201A-240(1); 2016) limit the toxic, radioactive, or other deleterious material concentrations that the facility may discharge to levels below those which have the potential to:

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

Narrative criteria protect the specific designated uses of all fresh waters (WAC 173-201A-200, 2016) and of all marine waters (WAC 173-201A-210, 2016) in the state of Washington.

Antidegradation

Description — The purpose of Washington's Antidegradation Policy (WAC 173-201A-300-330; 2016) is to:

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

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

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

- The facility is planning a new or expanded action.
- Ecology regulates or authorizes the action.

- The action has the potential to cause measurable degradation to existing water quality at the edge of a chronic mixing zone.

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

- Dischargers must maintain and protect existing and designated uses. Ecology must not allow any degradation that will interfere with, or become injurious to, existing or designated uses, except as provided for in chapter 173-201A WAC.
- For waters that do not meet assigned criteria, or protect existing or designated uses, Ecology will take appropriate and definitive steps to bring the water quality back into compliance with the water quality standards.
- Whenever the natural conditions of a water body are of a lower quality than the assigned criteria, the natural conditions constitute the water quality criteria. Where water quality criteria are not met because of natural conditions, human actions are not allowed to further lower the water quality, except where explicitly allowed in chapter 173-201A WAC.

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

Mixing zones

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

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

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

Ecology uses modeling to estimate the amount of mixing within the mixing zone. Through modeling, Ecology determines the potential for violating the water quality standards at the edge of the mixing zone and derives any necessary effluent limits. Steady-state models are the

most frequently used tools for conducting mixing zone analyses. Ecology chooses values for each effluent and for receiving water variables that correspond to the time period when the most critical condition is likely to occur (see Ecology's *Permit Writer's Manual*). Each critical condition parameter, by itself, has a low probability of occurrence and the resulting dilution factor is conservative. The term "reasonable worst-case" applies to these values.

The mixing zone analysis produces a numerical value called a dilution factor (DF). A dilution factor represents the amount of mixing of effluent and receiving water that occurs at the boundary of the mixing zone. For example, a dilution factor of 4 means the effluent is 25% and the receiving water is 75% of the total volume of water at the boundary of the mixing zone. Ecology uses dilution factors with the water quality criteria to calculate reasonable potentials and effluent limits. Water quality standards include both aquatic life-based criteria and human health-based criteria. The former are applied at both the acute and chronic mixing zone boundaries; the latter are applied only at the chronic boundary. The concentration of pollutants at the boundaries of any of these mixing zones may not exceed the numerical criteria for that zone.

Most aquatic life *acute* criteria are based on the assumption that organisms are not exposed to that concentration for more than one hour and more often than one exposure in three years. Most aquatic life *chronic* criteria are based on the assumption that organisms are not exposed to that concentration for more than four consecutive days and more often than once in three years.

The two types of human health-based water quality criteria distinguish between those pollutants linked to non-cancer effects (non-carcinogenic) and those linked to cancer effects (carcinogenic). The human health-based water quality criteria incorporate several exposure and risk assumptions. These assumptions include:

- A 70-year lifetime of daily exposures.
- An ingestion rate for fish or shellfish measured in kg/day.
- An ingestion rate of two and four tenths (2.4) liters/day for drinking water (increased from two liters/day in the 2016 Water Quality Standards update).
- A one-in-one-million cancer risk for carcinogenic chemicals.

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

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

   The proposed permit specifies the size and location of the allowed mixing zone (as specified below).

2. **The facility must fully apply "all known, available, and reasonable methods of prevention, control and treatment" (AKART) to its discharge.**

   Ecology has determined that the treatment provided at West Richland POTW meets the requirements of AKART (see "Technology-based Limits").

3. **Ecology must consider critical discharge conditions.**

   Surface water quality-based limits are derived for the water body's critical condition (the receiving water and waste discharge condition with the highest potential for adverse impact on the aquatic biota, human health, and existing or designated waterbody uses). The critical discharge condition is often pollutant-specific or waterbody-specific.

   Critical discharge conditions are those conditions that result in reduced dilution or increased effect of the pollutant. Factors affecting dilution include the depth of water, the density stratification in the water column, the currents, and the rate of discharge. Density stratification is determined by the salinity and temperature of the receiving water. Temperatures are warmer in the surface waters in summer. Therefore, density stratification is generally greatest during the summer months. Density stratification affects how far up in the water column a freshwater plume may rise. The rate of mixing is greatest when an effluent is rising. The effluent stops rising when the mixed effluent is the same density as the surrounding water. After the effluent stops rising, the rate of mixing is much more gradual. Water depth can affect dilution when a plume might rise to the surface when there is little or no stratification. Ecology's *Permit Writer's Manual* describes additional guidance on criteria/design conditions for determining dilution factors. The manual can be obtained from Ecology's website at: https://fortress.wa.gov/ecy/publications/documents/92109.pdf

Table 12 — Critical Conditions Used to Model the Discharge

Critical Condition	Value
The seven-day-average low river flow with a recurrence interval of ten years (7Q10)	28% of 7Q10 (649.3 cfs) 181.8 cfs
River depth at the 7Q10 period	4.27 feet
River velocity	0.80 ft/sec
Manning roughness coefficient	0.03
Channel width	53.2 feet
Maximum average monthly effluent flow for chronic and human health non-carcinogen	0.807 MGD

Critical Condition	Value
Maximum daily flow for acute mixing zone	0.906 MGD
7-DADMax Effluent temperature	25.7 °C

Ecology obtained ambient data from Kiona USGS gage 12510500 Yakima River at Kiona and from data submitted by the West Richland POTW during the previous permit term.

4. **Supporting information must clearly indicate the mixing zone would not:**

   - Have a reasonable potential to cause the loss of sensitive or important habitat.
   - Substantially interfere with the existing or characteristic uses.
   - Result in damage to the ecosystem.
   - Adversely affect public health.

   Ecology established Washington State water quality criteria for toxic chemicals using EPA criteria. EPA developed the criteria using toxicity tests with numerous organisms and set the criteria to generally protect the species tested and to fully protect all commercially and recreationally important species. Interim

   EPA sets acute criteria for toxic chemicals assuming organisms are exposed to the pollutant at the criteria concentration for one hour. They set chronic standards assuming organisms are exposed to the pollutant at the criteria concentration for four days. Dilution modeling under critical conditions generally shows that both acute and chronic criteria concentrations are reached within minutes of discharge.

   The discharge plume does not impact drifting and non-strong swimming organisms because they cannot stay in the plume close to the outfall long enough to be affected. Strong swimming fish could maintain a position within the plume, but they can also avoid the discharge by swimming away. Mixing zones generally do not affect benthic organisms (bottom dwellers) because the buoyant plume rises in the water column. Ecology has additionally determined that the effluent will not exceed 33 degrees C for more than two seconds after discharge; and that the temperature of the water will not create lethal conditions or blockages to fish migration.

   Ecology evaluates the cumulative toxicity of an effluent by testing the discharge with whole effluent toxicity (WET) testing.

   Because this is a domestic wastewater discharge, the effluent contains fecal coliform bacteria. Ecology developed the water quality criteria for fecal coliforms (discussed below) to assure that people swimming (primary contact recreation) in water meeting the criteria would not develop gastro enteric illnesses. Ecology has authorized a mixing zone for this discharge; however, the discharge is subject to a performance-based effluent limit of 100 colony forming units/100mL. This means the effluent meets the

water quality criteria at the point of discharge and doesn't need dilution to meet the water quality criteria.

Starting on January 1, 2021, the recreational water quality criteria for bacteria will change to *E.coli* for freshwater. No change to the indicator will occur during this permit cycle as a site-specific correlation between fecal coliform and *E.coli* needs developing.

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

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

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

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

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

   Ecology minimizes the size of mixing zones by requiring dischargers to install diffusers when they are appropriate the discharge and the specific receiving waterbody. When a diffuser is installed, the discharge is more completely mixed with the receiving water in a shorter time. Ecology also minimizes the size of the mixing zone (in the form of the dilution factor) using design criteria with a low probability of occurrence. For example, Ecology uses the expected 95th percentile pollutant concentration, the 90th percentile background concentration, the centerline dilution factor, and the lowest flow occurring once in every ten years to perform the reasonable potential analysis.

   Because of the above reasons, Ecology has effectively minimized the size of the mixing zone authorized in the proposed permit.

7. **Maximum size of mixing zone.**

   The authorized mixing zone does not exceed the maximum size restriction.

8. **Acute mixing zone.**

   - The discharge/receiving water mixture must comply with acute criteria as near to the point of discharge as practicably attainable.

   Ecology determined the acute criteria will be met at 10% of the distance of the chronic mixing zone at the ten year low flow.

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

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

   - Comply with size restrictions.

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

9. **Overlap of mixing zones.**

   This mixing zone does not overlap another mixing zone.

Designated uses and surface water quality criteria

Applicable designated uses and surface water quality criteria are defined in chapter 173-201A WAC. In addition, the U.S. EPA set human health criteria for toxic pollutants (EPA 1992). The tables included below summarize the criteria applicable to the receiving water's designated uses.

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

Freshwater Aquatic Life Uses and Associated Criteria

Table 13 — Salmonid Spawning, Rearing, and Migration

Criteria	Limit
Temperature Criteria – Highest 7-DAD MAX	17.5°C (63.5°F)
Dissolved Oxygen Criteria – Lowest 1-Day Minimum	8.0 mg/L
Turbidity Criteria	• 5 NTU over background when the background is 50 NTU or less; or • A 10 percent increase in turbidity when the background turbidity is more than 50 NTU.
Total Dissolved Gas Criteria	Total dissolved gas must not exceed 110 percent of saturation at any point of sample collection.
pH Criteria	The pH must measure within the range of 6.5 to 8.5 with a human-caused variation within the above range of less than 0.5 units.

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

Table 14 — Recreational Uses and Associated Criteria

Recreational Use	Criteria
Primary Contact Recreation (expires 12/31/2020)	Fecal coliform organism levels must not exceed a geometric mean value of 100 colonies /100 mL, with not more than 10 percent of all samples (or any single sample when less than ten sample points exist) obtained for calculating the geometric mean value exceeding 200 colonies /100 mL.
Primary Contact Recreation (effective 1/1/2021)	*E.coli* organism levels must not exceed a geometric mean value of 100 CFU or MPN per 100 mL, with not more than 10 percent of all samples (or any single sample when less than ten sample points exist) obtained within the averaging period exceeding 320 CFU or MPN per 100 mL.

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

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

Ecology must consider the narrative criteria described in WAC 173-201A-160 when it determines permit limits and conditions. Narrative water quality criteria limit the toxic, radioactive, or other deleterious material concentrations that the facility may discharge which have the potential to adversely affect designated uses, cause acute or chronic toxicity to biota, impair aesthetic values, or adversely affect human health.

Ecology considers narrative criteria when it evaluates the characteristics of the wastewater and when it implements all known, available, and reasonable methods of treatment and prevention (AKART) as described above in the technology-based limits section. When Ecology determines if a facility is meeting AKART it considers the pollutants in the wastewater and the adequacy of the treatment to prevent the violation of narrative criteria.

In addition, Ecology considers the toxicity of the wastewater discharge by requiring whole effluent toxicity (WET) testing when there is a reasonable potential for the discharge to contain toxics. Ecology's analysis of the need for WET testing for this discharge is described later in the fact sheet.

Water quality impairments

The Yakima River is listed on the current 303(d) and is impaired for several conventional parameters that include: dissolved oxygen, fecal coliform, pH, temperature, total phosphorus, turbidity, pesticides, polychlorinated biphenyls (PCBs).

The listed toxic parameters include: 4-4 Dichlorodiphenyldichloroethane (4-4'-DDD), 4-4 Dichlorodiphenyldichloroethene (4-4'DDE), ammonia N, arsenic, chloropyrifos, instream flow,Dichlorodiphenyltrichloroethane (DDT), PCBs, and Dieldrin. Most of these parameters are the result of agricultural practices and unlikely to have come from or be in the West Richland POTW's discharge.

A total maximum daily load (TMDL) toxics study is underway to address DDT and associated organic pesticide residues in the Lower Yakima River. The study will analyze municipal effluent within the reaches of the lower Yakima River. In the unlikely event pesticide waste load allocations are established for the West Richland POTW, limits would be included in the next permit when reissued or through a permit modification. A TMDL has been completed for the Yakima River to deal with TSS. The TMDL showed that the major load of sediment is from agricultural runoff and not from municipal treatment plant discharges.

Ecology continues to study the Yakima River for temperature. While there is no temperature TMDL at this time, temperature limits may be established for the West Richland POTW in the future. This permit does not contain an effluent limit for temperature and will require the POTW to continue monitoring the effluent temperature and report critical season temperature data to Ecology.

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

Pollutants in an effluent may affect the aquatic environment near the point of discharge (near-field) or at a considerable distance from the point of discharge (far-field). Toxic pollutants, for example, are near-field pollutants; their adverse effects diminish rapidly with mixing in the receiving water. Conversely, a pollutant such as biochemical oxygen demand (BOD_5) is a far-field pollutant whose adverse effect occurs away from the discharge even after dilution has occurred. Thus, the method of calculating surface water quality-based effluent limits varies with the point at which the pollutant has its maximum effect.

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

At the point of discharge, the 18-inch effluent pipe branches into a diffuser consisting of four 8-inch diameter effluent ports. The diffuser is positioned near the surface channel bottom.

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

The horizontal distance of the chronic mixing zone is 304.3 feet. The mixing zone extends from the bottom to the top of the water column.

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

The horizontal distance of the acute mixing zone is 30.4 feet. The mixing zone extends from the bottom to the top of the water column. The dilution factor is based on this distance.

Ecology determined the dilution factors that occur within these zones at the critical condition using CORMIX 11.0. The dilution factors are listed below.

Table 15 — Dilution Factors (DF)

Criteria	Acute	Chronic
Aquatic Life	3.6	35.2

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

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

With technology-based limits, this discharge results in a small amount of biochemical oxygen demand (BOD_5) relative to the large amount of dilution in the receiving water at critical conditions. Technology-based limits will ensure that dissolved oxygen criteria are met in the receiving water.

A mass balance calculation was conducted in the previous fact sheet using the newer updated design criteria flow of 1.5 MGD, 25% of the 7Q10, and resulted in retaining the design-based effluent limit for BOD5 of 10mg/L. Ecology will retain the previous permitted design-based effluent limit of 10mg/L in the proposed permit.

pH — In the previous permit cycle, Ecology retained the technology-based limits. Data used at the time was taken from an Ecology monitoring station 37090 at Kiona, WA. The station is located approximately 20 miles upstream of the West Richland POTW including upstream from the Buena POTW. The Yakima River is 303d listed for pH above and below the West Richland POTW. The West Richland POTW made recent operational changes by using the Wave-Ox feature of their Biolac system. The optimization has resulted in pH discharges near neutral. The City has taken the position that they can meet the water quality criteria for pH of 6.5 – 8.5 consistently.

The proposed permit includes performance based (technology-based) limits for pH.

Bacteria —Ecology modeled the number of fecal coliform by simple mixing analysis using the technology-based limit of 200 organisms per 100 mL and a dilution factor of 35.2. That analysis showed no violation of the fecal coliform water quality criterion under critical conditions. The previous permit included performance-based (technology-based) limits for fecal coliforms. The Richland POTW continues to demonstrate it met the water quality criterion of 100 colonies/100ml and average weekly criterion of 200 colonies/100ml.

The changes to the State's surface water quality criteria for bacteria did not affect the technology based limits for fecal coliform in WAC 173-221. Without a site specific correlation between fecal coliform and *E.coli*, Ecology cannot determine whether the discharge will violate the water quality criterion for *E.coli*. Given that the characteristics of the receiving water and the discharge have not changed substantially since the analysis conducted in the previous permit cycle, the proposed permit will maintain the technology-based effluent limit for fecal coliform. In addition, the permittee will be required to monitor for both fecal coliform and *E.coli* for development of the site specific correlation. Ecology will then use this data to assess the reasonable potential to exceed the applicable water quality criterion in the next iteration of this permit.

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

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

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

Ammonia's toxicity depends on that portion which is available in the unionized form. The amount of unionized ammonia depends on the temperature and pH in the receiving freshwater. To evaluate ammonia toxicity, Ecology used the available receiving water information from Ecology's Environmental Assessment Program Ambient Monitoring Station 37090 at Kiona, WA. and Ecology spreadsheet tools.

Ecology determined that ammonia, lead, copper, mercury, nickel, chromium, and silver pose no reasonable potential to exceed the water quality criteria at the critical condition using procedures given in EPA, 1991 (**Appendix D**) and as described above. Ecology's determination assumes that this facility meets the other effluent limits of this permit.

The previous permit included a

Temperature — The state temperature standards [WAC 173-201A, WAC 173-201A-200, WAC 173-201A-600, and WAC 173-201A-602] include multiple elements:

- Annual summer maximum threshold criteria (June 15 to September 15)
- Supplemental spawning and rearing season criteria (September 15 to June 15)
- Incremental warming restrictions
- Protections against acute effects

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

- Annual summer maximum and supplementary spawning/rearing criteria

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

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

  The threshold criteria apply at the edge of the chronic mixing zone. Criteria for most fresh waters are expressed as the highest 7-Day average of daily maximum temperature (7-DADMax).

  The 7-DADMax temperature is the arithmetic average of seven consecutive measures of daily maximum temperatures. Criteria for marine waters and some fresh waters are expressed as the highest 1-Day annual maximum temperature (1-DMax).

- Incremental warming criteria

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

  At locations and times when background temperatures are cooler than the assigned threshold criterion, point sources are permitted to warm the water by only a defined

increment. These increments are permitted only to the extent doing so does not cause temperatures to exceed either the annual maximum or supplemental spawning criteria.

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

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

- Protections for temperature acute effects

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

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

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

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

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

Human health

Washington's water quality standards include numeric human health-based criteria for 97 priority pollutants that Ecology must consider when writing NPDES permits.

Ecology evaluated the discharge's potential to violate the water quality standards as required by 40 CFR 122.44(d) by following the procedures published in the *Technical Support*

Document for Water Quality-Based Toxics Control (EPA/505/2-90-001) and Ecology's *Permit Writer's Manual* to make a reasonable potential determination.

Ecology determined the Richland POTW discharge does not contain chemicals of concern based on existing effluent data or knowledge of discharges to their system. Ecology will reevaluate this discharge for impacts to human health at the next permit reissuance.

Sediment quality

The aquatic sediment standards (chapter 173-204 WAC) protect aquatic biota and human health. Under these standards Ecology may require a facility to evaluate the potential for its discharge to cause a violation of sediment standards (WAC 173-204-400). You can obtain additional information about sediments at the Aquatic Lands Cleanup Unit website: https://ecology.wa.gov/Spills-Cleanup/Contamination-cleanup/Sediment-cleanups

Through a review of the discharger characteristics and of the effluent characteristics, Ecology determined that this discharge has no reasonable potential to violate the sediment management standards.

Whole effluent toxicity

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

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

Laboratories accredited by Ecology for WET testing know how to use the proper WET testing protocols, fulfill the data requirements, and submit results in the correct reporting format. Accredited laboratory staff know how to calculate an NOEC, LC50, EC50, IC25, etc. Ecology gives all accredited labs the most recent version of Ecology Publication No. WQ-R-95-80, *Laboratory Guidance and Whole Effluent Toxicity Test Review Criteria* https://fortress.wa.gov/ecy/publications/documents/9580.pdf which is referenced in the permit.

Ecology recommends that each regulated facility send a copy of the acute or chronic toxicity sections(s) of its NPDES permit to the laboratory.

During the previous permit term, the facility conducted effluent characterization for acute and chronic toxicity that resulted in no toxicity The proposed permit will require a series of WET testing studies to fulfill permit renewal application requirements.

Groundwater quality limits

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

The West Richland POTW does not discharge wastewater to the ground. The permittee is required to assess the impact (if any) of leakage from the sludge storage lagoon. No permit limits are required to protect groundwater.

Comparison of effluent limits with the previous permit issued September 10, 2013

Table 16 — Comparison of Previous and Proposed Effluent Limits

		Previous Effluent Limits: Outfall # 001		Proposed Effluent Limits: Outfall # 001	
Parameter	**Basis of Limit**	**Average Monthly**	**Average Weekly**	**Average Monthly**	**Average Weekly**
Biochemical Oxygen Demand (5-day)	Technology	10 mg/L 125 lbs/day	10 mg/L 125 lbs/day	10 mg/L 125 lbs/day	10 mg/L 125 lbs/day
Total Suspended Solids	Technology	15 mg/L 187.5 lbs/day	15 mg/L 187.5 lbs/day	15 mg/L 187.5 lbs/day	15 mg/L 187.5 lbs/day

Parameter	Basis of Limit	Limit (Min/Max)	Limit (Min/Max)
pH	Technology	6 – 9 standard units	6.5 – 8.5 standard units

Parameter	Basis of Limit	Monthly Geometric Mean Limit	Weekly Geometric Mean Limit	Monthly Geometric Mean Limit	Weekly Geometric Mean Limit
Fecal Coliform Bacteria	Technology	100 cfu/100mL	200 cfu/100mL	100 cfu/100mL	200 cfu/100mL

Parameter	Basis of Limit	Daily Maximum	Daily Maximum
Total Ammonia (as NH_3-N)	WQ-Based	1 mg/L and 12.6 lbs/day	1 mg/L and 12.6 lbs/day

Parameter	Basis of Limit	Daily Minimum	Daily Minimum
Dissolved Oxygen	WQ-Based	1 mg/L and 12.6 lbs/day	1 mg/L and 12.6 lbs/day

Monitoring Requirements

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

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

Wastewater monitoring

The monitoring schedule is detailed in the proposed permit under Special Condition S.2. Specified monitoring frequencies take into account the quantity and variability of the discharge, the treatment method, past compliance, significance of pollutants, and cost of monitoring. The required monitoring frequency is consistent with agency guidance given in the current version of Ecology's *Permit Writer's Manual* (Publication Number 92-109) for an activated sludge facility with an average design flow less than 2.0 MGD.

Monitoring of sludge quantity and quality is necessary to determine the appropriate uses of the sludge. Biosolids monitoring is required by the current state and local solid waste management program and also by EPA under 40 CFR 503.

Ecology updated the water contact recreation bacteria criteria in January 2019. This change will be effective January 1, 2021 and eliminated all recreational uses except for primary contact criteria in both fresh and marine waters. Primary contact criteria changed to *E.coli* for freshwater and to enterococci for marine water. Because the West Richland POTW has an effluent limit based on recreation, this permit requires monitoring of both fecal coliform and *E.coli* during this permit cycle. Ecology will reevaluate the bacteria limit based on the new indicator during the next permit cycle.

Ecology has required monitoring of both fecal coliform and E.coli in the permit application. This dual monitoring will help inform both Ecology and the West Richland POTW of the correlation between the two indicators. Dual monitoring requirements consist of Richland POTW sampling once a month for E. coli test. The sample for E. coli test must be taken at the same time as a weekly sample is taken for fecal coliform test.

The proposed permit requires includes some additional monitoring of nutrients that the West Richland POTW to further characterize the effluent. These pollutant(s) could have a significant impact on the quality of the surface water. Ecology will use this data in the future as it develops TMDLs.

Lab accreditation

Ecology requires that facilities must use a laboratory registered or accredited under the provisions of chapter 173-50 WAC, Accreditation of Environmental Laboratories, to prepare all monitoring data (with the exception of certain parameters). Ecology accredited the laboratory at this facility for:

Table 17 — Accredited Parameters

Parameter Name	Category	Method Name	Matrix Description
Ammonia	General Chemistry	EPA 350.1_2_1993	Non-Potable Water
Dissolved Oxygen	General Chemistry	Hach 10360 rev 1.2	Non-Potable Water
Solids, Total Suspended	General Chemistry	SM 2540 D-2011	Non-Potable Water
pH	General Chemistry	SM 4500-H+ B-2011	Non-Potable Water
Fecal coliform-count	Microbiology	SM 9222 D (mFC)-06	Non-Potable Water

IV. Other Permit Conditions

Reporting and record keeping

Ecology based Special Condition S3 on its authority to specify any appropriate reporting and record keeping requirements to prevent and control waste discharges (WAC 173-220-210).

Prevention of facility overloading

Overloading of the treatment plant is a violation of the terms and conditions of the permit. To prevent this from occurring, RCW 90.48.110 and WAC 173-220-150 require the West Richland POTW to:

- Take the actions detailed in proposed permit Special Condition S.4.
- Design and construct expansions or modifications before the treatment plant reaches existing capacity.
- Report and correct conditions that could result in new or increased discharges of pollutants.

Special Condition S.4 restricts the amount of flow.

If a municipality intends to apply for Ecology-administered funding for the design or construction of a facility project, the plan must meet the standard of a "Facility Plan", as defined in WAC 173-98-030. A complete "Facility Plan" includes all elements of an "Engineering Report" along with State Environmental Review Process (SERP) documentation to demonstrate compliance with 40 CFR 35.3140 and 40 CFR 35.3145, and a cost effectiveness analysis as required by WAC 173-98-730. The municipality should contact Ecology's regional office as early as practical before planning a project that may include Ecology-administered funding.

Operation and maintenance

The proposed permit contains Special Condition S.5 as authorized under RCW 90.48.110, WAC 173-220-150, chapter 173-230 WAC, and WAC 173-240-080. Ecology included it to ensure proper operation and regular maintenance of equipment, and to ensure that West Richland POTW takes adequate safeguards so that it uses constructed facilities to their optimum potential in terms of pollutant capture and treatment.

Pretreatment

Duty to enforce discharge prohibitions

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

- The first section of the pretreatment requirements prohibits the POTW from accepting pollutants which causes "pass-through" or "interference". This general prohibition is from 40 CFR §403.5(a). **Appendix C** of this fact sheet defines these terms.
- The second section reinforces a number of specific state and federal pretreatment prohibitions found in WAC 173-216-060 and 40 CFR §403.5(b). These reinforce that the POTW may not accept certain wastes, which:

  a. Are prohibited due to dangerous waste rules.
  b. Are explosive or flammable.
  c. Have too high or low of a pH (too corrosive, acidic or basic).
  d. May cause a blockage such as grease, sand, rocks, or viscous materials.
  e. Are hot enough to cause a problem.
  f. Are of sufficient strength or volume to interfere with treatment.
  g. Contain too much petroleum-based oils, mineral oil, or cutting fluid.
  h. Create noxious or toxic gases at any point.

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

- The third section of pretreatment conditions reflects state prohibitions on the POTW accepting certain types of discharges unless the discharge has received prior written authorization from Ecology. These discharges include:

  a. Cooling water in significant volumes.
  b. Stormwater and other direct inflow sources.
  c. Wastewaters significantly affecting system hydraulic loading, which do not require treatment.

Federal and state pretreatment program requirements

Ecology administers the Pretreatment Program under the terms of the addendum to the "Memorandum of Understanding between Washington Department of Ecology and the United States Environmental Protection Agency, Region 10" (1986) and 40 CFR Part 403. Under this delegation of authority, Ecology issues wastewater discharge permits for significant industrial users (SIUs) discharging to POTWs which have not been delegated authority to issue

wastewater discharge permits. Ecology must approve, condition, or deny new discharges or a significant increase in the discharge for existing significant industrial users (SIUs) [40 CFR 403.8 (f)(1)(i)(iii)].

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

Routine identification and reporting of industrial users

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

Requirements for performing an industrial user survey

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

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

Ecology describes the information needed in IU Survey submittals to allow Ecology to make permitting decision in the manual "Performing an Industrial User Survey". Properly completing an Industrial User Survey helps Ecology control discharges that may otherwise harm the POTW including its collection system, processes, and receiving waters. Where surveys are incomplete, Ecology may take such enforcement as appropriate and/or require the POTW to develop a fully delegated pretreatment program.

The proposed permit requires the West Richland POTW to conduct an industrial user survey to determine the extent of compliance of all industrial users of the sanitary sewer and wastewater treatment facility with federal pretreatment regulations [40 CFR Part 403 and CWA Sections 307(b) and CWA Section 308)], with state regulations (chapter 90.48 RCW and chapter 173-216 WAC), and with local ordinances.

Solid wastes

To prevent water quality problems the facility is required in permit Special Condition S7 to store and handle all residual solids (grit, screenings, scum, sludge, and other solid waste) in accordance with the requirements of RCW 90.48.080 and state water quality standards.

The final use and disposal of sewage sludge from this facility is regulated by U.S. EPA under 40 CFR 503, and by Ecology under chapter 70.95J RCW, chapter 173-308 WAC "Biosolids Management," and chapter 173-350 WAC "Solid Waste Handling Standards." The disposal of other solid waste is under the jurisdiction of the Benton Franklin Health District.

Requirements for monitoring sewage sludge and record keeping are included in this permit. Ecology will use this information, required under 40 CFR 503, to develop or update local limits.

Spill Plan

This facility stores a quantity of chemicals on-site that have the potential to cause water pollution if accidentally released. Ecology can require a facility to develop best management plans to prevent this accidental release [Section 402(a)(1) of the Federal Water Pollution Control Act (FWPCA) and RCW 90.48.080].

The West Richland POTW developed a plan for preventing the accidental release of pollutants to state waters and for minimizing damages if such a spill occurs. The proposed permit requires the facility to update this plan and submit it to Ecology.

Outfall evaluation

The proposed permit requires The West Richland POTW to conduct an outfall inspection and submit a report detailing the findings of that inspection (Special Condition S.11). The inspection must evaluate the physical condition of the discharge pipe and diffusers, and evaluate the extent of sediment accumulations in the vicinity of the outfall.

General conditions

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

V. Permit Issuance Procedures

Permit modifications

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

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

Proposed permit issuance

This proposed permit meets all statutory requirements for Ecology to authorize a wastewater discharge. The permit includes limits and conditions to protect human health and aquatic life, and the beneficial uses of waters of the state of Washington. Ecology proposes to issue this permit for a term of **5** years.

VI. References for Text and Appendices

Environmental Protection Agency (EPA)

1992. National Toxics Rule. Federal Register, V. 57, No. 246, Tuesday, December 22, 1992.

1991. *Technical Support Document for Water Quality-based Toxics Control*. EPA/505/2-90-001.

1988. *Technical Guidance on Supplementary Stream Design Conditions for Steady State Modeling*. USEPA Office of Water, Washington, D.C.

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

1983. *Water Quality Standards Handbook*. USEPA Office of Water, Washington, D.C.

Tsivoglou, E.C., and J.R. Wallace.
1972. *Characterization of Stream Reaeration Capacity*. EPA-R3-72-012. (Cited in EPA 1985 op.cit.)

Washington State Department of Ecology.
July 2018. *Permit Writer's Manual*. Publication Number 92-109 (https://fortress.wa.gov/ecy/publications/documents/92109.pdf)

September 2011. *Water Quality Program Guidance Manual – Supplemental Guidance on Implementing Tier II Antidegradation*. Publication Number 11-10-073 (https://fortress.wa.gov/ecy/publications/summarypages/1110073.html)

October 2010 (revised). *Water Quality Program Guidance Manual – Procedures to Implement the State's Temperature Standards through NPDES Permits*. Publication Number 06-10-100 (https://fortress.wa.gov/ecy/publications/summarypages/0610100.html)

Laws and Regulations (http://leg.wa.gov/LawsAndAgencyRules/Pages/default.aspx)

Permit and Wastewater Related Information (https://ecology.wa.gov/Regulations-Permits/Guidance-technical-assistance/Water-quality-permits-guidance)

Water Pollution Control Federation.
1976. *Chlorination of Wastewater*.

Wright, R.M., and A.J. McDonnell.
1979. *In-stream Deoxygenation Rate Prediction*. Journal Environmental Engineering Division, ASCE. 105(EE2). (Cited in EPA 1985 op.cit.)

City of West Richland.
October 2017. City of West Richland, West Richland, WA, Biosolids Management System Operation and Maintenance Manual. Prepared by J-U-B Engineers, Inc.

September 2005. City of West Richland Wastewater Treatment Plant Expansion Facilities Plan, Final. Prepared by HDR Engineering, Inc.

November 2016. City of West Richland, Benton County, WA, Inflow & Infiltration Report.

June 2009. City of West Richland Wastewater Treatment Plant, e-O&M Manual.

March 2016, Rev. 4. Operations and Maintenance Manual for Fibreplate™ Membrane Systems FPC400-3x3 and 2x3 Cassettes.

Appendix A — Public Involvement Information

Ecology proposes to reissue a permit to West Richland POTW. The permit includes wastewater discharge limits and other conditions. This fact sheet describes the facility and Ecology's reasons for requiring permit conditions.

Ecology will place a Public Notice of Draft on July 12, 2021 in the TriCity Herald to inform the public and to invite comment on the proposed draft National Pollutant Discharge Elimination System permit and fact sheet.

The notice:

- Tells where copies of the draft permit and fact sheet are available for public evaluation (a local public library, the closest regional or field office, posted on our website).
- Offers to provide the documents in an alternate format to accommodate special needs.
- Asks people to tell us how well the proposed permit would protect the receiving water.
- Invites people to suggest fairer conditions, limits, and requirements for the permit.
- Invites comments on Ecology's determination of compliance with antidegradation rules.
- Urges people to submit their comments, in writing, before the end of the comment period.
- Tells how to request a public hearing about the proposed NPDES permit.
- Explains the next step(s) in the permitting process.

NOTICE: ANNOUNCEMENT OF AVAILABILITY OF DRAFT PERMIT

PERMIT NO.: WA0051063

APPLICANT: City of West Richland
3100 Belmont Blvd.
West Richland, WA 99353

The City of West Richland has applied for renewal of National Pollutant Discharge Elimination System (NPDES) Permit No. WA0051063 in accordance with the provisions of Chapter 90.48 Revised Code of Washington (RCW) and Chapter 173-220 Washington Administrative Code (WAC), and the Federal Clean Water Act.

The City of West Richland presently owns and operates a wastewater treatment plant which is designed to handle a maximum daily flow of 1.50 million gallons per day. The wastewater, following treatment, must meet the requirements of the Washington State Water Pollution Control Act and applicable regulations for a permit to be issued.

Following evaluation of the application and other available information, a draft permit has been developed which would allow the discharge of treated domestic wastewater from 320 N. 48th Ave.,

West Richland, WA to the Yakima River, river mile 9.8. All discharges to be in compliance with the Department of Ecology's Water Quality Standards for a permit to be issued.

A tentative determination has been made on the effluent limitations and special permit conditions that will prevent and control pollution. A final determination will not be made until all timely comments received in response to this notice have been evaluated.

PUBLIC COMMENT AND INFORMATION

The draft permit and fact sheet may be viewed at the Department of Ecology (Department) website: https://apps.ecology.wa.gov/paris/DocumentSearch.aspx?PermitNumber=WA0051063&FacilityName=&City=&County=&Region=0&PermitType=0&DocumentType=0 . The application, fact sheet, proposed permit, and other related documents are also available at the Department's Central Regional Office for inspection and copying between the hours of 8:00 a.m. and 5:00 p.m., weekdays. To obtain a copy or to arrange to view copies at the Central Regional Office, please e-mail publicrecordsofficer@ecy.wa.gov or write to Public Records Officer, Department of Ecology, PO Box 47600, Olympia, WA 98504.

Interested persons are invited to submit written comments regarding the proposed permit. All comments must be submitted by August 12, 2021 to be considered for the final determination.

Submit comments online at: https://wq.ecology.commentinput.com/?id=UmgGS . Written comments should be sent to: Cynthia Huwe, WQ Permit Coordinator, Department of Ecology, Central Regional Office, 1250 West Alder Street, Union Gap, WA 98903-0009 or email at cynthia.huwe@ecy.wa.gov .

Any interested party may request a public hearing on the proposed permit within 30 days of the publication date of this notice. The request for a hearing shall state the interest of the party and the reasons why a hearing is necessary. The request should be sent to the above address. The Department will hold a hearing if it determines that there is significant public interest. If a hearing is to be held, public notice will be published at least 30 days in advance of the hearing date. Any party responding to this notice with comments will be mailed a copy of a hearing public notice.

Please bring this public notice to the attention of persons who you know would be interested in this matter. The Department is an equal opportunity agency. If you need this publication in an alternate format, please contact us at (509) 575-2490 or TTY (for the speech and hearing impaired) at 711 or 1-800-833-6388.

Ecology has published a document entitled *Frequently Asked Questions about Effective Public Commenting*, which is available on our website at https://fortress.wa.gov/ecy/publications/documents/0307023.pdf .

You may obtain further information from Ecology by telephone, 509-575-2490, or by writing to the address listed below.

Water Quality Permit Coordinator
Department of Ecology
Central Regional Office
1250 West Alder Street
Union Gap, WA 98903

The primary author of this permit and fact sheet is Erik Van Doren, Traci Gefre, Coleman Miller.

Appendix B — Your Right to Appeal

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

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

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

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

Table 16 — Address and Location Information

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

Appendix C — Glossary

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

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

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

AKART – The acronym for "all known, available, and reasonable methods of prevention, control and treatment." AKART is a technology-based approach to limiting pollutants from wastewater discharges, which requires an engineering judgment and an economic judgment. AKART must be applied to all wastes and contaminants prior to entry into waters of the state in accordance with RCW 90.48.010 and RCW 90.48.520, WAC 173-200-030(2)(c)(ii), and WAC 173-216-110(1)(a).

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

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

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

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

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

Average monthly discharge limit – The average of the measured values obtained over a calendar months' time.

Background water quality – The concentrations of chemical, physical, biological or radiological constituents or other characteristics in or of groundwater at a particular point in

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

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

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

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

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

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

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

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

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

Compliance inspection-with sampling – A site visit for the purpose of determining the compliance of a facility with the terms and conditions of its permit or with applicable statutes and regulations. In addition it includes as a minimum, sampling and analysis for all parameters with limits in the permit to ascertain compliance with those limits; and, for

municipal facilities, sampling of influent to ascertain compliance with the 85 percent removal requirement. Ecology may conduct additional sampling.

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

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

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

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

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

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

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

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

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

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

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

Enterococci – A subgroup of fecal streptococci that includes *S. faecalis, S. faecium, S. gallinarum,* and *S. avium.* The enterococci are differentiated from other streptococci by their ability to grow in 6.5% sodium chloride, at pH 9.6, and at 10°C and 45°C.

E. coli – A bacterium in the family Enterobacteriaceae named Escherichia coli and is a common inhabitant of the intestinal tract of warm-blooded animals, and its presence in water samples is an indication of fecal pollution and the possible presence of enteric pathogens.

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

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

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

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

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

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

- Inhibits or disrupts the POTW, its treatment processes or operations, or its sludge processes, use or disposal; and
- Therefore is a cause of a violation of any requirement of the POTW's NPDES permit (including an increase in the magnitude or duration of a violation) or of the prevention of

sewage sludge use or disposal in compliance with the following statutory provisions and regulations or permits issued thereunder (or more stringent State or local regulations): Section 405 of the Clean Water Act, the Solid Waste Disposal Act (SWDA) (including title II, more commonly referred to as the Resource Conservation and Recovery Act (RCRA), and including State regulations contained in any State sludge management plan prepared pursuant to subtitle D of the SWDA), sludge regulations appearing in 40 CFR Part 501, the Clean Air Act, the Toxic Substances Control Act, and the Marine Protection, Research and Sanctuaries Act.

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

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

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

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

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

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

Method detection level (MDL) – See Detection Limit.

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

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

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

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

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

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

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

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

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

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

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

Quantitation level (QL) – Also known as Minimum Level of Quantitation (ML) – The lowest level at which the entire analytical system must give a recognizable signal and acceptable calibration point for the analyte. It is equivalent to the concentration of the lowest calibration standard, assuming that the lab has used all method-specified sample weights, volumes, and cleanup procedures. The QL is calculated by multiplying the MDL by 3.18 and rounding the result to the number nearest to (1,2,or 5) x 10^n, where n is an integer. (64 FR 30417).
ALSO GIVEN AS:
The smallest detectable concentration of analyte greater than the Detection Limit (DL) where the accuracy (precision & bias) achieves the objectives of the intended purpose. (Report of the Federal Advisory Committee on Detection and Quantitation Approaches and Uses in Clean Water Act Programs Submitted to the US Environmental Protection Agency December 2007).

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

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

Sample Maximum – No sample may exceed this value.

Significant industrial user (SIU) –

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

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

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

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

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

Soil scientist – An individual who is registered as a Certified or Registered Professional Soil Scientist or as a Certified Professional Soil Specialist by the American Registry of Certified Professionals in Agronomy, Crops, and Soils or by the National Society of Consulting Scientists or who has the credentials for membership. Minimum requirements for eligibility are: possession of a baccalaureate, masters, or doctorate degree from a U.S. or Canadian institution with a minimum of 30 semester hours or 45 quarter hours professional core

courses in agronomy, crops or soils, and have 5,3,or 1 years, respectively, of professional experience working in the area of agronomy, crops, or soils.

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

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

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

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

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

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

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

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

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

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

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

Appendix D — Technical Calculations

Several of the Excel® spreadsheet tools used to evaluate a discharger's ability to meet Washington State water quality standards can be found in the PermitCalc workbook on Ecology's webpage at: https://ecology.wa.gov/Regulations-Permits/Guidance-technicalassistance/Water-quality-permits-guidance.

Cormix Session Report- Acute Dilution Factor

```
CORMIX SESSION REPORT:
XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX
XXXXXXXXXXXXXXX
          CORMIX MIXING ZONE EXPERT SYSTEM
            CORMIX Version 11.0GTD
           HYDRO1:Version-11.0.1.0  August,2019
SITE NAME/LABEL:           West Richland POTW
 DESIGN CASE:
 FILE NAME:             C:\Users\erva461\Desktop\West Richland.prd
 Using subsystem CORMIX1:    Single Port Discharges
 Start of session:          10/27/2020--19:12:42
*****************************************************************************
SUMMARY OF INPUT DATA:
---------------------------------------------------------------------------
AMBIENT PARAMETERS:
 Cross-section                         = bounded
 Width                        BS     = 16.22 m
 Channel regularity           ICHREG = 1
 Ambient flowrate             QA     = 5.15 m^3/s
 Average depth                HA     = 1.30 m
 Depth at discharge           HD     = 1.15 m
 Ambient velocity             UA     = 0.2439 m/s
 Darcy-Weisbach friction factor  F   = 0.0647
  Calculated from Manning's n        = 0.03
 Wind velocity                UW     = 2.24 m/s
 Stratification Type          STRCND = U
 Surface temperature                 = 28.40 degC
 Bottom temperature                  = 28.40 degC
 Calculated FRESH-WATER DENSITY values:
 Surface density              RHOAS  = 996.1193 kg/m^3
 Bottom density               RHOAB  = 996.1193 kg/m^3
---------------------------------------------------------------------------
DISCHARGE PARAMETERS:          Single Port Discharge
```

```
  Nearest bank                        = right
  Distance to bank              DISTB  = 6.10 m
  Port diameter                 D0     = 0.3640 m
  Port cross-sectional area     A0     = 0.1041 m^2
  Discharge velocity            U0     = 0.38 m/s
  Discharge flowrate            Q0     = 0.039694 m^3/s
  Discharge port height         H0     = 0.20 m
  Vertical discharge angle      THETA  = 0 deg
  Horizontal discharge angle    SIGMA  = 80 deg
  Discharge temperature (freshwater)   = 25.70 degC
  Corresponding density         RHO0   = 996.8637 kg/m^3
  Density difference            DRHO   = -0.7444 kg/m^3
  Buoyant acceleration          GP0    = -0.0073 m/s^2
  Discharge concentration       C0     = 100 %
  Surface heat exchange coeff.  KS     = 0 m/s
  Coefficient of decay          KD     = 0 /s
-------------------------------------------------------------------------------
DISCHARGE/ENVIRONMENT LENGTH SCALES:
  LQ  = 0.32 m        Lm  = 0.50 m        Lb  = 0.02 m
  LM  = 2.53 m        Lm' = 99999 m       Lb' = 99999 m
-------------------------------------------------------------------------------
NON-DIMENSIONAL PARAMETERS:
  Port densimetric Froude number  FR0    = 7.39
  Velocity ratio                  R      = 1.56
-------------------------------------------------------------------------------
MIXING ZONE / TOXIC DILUTION ZONE / AREA OF INTEREST PARAMETERS:
  Toxic discharge                       = no
  Water quality standard specified      = yes
  Water quality standard          CSTD  = 100 %
  Regulatory mixing zone                = yes
  Regulatory mixing zone specification  = distance
  Regulatory mixing zone value          = 9.27 m (m^2 if area)
  Region of interest                    = 304.80 m
*******************************************************************************
HYDRODYNAMIC CLASSIFICATION:
  *-----------------------*
  | FLOW CLASS   = NH4A2 |
  *-----------------------*
  This flow configuration applies to a layer corresponding to the full water
  depth at the discharge site.
  Applicable layer depth = water depth = 1.15 m
```

Limiting Dilution S = (QA/Q0)+ 1.0 = 130.7

****
MIXING ZONE EVALUATION (hydrodynamic and regulatory summary):

X-Y-Z Coordinate system:
Origin is located at the BOTTOM below the port/diffuser center:
6.10 m from the right bank/shore.
Number of display steps NSTEP = 10 per module.

NEAR-FIELD REGION (NFR) CONDITIONS :
Note: The NFR is the zone of strong initial mixing. It has no regulatory implication. However, this information may be useful for the discharge designer because the mixing in the NFR is usually sensitive to the discharge design conditions.
Pollutant concentration at NFR edge c = 16.945 %
Dilution at edge of NFR s = 5.9
NFR Location: x = 17.12 m
(centerline coordinates) y = 0.50 m
z = 0 m
NFR plume dimensions: half-width (bh) = 1.63 m
thickness (bv) = 0.38 m
Cumulative travel time: 70.1935 sec.

Buoyancy assessment:
The effluent density is greater than the surrounding ambient water density at the discharge level.
Therefore, the effluent is NEGATIVELY BUOYANT and will tend to sink towards the bottom.
IMPORTANT NOTE:
Since the effluent is NEGATIVELY BUOYANT, it is recommended that you consider using the Brine or Sediment options for Effluent specification for a more detailed analysis, particularly for coastal discharges over a sloping bottom where density currents are important.

CORMIX will however continue with the current simulation.

Benthic attachment:
For the present combination of discharge and ambient conditions, the discharge plume becomes attached to the channel bottom within the NFR immediately following the efflux. High benthic concentrations may occur.

FAR-FIELD MIXING SUMMARY:
Plume becomes vertically fully mixed at 103.43 m downstream.

PLUME BANK CONTACT SUMMARY:
Plume in bounded section does not contact bank.
********** TOXIC DILUTION ZONE SUMMARY **********
No TDZ was specified for this simulation.
********** REGULATORY MIXING ZONE SUMMARY **********
The plume conditions at the boundary of the specified RMZ are as follows:
Pollutant concentration c = 28.162754 %
Corresponding dilution s = 3.6
Plume location: x = 9.27 m
(centerline coordinates) y = 0.50 m
z = 0 m
Plume dimensions: half-width (bh) = 1.14 m
thickness (bv) = 0.32 m
Cumulative travel time < 70.1935 sec. (RMZ is within NFR)

Cormix Session Report- Chronic Dilution Factor

CORMIX SESSION REPORT:
XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX
XXXXXXXXXXXXXXX

CORMIX MIXING ZONE EXPERT SYSTEM
CORMIX Version 11.0GTD
HYDRO1:Version-11.0.1.0 August,2019

SITE NAME/LABEL: West Richland POTW
DESIGN CASE:
FILE NAME: C:\Users\erva461\Desktop\West Richland.prd
Using subsystem CORMIX1: Single Port Discharges
Start of session: 10/27/2020--14:34:20
****

SUMMARY OF INPUT DATA:

AMBIENT PARAMETERS:
Cross-section = bounded
Width BS = 16.22 m
Channel regularity ICHREG = 1
Ambient flowrate QA = 5.15 m^3/s
Average depth HA = 1.30 m
Depth at discharge HD = 1.15 m
Ambient velocity UA = 0.2439 m/s
Darcy-Weisbach friction factor F = 0.0647
Calculated from Manning's n = 0.03
Wind velocity UW = 2.24 m/s
Stratification Type STRCND = U
Surface temperature = 28.40 degC
Bottom temperature = 28.40 degC
Calculated FRESH-WATER DENSITY values:
Surface density RHOAS = 996.1193 kg/m^3
Bottom density RHOAB = 996.1193 kg/m^3

DISCHARGE PARAMETERS: Single Port Discharge
Nearest bank = right
Distance to bank DISTB = 6.10 m
Port diameter D0 = 0.3640 m
Port cross-sectional area A0 = 0.1041 m^2
Discharge velocity U0 = 0.34 m/s
Discharge flowrate Q0 = 0.035357 m^3/s
Discharge port height H0 = 0.20 m
Vertical discharge angle THETA = 0 deg

```
  Horizontal discharge angle      SIGMA  = 80 deg
  Discharge temperature (freshwater)     = 25.70 degC
  Corresponding density           RHO0   = 996.8637 kg/m^3
  Density difference              DRHO   = -0.7444 kg/m^3
  Buoyant acceleration            GP0    = -0.0073 m/s^2
  Discharge concentration         C0     = 100 %
  Surface heat exchange coeff.    KS     = 0 m/s
  Coefficient of decay            KD     = 0 /s
-------------------------------------------------------------------------------
DISCHARGE/ENVIRONMENT LENGTH SCALES:
  LQ  = 0.32 m        Lm  = 0.45 m        Lb  = 0.02 m
  LM  = 2.25 m        Lm' = 99999 m       Lb' = 99999 m
-------------------------------------------------------------------------------
NON-DIMENSIONAL PARAMETERS:
  Port densimetric Froude number  FR0    = 6.58
  Velocity ratio                  R      = 1.39
-------------------------------------------------------------------------------
MIXING ZONE / TOXIC DILUTION ZONE / AREA OF INTEREST PARAMETERS:
  Toxic discharge                        = no
  Water quality standard specified       = yes
  Water quality standard          CSTD   = 100 %
  Regulatory mixing zone                 = yes
  Regulatory mixing zone specification   = distance
  Regulatory mixing zone value           = 92.75 m (m^2 if area)
  Region of interest                     = 304.80 m
*******************************************************************************
HYDRODYNAMIC CLASSIFICATION:
  *-----------------------*
  | FLOW CLASS   = NH4A2 |
  *-----------------------*
  This flow configuration applies to a layer corresponding to the full water
  depth at the discharge site.
  Applicable layer depth = water depth = 1.15 m

  Limiting Dilution S = (QA/Q0)+ 1.0 = 146.6

*******************************************************************************
MIXING ZONE EVALUATION (hydrodynamic and regulatory summary):

-------------------------------------------------------------------------------
X-Y-Z Coordinate system:
  Origin is located at the BOTTOM below the port/diffuser center:
```

6.10 m from the right bank/shore.
Number of display steps NSTEP = 10 per module.

NEAR-FIELD REGION (NFR) CONDITIONS :
Note: The NFR is the zone of strong initial mixing. It has no regulatory implication. However, this information may be useful for the discharge designer because the mixing in the NFR is usually sensitive to the discharge design conditions.
Pollutant concentration at NFR edge c = 17.4009 %
Dilution at edge of NFR s = 5.7
NFR Location: x = 14.63 m
(centerline coordinates) y = 0.44 m
z = 0 m
NFR plume dimensions: half-width (bh) = 1.44 m
thickness (bv) = 0.37 m
Cumulative travel time: 59.9758 sec.

Buoyancy assessment:
The effluent density is greater than the surrounding ambient water density at the discharge level.
Therefore, the effluent is NEGATIVELY BUOYANT and will tend to sink towards the bottom.
IMPORTANT NOTE:
Since the effluent is NEGATIVELY BUOYANT, it is recommended that you consider using the Brine or Sediment options for Effluent specification for a more detailed analysis, particularly for coastal discharges over a sloping bottom where density currents are important.

CORMIX will however continue with the current simulation.

Benthic attachment:
For the present combination of discharge and ambient conditions, the discharge plume becomes attached to the channel bottom within the NFR immediately following the efflux. High benthic concentrations may occur.

FAR-FIELD MIXING SUMMARY:
Plume becomes vertically fully mixed at 101.68 m downstream.

PLUME BANK CONTACT SUMMARY:
Plume in bounded section does not contact bank.
********** TOXIC DILUTION ZONE SUMMARY **********
No TDZ was specified for this simulation.
********** REGULATORY MIXING ZONE SUMMARY **********

The plume conditions at the boundary of the specified RMZ are as follows:

Pollutant concentration	c = 2.872163 %
Corresponding dilution	s = 35.2
Plume location:	x = 92.75 m
(centerline coordinates)	y = 0.44 m
	z = 0 m
Plume dimensions:	half-width (bh) = 2.89 m
	thickness (bv) = 1.12 m
Cumulative travel time:	378.0466 sec.

Log-Pearson Type III Distribution Analysis- 7Q10

LOW FLOW [] Frequency Analysis Calculator: Log-Pearson Type III Distribution; EPA 1986[3] Frequency Factors

USGS Gaging Station Name: Kiona USGS Site ID: 12510500

Step 1: On separate sheet, sort yearly minimum 7D average with date, from lowest to highest; Step 2: Paste sorted year and corresponding minimum 7D average into Col B and C, respectively

RANK	YEAR OF 7DAvg_Low FLOW	LOW_FLOW_VALUE_ Q(cfs)	LN [Log base e, natural] Q_cfs	[Tr]Return Period (n+1)/m	Exceedence Probability (1/Tr)
1	2019	545	6.301	22.00	0.045
2	2015	591	6.382	11.00	0.091
3	2001	678	6.519	7.33	0.136
4	2005	685	6.530	5.50	0.182
5	2018	794	6.677	4.40	0.227
6	2006	825	6.715	3.67	0.273
7	2008	828	6.719	3.14	0.318
8	2007	854	6.750	2.75	0.364
9	2004	861	6.758	2.44	0.409
10	2009	917	6.822	2.20	0.455
11	2016	923	6.828	2.00	0.500
12	2003	940	6.846	1.83	0.545
13	2017	1077	6.982	1.69	0.591
14	2014	1094	6.997	1.57	0.636
15	2002	1112	7.014	1.47	0.682
16	2011	1246	7.127	1.38	0.727
17	2010	1251	7.132	1.29	0.773
18	2000	1384	7.233	1.22	0.818
19	2013	1536	7.337	1.16	0.864
20	2012	1580	7.365	1.10	0.909
21	1999	1787	7.488	1.05	0.955

No. Years in Record	21.00 ~ COUNT(C5:Cxx)
Avg_Q_7DAvg-LOW_cfs	1,024 ~ AVERAGE(C5:Cxx)
Avg_LN_Q_cfs	6.882 ~ AVERAGE(D5:Dxx)
Variance_LN_Q_cfs	0.1038 ~ VAR(D5:Dxx)
Stdev_LN_Q_cfs	0.3222 ~ STDEV(D5:Dxx)
Skewness (Cs)	0.1212 ~ SKEW(D5:Dxx)

Table Cw upper	0.1
Table Cw lower	0.2
Skewness (Cs)	0.1212

Tr	K lower	K upper	Slope	K calculated	LN_Q_{Tr}_cfs	Q_{Tr}_cfs
2	0.017	0	0.17	0.004	6.883	**975.6**
5	-0.836	-0.842	0.06	-0.841	6.611	**743.3**
10	-1.27	-1.258	**-0.12**	**-1.261**	6.476	**649.3**
25	-1.785	-1.751	-0.34	-1.758	6.316	**553.1**
50	-2.107	-2.054	-0.53	-2.065	6.217	**501.0**
100	-2.4	-2.326	-0.74	-2.342	6.128	**458.3**
200	-2.67	-2.576	-0.94	-2.596	6.046	**422.3**

*Note: paste K lower and upper values from K factor table below

Ammonia Criteria Calculation-PermitCalc

Freshwater Un-ionized Ammonia Criteria Calculation
Based on Chapter 173-201A WAC, amended November 20, 2006

INPUT				
1. Receiving Water Temperature (deg C):	28.4			
2. Receiving Water pH:	8.87			
3. Is salmonid habitat an existing or designated use?	Yes			
4. Are non-salmonid early life stages present or absen	Present			
OUTPUT				
Using mixed temp and pH at mixing zone boundaries?	no			
Ratio	13.500			
FT	1.400			
FPH	1.000			
pKa	9.143			
Unionized Fraction	0.348			
Unionized ammonia NH3 criteria (mg/L as NH_3)				
Acute:	0.462			
Chronic:	0.042			
RESULTS				
Total ammonia nitrogen criteria (mg/L as N):				
Acute:	1.093			
Chronic:	0.100			

Reasonable Potential Calculations-PermitCalc

Reasonable Potential Calculation

Facility	West Richland POTW
Water Body Type	Freshwater
Rec. Water Hardness	116.6 mg/L

Dilution Factors:	Acute	Chronic
Aquatic Life	3.6	35.2
Human Health Carcinogenic		
Human Health Non-Carcinogenic		

Pollutant, CAS No. & NPDES Application Ref. No.			AMMONIA, Criteria as Total NH3	LEAD - 7439921 7M Dependent on hardness	COPPER - 744058 6M Hardness dependent	MERCURY 7439976 8M	NICKEL - 7440020 9M - Dependent on hardness	CHROMIUM(HEX) 18540299 - Dissolved	SILVER - 7740224 11M dependent on hardness.						
Effluent Data	# of Samples (n)		12	1	1	1	1	1	1						
	Coeff of Variation (Cv)		0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6		
	Effluent Concentration, ug/L (Max. or 95th Percentile)		340	0.2	9.98	0.045	1.79	0.51	0.025						
	Calculated 50th percentile Effluent Conc. (when n>10)														
Receiving Water Data	90th Percentile Conc., ug/L		24	0.1	1.4	0.002	1.36	0.87	0.1						
	Geo Mean, ug/L				1.4	0.002	1.36								
Water Quality Criteria	Aquatic Life Criteria, ug/L	Acute	1,093	210	19.666	2.1	1611.79	15	4.49304						
		Chronic	100	8.1	12.943	0.012	179.002	10	-						
	WQ Criteria for Protection of Human Health, ug/L		-	-	1300	0.14	150	-	-						
	Metal Criteria Translator, decimal	Acute	-	0.466	0.996	0.85	0.998	-	0.85						
		Chronic	-	0.466	0.996	-	0.997	-	-						
	Carcinogen?		N	N	N	N	N	N	N						

Aquatic Life Reasonable Potential

Effluent percentile value			0.950	0.950	0.950	0.950	0.950	0.950	0.950						
s	$s^2=\ln(CV^2+1)$		0.555	0.555	0.555	0.555	0.555	0.555	0.555						
Pn	$Pn=(1\text{-confidence level})^{1/n}$		0.779	0.050	0.050	0.050	0.050	0.050	0.050						
Multiplier			1.63	6.20	6.20	6.20	6.20	6.20	6.20						
Max concentration (ug/L) at edge of...		Acute	171	0.233	18.124	0.067	4.058	1.506	0.109						
		Chronic	39	0.114	3.110	0.010	1.636	0.935	0.102						
Reasonable Potential? Limit Required?			**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**						

Chronic Mixing Zone Calculation- Dissolved Oxygen and Fecal Coliform

Calculation of Fecal Coliform at Chronic Mixing Zone

INPUT	
Chronic Dilution Factor	35.2
Receiving Water Fecal Coliform, #/100 ml	10
Effluent Fecal Coliform - worst case, #/100 ml	5
Surface Water Criteria, #/100 ml	*200*
OUTPUT	
Fecal Coliform at Mixing Zone Boundary, #/100 ml	**10**
Difference between mixed and ambient, #/100 ml	0

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

Calculation of Dissolved Oxygen at Chronic Mixing Zone

INPUT	
Chronic Dilution Factor	35.2
Receiving Water DO Concentration, mg/L	9.1
Effluent DO Concentration, mg/L	4.3
Effluent Immediate DO Demand (IDOD), mg/L	
Surface Water Criteria, mg/L	*8*
OUTPUT	
DO at Mixing Zone Boundary, mg/L	**8.96**
DO decrease caused by effluent at chronic boundary, mg/L	**0.14**

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

References: EPA/600/6-85/002b and EPA/430/9-82-011

Freshwater Temperature Reasonable Potential and Limit Calculation-Permit Calc

Freshwater Temperature Reasonable Potential and Limit Calculation

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

	Core Summer Critera	
INPUT	**July 1-Sept 14**	
1. Chronic Dilution Factor at Mixing Zone Boundary	35.2	
2. 7DADMax Ambient Temperature (T) (Upstream Background 90th percentile)	28.4 °C	
3. 7DADMax Effluent Temperature (95th percentile)	25.7 °C	
4. Aquatic Life Temperature WQ Criterion in Fresh Water	17.5 °C	
OUTPUT		
5. Temperature at Chronic Mixing Zone Boundary:	28.3 °C	
6. Incremental Temperature Increase or decrease:	-0.1 °C	
7. Maximum Allowable Incremental Temperature Increase:	0.3 °C	
8. Maximum Allowable Temperature at Mixing Zone Boundary:	28.7 °C	
A. If ambient temp is warmer than WQ criterion		
9. Does temp fall within this warmer temp range?	YES	
10. Temperature Limit if Required:	NO LIMIT	
B. If ambient temp is cooler than WQ criterion but within $28/(T_{amb}+7)$ and within 0.3 °C of the criterion		
11. Does temp fall within this incremental temp. range?	---	
12. Temp increase allowed at mixing zone boundary, if required:	---	
C. If ambient temp is cooler than (WQ criterion-0.3) but within $28/(T_{amb}+7)$ of the criterion		
13. Does temp fall within this Incremental temp. range?	---	
14. Temp increase allowed at mixing zone boundary, if required:	---	
D. If ambient temp is cooler than (WQ criterion - $28/(T_{amb}+7)$)		
15. Does temp fall within this Incremental temp. range?	---	
16. Temp increase allowed at mixing zone boundary, if required:	---	
RESULTS		
17. Do any of the above cells show a temp increase?	**NO**	
18. Temperature Limit if Required?	**NO LIMIT**	

Appendix E — Response to Comments

The Department of Ecology did not receive any comments during the public notice of draft period.