Fact Sheet for NPDES Permit WA0000281

Emerald Kalama Chemical, LLC

March 1, 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 Emerald Kalama Chemical, LLC (Emerald).

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 Emerald, NPDES permit WA0000281, are available for public review and comment from November 12, 2020 until December 18, 2020. For more details on preparing and filing comments about these documents, please see **Appendix A - Public Involvement Information**.

Emerald reviewed the draft permit and fact sheet for factual accuracy. Ecology corrected any errors or omissions regarding the facility's location, history, 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 I - 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

Emerald is an organic chemical manufacturing facility in Kalama, Washington. This facility produces benzene, benzoic acid, benzaldehyde, benzyl alcohol, benzyl benzoate, sodium and potassium benzoate, cinnamic alcohol, cinnamic aldehyde, amyl cinnamic aldehyde, hexyl cinnamic aldehyde, methyl cinnamic aldehyde, p-isopropyl cinnamic aldehyde, methyl benzoate, C6/C8/C10 aldehydes, 3-phenyl propanol, and plasticizers. These products are used in food preservatives, fragrances, perfumes, adhesives, resins, coatings, dyes, detergents, sunscreens, and solvents.

The proposed permit addresses treated process wastewater, non-contact cooling water, filter backwash water, and stormwater at Emerald's facility. The proposed permit includes more stringent limits for toxic pollutants, and less stringent limits for 5-day biochemical oxygen demand (BOD_5), total suspended solids (TSS), copper, nickel, and zinc at Monitoring Point 002 (previously called Outfall 002) compared to the previous permit. The changes in limits are based on updated average flow data provided by Emerald. The proposed permit retains the effluent limits for temperature at Outfall 001 and pH at Monitoring Point 002 from the previous permit, and adds a heat load limit at Outfall 001. The proposed permit reduces the monitoring frequency for all toxic pollutants at Monitoring Point 002 to annually.

The proposed permit changes the parameters that are monitored at Outfall 003 and requires Emerald to evaluate whether all known, available, and reasonable methods of prevention, control, and treatment (AKART) is being applied to the stormwater discharge at Outfall 003 prior to Emerald resuming discharge at this outfall.

The proposed permit also requires Emerald to update their Pollution Prevention Plan, submit a cooling water intake structure information and compliance report, perform an outfall evaluation and mixing zone study, address filter backwash water from the cooling water intake system, and submit discharge monitoring reports electronically.

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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 industrial NPDES permits:

- Procedures Ecology follows for issuing NPDES permits (Washington Administrative Code (WAC) chapter 173-220)
- Water quality criteria for surface waters (chapter 173-201A WAC)
- Water quality criteria for ground waters (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 industrial 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 performance 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** 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 I**.

II. Background Information

Table 1 General Facility Information

Applicant	**Emerald Kalama Chemical, LLC**
Facility Name and Address	Emerald Kalama Chemical, LLC 1296 Third Street NW Kalama, Washington 98625
Contact at Facility	Name: Phil Oyer Telephone #: (360) 673-2550
Responsible Official	Name: Chris Lorge Title: Site Director Address: 1296 Third Street NW Kalama, Washington 98625-9799 Telephone #: (360) 673-2550
Industry Type	Organic Chemicals, Plastics, and Synthetic Fibers
Categorical Industry	40 CFR Part 414
Types of Treatments	Activated Sludge, Anaerobic Treatment, Pre-Aeration
Standard Industrial Classification (SIC) Codes	2869 - Industrial Organic Chemicals 2865 - Cyclic Organic Crudes and Intermediates, and Organic Dyes and Pigments
North American Industry Classification System (NAICS) Codes	325199 - All Other Basic Organic Chemical Manufacturing 325194 - Cyclic Crude, Intermediate, and Gum and Wood Chemical Manufacturing
Facility Location (NAD83/WGS84 reference datum)	Latitude: 46.02097 Longitude: -122.85675

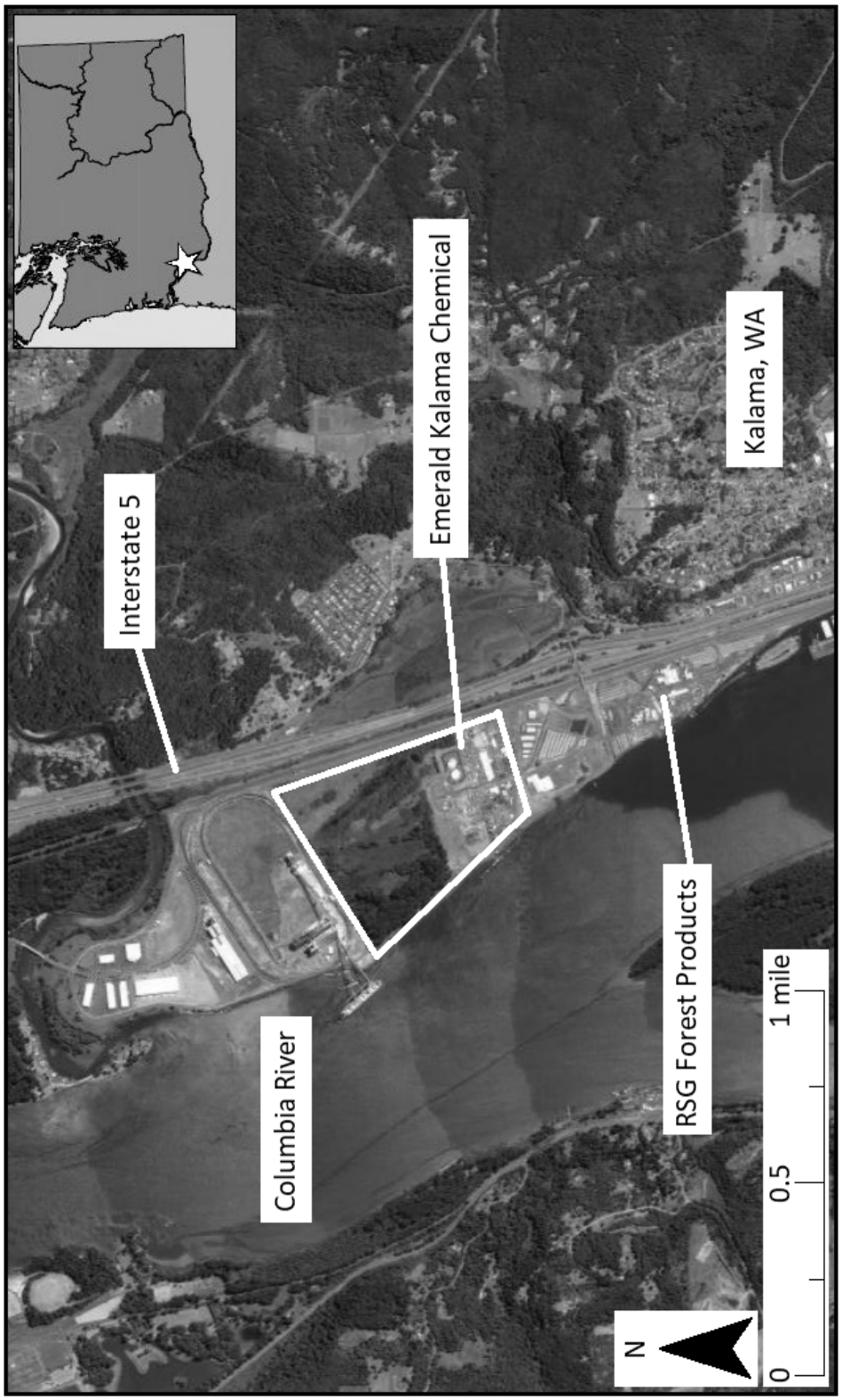
Applicant	**Emerald Kalama Chemical, LLC**
Discharge Waterbody Name and Location (NAD83/WGS84 reference datum)	Outfall 001: Columbia River Latitude: 46.02182 Longitude: -122.86155 Monitoring Point 002: Outfall 001 then Columbia River Latitude: 46.02158 Longitude: -122.86045 Outfall 003: Wetland Latitude: 46.02341 Longitude: -122.85466 Outfall 010: Columbia River Latitude: 46.02145 Longitude: -122.86088 Outfall 011: Columbia River Latitude: 46.02143 Longitude: -122.86084
Intake Structure	Latitude: 46.02145 Longitude: -122.86067
Renewal Date of Previous Permit	July 1, 2009
Application for Permit Renewal Submittal Date	June 28, 2013 (original) June 29, 2018 (1st updated) July 30, 2018 (2nd updated)
Date of Ecology Acceptance of Application	August 9, 2018
Date of Last Sampling Inspection	June 19, 2019
Date of Last Non-sampling Inspection Date	March 6, 2019

A. Facility Description

History

Emerald Kalama Chemical, LLC (Emerald) owns 165 acres of property on the Columbia River near the town of Kalama, Washington. The manufacturing plant occupies 40 acres of the property on the northern side of the Kalama Industrial Park bounded at the north by a man-made wetland, west by the Columbia River, east by Interstate 5, and south by RSG Forest Products. See Figure 1 for a facility location map.

Figure 1 Facility Location Map



The facility has undergone several ownership transfers since its construction in 1962.

Former owners include the Dow Chemical Company, Kalama Chemical, Rogers Sugar Ltd., Freedom Chemical, BF Goodrich, Noveon, and Lubrizol. In May 2006, Emerald Performance Materials, a subsidiary of Sun Capital, purchased the plant and the property from Lubrizol. They renamed the facility Emerald Kalama Chemical. In August 2014, the private equity firm American Securities, LLC purchased Emerald Performance Materials.

EPA classifies Emerald as a major NPDES facility.

Cooling Water Intake Structures

CWA § 316(b) requires that the location, design, construction, and capacity of cooling water intake structures reflect the best technology available for minimizing adverse environmental impact. Since July 2013, Ecology has required a supplemental application for all applicants using EPA Form 2-C. Emerald selected "Yes" on this form when asked if a cooling water intake is associated with the facility.

Thousands of industrial facilities use large volumes of water from lakes, rivers, estuaries, or oceans to cool their machinery. Cooling water intake structures (CWISs) can cause adverse environmental impacts by pulling large numbers of fish and shellfish or their eggs into a power plant's or manufacturing facility's cooling system. The organisms may be killed or injured by heat, physical stress, or by chemicals used to clean the cooling system. Larger organisms may be killed or injured when they are trapped against screens at the front of an intake structure.

Section 316(b) of the Clean Water Act required EPA to issue regulations for the design and operation of cooling water intake structures to minimize adverse environmental impacts. EPA has finalized standards that apply to existing manufacturing and industrial facilities that are designed to withdraw more than 2 million gallons of cooling water per day and use at least 25% of the water for cooling purposes.

The new requirements for existing facilities are included in the NPDES permit regulations, 40 CFR Parts 122 and 125 (Subpart J). The rule establishes best technology available to minimize impingement and entrainment of all life stages of fish and shellfish. Impingement occurs when fish or shellfish become entrapped on the outer part of intake screens and entrainment occurs when fish or shellfish pass through the screens and into the cooling water system.

The rule gives facilities seven options to reduce impingement. Entrainment standards are either site specific or a reduction of intake flow to a level commensurate with a closed cycle recirculating system.

Emerald withdraws cooling water from the Columbia River using four pumps. The water from the river goes through trash grates designed to prevent large items from entering the pump house. After the trash grates, the water enters the pump house and travels through three intake screens.

The screens have square openings no larger than 0.09375 inches and meet the Anadromous Salmonid Passage Facility Design criteria as specified by the National Marine Fisheries Service (NMFS). After the intake screens, the water from the river is sent through two filters to remove unwanted material.

The filters are continuously cleaned and Emerald discharges the filter backwash directly to the Columbia River. The filtered water is then pumped to the plant for use as non-contact cooling water.

The CWIS for Emerald's facility was originally designed and constructed in 1962. In 2017, Emerald installed new intake screens. Emerald's CWIS was designed to withdraw approximately 22 million gallons per day (MGD). The actual withdrawal averages 12.964 MGD with 100% used exclusively for cooling. The approximate maximum intake velocity is 0.38 feet per second.

Ecology must ensure that the location, design, construction, and capacity of Emerald's cooling water intake structure reflect the best technology available for minimizing adverse environmental impacts. The proposed permit requires Emerald to properly operate and maintain existing technologies to minimize impingement and entrainment and report any significant impingement or entrainment observed. In addition, the proposed permit requires Emerald to submit an information and compliance report that addresses NPDES permit application requirements for cooling water intake structures. Ecology will use this information to assess the potential for impingement and entrainment at the CWIS, evaluate the appropriateness of any proposed technologies or mitigation measures, and determine any additional requirements to place on the facility in the next permit cycle.

Filter Backwash Water

As described above, after the intake screens, the water from the river is sent through two filters to remove unwanted material. The filters are automatically continuously cleaned and Emerald discharges the filter backwash water directly to the Columbia River from two pipes (one pipe for each filter). The proposed permit requires Emerald to characterize the filter backwash water and submit a Filter Backwash Water AKART Analysis and Engineering Report to demonstrate if the filter backwash water discharges meet all known, available, and reasonable methods of prevention, control, and treatment (AKART). The report must include the characterization results, AKART analysis, and an evaluation of whether the AKART treatment technologies analyzed will meet water quality criteria. The proposed permit also requires a mixing study for the filter backwash water discharges.

Industrial Processes

Emerald is an organic manufacturing facility with a SIC code of 2869 and a NAICS code of 325199. Effluent limitation guidelines and pretreatment standards, also called effluent guidelines (ELGs), are uniform national standards developed by EPA for specific industrial categories. EPA bases these standards on the greatest pollutant reductions economically achievable for each industry. ELGs cover specific industrial processes and limit specific pollutants (EPA 2018).

Emerald is a part of the Organic Chemicals, Plastics, and Synthetic Fibers (OCPSF) categorical treatment standards in 40 CFR Part 414. In June 2016, EPA published the *Preliminary 2016 Effluent Guidelines Program Plan* (EPA-821-R-16-001) and said "From its preliminary category review, EPA determined that further review is appropriate for the OCPSF Category, specifically related to discharges of two pollutants: total residual chlorine and nitrate compounds." In the future, EPA may consider updating the OCPSF effluent guidelines.

The facility operates 24 hours a day, 7 days a week and has approximately 150 employees. Using toluene as the raw material, the facility produced approximately 155,000 tons of chemicals per year from 2015 through August 2020. The products include benzene, benzoic acid, benzaldehyde, benzyl alcohol, benzyl benzoate, sodium and potassium benzoate, cinnamic alcohol, cinnamic aldehyde, amyl cinnamic aldehyde, hexyl cinnamic aldehyde, methyl cinnamic aldehyde, p-isopropyl cinnamic aldehyde, methyl benzoate, C6/C8/C10 aldehydes, 3-phenyl propanol, and plasticizers. The products are used in food preservatives, fragrances, perfumes, adhesives, resins, coatings, dyes, detergents, sunscreens, and solvents. Emerald receives toluene approximately once every 6 to 8 weeks from ships at the dock and stores the toluene in on-site tanks before being used in the manufacturing process. Emerald uses railcars, trucks, totes, and drums to ship products offsite.

Cleanup Activities

EPA and Ecology have identified soil and groundwater contamination at the facility. Ecology established cleanup levels for the contaminated soil and groundwater under the Model Toxics Control Act (MTCA). In 1995, the facility implemented interim corrective measures, which included two trench systems and soil vapor extraction (SVE) wells to treat contaminated soil and groundwater. Interim measures also included seven recovery wells in the west area to reduce contaminated groundwater flow to the river. Groundwater recovered from the interim measures is treated in Emerald's wastewater treatment system.

In 1998, former plant owners Goodrich and Rogers Sugar entered into an Agreed Order with Ecology. Under the Agreed Order, the plant owners' consultant submitted a remedial investigation/feasibility study (RI/FS) and cleanup action plan (CAP). Ecology approved the CAP dated June 30, 2004. On March 17, 2008, Ecology, Goodrich, and Emerald entered into a consent decree to implement cleanup activities as described by the CAP. Goodrich's consultant upgraded the recovery well system in the west area and installed Waterloo® emitters and additional SVE wells. Construction was completed in February 2009.

Emerald submitted a request in September 2012 to shut down and remove the SVE system. Ecology sent a letter back to Emerald in February 2013 asking for soil sampling to verify that the contaminated soils met the remediation objectives in the CAP. In July 2013, Emerald responded to Ecology's letter stating that the SVE system had achieved the goal for which it was designed and the concentrations of benzene and toluene had reached asymptotic levels. In December 2013, after reviewing additional extraction performance data provided by Emerald, Ecology approved the shutdown and decommissioning of the SVE system except for two wells near the west impacted area.

Emerald submits an annual report to Ecology summarizing the previous year's sampling and operation results with regards to the MTCA cleanup.

Wastewater Treatment Processes

The wastewater treatment system was constructed in 1975. The system uses biological treatment, or activated sludge, to treat process wastewater.

In 1978, the facility expanded the system by adding an anaerobic plant to pre-treat the high strength acetic/formic acid-bearing waste streams. Effluent from the anaerobic plant enters the biological treatment plant for further treatment.

The facility upgraded the treatment system between 1980 and 1995. A second aeration tank was added to the biological treatment plant in 1980 and a second clarifier was added in 1985. In 1995, the facility added a larger aeration tank while converting the old aeration tank into an equalization unit; this upgrade also added a third clarifier to the system. In 2016, Emerald constructed a new digester tank in the anaerobic plant in order to inspect and repair, if necessary, the original digester tank from 1978.

The wastewater treatment plant (WWTP) consists of a flow equalization system, anaerobic treatment (ANTS) plant, and a biological treatment (BIOX) plant. The BIOX plant can treat a maximum of 5,006 pounds of 5-day Biochemical Oxygen Demand (BOD_5) per day at a maximum flow of 400 gallons per minute (gpm) of wastewater. The ANTS plant is designed to treat a maximum loading of 28,000 pounds of Chemical Oxygen Demand (COD) per day at a maximum flow rate of 50 gpm.

The sources of wastewater to the WWTP include:

- **Process and laboratory wastewater**

  Process and laboratory wastewaters flow to a dual-chamber American Petroleum Institute (API) oil/water separator and then to the wastewater treatment system.

- **Groundwater**

  Cleanup activities remove contaminated groundwater from the following areas:

  1. North Impacted Area (NIA) - The area has a 1,450-foot long trench running east to west along the boundary of the northern wetland. There are two wells with pumps to remove groundwater captured by the trench.
  2. West Impacted Area (WIA) - There are two trenches and ten recovery wells along the Columbia River. The trenches capture groundwater in the shallow aquifer and the recovery wells extract groundwater in the intermediate sand aquifer.

  Emerald uses Modu-tanks ™ T-103A and T-103B for managing groundwater from the NIA and WIA. T-103A stores high-COD wastewater and also serves as emergency storage. T-103B stores low COD groundwater. Each Modu-tank ™ has a 500,000-gallon storage capacity and a leak detection system. The tanks also have high level indicators and alarms to prevent overflows.

- **Stormwater**

  Stormwater in the process areas drains to the API oil/water separator and then to the wastewater treatment system. The south sump collects stormwater flow from the toluene storage tank containment area, parking lots, and non-process areas. Stormwater in the sump flows to Modu-tank ™ T-103B and then to the BIOX plant. For every inch of rain that falls on the manufacturing area, there is approximately one million gallons of stormwater generated.

The flow equalization system is comprised of numerous collection and equalization tanks within each of the main process areas. Below is a list and description of the main tanks in the flow equalization system:

- Tank T-910 is the main wastewater collection tank in the Benzoate process area. Wastewater from T-910 is metered into the waste conveyance system or T-55 at a flow rate determined by WWTP supervisors.
- Tanks T-1117, T-1126, and T-1128 make up the organic/water separator system located in the Specialty process area. Wastewater from T-1117 is metered into the waste conveyance system at a flow rate determined by WWTP supervisors.
- Tank T-55 stores wastewater from the production of hexyl cinnamic aldehyde (HCA) and sodium and potassium benzoate. Wastewater is pumped to the ANTS plant for pre-treatment. The flow rate to the ANTS plant is determined by WWTP supervisors.
- Tank T-13 stores wastewater from the Plasticizer process area. Wastewater from T-910 is metered into the waste conveyance system at a flow rate determined by WWTP supervisors.
- Tanks T-21B and T-21D are the main wastewater equalization tanks in the Intermediate process area. Wastewater from T-21B and T-21D is pumped to the ANTS plant for pre-treatment.
- Tank T-90 is the primary surge tank for all of the process wastewater. T-90 is designed to be operated at 25% full (total capacity is 280,000 gallons). T-90 contains two side agitators that maintain complete mixing of the tank. The wastewater from T-90 is pumped to tank T-22.
- Tank T-22 is the main equalization tank prior to the BIOX plant. T-22 is maintained at a constant level of 85% full. Two side agitators keep T-22 constantly mixed.
- Modu-tanks ™ T-103A, T-103B, and T-40 are used to supplement the plant's equalization and surge capacity.
- Tank T-100 is used for additional acid water capacity during ANTS outages and plant upsets. T-100 has a capacity of 30,000 gallons.
- Tank T-801 is used for additional storage capacity for the Benzoate, Specialty, and HCA process areas. Wastewater stored in T-801 can be routed to either wastewater conveyance system or to T-55 as determined by the WWTP supervisor. T-801 has a capacity of 158,600 gallons.

- Tank T-1 is used for additional surge capacity during heavy rainfall and plant upsets. T-1 has a capacity of 845,000 gallons.

Emerald may change which tanks are used for wastewater storage and surge capacity depending on maintenance schedules and other facility needs.

Alarm systems are set up on many of the equalization tanks to ensure that the WWTP operates as designed. Tank T-90 has both low and high level alarms. All wastewater storage tanks have high level alarms to prevent overflows and T-21D, T-55, and T-100 have conductivity alarms which will sound if organics are detected.

The ANTS plant provides pre-treatment of acid wastewater from the benzoic acid processes and high COD wastewater generated during production of HCA or sodium/potassium benzoate. The system consists of three digesters and two clarifiers. Emerald pumps effluent from the ANTS plant to the discharge of Tank T-22 (BIOX feed). T-22 and T-90 also hold wastewater from the API oil/water separator which flows to the BIOX plant.

The BIOX plant consists of two aeration basins and three clarifiers. Wastewater enters aeration tank T-91A and then aeration tank T-92.

The aeration basins contain blowers for air sparging. The optimum temperature of wastewater in T-91A is from 24 to 26 degrees Celsius (°C).

Wastewater in T-92 overflows to two primary clarifiers, T-96 and T-96A, which operate in parallel. Each clarifier has a surface and bottom rake which remove solids from the clarifier. Solids from the top of the clarifier are collected in the waste sludge tank, T-91, and solids off of the bottom of the tank are returned to T-91A as recycled activated sludge. A portion of the recycled activated sludge is waste into T-91 to maintain sludge age. Flows from the top of the clarifiers are routed to the third “polishing” clarifier, T-93. Operators can maintain constant hydraulics to the system by pumping T-93 bottoms back to aeration tank T-91A as needed. Employees routinely monitor the depth to the sludge surface in the clarifiers to maintain an optimal depth of 12 to 15 feet.

Staff sample T-91A feed twice a day for chemical oxygen demand (COD). They also monitor for pH, ammonia, phosphorus, and mixed liquor suspended solids (MLSS). Emerald controls the COD and hydraulic loading to the plant through routine sampling.

Emerald adds polymers to the clarifiers as a flocculant (floc) or coagulant. During the day and night shifts, staff take water samples from the aeration tanks, clarifiers, and the final effluent. Operators visually compare the sample jars and check for floc formation.

Emerald uses catch basins and dry wells to manage stormwater from the employee parking lot and finished product storage lot. There are a total of 13 catch basins with 3 in the employee parking lot and 10 in the finished product storage lot. The dry wells are prefabricated concrete with 48 inch diameters and approximately 6 to 8 feet deep. Stormwater is collected in catch basins with organic traps and piped to the main dry well. The stormwater is discharged from the dry well into the soil around and the groundwater beneath the dry well. Potential contamination sources to the catch basins and dry well include motor oil form vehicles and fork lifts, and leaks from product storage totes or drums.

In August 2000, Ecology accepted Emerald's registration of the 13 catch basins/dry well into the Underground Injection Control (UIC) program. See Ecology's website at https://ecology.wa.gov/Regulations-Permits/Guidance-technical-assistance/Underground-injection-control-program for more information about Ecology's UIC program. Ecology considers the dry well at Emerald to be a Class V well.

Solid Wastes

Emerald generates various solid wastes onsite including garbage, recyclables (paper, plastic, glass, metal, and wood), contaminated soil from spills, and sludge associated with the wastewater treatment system. The solid waste generated onsite is sent offsite for disposal. Emerald also generates solid waste that designates as dangerous waste. Dangerous waste generated onsite is managed according to WAC 173-303. Emerald has a pollution prevention plan that includes past solid waste control plan requirements. The proposed permit requires Emerald to submit an updated pollution prevention plan that includes solid waste control plan elements. The proposed permit also requires Emerald to handle and dispose of all solid waste material in such a manner as to prevent its entry into state ground or surface water.

In 1986, the facility added a dissolved air flotation (DAF) unit to treat sludge from the clarifiers. The facility later installed a SOMAT sludge press and removed the DAF from use.

Emerald also adds a higher molecular weight polymer to the sludge in the SOMAT press to improve de-watering. The SOMAT press dewaters the waste sludge to about 8.5 to 9.5 percent solids. Water removed by the SOMAT press is returned to aeration tank T-91A. Emerald disposes of the sludge at a hazardous waste permitted landfill in Arlington, Oregon.

Emerald generates approximately 40 tons per week of industrial wastewater biological solids (IWBS) from the wastewater treatment system. The IWBS is a listed hazardous waste. In 2018, Emerald petitioned EPA and Ecology to request that the IWBS be delisted and sent to a solid waste landfill. EPA and Ecology are processing this request.

Discharge Outfalls

Outfall 001 extends about 170 feet into the Columbia River. The submerged diffuser originally had a total of 756 ports along the last 100 feet of the outfall pipe. In 1992, the facility modified the diffuser by plugging approximately 400 of the ports. The diffuser is 50 feet in length. On April 15, 2010, Emerald had a contractor inspect the submerged portion of the outfall. The inspection showed 126 ports working. On February 16, 2012, Emerald had a contractor inspect the submerged portion of the outfall again. The inspection showed 97 ports working. The ports are 1.25 inches in diameter. The diffuser extends from a depth of about -5.0 feet to -45.5 feet mean sea level (MSL). The diffuser continuously discharges non-contact cooling water mixed with effluent from the biological treatment plant. See Figure 2 for a map of Emerald's discharge and wastewater treatment locations.

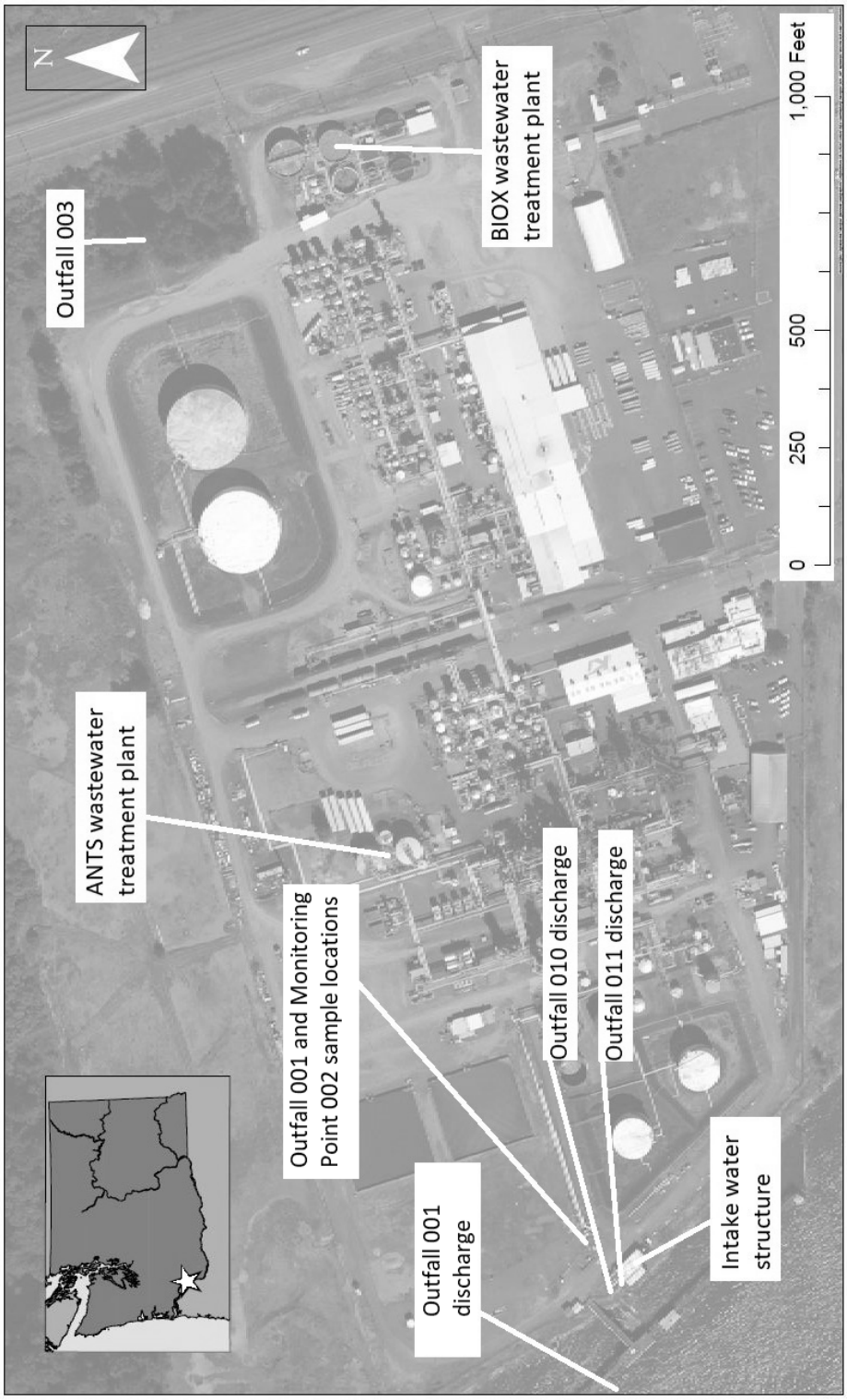
Treated effluent from the BIOX system is discharged at Monitoring Point 002. The Monitoring Point 002 BIOX effluent does not directly discharge to the Columbia River as a single wastewater stream. The treated effluent flows into an open-air concrete mixing basin and combines with non-contact cooling water before discharging through Outfall 001.

Emerald collects grab and composite samples of the Monitoring Point 002 effluent before it mixes with the non-contact cooling water. Emerald collects grab samples from the Outfall 001 discharge (non-contact cooling water and treated BIOX effluent) directly from the mixing basin.

Outfall 003 is a stormwater outfall on the east side of the facility just north of the BIOX plant which discharges to a wetland area. Outfall 003 drains the secondary containment area for toluene tanks T-70 and T-71. Emerald last discharged through Outfall 003 in January 2002. The outfall's valve is normally closed, blinded, and padlocked.

Outfalls 010 and 011 are filter backwash water discharges near the intake cooling water structure. Columbia River water is filtered before use as non-contact cooling water in Emerald's facility. The two filters are automatically and continuously cleaned which creates filter backwash water.

Figure 2 Facility Outfall Map



B. Description of the Receiving Water

Emerald discharges non-contact cooling water, treated BIOX effluent, and filter backwash water to the Columbia River at River Mile 74. According to Ecology's Permitting and Reporting Information System (PARIS; available online at https://fortress.wa.gov/ecy/paris/PermitLookup.aspx), other nearby point source outfalls include various industrial sites with coverage under the Industrial Stormwater General Permit (ISGP) and the City of Kalama's Sewage Treatment Plant. Significant nearby non-point sources of pollutants include stormwater runoff from roads. Heavy industrial traffic uses the roads which may result in pollutants entering the receiving water near Emerald's outfalls.

There are no nearby drinking water intakes on the Columbia River. See Section III.E, "Water Quality Impairments" which describes any receiving waterbody impairments.

The Columbia River ambient background data used in this permit is in Table 2.

Table 2 Ambient Background Data

Parameter	Value Used [a]
Temperature (highest annual maximum)	23.90 °C
Temperature (annual 90th percentile)	22.16 °C
Temperature (June 15th - September 15th, 90th percentile)	22.41 °C
Temperature (September 16th - June 14th, 90th percentile)	19.05 °C
pH (minimum / maximum)	7.4 / 8.9 standard units (SU)
Dissolved Oxygen Percent Saturation (minimum)	94.1%
Dissolved Oxygen Percent Saturation (10th percentile)	97.2%
Turbidity (90th percentile)	7.43 Nephelometric Turbidity Units (NTU)
Ammonia as N (90th percentile)	0.03 mg/L
Suspended Solids (90th percentile)	13.7 mg/L
Hardness (estimated 90th percentile [b])	104.86 mg/L
Chromium, dissolved (estimated 90th percentile [b])	0.56 µg/L
Copper, dissolved (geometric mean)	0.65 micrograms/liter (µg/L)
Copper, dissolved (estimated 90th percentile [b])	1.12 µg/L
Mercury [c], dissolved (geometric mean)	1.39 nanograms/liter (ng/L)
Mercury [c], dissolved (estimated 90th percentile [b])	2.42 ng/L
Nickel, dissolved (geometric mean)	0.55 µg/L
Nickel, dissolved (estimated 90th percentile [b])	0.95 µg/L

Parameter	Value Used [a]
Zinc, dissolved (geometric mean)	3.16 µg/L
Zinc, dissolved (90th percentile)	52.0 µg/L

Footnotes:

a The values are from Ecology's EIM database (https://ecology.wa.gov/Research-Data/Data-resources/Environmental-Information-Management-database) for river miles 75.9 to 109.5 from 2001 to 2019.

b Estimated 90th percentile means when the number of data points is less than 21, the geometric mean of the receiving water values are multiplied by a factor of 1.74 to estimate the 90th percentile.

c The ambient data for mercury was in the total fraction. A metal translator of 0.85 was used to estimate the dissolved fraction of mercury.

C. Wastewater Characterization

Emerald reported the concentration of pollutants described below in the permit application, discharge monitoring reports (DMRs), and annual priority pollutant scans. The combined non-contact cooling water and treated BIOX effluent at Outfall 001 is shown in Table 3 and the treated BIOX effluent at Monitoring Point 002 is shown in Table 4. The following tables also include Ecology's inspection monitoring results. The tabulated data for Outfall 001 and Monitoring Point 002 represent the quality of the discharges from the three-year period February 2017 through January 2020. Using data from no more than the previous three years is consistent with the instructions for EPA Forms 2C and 2F for NPDES permit renewal applications. Emerald has not discharged from Outfall 003 since January 2002. The discharges are characterized as follows:

Table 3 Outfall 001 Characterization

Parameter	Units	# of Samples (# of non-detects)	Average Value [a]	95th Percentile	Maximum Value [a]
Flow	MGD [b]	1095 (0)	12.4	-	15.0
Toluene	µg/L	45 (41)	11.3	1.00 [c]	460.0
Temperature (annual)	°C	1095 (0)	-	31.9	34.6
Temperature (June 15th - September 15th)	°C	279 (0)	-	33.4	34.6
Temperature (September 16th - June 14th)	°C	816 (0)	-	27.7	29.8

Footnotes:

a For data sets that include sample results that were non-detect, the average and maximum values were calculated using the detection limit. For example, if a sample result was non-detect at 2.0 milligrams per liter (mg/L), then 2.0 mg/L was used to calculate the average and maximum values.

b MGD means million gallons per day.

c This value is for the 50th percentile, not the 95th percentile.

Table 4 Monitoring Point 002 Characterization

Parameter	Units	# of Samples (# of non-detects)	Average Value [a]	Maximum Value [a]
Flow	MGD	1095 (0)	0.334	0.503
BOD_5	mg/L	260 (0)	7.8	39
BOD_5	lbs/day [b]	260 (0)	21.5	114
Total Suspended Solids (TSS)	mg/L	166 (0)	15.5	268
TSS	lbs/day	166 (0)	37.8	565
Oil and Grease	mg/L	1 (0)	-	2.37
pH	SU	1098 (0)	7.4 [c]	8.9
Aluminum, total	µg/L	1 (0)	-	6.06
Antimony, total	µg/L	4 (1)	1.0	3.6
Arsenic, total	µg/L	5 (1)	1.81	6.0
Chromium, total	µg/L	5 (1)	0.73	1.23
Copper, total	µg/L	43 (2)	7.4	29.6
Copper, total	lbs/day	43 (2)	0.020	0.079
Fluoride	µg/L	1 (0)	-	241
Iron, total	µg/L	1 (0)	-	26.2
Manganese, total	µg/L	1 (0)	-	6.34
Mercury, total	ng/L	4 (3)	13.3	50.0
Nickel, total	µg/L	43 (0)	16.4	27.8
Nickel, total	lbs/day	43 (0)	0.045	0.082
Zinc, total	µg/L	43 (2)	14.4	68.00
Zinc, total	lbs/day	43 (2)	0.041	0.243
Ammonia (as N)	mg/L	1 (0)	-	2.97

Parameter	Units	# of Samples (# of non-detects)	Average Value [a]	Maximum Value [a]
Alkalinity	mg/L	1 (0)	-	579
Total Dissolved Solids	mg/L	1 (0)	-	849
Nitrate-Nitrite as N	mg/L	2 (0)	2.3	4.4
Total Organic Nitrogen	mg/L	1 (0)	-	2.06
Total Phosphorus	mg/L	2 (0)	2.04	3.48
Acenaphthene	µg/L	12 (12)	0.11	0.28
Acenaphthene	lbs/day	12 (12)	0.0003	0.0008
Acenaphthylene	µg/L	12 (12)	0.11	0.30
Acenaphthylene	lbs/day	12 (12)	0.0003	0.0009
Acrylonitrile	µg/L	6 (6)	0.08	0.12
Acrylonitrile	lbs/day	6 (6)	0.0002	0.0004
Anthracene	µg/L	12 (12)	0.16	0.34
Anthracene	lbs/day	12 (12)	0.0004	0.0010
Benzene	µg/L	19 (19)	0.44	1.00
Benzene	lbs/day	19 (19)	0.0012	0.0036
Benzo(a)anthracene	µg/L	12 (12)	0.15	0.26
Benzo(a)anthracene	lbs/day	12 (12)	0.0004	0.0008
3,4-Benzofluoranthene	µg/L	12 (12)	0.13	0.28
3,4-Benzofluoranthene	lbs/day	12 (12)	0.0004	0.0008
Benzo(k)fluoranthene	µg/L	12 (12)	0.14	0.33
Benzo(k)fluoranthene	lbs/day	12 (12)	0.0004	0.0010
Benzo(a)pyrene	µg/L	12 (12)	0.13	0.38
Benzo(a)pyrene	lbs/day	12 (12)	0.0004	0.0012
Bis(2-ethylhexyl) phthalate	µg/L	12 (10)	1.14	2.42
Bis(2-ethylhexyl) phthalate	lbs/day	12 (10)	0.0032	0.0064
Carbon Tetrachloride	µg/L	12 (12)	0.53	1.00
Carbon Tetrachloride	lbs/day	12 (12)	0.0015	0.0032
Chlorobenzene	µg/L	12 (12)	0.53	1.00
Chlorobenzene	lbs/day	12 (12)	0.0015	0.0032

Parameter	Units	# of Samples (# of non-detects)	Average Value [a]	Maximum Value [a]
Chloroethane	µg/L	12 (12)	0.58	1.00
Chloroethane	lbs/day	12 (12)	0.0016	0.0032
Chloroform	µg/L	12 (7)	0.53	1.00
Chloroform	lbs/day	12 (7)	0.0015	0.0027
2-Chlorophenol	µg/L	12 (12)	0.29	0.43
2-Chlorophenol	lbs/day	12 (12)	0.0008	0.0013
Chrysene	µg/L	12 (12)	0.19	0.41
Chrysene	lbs/day	12 (12)	0.0005	0.0013
Di-n-butyl phthalate	µg/L	12 (8)	0.53	1.34
Di-n-butyl phthalate	lbs/day	12 (8)	0.0015	0.0036
1,2-Dichlorobenzene	µg/L	12 (12)	0.23	1.00
1,2-Dichlorobenzene	lbs/day	12 (12)	0.0006	0.0027
1,3-Dichlorobenzene	µg/L	12 (12)	0.23	1.00
1,3-Dichlorobenzene	lbs/day	12 (12)	0.0006	0.0027
1,4-Dichlorobenzene	µg/L	12 (12)	0.23	1.00
1,4-Dichlorobenzene	lbs/day	12 (12)	0.0006	0.0027
1,1-Dichloroethane	µg/L	12 (12)	0.53	1.00
1,1-Dichloroethane	lbs/day	12 (12)	0.0015	0.0032
1,2-Dichloroethane	µg/L	12 (12)	0.54	1.00
1,2-Dichloroethane	lbs/day	12 (12)	0.0015	0.0032
1,1-Dichloroethylene	µg/L	12 (12)	0.54	1.00
1,1-Dichloroethylene	lbs/day	12 (12)	0.0015	0.0032
1,2-trans-Dichloroethylene	µg/L	12 (11)	1.25	9.56
1,2-trans-Dichloroethylene	lbs/day	12 (11)	0.0034	0.0258
2,4-Dichlorophenol	µg/L	12 (12)	0.54	0.80
2,4-Dichlorophenol	lbs/day	12 (12)	0.0015	0.0025
1,2-Dichloropropane	µg/L	12 (12)	0.54	1.00
1,2-Dichloropropane	lbs/day	12 (12)	0.0015	0.0032
1,3-Dichloropropylene	µg/L	12 (12)	0.53	1.00

Parameter	Units	# of Samples (# of non-detects)	Average Value [a]	Maximum Value [a]
1,3-Dichloropropylene	lbs/day	12 (12)	0.0015	0.0032
Diethyl phthalate	µg/L	12 (12)	0.17	0.34
Diethyl phthalate	lbs/day	12 (12)	0.0005	0.0010
2,4-Dimethylphenol	µg/L	12 (12)	0.65	1.20
2,4-Dimethylphenol	lbs/day	12 (12)	0.0018	0.0035
Dimethyl phthalate	µg/L	12 (12)	0.23	0.73
Dimethyl phthalate	lbs/day	12 (12)	0.0007	0.0022
4,6-Dinitro-o-cresol	µg/L	12 (12)	1.24	2.40
4,6-Dinitro-o-cresol	lbs/day	12 (12)	0.0035	0.0072
2,4-Dinitrophenol	µg/L	12 (12)	0.64	1.10
2,4-Dinitrophenol	lbs/day	12 (12)	0.0018	0.0031
2,4-Dinitrotoluene	µg/L	12 (12)	0.27	0.32
2,4-Dinitrotoluene	lbs/day	12 (12)	0.0008	0.0010
2,6-Dinitrotoluene	µg/L	12 (12)	0.24	0.32
2,6-Dinitrotoluene	lbs/day	12 (12)	0.0007	0.0010
Ethylbenzene	µg/L	19 (19)	0.44	1.00
Ethylbenzene	lbs/day	19 (19)	0.0013	0.0036
Fluoranthene	µg/L	12 (12)	0.19	0.46
Fluoranthene	lbs/day	12 (12)	0.0005	0.0014
Fluorene	µg/L	19 (19)	0.13	0.26
Fluorene	lbs/day	19 (19)	0.0004	0.0008
Hexachlorobenzene	µg/L	12 (12)	0.15	0.28
Hexachlorobenzene	lbs/day	12 (12)	0.0004	0.0008
Hexachlorobutadiene	µg/L	12 (12)	0.31	1.00
Hexachlorobutadiene	lbs/day	12 (12)	0.0009	0.0027
Hexachloroethane	µg/L	12 (12)	0.29	1.00
Hexachloroethane	lbs/day	12 (12)	0.0008	0.0027
Methyl Chloride	µg/L	12 (12)	0.53	1.00
Methyl Chloride	lbs/day	12 (12)	0.0015	0.0032
Methylene Chloride	µg/L	12 (12)	1.05	1.63
Methylene Chloride	lbs/day	12 (12)	0.0030	0.0058

Parameter	Units	# of Samples (# of non-detects)	Average Value [a]	Maximum Value [a]
Naphthalene	µg/L	19 (19)	0.28	1.00
Naphthalene	lbs/day	19 (19)	0.0008	0.0027
Nitrobenzene	µg/L	12 (12)	0.14	0.37
Nitrobenzene	lbs/day	12 (12)	0.0004	0.0011
2-Nitrophenol	µg/L	12 (12)	0.21	0.36
2-Nitrophenol	lbs/day	12 (12)	0.0006	0.0011
4-Nitrophenol	µg/L	10 (10)	1.18	2.40
4-Nitrophenol	lbs/day	10 (10)	0.0033	0.0072
Phenanthrene	µg/L	12 (12)	0.15	0.25
Phenanthrene	lbs/day	12 (12)	0.0004	0.0008
Phenol	µg/L	19 (16)	0.33	0.84
Phenol	lbs/day	19 (16)	0.0010	0.0031
Pyrene	µg/L	12 (12)	0.18	0.48
Pyrene	lbs/day	12 (12)	0.0005	0.0015
Tetrachloroethylene	µg/L	12 (12)	0.58	1.00
Tetrachloroethylene	lbs/day	12 (12)	0.0016	0.0032
Toluene	µg/L	19 (18)	0.50	1.00
Toluene	lbs/day	19 (18)	0.0014	0.0036
1,2,4-Trichlorobenzene	µg/L	12 (12)	0.59	1.00
1,2,4-Trichlorobenzene	lbs/day	12 (12)	0.0017	0.0032
1,1,1-Trichloroethane	µg/L	12 (12)	0.52	1.00
1,1,1-Trichloroethane	lbs/day	12 (12)	0.0015	0.0032
1,1,2-Trichloroethane	µg/L	12 (12)	0.58	1.00
1,1,2-Trichloroethane	lbs/day	12 (12)	0.0016	0.0032
Trichloroethylene	µg/L	12 (12)	0.54	1.00
Trichloroethylene	lbs/day	12 (12)	0.0015	0.0032
Vinyl Chloride	µg/L	12 (12)	0.56	1.00
Vinyl Chloride	lbs/day	12 (12)	0.0016	0.0032

Footnotes:

a For data sets that include sample results that were non-detect, the average and maximum values were calculated using the detection limit. For example, if a sample result was non-detect at 2.0 milligrams per liter (mg/L), then 2.0 mg/L was used to calculate the average and maximum values.

b lbs/day means pounds per day.

c This value is the minimum pH, not the average.

D. Summary of Compliance with Previous Permit Issued

The previous permit placed effluent limits on temperature at Outfall 001 and on BOD_5, TSS, pH, copper, nickel, zinc, acenaphthene, acenaphthylene, acrylonitrile, anthracene, benzene, benzo(a)anthracene, 3,4-benzofluoranthene, benzo(k)fluoranthene, benzo(a)pyrene, bis(2-ethylhexyl) phthalate, carbon tetrachloride, chlorobenzene, chloroethane, chloroform, 2-chlorophenol, chrysene, di-n-butyl phthalate, 1,2-dichlorobenzene, 1,3-dichlorobenzene, 1,4-dichlorobenzene, 1,1-dichloroethane, 1,2-dichloroethane, 1,1-dichloroethylene, 1,2-trans-dichloroethylene, 2,4-dichlorophenol, 1,2-dichloropropane, 1,3-dichloropropylene, diethyl phthalate, 2,4-dimethylphenol, dimethyl phthalate, 4,6-dinitro-o-cresol, 2,4-dinitrophenol, 2,4-dinitrotoluene, 2,6-dinitrotoluene, ethylbenzene, fluoranthene, fluorene, hexachlorobenzene, hexachlorobutadiene, hexachloroethane, methyl chloride, methylene chloride, naphthalene, nitrobenzene, 2-nitrophenol, 4-nitrophenol, phenanthrene, phenol, pyrene, tetrachloroethylene, toluene, 1,2,4-trichlorobenzene, 1,1,1-trichloroethane, 1,1,2-trichloroethane, trichloroethylene, and vinyl chloride at Monitoring Point 002.

Ecology assessed compliance with the effluent limits and permit conditions throughout the duration of the previous permit issued on July 1, 2009 based on its review of the facility's discharge monitoring reports (DMRs) and on inspections.

Table 5 summarizes the violations that occurred during the last permit term.

Table 5 Violations

Date	Outfall	Parameter	Units	Result	Limit
7/1/2009	-	-	-	-	Late submittal of DMRs
3/1/2012	001	Toluene	µg/L	Not sampled	Once per month sampling frequency
10/24/2013	-	-	-	-	Biennial Progress Report - Pollution Prevention submitted late
11/4/2015	-	-	-	-	Biennial Progress Report - Pollution Prevention submitted late
7/1/2016	-	-	-	-	Late submittal of DMRs

Date	Outfall	Parameter	Units	Result	Limit
11/28/2017	-	-	-	-	Biennial Progress Report - Pollution Prevention submitted late
2/1/2018	002	Zinc	lbs/day	0.243	Exceeded the average monthly loading permit limit of 0.193 lbs/day
2/20/2018	001	Toluene	µg/L	460	No limit, unauthorized discharge from non-contact cooling water system
4/30/2018	-	-	-	-	Failed to conduct wet season stormwater inspection between October 1, 2017 and April 30, 2018
5/1/2018	-	-	-	-	Late submittal of DMRs
12/31/2018	-	-	-	-	Priority Pollutant Scan sampled late [a]
9/12/2019	002	pH	-	-	Analysis not conducted due to equipment/system failure
9/13/2019	002	pH	-	-	Analysis not conducted due to equipment/system failure
10/30/2019	-	-	-	-	Late submittal of DMRs
11/1/2019	002	TSS	lbs/day	150	Exceeded the average monthly loading permit limit of 129 lbs/day [b]
11/27/2019	002	TSS	lbs/day	566	Exceeded the daily maximum loading permit limit of 418 lbs/day [b]
12/20/2019	-	-	-	-	Biennial Progress Report - Pollution Prevention submitted late [b]

Footnotes:

a Ecology issued Emerald a $500 penalty on June 4, 2019 for the late sampling of Priority Pollutants.

b Ecology issued Emerald a $1,500 penalty on February 5, 2020 for the November 2019 monthly average and daily maximum total suspended solids limit violations and the late submittal of the 2019 Biennial Progress Report.

Table 6 summarizes compliance with report submittal requirements over the permit term according to PARIS.

Table 6 Permit Submittals

Submittal Name	Due Date	Received Date	Applicable Permit Section
Spill Prevention Plan	10/30/2009	11/3/2009	S9.
Pollution Prevention Plan	2/1/2010	2/2/2010	S10.A.
O&M - First Update and Review Confirmation Letter	7/1/2010	7/1/2010	S4.A.
O&M - First Update and Review Confirmation Letter	-	12/20/2011	S4.A.
Biennial Progress Report - Pollution Prevention	10/1/2011	9/29/2011	S10.D.
Spill Prevention Plan	-	11/15/2011	S9.
Priority Pollutant Scan	7/30/2012	7/30/2012	S14.
O&M - First Update and Review Confirmation Letter	12/31/2012	-	S4.A.
Outfall Evaluation Inspection Report	7/1/2013	7/1/2013	S11.
O&M - Treatment System Operating Plan	7/1/2013	7/1/2013	S4.A.
Solid Waste Control Plan Update	7/1/2013	7/1/2013	S7.C.
Application For Permit Renewal	7/1/2013	7/1/2013	S5.
Toxicity - Acute Testing	-	7/1/2013	S12.A.
Toxicity - Acute Testing	-	7/1/2013	S12.A.
Toxicity - Acute Testing	-	7/1/2013	S12.A.
Toxicity - Acute Testing	-	7/1/2013	S12.A.
Toxicity - Acute Summary Report	7/1/2013	7/1/2013	S12.B.
Toxicity - Chronic Testing	-	7/1/2013	S13.A.
Toxicity - Chronic Testing	-	7/1/2013	S13.A.
Toxicity - Chronic Testing	-	7/1/2013	S13.A.
Toxicity - Chronic Testing	-	7/1/2013	S13.A.
Toxicity - Chronic Summary Report	7/1/2013	7/1/2013	S13.B.
Priority Pollutant Scan	7/3/2013	7/3/2013	S14.
Biennial Progress Report - Pollution Prevention	10/1/2013	10/24/2013	S10.D.

Submittal Name	Due Date	Received Date	Applicable Permit Section
O&M - First Update and Review Confirmation Letter	12/31/2013	7/1/2013	S4.A.
O&M - First Update and Review Confirmation Letter	1/13/2015	1/13/2015	S4.A.
Biennial Progress Report - Pollution Prevention	10/1/2015	11/4/2015	S10.D.
O&M - First Update and Review Confirmation Letter	12/31/2015	10/27/2015	S4.A.
Priority Pollutant Scan	7/30/2016	7/27/2016	S14.
Priority Pollutant Scan	-	9/15/2016	S14.
O&M - First Update and Review Confirmation Letter	3/24/2017	3/24/2017	S4.A.
Biennial Progress Report - Pollution Prevention	10/1/2017	11/28/2017	S10.D.
O&M - First Update and Review Confirmation Letter	12/31/2017	11/3/2017	S4.A.
Signatory Requirements	-	8/17/2018	G1.C
Signatory Requirements	-	11/6/2018	G1.C
O&M - First Update and Review Confirmation Letter	12/31/2018	12/24/2018	S4.A
Priority Pollutant Scan	5/13/2019	4/23/2019	S.14
Biennial Progress Report - Pollution Prevention	10/1/2019	12/26/2019	S10.D
5 Day Follow-up Report	-	12/16/2019	S3
O&M - First Update and Review Confirmation Letter	12/31/2019	12/26/2019	S4.A

E. 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 National Toxics Rule (40 CFR 131.36).
- 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.

A. 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 engineering report prepared by Parametrix, Inc. for Emerald dated February 1995. Table 7 includes design criteria from the referenced report.

Table 7 Design Criteria for Emerald's Wastewater Treatment System

Parameter	Design Criteria
BIOX Plant Flow – peak instantaneous	400 gpm
BIOX Plant BOD_5 – maximum daily influent	5,006 lbs/day
ANTS Plant Flow – peak instantaneous	50 gpm
ANTS Plant COD – maximum daily influent	28,000 lbs/day

B. Technology-Based Effluent Limits

Ecology must ensure that facilities provide AKART when it issues a permit.

Ecology calculated effluent limits for Emerald based on Best Available Technology Economically Achievable (BAT) and Best Practicable Control Technology Currently Available (BPT) developed by EPA. The federal effluent guidelines applicable to Emerald were published July 9, 1993 under 40 CFR Part 414 Organic Chemicals, Plastics, and Synthetic Fibers (OCPSF) for the Commodity Organic Chemicals (Subpart F), Bulk Organic Chemicals (Subpart G), Specialty Organic Chemicals (Subpart H), and Direct Discharge Point Sources That Use End-of-Pipe Biological Treatment (Subpart I) subcategories. The technology-based effluent limit calculations are tabulated in **Appendix E**. Ecology followed the guidance in EPA's *Development Document for Effluent Limitations: Guidelines and Standards for the Organic Chemicals, Plastics and Synthetic Fibers Point Source Category* (*Development Document*, EPA Publication 440/1-87/009) and EPA's *Supplement to the Development Document for Effluent Limitations Guidelines and New Source Performance Standards for the Organic Chemicals, Plastics, and Synthetic Fibers Point Source Category* (*Supplement to the Development Document*, EPA Publication 821-R-93-007) in determining the basis for Emerald's effluent limits.

EPA's *Development Document* includes guidance for the appropriate flow basis for converting the concentrations in the federal effluent guidelines into mass-based limitations. According to the *Development Document*, Ecology should use the facility's annual average process wastewater flow to calculate the mass-based limitations for the discharge at Monitoring Point 002. EPA says in the *Supplement to the Development Document*, that design-based flows are not recommended as appropriate bases for determining a facility's annual average process wastewater flow.

Emerald provided average flows for process wastewater, stormwater from non-process areas, and groundwater to the wastewater treatment system from January 1, 2015 to August 31, 2020. Ecology used these flow values to calculate the OCPSF effluent limits.

In the previous permit issued in 2009, Ecology used design flow values to calculate the OCPSF effluent limits. Based on EPA's guidance, Ecology calculated effluent limits in the proposed permit using average flows, not design flow, which increases limits for some parameters and decreased limits for other parameters compared to previous permit limits. Ecology also used production values from 2015 through August 2020 in calculating the effluent limits. Any changes in production from the previous permit may also have resulted in different effluent limits.

According to EPA's *Development Document*, Ecology may provide additional discharge allowances on a case-by-case basis for pollutants present at significant levels in non-OCPSF and non-process wastewaters such as stormwater and groundwater. Ecology used best professional judgement (BPJ) to include the flow from groundwater and stormwater in calculating mass effluent limitations for BOD_5, TSS, and the organic parameters. Ecology also used BPJ to include the flow from stormwater in calculating mass effluent limitations for copper, nickel, and zinc. Ecology based these BPJ determinations on the probability of finding the pollutants in the groundwater and stormwater at significant levels that could impact the wastewater treatment plant operation. The proposed limits for Monitoring Point 002 are shown in Table 16.

Ecology also requires facilities to use AKART in its wastewater treatment as required under Washington State regulations.

Ecology must decide whether the federal effluent guidelines constitute AKART. As a general rule, if the effluent guidelines for a particular category are five years old or less, they are considered to be AKART. This will be immediately apparent in reviewing the development document. The development document describes production processes, pollutants generated, treatment efficiencies, and unit process designs present nationwide in the specific industry at the time of effluent guideline development.

Generally, when effluent guidelines are over 10 years old, Ecology will analyze unit process designs and efficiencies to determine that the effluent guidelines constitute AKART and meet the intent of RCW 90.48.520.

Ecology compared Emerald's production processes, pollutants generated, and treatment technology to EPA's original development document and found that the facility's processes and operations remain consistent with the description in the development document. According to Emerald's 2018 operations and maintenance manual update, historical data has shown that the wastewater treatment system is 99% or more efficient in treating the facility's process wastewater, stormwater, and groundwater. The system is monitored continuously using instrumentation and operations personnel to ensure that the facility operates within design parameters. Based on this review, Ecology determined that Emerald is providing AKART for its wastewater and the federal effluent guideline constitutes AKART.

The state's antidegradation program is discussed later in this document (see Section III.C, "Surface Water Quality-Based Effluent Limits"). The federally mandated program has three tiers of protection. The Tier II antidegradation provisions limit the conditions under which waters of higher quality than standards can be degraded. A Tier II analysis is required for new or expanded sources of pollution from specific activities regulated by Ecology.

A greater than 10 percent increase to an existing effluent concentration or mass limit in an NPDES permit is considered an expanded action. The effective date of new or expanded actions is defined in WAC 173-201A-020 as those actions that result in an increase in pollution after July 1, 2003.

For purposes of evaluating a greater than 10 percent increase, Ecology set the baseline as those effluent limits that applied in July 2003. In this case, the baseline is the effluent limits in Emerald's NPDES permit issued on July 25, 2002.

Table 8 below compares the calculated effluent limits (from **Appendix E)** with the limits from the baseline permit issued in July 2002.

Table 8 Comparison of 2002 and Calculated Technology-Based Effluent Limits

Parameter	Units	2002 Average Monthly Limit	2002 Maximum Daily Limit	Calculated Average Monthly Limit	Calculated Maximum Daily Limit
BOD_5	lbs/day	104	277	116	311

Parameter	Units	2002 Average Monthly Limit	2002 Maximum Daily Limit	Calculated Average Monthly Limit	Calculated Maximum Daily Limit
TSS	lbs/day	127	412	153	494
pH	SU	- [a]	- [a]	- [b]	- [b]
Copper	lbs/day	0.67	1.54	0.411	0.958
Nickel	lbs/day	0.50	1.13	0.550	1.295
Zinc	lbs/day	0.49	1.19	0.298	0.740
Acenaphthene	lbs/day	0.106	0.283	0.063	0.168
Acenaphthylene	lbs/day	0.106	0.283	0.063	0.168
Acrylonitrile	lbs/day	0.461	1.163	0.273	0.688
Anthracene	lbs/day	0.106	0.283	0.063	0.168
Benzene	lbs/day	0.178	0.653	0.105	0.387
Benzo(a)anthracene	lbs/day	0.106	0.283	0.063	0.168
3,4-Benzofluoranthene	lbs/day	0.110	0.293	0.065	0.173
Benzo(k)fluoranthene	lbs/day	0.106	0.283	0.063	0.168
Benzo(a)pyrene	lbs/day	0.110	0.293	0.065	0.173
Bis(2-ethylhexyl) phthalate	lbs/day	0.495	1.340	0.293	0.793
Carbon Tetrachloride	lbs/day	0.086	0.183	0.051	0.108
Chlorobenzene	lbs/day	0.072	0.135	0.043	0.080
Chloroethane	lbs/day	0.500	1.287	0.296	0.762
Chloroform	lbs/day	0.101	0.221	0.060	0.131
2-Chlorophenol	lbs/day	0.149	0.471	0.088	0.279
Chrysene	lbs/day	0.106	0.283	0.063	0.168
Di-n-butyl phthalate	lbs/day	0.130	0.274	0.077	0.162
1,2-Dichlorobenzene	lbs/day	0.370	0.783	0.219	0.464
1,3-Dichlorobenzene	lbs/day	0.149	0.211	0.088	0.125
1,4-Dichlorobenzene	lbs/day	0.072	0.135	0.043	0.080
1,1-Dichloroethane	lbs/day	0.106	0.283	0.063	0.168
1,2-Dichloroethane	lbs/day	0.327	1.014	0.193	0.600
1,1-Dichloroethylene	lbs/day	0.077	0.120	0.046	0.071

Parameter	Units	2002 Average Monthly Limit	2002 Maximum Daily Limit	Calculated Average Monthly Limit	Calculated Maximum Daily Limit
1,2-trans-Dichloroethylene	lbs/day	0.101	0.259	0.060	0.154
2,4-Dichlorophenol	lbs/day	0.187	0.538	0.111	0.319
1,2-Dichloropropane	lbs/day	0.735	1.105	0.435	0.654
1,3-Dichloropropylene	lbs/day	0.139	0.211	0.082	0.125
Diethyl phthalate	lbs/day	0.389	0.975	0.230	0.577
2,4-Dimethylphenol	lbs/day	0.086	0.173	0.051	0.102
Dimethyl phthalate	lbs/day	0.091	0.226	0.054	0.134
4,6-Dinitro-o-cresol	lbs/day	0.375	1.331	0.222	0.788
2,4-Dinitrophenol	lbs/day	0.341	0.591	0.202	0.350
2,4-Dinitrotoluene	lbs/day	0.543	1.369	0.321	0.811
2,6-Dinitrotoluene	lbs/day	1.225	3.079	0.725	1.823
Ethylbenzene	lbs/day	0.154	0.519	0.091	0.307
Fluoranthene	lbs/day	0.120	0.327	0.071	0.193
Fluorene	lbs/day	0.106	0.283	0.063	0.168
Hexachlorobenzene	lbs/day	0.072	0.135	0.043	0.080
Hexachlorobutadiene	lbs/day	0.096	0.235	0.057	0.139
Hexachloroethane	lbs/day	0.101	0.259	0.060	0.154
Methyl Chloride	lbs/day	0.413	0.913	0.245	0.540
Methylene Chloride	lbs/day	0.192	0.428	0.114	0.253
Naphthalene	lbs/day	0.106	0.283	0.063	0.168
Nitrobenzene	lbs/day	0.130	0.327	0.077	0.193
2-Nitrophenol	lbs/day	0.197	0.331	0.117	0.196
4-Nitrophenol	lbs/day	0.346	0.596	0.205	0.353
Phenanthrene	lbs/day	0.106	0.283	0.063	0.168
Phenol	lbs/day	0.072	0.125	0.043	0.074
Pyrene	lbs/day	0.120	0.322	0.071	0.191
Tetrachloroethylene	lbs/day	0.106	0.269	0.063	0.159
Toluene	lbs/day	0.125	0.384	0.074	0.228
1,2,4-Trichlorobenzene	lbs/day	0.327	0.673	0.193	0.398

Parameter	Units	2002 Average Monthly Limit	2002 Maximum Daily Limit	Calculated Average Monthly Limit	Calculated Maximum Daily Limit
1,1,1-Trichloroethane	lbs/day	0.101	0.259	0.060	0.154
1,1,2-Trichloroethane	lbs/day	0.101	0.259	0.060	0.154
Trichloroethylene	lbs/day	0.101	0.259	0.060	0.154
Vinyl Chloride	lbs/day	0.500	1.287	0.296	0.762

Footnotes:

a Daily minimum is equal to or greater than 6 and the daily maximum is less than or equal to 9.0.

b Daily minimum is equal to or greater than 6.0 and the daily maximum is less than or equal to 9.0.

The calculated technology-based average monthly limits for BOD_5 and TSS are greater than 10 percent of the limits in Emerald's 2002 permit. Also, the calculated technology-based maximum daily limits for BOD_5, TSS, and nickel are also greater than 10 percent of the limits in Emerald's 2002 permit. Ecology set the five limits described above for BOD_5, TSS, and nickel to at or just below 10 percent greater of the limits in Emerald's 2002 permit. Therefore, a Tier II analysis is not required. Emerald will not be eligible for additional limit increases for the five limits described above for BOD_5, TSS, and nickel unless they do a Tier II analysis and no degradation is shown, or if it is in the public interest. During the next permit renewal, the limits may decrease if the average flows decrease. However, if the average flows increase, the limits will not increase unless Emerald does a Tier II analysis. The proposed limits for Monitoring Point 002 are shown in Table 16.

C. 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 (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 as adopted in the National Toxics Rule (40 CFR 131.36) remain in effect.

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); 2006) 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, 2006) and of all marine waters (WAC 173-201A-210, 2006) in the state of Washington.

Antidegradation

Description--The purpose of Washington's Antidegradation Policy (WAC 173-201A-300-330; 2006) is to:

- Restore and maintain the highest possible quality of the surface waters of Washington.
- Describe situations under which water quality may be lowered from its current condition.
- Apply to human activities that are likely to have an impact on the water quality of surface water.
- Ensure that all human activities likely to contribute to a lowering of water quality, at a minimum, apply 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.

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 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)].

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.

Each aquatic life *acute* criterion is 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. Each aquatic life *chronic* criterion is 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 Emerald meets the requirements of AKART (see Section III.B, "Technology-Based Effluent 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/SummaryPages/92109.html.

Ecology obtained ambient data at critical conditions in the vicinity of Outfall 001 from the June 1993 mixing zone study report prepared by Beak Consultants, Inc. as shown in Table 9. The proposed permit requires Emerald to perform a new mixing zone study to update the information in Table 9.

Table 9 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)	87,585 cubic feet per second
Channel cross-sectional area	91,880 square feet
Channel width	3,700 feet
Near shore current speed	0.20 feet per second
Ambient temperature	21.5 °C
90th percentile of maximum effluent temperature	34 °C
99th percentile of maximum effluent temperature	40.9 °C
90th percentile of maximum effluent flow	22.44 MGD
Elevation (MSL) of river at 7Q10	20.0 feet
Depth of water over the last (farthest to shore) diffuser port [a]	65.5 feet
Depth of water over the first (closest to shore) diffuser port [a]	25 feet
Number of ports	350
Port elevation [b]	0.0 feet
Port diameter	1.25 inches
Port spacing	6.0 inches
Vertical discharge angle [c]	varies
Horizontal discharge angle [d]	150°

Footnotes:

a These values are estimated based on available information.

b There are no ports coming off of the outfall pipe. The ports are holes in the outfall pipe, similar to a perforated pipe.

c Since the ports are holes in the outfall pipe, the discharge angle is perpendicular to the outfall pipe where the port is located

d The angle between the upstream river bank and the outfall is 150° and the angle between the downstream river bank and the outfall is 30°.

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.

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.

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. Although the Columbia River is tidally influenced from the Pacific Ocean to Bonneville Dam near river mile 145, the plume orientation within the mixing zone probably does not change direction. 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 to 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.

- **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.

D. 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). Tables 10 and 11 summarize the criteria applicable to this facility's discharge.

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.

According to Table 602 in WAC 173-201A-602, Emerald's discharge is in the "Columbia River from mouth to the Washington-Oregon border (River Mile 309.3)" category. The aquatic life use designation is "Spawning/Rearing" which includes salmonid spawning, rearing, and migration. The recreation use designation is "Primary Cont" which means primary contact recreation.

Table 10 Freshwater Aquatic Life Uses and Associated Criteria

Parameter	Criteria
Description	The key identifying characteristic of this use is salmon or trout spawning and emergence that only occurs outside of the summer season (September 16 - June 14). Other common characteristic aquatic life uses for waters in this category include rearing and migration by salmonids.
Temperature Criteria – 1-DMax [a]	Temperature shall not exceed a 1-day maximum (1-DMax) of 20.0°C due to human activities. When natural conditions exceed a 1-DMax of 20.0°C, no temperature increase will be allowed which will raise the receiving water temperature by greater than 0.3°C; nor shall such temperature increases, at any time, exceed 0.3°C due to any single source or 1.1°C due to all such activities combined.
Dissolved Oxygen Criteria – Lowest 1-Day Minimum [a]	Dissolved oxygen shall exceed 90 percent of saturation.
Turbidity Criteria	Turbidity shall not exceed: • 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 shall 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.

Footnote:

a See footnote 1 of Table 602 in WAC 173-201A-602(1) for the Columbia River. The criteria notes in Table 602 take precedence over the criteria in WAC 173-201A-200 for the same parameter.

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

Table 11 Recreational Uses and Associated Criteria

Recreational Use	Criteria
Primary Contact Recreation	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.

The *water supply uses* are domestic, industrial, agricultural, and stock watering.

The *miscellaneous freshwater uses* are wildlife habitat, harvesting, commerce and navigation, boating, and aesthetics.

E. Water Quality Impairments

The Columbia River is listed on the current 303(d) and is impaired (Category 5) for dieldrin, polychlorinated biphenyls (PCBs), and temperature in the vicinity of Outfall 001. The Columbia River is listed for a number of other pollutants in Categories 4A and 2, including dioxin, total dissolved gas, dichlorodiphenyldichloroethylene (4,4'-DDE), arsenic, bis(2-ethylhexyl) phthalate, and temperature. The waterway was listed in these categories because pollutants were detected in the tissue and water samples above standards or thresholds. Table 12 lists the water quality impairments in several segments of the Columbia River near Emerald's discharge.

Table 12 Water Quality Impairments

Listing ID	Parameter	Medium	Category
8782	Dieldrin	Tissue	5
8783	PCBs	Tissue	5
3785, 21538	Temperature	Water	5
8776, 8785	Dioxin	Water	4A
3786, 7812	Total Dissolved Gas	Water	4A
8784	4,4'-DDE	Tissue	2
8787	Arsenic	Water	2
8780, 8781	Bis(2-ethylhexyl) phthalate	Tissue	2
7810	Temperature	Water	2

The Columbia River near Emerald's outfall is impaired and on the 303(d) list for dieldrin and PCBs because in 1993 there were three excursions beyond the national toxics rule criterion in the edible tissue of an individual white sturgeon at River Mile 75.

Ecology has not conducted a Total Maximum Daily Load (TMDL) analyses for dieldrin and PCBs on the Columbia River near Emerald's outfall. Based on the information available, Ecology determined that the Emerald facility is not a contributing source of dieldrin and PCBs.

Ecology considers the entire Columbia River impaired for temperature. On May 18, 2020, EPA issued a TMDL for temperature in the Columbia and lower Snake Rivers. EPA used heat load (the product of temperature, flow, and a conversion factor) to determine wasteload allocations (WLAs) for three main source categories: tributaries, current and future point sources subject to NPDES permits, and nonpoint source impacts from dams and reservoirs. Emerald's facility is listed in the TMDL as receiving a WLA of 1.97×10^9 kilocalories per day (kcal/day) of heat load. EPA calculated the WLA for Emerald's facility using a flow of 15.0 MGD and a temperature of 34.7 °C. A conversion factor of approximately 3.77×10^6 was used to multiply 15.0 MGD with 34.7 °C to get the heat load of 1.97×10^9 kcal/day.

According to the TMDL, the WLA will only apply from July through October and is expressed as an average monthly limit. The proposed permit includes the WLA as a limit. Emerald will report average flow and temperature values for every day in a month. From those daily values, Emerald will calculate average monthly flow and average monthly temperature values. Finally, Emerald will multiply the average monthly flow, average monthly temperature, and the conversion factor to calculate the average monthly heat load. This calculated heat load will be compared to the WLA to determine compliance. For more information on EPA's temperature TMDL, see EPA's website at https://www.epa.gov/columbiariver/tmdl-temperature-columbia-and-lower-snake-rivers.

Further discussion regarding temperature is in Section III.G, "Evaluation of Surface Water Quality-Based Effluent Limits for Numeric Criteria".

For more information on how Ecology assesses water quality data and determines if water bodies are polluted, see Water Quality Policy 1-11 at https://ecology.wa.gov/Water-Shorelines/Water-quality/Water-improvement/Assessment-of-state-waters-303d/Assessment-policy-1-11. For more information on specific listings, enter the Listing ID number on the Washington State Water Quality Assessment search tool at https://apps.ecology.wa.gov/ApprovedWQA/ApprovedPages/ApprovedSearch.aspx.

F. 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 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.

G. 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 biological oxygen demand (BOD) 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.

The diffuser at Outfall 001 is 50 feet long with a diameter of 30 inches. The diffuser has a total of 350, 1.25 inch diameter ports. The distance between each row of ports is six inches. The depth of water over the first (closest to shore) diffuser port is approximately 25 feet and the depth of water over the last (farthest to shore) diffuser port is approximately 65 feet. The average elevation (MSL) of the river is approximately 20 feet. Ecology obtained this information from the June 1993 mixing zone study report prepared by Beak Consultants, Inc.

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 325 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 32.5 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 the June 1993 mixing zone study report prepared by Beak Consultants, Inc. The consultant used RSB to model dilution at the edge of the chronic mixing zone and the UM model with PLUMES interface, which estimates dilution closer to the diffuser than the RSB model, to model the dilution at the acute mixing zone.

Ecology used the same dilution factors from the previous permit, with the exception of assuming the human health criteria dilution factors are similar to the chronic aquatic life criteria dilution factors. The dilution factors are listed in Table 13 for Outfall 001 and Monitoring Point 002.

Table 13 Dilution Factors for Outfall 001 and Monitoring Point 002

Criteria	Dilution Factor
Outfall 001 - Acute Aquatic Life	8.3
Outfall 001 - Chronic Aquatic Life	21.1
Outfall 001 - Human Health, Carcinogen	21.1
Outfall 001 - Human Health, Non-carcinogen	21.1
Monitoring Point 002 - Acute Aquatic Life	359
Monitoring Point 002 - Chronic Aquatic Life	913
Monitoring Point 002 - Human Health, Carcinogen	913
Monitoring Point 002 - Human Health, Non-carcinogen	913

The Outfall 001 dilution factors come from the 1993 mixing study. In the fact sheet for the previous permit, Ecology determined that the mixing factor between the Monitoring Point 002 BIOX effluent and the non-contact cooling water flows was approximately 43.3. Multiplying the Outfall 001 dilution factors by the mixing factor of 43.3 gives an approximately dilution factor for pollutants discharged at Monitoring Point 002. For example, the Outfall 001 acute dilution factor of 8.3 is multiplied by 43.3 to get the Monitoring Point 002 acute dilution factor of 359. Also, the Outfall 001 chronic dilution factor of 21.1 is multiplied by 43.3 to get the Monitoring Point 002 chronic dilution factor of 913.

Ecology determined the impacts of dissolved oxygen deficiency, nutrients, pH, ammonia, metals, other toxics, 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 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 in the receiving water.

With technology-based limits, this discharge results in a small amount of BOD_5 loading 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.

pH--Ecology modeled the impact of the effluent pH on the receiving water using the calculations from EPA, 1988, and the chronic dilution factor tabulated above.

Ecology predicts no violation of the pH criteria under critical conditions. Therefore, the proposed permit includes technology-based effluent limits for pH.

Turbidity--Ecology evaluated the impact of turbidity based on the range of TSS in the effluent and the receiving water. Although turbidity and TSS are related, there is no universal correlation between them. In the absence of turbidity data for the effluent, Ecology believes considering TSS data is appropriate. The receiving water and effluent TSS data are shown in Table 14.

Table 14 Receiving Water and Effluent TSS Data

Statistics	Receiving Water [a]	Effluent [b]
Minimum (mg/L)	1.0	0.02
Average (mg/L)	7.1	0.36
90th percentile (mg/L)	13.7	0.77
Maximum (mg/L)	33.0	6.19

Footnotes:

a The receiving water data contains 42 samples from 2001 through 2015 and from river miles 75.9 to 109.5.

b The effluent data is from Monitoring Point 002 from February 2017 through January 2020. The values shown in this table apply the mixing factor from Monitoring Point 002 to Outfall 001 of 43.3 to compare to the receiving water data.

Based on the available TSS data, Ecology predicts no violation of the turbidity criteria under critical conditions. The proposed permit requires Emerald to monitor for turbidity at Outfall 001.

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.

To determine if a toxic pollutant is present in Emerald's discharge, Ecology considered any sample flag other than a non-detect as indicating the pollutant was present. For example, Ecology evaluated 12 sample results for chloroform. Seven of the results showed chloroform was not detected (typically given a sample flag of "U" or "<") and five of the results showed chloroform was positively identified but the actual concentration was an estimate (typically given a sample flag of "J").

Therefore, Ecology included chloroform in the reasonable potential analysis. In another example, Ecology evaluated 12 sample results for chloroethane. Ten of the results showed chloroethane was not detected and two of the results showed chloroethane was not detected but the detection level was an estimated value (typically given a sample flag of "UJ" or "<J"). Ecology did not include chloroethane in the reasonable potential analysis.

Toluene was determined to be present in the discharge at Outfall 001. The following toxic pollutants were determined to be present in the discharge at Monitoring Point 002: ammonia, antimony, arsenic, bis(2-ethylhexyl) phthalate, chloroform, chromium, copper, di-n-butyl phthalate, 1,2-trans-dichloroethylene, mercury, nickel, phenol, toluene, and zinc.

Ecology conducted a reasonable potential analysis (see **Appendices F and G**) on these pollutants 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 as shown in Table 2 and Ecology spreadsheet tools.

No valid ambient background data were available for antimony, bis(2-ethylhexyl) phthalate, arsenic, chloroform, di-n-butyl phthalate, 1,2-trans-dichloroethylene, phenol, and toluene. Ecology used zero for background.

Valid ambient background data were available for ammonia, chromium, copper, mercury, nickel, and zinc. Ecology used all applicable data to evaluate reasonable potential for this discharge to cause a violation of water quality standards.

Ecology determined that ammonia, antimony, bis(2-ethylhexyl) phthalate, chloroform, chromium, copper, di-n-butyl phthalate, 1,2-trans-dichloroethylene, mercury, nickel, phenol, toluene, and zinc pose no reasonable potential to exceed the water quality criteria at the critical condition using procedures given in EPA, 1991 (**Appendices F and G**) and as described above. Ecology's determination assumes that this facility meets the other effluent limits of this permit. Ecology determined that arsenic poses reasonable potential to exceed the water quality criteria at the critical condition using procedures given in EPA, 1991. Arsenic is discussed below (see Section III.H, "Human Health"). Water quality criteria for most metals published in chapter 173-201A WAC are based on the dissolved fraction of the metal (see footnotes to table WAC 173-201A-240(3); 2006).

Temperature--The state temperature standards (WAC 173-201A-200-210 and 600-612) include multiple elements:

- Annual summer maximum threshold criteria (June 15 to September 15)
- Supplemental spawning and rearing season criteria (September 16 to June 14)
- 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), 210(1)(c), and 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), 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.

EPA issued a TMDL for temperature on the Columbia and Lower Snake Rivers on May 18, 2020. The TMDL addresses Washington State's antidegradation policy by limiting the heat load discharged from tributaries, current and future NPDES point sources, and nonpoint source impacts from dams and reservoirs. Emerald's Outfall 001 discharge will have an average monthly heat load limit of 1.97×10^9 kcal/day applied from July through October. Further discussion regarding the temperature TMDL is in Section III.E, "Water Quality Impairments".

- Protections for temperature acute effects

Instantaneous lethality to passing fish: The upper 99^{th} 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 temperature water quality criteria for the Columbia River at Emerald's discharge is 20 °C. As shown in Table 2, the annual 90th percentile temperature of the Columbia River is 22.16 °C, which exceeds the temperature water quality criteria. The proposed permit requires Emerald to conduct a new mixing zone study. Ecology will evaluate the reasonable potential to exceed the temperature water quality criteria with the new information from the mixing zone study and updated temperature effluent data.

Ecology's *Water Quality Program Guidance Manual: Procedures to Implement the State's Temperature Standards through NPDES Permits* (Ecology Publication No. 06-10-100) available at https://fortress.wa.gov/ecy/publications/summarypages/0610100.html, describes the implementation of fresh water temperature criteria and provides the process that Ecology should use to determine temperature effluent limits in permits. According to Figure 2.1 in the guidance, if there is not enough data and information to calculate a reasonable potential to exceed standards, then Ecology may require a mixing zone study before evaluating reasonable potential.

Emerald's most recent mixing zone study was performed in 1993. In 1992, the outfall diffuser had approximately 356 functioning discharge ports. On April 15, 2010, Emerald had a contractor inspect the submerged portion of the outfall. The inspection showed only 126 working ports. On February 16, 2012, Emerald had a contractor inspect the submerged portion of the outfall again. This inspection showed 97 working ports. Emerald has not reported to Ecology the number of functioning discharge ports since 2012. Based on the reduction in functioning discharge ports, Ecology believes the dilution factor in the 1993 mixing zone study is no longer applicable. Ecology recognizes there is some dilution available, but the dilution is unknown. Therefore, there is not enough information to calculate an accurate reasonable potential for temperature at Outfall 001.

The proposed permit requires Emerald to first inspect the outfall diffuser and then perform an updated mixing zone study for Outfall 001 based on the number of functioning ports. Ecology will evaluate reasonable potential for temperature with the updated information from the mixing zone study and determine if the permit should be modified to include a more stringent temperature limit. The current limit from the previous permit is a maximum daily temperature of 40.7°C. The proposed permit retains this 40.7°C maximum daily temperature limit. EPA's TMDL does not replace the existing 40.7°C maximum daily temperature limit because the TMDL only addresses the antidegradation policy and does not evaluate for protection against acute effects. The 40.7°C limit is to ensure protection against acute effects.

H. 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 determined the effluent may contain chemicals of concern for human health, based on the facility's status as an EPA major discharger and data or information indicating the discharge contains regulated chemicals.

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. The evaluation showed that the discharges at Outfall 001 and 002 have no reasonable potential to cause a violation of human health-based water quality standards for antimony, bis(2-ethylhexyl) phthalate, chloroform, copper, di-n-butyl phthalate, 1,2-trans-Dichloroethylene, mercury, nickel, phenol, toluene, and zinc, and effluent limits are not needed (see **Appendices F and G**).

Ecology evaluated the discharge at Monitoring Point 002 for the potential to exceed the inorganic arsenic human health criteria. This evaluation included a review of all total recoverable arsenic data and available dilution. Ecology determined that there is a potential to exceed the arsenic human health criteria at Monitoring Point 002. This is a conservative determination while EPA reviews the inorganic arsenic human health criteria and until an approved analytical method for inorganic arsenic can be developed.

Ecology submitted newly adopted state Human Health Water Quality Criteria to the EPA for Clean Water Act review and approval in August 2016. Parts of that submittal to EPA were new total arsenic criteria of 10 µg/L for both marine and freshwaters. Additional requirements in the new state rule included pollutant minimization requirements for anthropogenic inputs of arsenic from both indirect and direct discharges. The state's new total arsenic criteria match the EPA's Safe Drinking Water Act maximum contaminant level (MCL) used in Washington State for drinking water protection. The state's new arsenic criteria took into account existing scientific data, high concentrations of naturally occurring arsenic in the State of Washington, and EPA's CWA approval of 10 µg/L total arsenic criteria in almost all other western states.

Ecology intended the new total arsenic criteria to supersede the inorganic arsenic human health criteria adopted for the State of Washington by the EPA in the 1992 National Toxics Rule (NTR; 40 CFR 131.36). The EPA's 1992 risk based human health criterion for marine waters is 0.14 µg/L inorganic arsenic, and is based on exposure from fish and shellfish tissue ingestion. The freshwater criterion is 0.018 µg/L, and is based on exposure from fish and shellfish tissue and surface water ingestion. The 2016 arsenic criteria adopted by Ecology eliminated uncertainties associated with the cancer potency factor used by the EPA in the 1992 NTR arsenic standards. However, the EPA disapproved Ecology's proposed total arsenic criteria in November 2016 and retained the inorganic arsenic human health criteria set in the 1992 NTR. The EPA's Technical Support Document for the approval/disapproval of Washington's Human Health Water Quality Criteria states that the federal agency intends to conduct a toxicological review of inorganic arsenic in 2017. The work has not yet been completed. This toxicological review could lead to an opportunity for Ecology to participate in a national dialogue associated with the update of the arsenic criteria in section 304(a) of the Clean Water Act.

Until the EPA inorganic arsenic review is completed, scientific information is updated, and Washington State adopts into rule EPA CWA-approvable new total or inorganic arsenic criteria, the EPA's existing marine and freshwater inorganic arsenic criteria remain in effect at 0.14 and 0.018 µg/L.

The EPA's disapproval of Washington's new total arsenic criteria continues to create several difficulties in the wastewater discharge permitting process.

One issue, as mentioned above, involves natural background concentrations of both marine and freshwaters that exceed the criteria. This can be particularly problematic for groundwater-sourced drinking waters with arsenic concentrations above 0.018 µg/L, which then pass through wastewater treatment plants after initial use. In this situation, no implementation tool exists to account for the naturally occurring element in the drinking water source. Intake credits do not apply in this situation because the source water and the receiving water must be the same body of water or proven to be hydraulically connected.

Another issue is the lack of a 40 CFR 136-approved analytical method for inorganic arsenic that can be used for compliance assessment. Evaluation of point source discharges for effluent limit compliance must use 40 CFR 136 methods. The current 40 CFR 136-approved method for arsenic measures the total recoverable portion of the metal, and does not differentiate the inorganic portion. The lack of federally approved translators for inorganic-to-total recoverable arsenic in discharges increases the difficulty in assigning an effluent limitation for discharges to surface waters.

Attainment of Washington's inorganic arsenic criteria remains challenging if not improbable. At best, current treatment technologies may be capable of arsenic removal to approximate concentrations ranging from 0.5 - 1 µg/L. The difference between the best available treatment technology and numeric effluent limits based on the criteria creates difficulty for both existing and proposed discharges.

Where numeric effluent limits are infeasible, 40 CFR 122.44(k) provides for the use of best management practices (BMPs) to control or abate the discharge of pollutants. This provision in the federal regulations provides the basis for Ecology's permitting strategy for inorganic arsenic until the EPA revisits their criteria development procedures and develops site specific total-to-inorganic arsenic translators for individual dischargers. Components of Ecology's permitting strategy include permit requirements to monitor for total recoverable arsenic, implementation of source control BMPs, and an adaptive management process to refine BMPs for continuous pollutant minimization. While numeric effluent limits based on the human health inorganic arsenic criteria remain infeasible, Washington NPDES permits will continue to contain numeric effluent limits for arsenic based on best available treatment technology and aquatic life-based criteria as appropriate.

I. 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 effluent characteristics, Ecology determined that this discharge has no reasonable potential to violate the sediment management standards.

J. Groundwater Quality

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).

Ecology determined Emerald's stormwater discharges from the employee parking lot and finished product storage lot have the potential to enter the groundwater through dry wells. The proposed permit requires Emerald to update their Pollution Prevention Plan to include Best Management Practices to prevent contaminated stormwater from entering the dry wells.

Groundwater contamination at the facility is addressed through the 2008 MTCA Consent Decree as discussed in Section A, "Facility Description."

K. 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 organism 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 about WET testing and 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/SummaryPages/9580.html), which is referenced in the permit. Ecology recommends that Emerald send a copy of the acute or chronic toxicity sections(s) of its NPDES permit to the laboratory.

WET testing conducted during effluent characterization showed no reasonable potential for effluent at Outfall 001 to cause receiving water acute or chronic toxicity. Therefore, the proposed permit does not include acute or chronic WET limits. Since the last WET testing was performed in 2013, the proposed permit requires Emerald to retest the effluent at Outfall 001 in the first year of the permit to provide updated data. Emerald must also retest the effluent at Outfall 001 before submitting an application for permit renewal using updated dilution factors from the mixing study for Outfall 001.

If WET testing conducted in the first year of the permit fails to meet the performance standards in WAC 173-205-020, Ecology will assume that effluent toxicity has increased.

If WET testing in the first year of the permit shows acute or chronic toxicity levels that have a reasonable potential to cause receiving water toxicity, then the proposed permit will:

- Set a limit on acute or chronic toxicity.
- Require the facility to conduct WET testing to monitor compliance with an acute toxicity limit, a chronic toxicity limit, or both.
- Specify the procedures the facility must use to come back into compliance if toxicity exceeds the limits.

If this facility makes process or material changes which, in Ecology's opinion, increase the potential for effluent toxicity, then Ecology may (in a regulatory order, by permit modification, or in the permit renewal) require the facility to conduct additional effluent characterization. Emerald may demonstrate to Ecology that effluent toxicity has not increased by performing additional WET testing and/or chemical analyses after the process or material changes have been made. Ecology recommends that Emerald check to make sure that Ecology will consider the demonstration adequate to support a decision to not require an additional effluent characterization.

See **Appendix H** for a summary of the WET tests conducted during the last permit cycle.

L. Comparison of Effluent Limits with the Previous Permit Issued on July 1, 2009

Table 15 compares the effluent limit in the proposed permit with the effluent limit in the previous permit for Outfall 001.

Table 15 Comparison of Previous and Proposed Effluent Limits for Outfall 001

Parameter	Basis of Limit	Previous Average Monthly Limit	Previous Maximum Daily Limit	Proposed Average Monthly Limit	Proposed Maximum Daily Limit
Temperature	Water Quality	-	40.7 °C	-	40.7 °C
Heat Load	Water Quality - TMDL	-	-	1.97×10^9 kcal/day	-

Ecology considered changes in the facility's production and process wastewater operations to evaluate new permit limits at Monitoring Point 002. The proposed permit includes the following changes:

BOD_5 – The facility produces organic chemicals in more than one subcategory in 40 CFR 414. Ecology used the percentage of total production in the bulk, commodity, and specialty chemical subcategories of 40 CFR 414 to calculate production-proportioned limits. Ecology evaluated the BOD_5 limits for process wastewater based on new production data. Ecology also used BPJ to include stormwater from non-process areas and contaminated groundwater average flows to calculate limits for BOD_5 loading. The BOD_5 limit for the combined treated process wastewater, stormwater from non-process areas, and contaminated groundwater is greater than the previous permit limit based on current average flows.

TSS – As with BOD_5, Ecology evaluated the TSS limits for process wastewater based on new production data. Ecology also used BPJ to include stormwater from non-process areas and contaminated groundwater average flows to calculate limits for TSS loading. The TSS limit for the combined treated process wastewater, stormwater from non-process areas, and contaminated groundwater is greater than the previous permit limit based on current average flows.

Copper, nickel, and zinc – Emerald provided Ecology updated metal-bearing process wastewater flows for copper, nickel, and zinc. Ecology also used BPJ to include stormwater from non-process areas average flows to calculate limits for copper, nickel, and zinc loadings. Ecology used the updated flows to calculate new limits. The proposed limits are greater than the limits in the previous permit for copper, nickel, and zinc based on current average flows.

Other pollutants – Ecology used updated process wastewater flows to calculate the limits for all other toxic pollutants listed in 40 CFR 414.91. Ecology also used BPJ to include stormwater from non-process areas and contaminated groundwater average flows to calculate limits for toxic pollutant loadings. The proposed limits are significantly lower than the limits in the previous permit for toxic pollutants based on current average flows.

Table 16 compares the effluent limits in the proposed permit with the effluent limits in the previous permit for Monitoring Point 002.

Table 16 Comparison of Previous and Proposed Effluent Limits for Monitoring Point 002

Parameter	Basis of Limit	Previous Average Monthly Limit (lbs/day)	Previous Maximum Daily Limit (lbs/day)	Proposed Average Monthly Limit (lbs/day)	Proposed Maximum Daily Limit (lbs/day)
BOD_5	Technology	95	258	114	304
TSS	Technology	129	418	139	453
pH	Technology	- [a]	- [a]	- [a]	- [a]
Copper	Technology	0.267	0.621	0.411	0.958
Nickel	Technology	0.426	1.00	0.550	1.242
Zinc	Technology	0.193	0.480	0.298	0.740
Acenaphthene	Technology	0.106	0.283	0.063	0.168
Acenaphthylene	Technology	0.106	0.283	0.063	0.168
Acrylonitrile	Technology	0.461	1.163	0.273	0.688
Anthracene	Technology	0.106	0.283	0.063	0.168
Benzene	Technology	0.178	0.654	0.105	0.387
Benzo(a)anthracene	Technology	0.106	0.283	0.063	0.168
3,4-Benzofluoranthene	Technology	0.110	0.293	0.065	0.173
Benzo(k)fluoranthene	Technology	0.106	0.283	0.063	0.168
Benzo(a)pyrene	Technology	0.110	0.293	0.065	0.173
Bis(2-ethylhexyl) phthalate	Technology	0.495	1.341	0.293	0.793
Carbon Tetrachloride	Technology	0.086	0.183	0.051	0.108
Chlorobenzene	Technology	0.072	0.135	0.043	0.080
Chloroethane	Technology	0.500	1.287	0.296	0.762
Chloroform	Technology	0.101	0.221	0.060	0.131
2-Chlorophenol	Technology	0.149	0.471	0.088	0.279
Chrysene	Technology	0.106	0.283	0.063	0.168
Di-n-butyl phthalate	Technology	0.130	0.274	0.077	0.162
1,2-Dichlorobenzene	Technology	0.370	0.783	0.219	0.464
1,3-Dichlorobenzene	Technology	0.149	0.211	0.088	0.125
1,4-Dichlorobenzene	Technology	0.072	0.135	0.043	0.080

Parameter	Basis of Limit	Previous Average Monthly Limit (lbs/day)	Previous Maximum Daily Limit (lbs/day)	Proposed Average Monthly Limit (lbs/day)	Proposed Maximum Daily Limit (lbs/day)
1,1-Dichloroethane	Technology	0.106	0.283	0.063	0.168
1,2-Dichloroethane	Technology	0.327	1.014	0.193	0.600
1,1-Dichloroethylene	Technology	0.077	0.120	0.046	0.071
1,2-trans-Dichloroethylene	Technology	0.101	0.259	0.060	0.154
2,4-Dichlorophenol	Technology	0.187	0.538	0.111	0.319
1,2-Dichloropropane	Technology	0.735	1.105	0.435	0.654
1,3-Dichloropropylene	Technology	0.139	0.211	0.082	0.125
Diethyl phthalate	Technology	0.389	0.975	0.230	0.577
2,4-Dimethylphenol	Technology	0.086	0.173	0.051	0.102
Dimethyl phthalate	Technology	0.091	0.226	0.054	0.134
4,6-Dinitro-o-cresol	Technology	0.375	1.331	0.222	0.788
2,4-Dinitrophenol	Technology	0.341	0.591	0.202	0.350
2,4-Dinitrotoluene	Technology	0.543	1.369	0.321	0.811
2,6-Dinitrotoluene	Technology	1.225	3.079	0.725	1.823
Ethylbenzene	Technology	0.154	0.519	0.091	0.307
Fluoranthene	Technology	0.120	0.327	0.071	0.193
Fluorene	Technology	0.106	0.284	0.063	0.168
Hexachlorobenzene	Technology	0.072	0.135	0.043	0.080
Hexachlorobutadiene	Technology	0.096	0.235	0.057	0.139
Hexachloroethane	Technology	0.101	0.259	0.060	0.154
Methyl Chloride	Technology	0.413	0.913	0.245	0.540
Methylene Chloride	Technology	0.192	0.428	0.114	0.253
Naphthalene	Technology	0.106	0.284	0.063	0.168
Nitrobenzene	Technology	0.130	0.327	0.077	0.193
2-Nitrophenol	Technology	0.197	0.331	0.117	0.196
4-Nitrophenol	Technology	0.346	0.596	0.205	0.353
Phenanthrene	Technology	0.106	0.283	0.063	0.168

Parameter	Basis of Limit	Previous Average Monthly Limit (lbs/day)	Previous Maximum Daily Limit (lbs/day)	Proposed Average Monthly Limit (lbs/day)	Proposed Maximum Daily Limit (lbs/day)
Phenol	Technology	0.072	0.125	0.043	0.074
Pyrene	Technology	0.120	0.322	0.071	0.191
Tetrachloroethylene	Technology	0.106	0.269	0.063	0.159
Toluene	Technology	0.125	0.385	0.074	0.228
1,2,4-Trichlorobenzene	Technology	0.327	0.673	0.193	0.398
1,1,1-Trichloroethane	Technology	0.101	0.259	0.060	0.154
1,1,2-Trichloroethane	Technology	0.101	0.259	0.060	0.154
Trichloroethylene	Technology	0.101	0.259	0.060	0.154
Vinyl Chloride	Technology	0.500	1.287	0.296	0.762

Footnote:

a Daily minimum is equal to or greater than 6.0 and the daily maximum is less than or equal to 9.0.

The proposed permit has ten permit limits at Monitoring Point 002 that are greater (less stringent) than the previous permit issued in 2009. The average monthly limits and maximum daily limits for BOD_5, TSS, copper, nickel, and zinc are greater in the proposed permit. As discussed in Section III.B. ("Technology-Based Effluent Limits") of this fact sheet, Ecology used the federal effluent guidelines developed for facilities that manufacture organic chemicals, plastics, and synthetic fibers to calculate these limits. The guidelines for calculating BOD_5, TSS, and metals limits are based on production and wastewater flow. The limits can increase or decrease depending on a facility's production and wastewater flow. During the last permit cycle, Emerald's wastewater flow increased compared to the previous permit cycle, so the proposed permit limits based on these parameters also increased.

The new production and wastewater flow rates are new information that justified the application of the less stringent limits in accordance with 40 CFR 122.44(l)(2)(i)(B). Therefore, these changes do not constitute backsliding.

IV. 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) in the monthly discharge monitoring report or in the required laboratory report.

A. Wastewater Monitoring

In addition to the parameters listed in Tables 15 and 16, the proposed permit requires Emerald to monitor the effluent at Outfall 001 for toluene and the effluent at Monitoring Point 002 for priority pollutants to further characterize the effluent. These pollutants could have a significant impact on the quality of the surface water. The proposed permit requires Emerald to monitor stormwater discharges at Outfall 003 for copper, oil and grease, pH, toluene, turbidity, and zinc to further characterize the effluent at this outfall.

The previous permit required Emerald to sample stormwater discharges at Outfall 003 for BOD_5, nitrate/nitrite as N, and total phosphorus. Ecology determined that BOD_5, nitrate/nitrite as N, and total phosphorus are not likely pollutants in the stormwater discharges at Outfall 003 and removed these three parameters from monitoring requirements in the proposed permit. Ecology determined that copper and toluene are potential pollutants in the stormwater discharges at Outfall 003 and added these two parameters to the monitoring requirements in the proposed permit.

The monitoring schedule for Outfall 001, Monitoring Point 002, and Outfall 003 is detailed in the proposed permit under Special Condition S2. 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.

Emerald installs, calibrates, and maintains all monitoring devices to ensure accuracy of measurements using accepted industry standards, manufacturer's recommendations, and approved O&M manual procedures. Emerald calibrates pH monitoring devices monthly and flow measurement devices annually.

B. Monitoring Reduction for Exemplary Performance

EPA distributed guidance in April of 1996 entitled "Interim Guidance for Performance-based Reduction of NPDES Permit Monitoring Frequencies". EPA's goal was to reduce the regulatory burden associated with reporting and monitoring on the basis of excellent performance. The guidance provides a tool to evaluate a facility's performance. This guidance in included in Ecology's *Permit Writer's Manual.*

Ecology may reduce the monitoring frequency of a parameter in the permit by examining the performance of the parameter during the last permit cycle. The amount of reduction is dependent upon the ratio of the long term average of monitoring results to the monthly average effluent limit.

Table 17 shows the allowable monitoring reduction based on a specific baseline monitoring frequency and the ratio of long term average to the monthly average limit. Table 18 summarizes the performance of the parameters monitored at Monitoring Point 002 with the monthly average effluent limits from February 2017 through January 2020.

Table 17 Allowable Monitoring Frequency Reduction

Baseline Monitoring	Ratio of 75-66%	Ratio of 65-50%	Ratio of 49-25%	Ratio of <25%
7/week	5/week	4/week	3/week	1/week
6/week	4/week	3/week	2/week	1/week
5/week	4/week	3/week	2/week	1/week
4/week	3/week	2/week	1/week	1/week
3/week	3/week	2/week	1/week	1/week
2/week	2/week	1/week	2/month	1/month
1/week	1/week	1/week	2/month	1/2 months
2/month	2/month	2/month	2/month	1/quarter
1/month	1/month	1/month	1/quarter	1/6 months

Table 18 Performance Summary of Parameters at Monitoring Point 002

Parameter	Baseline Monitoring Frequency	Previous Permit Monitoring Frequency	Long Term Average (lbs/day)	Previous Average Monthly Limit (lbs/day)	Ratio of Long Term Average to the Average Monthly Limit
BOD5	7/week	1/week	21	95	23%
TSS	7/week	1/week	38	129	29%
Copper	7/week	1/month	0.020	0.267	7%
Nickel	1/week	1/month	0.045	0.426	11%
Zinc	7/week	1/month	0.041	0.193	21%
Acenaphthene	4/week	1/6 months	0.0003	0.106	0.3%
Acenaphthylene	6/week	1/6 months	0.0003	0.106	0.3%
Acrylonitrile	2/week	1/6 months	0.0002	0.461	0.05%
Anthracene	4/week	1/6 months	0.0004	0.106	0.4%
Benzene	7/week	1/quarter	0.0012	0.178	0.7%
Benzo(a)anthracene	2/week	1/6 months	0.0004	0.106	0.4%

Parameter	Baseline Monitoring Frequency	Previous Permit Monitoring Frequency	Long Term Average (lbs/day)	Previous Average Monthly Limit (lbs/day)	Ratio of Long Term Average to the Average Monthly Limit
3,4-Benzofluoranthene	3/week	1/6 months	0.0004	0.110	0.3%
Benzo(k)fluoranthene	5/week	1/6 months	0.0004	0.106	0.4%
Benzo(a)pyrene	7/week	1/6 months	0.0004	0.110	0.3%
Bis(2-ethylhexyl) phthalate	4/week	1/6 months	0.0032	0.495	0.6%
Carbon Tetrachloride	7/week	1/6 months	0.0015	0.086	1.7%
Chlorobenzene	7/week	1/6 months	0.0015	0.072	2.1%
Chloroethane	6/week	1/6 months	0.0016	0.500	0.3%
Chloroform	7/week	1/6 months	0.0015	0.101	1.5%
2-Chlorophenol	1/week	1/6 months	0.0008	0.149	0.5%
Chrysene	3/week	1/6 months	0.0005	0.106	0.5%
Di-n-butyl phthalate	7/week	1/6 months	0.0015	0.130	1.1%
1,2-Dichlorobenzene	7/week	1/6 months	0.0006	0.370	0.2%
1,3-Dichlorobenzene	7/week	1/6 months	0.0006	0.149	0.4%
1,4-Dichlorobenzene	7/week	1/6 months	0.0006	0.072	0.9%
1,1-Dichloroethane	7/week	1/6 months	0.0015	0.106	1.4%
1,2-Dichloroethane	7/week	1/6 months	0.0015	0.327	0.5%
1,1-Dichloroethylene	7/week	1/6 months	0.0015	0.077	2.0%
1,2-trans-Dichloroethylene	7/week	1/6 months	0.0034	0.101	3.4%
2,4-Dichlorophenol	2/week	1/6 months	0.0015	0.187	0.8%
1,2-Dichloropropane	7/week	1/6 months	0.0015	0.735	0.2%
1,3-Dichloropropylene	7/week	1/6 months	0.0015	0.139	1.1%
Diethyl phthalate	2/week	1/6 months	0.0005	0.389	0.1%
2,4-Dimethylphenol	3/week	1/6 months	0.0018	0.086	2.1%
Dimethyl phthalate	7/week	1/6 months	0.0007	0.091	0.7%
4,6-Dinitro-o-cresol	4/week	1/6 months	0.0035	0.375	0.9%

Parameter	Baseline Monitoring Frequency	Previous Permit Monitoring Frequency	Long Term Average (lbs/day)	Previous Average Monthly Limit (lbs/day)	Ratio of Long Term Average to the Average Monthly Limit
2,4-Dinitrophenol	3/week	1/6 months	0.0018	0.341	0.5%
2,4-Dinitrotoluene	1/month	1/6 months	0.0008	0.543	0.1%
2,6-Dinitrotoluene	2/week	1/6 months	0.0007	1.225	0.1%
Ethylbenzene	7/week	1/quarter	0.0013	0.154	0.8%
Fluoranthene	5/week	1/6 months	0.0005	0.120	0.4%
Fluorene	4/week	1/quarter	0.0004	0.106	0.3%
Hexachlorobenzene	3/week	1/6 months	0.0004	0.072	0.6%
Hexachlorobutadiene	7/week	1/6 months	0.0009	0.096	0.9%
Hexachloroethane	7/week	1/6 months	0.0008	0.101	0.8%
Methyl Chloride	7/week	1/6 months	0.0015	0.413	0.4%
Methylene Chloride	3/week	1/6 months	0.0030	0.192	1.6%
Naphthalene	7/week	1/quarter	0.0008	0.106	0.7%
Nitrobenzene	6/week	1/6 months	0.0004	0.130	0.3%
2-Nitrophenol	1/week	1/6 months	0.0006	0.197	0.3%
4-Nitrophenol	3/week	1/6 months	0.0033	0.346	1.0%
Phenanthrene	2/week	1/6 months	0.0004	0.106	0.4%
Phenol	3/week	1/quarter	0.0010	0.072	1.3%
Pyrene	5/week	1/6 months	0.0005	0.120	0.4%
Tetrachloroethylene	6/week	1/6 months	0.0016	0.106	1.5%
Toluene	7/week	1/quarter	0.0014	0.125	1.1%
1,2,4-Trichlorobenzene	5/week	1/6 months	0.0017	0.327	0.5%
1,1,1-Trichloroethane	7/week	1/6 months	0.0015	0.101	1.5%
1,1,2-Trichloroethane	6/week	1/6 months	0.0016	0.101	1.6%
Trichloroethylene	7/week	1/6 months	0.0015	0.101	1.5%
Vinyl Chloride	7/week	1/6 months	0.0016	0.500	0.3%

Ecology established the baseline monitoring frequencies for the parameters in Table 18 using the original monitoring frequencies in previous versions of the permit and statistical formulas from Ecology's *Permit Writer's Manual*.

Using the allowable monitoring frequency reductions in Table 17 and the baseline monitoring frequencies in Table 18, only nickel is eligible for reduced monitoring. Ecology elected to maintain the current monitoring frequency for nickel even though the guidance would have allowed less frequent monitoring. Nickel is a key indicator of when there is an upset condition at the wastewater treatment facility.

All other parameters, based on the baseline monitoring frequency, are not eligible for reduced monitoring because the current monitoring frequency is either at or exceeds the maximum allowable reduction in monitoring. However, Ecology recognizes that the monitoring reduction guidance does not take into consideration the number of non-detects in the sample set. Of the 56 pollutants required to be monitored in 40 CFR 414 Subpart I, 50 of them had all sample results showing as non-detects. Of the six pollutants where not all sample results were non-detects, 1,2-trans-dichloroethylene had the largest ratio of long term average to the average monthly limit of 3.4% based on 11 non-detects in a set of 12 samples.

Based on the large number of non-detects in the sample results and the very low ratios of long term averages to monthly average limits, Ecology believes the Subpart I pollutants are eligible for reduced monitoring. Ecology reduced the monitoring of the Subpart I pollutants in the proposed permit from semi-annually to annually and quarterly to annually.

C. 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).

Accreditation is required to be updated every year. Ecology accredited the laboratory at Emerald for BOD_5, pH, and TSS. Emerald's accreditation number is I615-18. This accreditation was last reviewed on February 10, 2020 and expires on February 9, 2021.

To find an accredited laboratory, visit https://apps.ecology.wa.gov/laboratorysearch.

V. Other Permit Conditions

A. 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).

B. Non-Routine and Unanticipated Wastewater

Occasionally, this facility may generate wastewater which was not characterized in the permit application because it is not a routine discharge and was not anticipated at the time of application. These wastes typically consist of waters used to pressure-test storage tanks or fire water systems or of leaks from drinking water systems.

The permit authorizes the discharge of non-routine and unanticipated wastewater under certain conditions.

The facility must characterize these waste waters for pollutants and examine the opportunities for reuse. Depending on the nature and extent of pollutants in this wastewater and on any opportunities for reuse, Ecology may:

- Authorize the facility to discharge the wastewater.
- Require the facility to treat the wastewater.
- Require the facility to reuse the wastewater.

C. Operation and Maintenance Manual

Ecology requires industries to take all reasonable steps to properly operate and maintain their wastewater treatment system in accordance with state and federal regulations [40 CFR 122.41(e) and WAC 173-220-150 (1)(g)]. The facility has prepared and submitted an operation and maintenance manual (O&M Manual) as required by state regulation for the construction of wastewater treatment facilities (WAC 173-240-150).

Implementation of the procedures in the (O&M Manual) ensures the facility's compliance with the terms and limits in the permit. The proposed permit requires Emerald to submit an updated O&M Manual and an updated Treatment System Operating Plan which is a concise summary of specifically defined elements of the O&M Manual.

D. Outfall Evaluation

The previous outfall evaluation occurred in February 2012, which was over eight years ago. It is currently unknown how many ports in the diffuser are still working. The number of working ports and the condition of the outfall are critical information for an accurate mixing zone study.

The proposed permit requires Emerald to conduct an outfall inspection in the first year of the permit. The inspection must evaluate the physical condition of the discharge pipe and diffuser and the extent of sediment accumulation in the vicinity of the outfall.

The proposed permit requires Emerald to conduct a new mixing study. Emerald must submit the results of the outfall evaluation with the new mixing study report.

E. Effluent Mixing Study

In preparing the proposed permit, Ecology estimated the amount of mixing of the discharge at Outfall 001 with receiving water and the potential for the mixture to violate the water quality standards for surface waters at the edge of the mixing zone (chapter 173-201A WAC). The previous mixing studies at Emerald were conducted in 1992 and 1993 by Beak Consultants, Inc. which included in-river temperature monitoring and modeling.

According to the mixing study reports, there were approximately 350 ports used to diffuse effluent into the Columbia River during the 1992 and 1993 studies. Contractor inspections of the submerged portion of the outfall in April 2010 and February 2012, determined that the outfall diffuser had only 126 and 97 ports working, respectively.

The February 2012 inspection was over eight years ago and it is currently unknown how many ports are still working. It is likely that the actual mixing has decreased since the 1992 and 1993 studies.

In the 27 years since the original 1993 modeling of Emerald's mixing zone, Ecology assumes that models have improved. The 1993 mixing study report states, "The primary model chosen for this diffuser configuration was CORMIX 2. However, initial attempts at modeling the diffuser with CORMIX 2 revealed an error with one of the subroutines which is required to model this diffuser. After contacting EPA and Cornell University, it was determined that the model error would not be corrected for several months." Instead, Beak Consultants, Inc. chose a different set of models.

The proposed permit requires Emerald to conduct a new effluent mixing study. The effluent mixing study must measure or model the characteristics of the discharge under conditions specified in the permit to assess whether receiving water quality is protected outside the mixing zone boundaries. Emerald must use the results of the outfall evaluation in the effluent mixing study.

F. 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].

Emerald 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 incorporate the spill plan into the NPDES Pollution Prevention Plan.

G. Solid Waste Control Plan

Emerald could cause pollution of the waters of the state through inappropriate disposal of solid waste or through the release of leachate from solid waste.

The proposed permit requires Emerald to incorporate the solid waste control plan into the NPDES Pollution Prevention Plan.

H. Stormwater Pollution Prevention Plan

In accordance with 40 CFR 122.44(k) and 40 CFR 122.44 (s), the proposed permit includes requirements for the development and implementation of a stormwater pollution prevention plan (SWPPP) along with BMPs to minimize or prevent the discharge of pollutants to waters of the state. BMPs constitute Best Conventional Pollutant Control Technology (BCT) and Best Available Technology Economically Achievable (BAT) for stormwater discharges. Ecology has determined that Emerald must follow a SWPPP and implement adequate BMPs in order to meet the requirements of AKART. A SWPPP requires a facility to implement actions necessary to manage stormwater to comply with the state's requirement under chapter 90.48 RCW to protect the beneficial uses of waters of the state.

The SWPPP must identify potential sources of stormwater contamination from industrial activities and identify how the facility plans to manage those sources to prevent or minimize contamination of stormwater. The proposed permit requires the facility to incorporate the SWPPP into the NPDES Pollution Prevention Plan.

I. NPDES Pollution Prevention Plan

The previous permit required Emerald to submit and follow a Pollution Prevention Plan to identify opportunities to prevent, reduce, eliminate, or control releases of pollutants to influent wastewater streams, stormwater, and other waters of the state. Emerald was required to implement pollution prevention opportunities that were technically and economically feasible. The previous permit also required Emerald to submit a spill plan, a solid waste handling and disposal plan, and a stormwater pollution prevention plan. The proposed permit requires an NPDES Pollution Prevention Plan that incorporates all of those plans into one plan.

The following are projects completed by Emerald during the last permit cycle that had a positive impact on wastewater treatment plant operations and provided protection of the receiving water:

- Automate Reactor R-921 – This project will allow precise control of the water and reactants used, which will decrease the process variability including water usage and wastewater generation.
- Flow Meters for Benzoate Scrubbers – These meters will ensure optimum water flow to balance production, wastewater, and scrubber operation, which will decrease the process variability including water usage and wastewater generation.
- Nutrient and Pump Changes at the Anaerobic Digesters – These changes will improve the metabolic efficiency of the anaerobic digesters.

  The new nutrient chemical is less corrosive and a safer alternative to the old chemical. Also, the new pumps will improve the health of the microorganisms and help ensure that the digesters are operating as efficiently as possible, thus reducing the amount of organic chemicals sent to the aerobic digesters and to the anaerobic flare.
- Replace Pump P-901 – The new pump will eliminate the frequent seal failures that have often occurred at pump P-901 and have required operator response in order to prevent damage to the WWTP.
- Automatic Valves for Tank 1117D – This change will reduce the potential for spills to the WWTP which can cause upsets in the system.
- Replace Level Switches on Tanks T-1250, T-1252, and T-1254 – The old model switches had been determined to be at risk of failing, so replacing the level switches before the old model failed reduced the potential for organic spills to the WWTP which can cause upsets in the system.

- Heat Exchangers Connected to Distributed Control System – This change will reduce the potential for toluene to discharge into the Columbia River through the non-contact cooling water system by automatically alerting operators when there is a toluene leak into a heat exchanger.

The proposed permit includes a pollution prevention requirement to follow-up on the work done by the refinery in the previous permit cycle. It includes a requirement to:

- Continue to follow and update BMPs, SOPs, and other work practices to prevent or minimize the release of pollutants to the wastewater treatment system, stormwater, and waters of the state.
- Submit an update to the current NPDES Pollution Prevention Plan.
- Submit a biennial evaluation of the NPDES Pollution Prevention Plan.
- Conduct stormwater inspections to ensure the adequacy of BMPs and to identify any unknown improper discharges to stormwater.
- Continue to identify and evaluate pollution prevention opportunities in all decisions having environmental consequences.

The proposed permit also requires Emerald to update their Pollution Prevention Plan to include additional information on the dry wells in the employee parking lot and the finished product storage lot.

J. Receiving Water Study

The proposed permit requires Emerald to perform a receiving water study to monitor the Columbia River for ammonia, pH, temperature, turbidity, and for both the total and dissolved fractions of the 13 priority pollutant metals (antimony, arsenic, beryllium, cadmium, chromium, copper, lead, mercury, nickel, selenium, silver, thallium, and zinc). These ambient data will be used in the reasonable potential analysis for the next permit renewal.

K. AKART Analysis and Engineering Report for Outfall 003

At permit renewal, Ecology must make a determination of whether a discharge meets AKART. The last time Emerald discharged stormwater at Outfall 003 was in January 2002. Outfall 003 discharges to a wetland according to the U.S. Fish and Wildlife Service's National Wetlands Inventory (available at https://www.fws.gov/wetlands/data/mapper.html); the wetland is considered a Freshwater Emergent Wetland. Because there haven't been any recent stormwater discharges to Outfall 003, Ecology is unable to determine if AKART would be applied to the stormwater prior to discharge at Outfall 003. Ecology believes that an AKART evaluation is necessary at Outfall 003.

The proposed permit requires Emerald to submit an Outfall 003 AKART Analysis and Engineering Report to demonstrate that all applicable stormwater BMPs will be applied at Outfall 003 to meet AKART. The analysis and report are required prior to Emerald resuming any discharge of stormwater at Outfall 003. The report must include an evaluation to determine if new BMPs necessary to achieve AKART.

Emerald's analysis will provide information for Ecology to determine if AKART has been or will be met for stormwater discharges at Outfall 003. See Section III.B, "Technology-Based Effluent Limits" for more information on AKART.

L. Filter Backwash Water

Water from the cooling water intake system is automatically continuously cleaned by two filters. Currently, Emerald discharges the filter backwash water directly to the Columbia River from two pipes.

The proposed permit requires Emerald to characterize the filter backwash water and conduct an analysis of AKART for the wastewater stream. Emerald must assess whether, after applying AKART, the filter backwash water meets the State's Water Quality Standards. Emerald must submit an engineering report detailing the findings of the characterization study, AKART analysis, and water quality assessment.

M. Dangerous Wastes – Permit by Rule Requirements

The proposed permit authorizes Emerald to treat dangerous wastes, generated onsite, at the wastewater treatment facility under the permit by rule provisions of Chapter WAC 173-303-802(5). This authorization is limited to the onsite waste streams identified on the permit application and application amendments as approved by Ecology.

Effluent sampling and monitoring requirements established in the permit should adequately address the pollutants in the waste stream. Permit-by-rule provisions cover the identified waste streams as long as Emerald complies with the conditions of the NPDES permit and with the following dangerous waste requirements in WAC 173-303, as required by WAC 173-303-802(5)(a), pertaining to:

- Notification and identification numbers
- Designation of dangerous wastes
- Performance standards
- General waste analysis
- Security
- Contingency plans and emergency procedures
- Emergencies
- Manifest system
- Operating record
- Facility reporting

N. General Conditions

Ecology bases the standardized General Conditions on state and federal law and regulations. These conditions are included in all individual industrial NPDES permits issued by Ecology.

VI. Permit Issuance Procedures

A. 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 ground water, after obtaining 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.

B. Proposed Permit Issuance

This proposed permit includes 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.

VII. References for Text and Appendices

Environmental Protection Agency (EPA)

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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.

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

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.)

Appendix A--Public Involvement Information

Ecology proposes to reissue a permit to Emerald Kalama Chemical, LLC. 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 November 12, 2020 in the Daily News 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.
- Urges people to submit their comments, in writing, before the end of the Comment Period.
- Tells how to request a public hearing of comments about the proposed NPDES permit.
- Explains the next step(s) in the permitting process.

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/SummaryPages/0307023.html.

You may obtain further information from Ecology by telephone, (360) 407-6934, or by writing to the address listed below.

Water Quality Permit Coordinator
Department of Ecology
Industrial Section
PO Box 47600
Olympia, WA 98504-7600

The primary author of this permit and fact sheet is Greg Gould.

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.

ADDRESS AND LOCATION INFORMATION

Street Addresses	Mailing Addresses
Department of Ecology Attn: Appeals Processing Desk 300 Desmond Drive SE Lacey, WA 98503 **Pollution Control Hearings Board** 1111 Israel RD SW STE 301 Tumwater, WA 98501	**Department of Ecology** Attn: Appeals Processing Desk PO Box 47608 Olympia, WA 98504-7608 **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 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 (BMPs) -- 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 173-240-130.

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 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 507, 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.

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.

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.

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 on Ecology's webpage at https://ecology.wa.gov/Regulations-Permits/Guidance-technical-assistance/Water-quality-permits-guidance/.

Simple Mixing:

Ecology uses simple mixing calculations to assess the impacts of certain conservative pollutants, such as the expected increase in fecal coliform bacteria at the edge of the chronic mixing zone boundary. Simple mixing uses a mass balance approach to proportionally distribute a pollutant load from a discharge into the authorized mixing zone. The approach assumes no decay or generation of the pollutant of concern within the mixing zone. The predicted concentration at the edge of a mixing zone (C_{mz}) is based on the following calculation:

$$C_{mz} = Ca + \frac{(Ce - Ca)}{DF}$$

where: Ce = Effluent Concentration
Ca = Ambient Concentration
DF = Dilution Factor

Reasonable Potential Analysis:

The process and formulas for determining reasonable potential and effluent limits are taken directly from the *Technical Support Document for Water Quality-based Toxics Control*, (EPA 505/2-90-001). The adjustment for autocorrelation is from EPA (1996a), and EPA (1996b).

Calculation of Water Quality-Based Effluent Limits:

Water quality-based effluent limits are calculated by the two-value wasteload allocation process as described on page 100 of the TSD (EPA, 1991) and shown below.

1. Calculate the acute wasteload allocation WLA_a by multiplying the acute criteria by the acute dilution factor and subtracting the background factor. Calculate the chronic wasteload allocation (WLA_c) by multiplying the chronic criteria by the chronic dilution factor and subtracting the background factor.

$$WLA_a = (\text{acute criteria} \times DF_a) - [(\text{background conc.} \times (DF_a - 1)]$$
$$WLA_c = (\text{chronic criteria} \times DF_c) - [(\text{background conc.} \times (DF_c - 1)]$$

where: DF_a = Acute Dilution Factor
DF_c = Chronic Dilution Factor

2. Calculate the long term averages (LTA_a and LTA_c) which will comply with the wasteload allocations WLA_a and WLA_c.

$LTA_a = WLA_a \times e^{[0.5\sigma^2 - z\sigma]}$

where: $\sigma^2 = \ln[CV^2 + 1]$

$z = 2.326$

CV = coefficient of variation = std. dev/mean

$LTA_c = WLA_c \times e^{[0.5\sigma^2 - z\sigma]}$

where: $\sigma^2 = \ln[(CV^2 \div 4) + 1]$

$z = 2.326$

3. Use the smallest LTA of the LTA_a or LTA_c to calculate the maximum daily effluent limit and the monthly average effluent limit.

MDL = Maximum Daily Limit

$MDL = LTA \times e^{(Z\sigma - 0.5\sigma^2)}$

where: $\sigma^2 = \ln[CV^2 + 1]$

$z = 2.326$ (99th percentile occurrence)

LTA = Limiting long term average

AML = Average Monthly Limit

$AML = LTA \times e^{(Z\sigma_n - 0.5\sigma_n^2)}$

where: $\sigma^2 = \ln[(CV^2 \div n) + 1]$

n = number of samples/month

$z = 1.645$ (95^{th} % occurrence probability)

LTA = Limiting long term average

Appendix E--Technology-Based Effluent Limit Calculations

Table E.1 Effluent limit calculations for BOD_5 and TSS at Monitoring Point 002

Subcategory	OCPSF Product	Average Annual Plant Production from January 2015 - August 2020 (lbs/yr)	Subcategory Proportion	Average Annual Process Wastewater, Stormwater, and Groundwater Flow (MGD) [a]	Monthly Average				Daily Maximum			
					Subcategory Effluent Guideline Limitation (mg/L)		Limits [b] (lbs/day)		Subcategory Effluent Guideline Limitation (mg/L)		Limits [b] (lbs/day)	
					BOD_5	TSS	BOD_5	TSS	BOD_5	TSS	BOD_5	TSS
Commodity	Benzene	607,106	0.00196	0.341	30	46	0.17	0.26	80	149	0.45	0.83
Bulk	Benzoic Acid	117,072,243	0.37803	0.341	34	49	36.55	52.68	92	159	98.91	170.94
Specialty	3-Phenyl Propanol	182,869										
	Benzaldehyde	26,509,602										
	Benzyl Alcohol	13,985,970										
	Sodium/Potassium Benzoate	54,971,099										
	Plasticizers	65,141,668										
	Cinnamic Alcohol	676,200										
	Cinnamic Aldehyde	3,623,341										
	Amyl Cinnamic Aldehyde	673,278										
	Hexyl Cinnamic Aldehyde	14,347,324										
	Benzyl Benzoate	5,739,660										
	Methyl Cinnamic Aldehyde	25,750										
	p-Isopropyl Cinnamic Aldehyde	114,262										
	Methyl Benzoate	57,223										
	C6/C8/C10 Aldehydes	5,963,437										
		Sum = 192,011,682	0.62001	0.341	45	57	79.35	100.51	120	183	211.59	322.68
Column Totals		309,691,031	1.00000				116	153			311	494

Footnotes:

a Emerald provided average annual process wastewater, stormwater, and groundwater flows for 2015 through August 2020. Emerald reported the average annual process wastewater flow as 0.234 MGD, stormwater flow as 0.024 MGD, and groundwater flow as 0.083 MGD. The sum of these average annual flows is 0.341 MGD.

b The limits are calculated as the product of the subcategory portion, average flows, subcategory effluent guideline limitation, and a conversion factor of 8.34.

Table E.2 Effluent guideline limit calculations for metals and toxic pollutants at Monitoring Point 002

Toxic Pollutant	Average Annual Process Wastewater, Stormwater, and Groundwater Flow (MGD) [a]	Effluent Guideline Limitation (µg/L)		Calculated Plant Limitations (lbs/day) [b]	
		Monthly Average	Daily Maximum	Monthly Average	Daily Maximum
Total Chromium	0.000	1,110	2,770	0.000	0.000
Total Copper	0.034	1,450	3,380	0.411	0.958
Total Cyanide	0.000	420	1,200	0.000	0.000
Total Lead	0.000	320	690	0.000	0.000
Total Nickel	0.039	1,690	3,980	0.550	1.295
Total Zinc	0.034	1,050	2,610	0.298	0.740
Acenaphthene	0.341	22	59	0.063	0.168
Acenaphthylene	0.341	22	59	0.063	0.168
Acrylonitrile	0.341	96	242	0.273	0.688
Anthracene	0.341	22	59	0.063	0.168
Benzene	0.341	37	136	0.105	0.387
Benzo(a)anthracene	0.341	22	59	0.063	0.168
3,4-Benzofluoranthene	0.341	23	61	0.065	0.173
Benzo(k)fluoranthene	0.341	22	59	0.063	0.168
Benzo(a)pyrene	0.341	23	61	0.065	0.173
Bis(2-ethylhexyl) phthalate	0.341	103	279	0.293	0.793
Carbon Tetrachloride	0.341	18	38	0.051	0.108
Chlorobenzene	0.341	15	28	0.043	0.080
Chloroethane	0.341	104	268	0.296	0.762
Chloroform	0.341	21	46	0.060	0.131
2-Chlorophenol	0.341	31	98	0.088	0.279
Chrysene	0.341	22	59	0.063	0.168

Toxic Pollutant	Average Annual Process Wastewater, Stormwater, and Groundwater Flow (MGD) [a]	Effluent Guideline Limitation (µg/L)		Calculated Plant Limitations (lbs/day) [b]	
		Monthly Average	Daily Maximum	Monthly Average	Daily Maximum
Di-n-butyl phthalate	0.341	27	57	0.077	0.162
1,2-Dichlorobenzene	0.341	77	163	0.219	0.464
1,3-Dichlorobenzene	0.341	31	44	0.088	0.125
1,4-Dichlorobenzene	0.341	15	28	0.043	0.080
1,1-Dichloroethane	0.341	22	59	0.063	0.168
1,2-Dichloroethane	0.341	68	211	0.193	0.600
1,1-Dichloroethylene	0.341	16	25	0.046	0.071
1,2-trans-Dichloroethylene	0.341	21	54	0.060	0.154
2,4-Dichlorophenol	0.341	39	112	0.111	0.319
1,2-Dichloropropane	0.341	153	230	0.435	0.654
1,3-Dichloropropylene	0.341	29	44	0.082	0.125
Diethyl phthalate	0.341	81	203	0.230	0.577
2,4-Dimethylphenol	0.341	18	36	0.051	0.102
Dimethyl phthalate	0.341	19	47	0.054	0.134
4,6-Dinitro-o-cresol	0.341	78	277	0.222	0.788
2,4-Dinitrophenol	0.341	71	123	0.202	0.350
2,4-Dinitrotoluene	0.341	113	285	0.321	0.811
2,6-Dinitrotoluene	0.341	255	641	0.725	1.823
Ethylbenzene	0.341	32	108	0.091	0.307
Fluoranthene	0.341	25	68	0.071	0.193
Fluorene	0.341	22	59	0.063	0.168
Hexachlorobenzene	0.341	15	28	0.043	0.080
Hexachlorobutadiene	0.341	20	49	0.057	0.139
Hexachloroethane	0.341	21	54	0.060	0.154

Toxic Pollutant	Average Annual Process Wastewater, Stormwater, and Groundwater Flow (MGD) [a]	Effluent Guideline Limitation (µg/L)		Calculated Plant Limitations (lbs/day) [b]	
		Monthly Average	Daily Maximum	Monthly Average	Daily Maximum
Methyl Chloride	0.341	86	190	0.245	0.540
Methylene Chloride	0.341	40	89	0.114	0.253
Naphthalene	0.341	22	59	0.063	0.168
Nitrobenzene	0.341	27	68	0.077	0.193
2-Nitrophenol	0.341	41	69	0.117	0.196
4-Nitrophenol	0.341	72	124	0.205	0.353
Phenanthrene	0.341	22	59	0.063	0.168
Phenol	0.341	15	26	0.043	0.074
Pyrene	0.341	25	67	0.071	0.191
Tetrachloroethylene	0.341	22	56	0.063	0.159
Toluene	0.341	26	80	0.074	0.228
1,2,4-Trichlorobenzene	0.341	68	140	0.193	0.398
1,1,1-Trichloroethane	0.341	21	54	0.060	0.154
1,1,2-Trichloroethane	0.341	21	54	0.060	0.154
Trichloroethylene	0.341	21	54	0.060	0.154
Vinyl Chloride	0.341	104	268	0.296	0.762

Footnotes:

a Emerald provided average annual process wastewater, stormwater, and groundwater flows for 2015 through August 2020. Emerald reported the average annual process wastewater flow as 0.234 MGD, stormwater flow as 0.024 MGD, and groundwater flow as 0.083 MGD. The sum of these average annual flows is 0.341 MGD. Ecology used the 0.341 MGD flow to calculate the toxic pollutant limits. Emerald reported the metal-bearing process wastewater flows for copper, nickel, and zinc as 0.010 MGD, 0.015 MGD, and 0.010 MGD, respectively. For copper, nickel, and zinc, Ecology used the metal-bearing specific process wastewater and stormwater flows to calculate the limits.

b The limits are calculated as the product of the average flow, effluent guideline limitation, and a conversion factor of 0.00834.

Appendix F--Reasonable Potential Calculations for Outfall 001

Facility	Emerald - Outfall 001
Water Body Type	Freshwater
Rec. Water Hardness	104.86 mg/L

Dilution Factors:	Acute	Chronic
Aquatic Life	8.3	21.1
Human Health Carcinogenic		21.1
Human Health Non-Carcinogenic		21.1

Pollutant, CAS No. & NPDES Application Ref. No.	Outfall 001		TOLUENE 108883 25V
Effluent Data	# of Samples (n)		45
	Coeff of Variation (Cv)		6.0556
	Effluent Concentration, ug/L (Max. or 95th Percentile)		
	Calculated 50th percentile Effluent Conc. (when n>10)		1.00
Receiving Water Data	90th Percentile Conc., ug/L		
	Geo Mean, ug/L		0
Water Quality Criteria	Aquatic Life Criteria, ug/L	Acute	-
		Chronic	-
	WQ Criteria for Protection of Human Health, ug/L		180
	Metal Criteria Translator, decimal	Acute	-
		Chronic	-
	Carcinogen?		N

Human Health Reasonable Potential

s	$s^2=\ln(CV^2+1)$	1.90496
Pn	Pn=(1-confidence level)1/n	0.936
Multiplier		0.05539
Dilution Factor		21.1
Max Conc. at edge of Chronic Zone, ug/L		0.04739
Reasonable Potential? Limit Required?		**NO**

Comments/Notes:

References: WAC 173-201A,

Technical Support Document for Water Quality-based Toxics Control, US EPA, March 1991, EPA/505/2-90-001, pages 56/99

Appendix G--Reasonable Potential Calculations for Monitoring Point 002

Facility	Emerald - Monitoring Point 002
Water Body Type	Freshwater
Rec. Water Hardness	104.86 mg/L

Dilution Factors:	Acute	Chronic
Aquatic Life	359.0	913.0
Human Health Carcinogenic		913.0
Human Health Non-Carcinogenic		913.0

Pollutant, CAS No. & NPDES Application Ref. No. — Monitoring Point 002			AMMONIA, Criteria as Total NH3	ANTIMONY (INORGANIC) 7440360 1M	BIS(2-ETHYLHEXYL) PHTHALATE 117817 13B	CHLOROFORM 67663 11V	CHROMIUM(HEX) 18540299 - Dissolved
			1	2	3	4	
Effluent Data	# of Samples (n)		1	4	12	12	5
	Coeff of Variation (Cv)		0.6	0.6	0.6071	0.8325	0.6
	Effluent Concentration, ug/L (Max. or 95th Percentile)		2,970	3.6			1.23
	Calculated 50th percentile Effluent Conc. (when n>10)				1.335	0.59	
Receiving Water Data	90th Percentile Conc., ug/L		30				0.56
	Geo Mean, ug/L			0	0	0	
Water Quality Criteria	Aquatic Life Criteria, ug/L	Acute	1,039	-	-	-	15
		Chronic	129	-	-	-	10
	WQ Criteria for Protection of Human Health, ug/L		-	12	0.23	260	-
	Metal Criteria Translator, decimal	Acute	-	-	-	-	-
		Chronic	-	-	-	-	-
	Carcinogen?		N	N	Y	Y	N

Aquatic Life Reasonable Potential

Effluent percentile value			0.950				0.950
s	$s^2=\ln(CV^2+1)$		0.555	0.555	0.560	0.726	0.555
Pn	$Pn=(1\text{-confidence level})^{1/n}$		0.050				0.549
Multiplier			6.20	2.59	1.63	1.89	2.32
Max concentration (ug/L) at edge of…		Acute	81				0.566
		Chronic	50				0.563
Reasonable Potential? Limit Required?			**NO**				**NO**

Human Health Reasonable Potential

s	$s^2=\ln(CV^2+1)$	0.555	0.55451303	0.56015	0.72563	0.55451
Pn	Pn=(1-confidence level)1/n		0.473	0.779	0.779	
Multiplier		2.490	1.03845866	0.64999	0.57231	0.93365
Dilution Factor			913	913	913	
Max Conc. at edge of Chronic Zone, ug/L		8.098	0.00409	0.00146	0.00065	0.00126
Reasonable Potential? Limit Required?			**NO**	**NO**	**NO**	

Freshwater Un-ionized Ammonia Criteria Calculation

Based on Chapter 173-201A WAC, amended November 20, 2006

INPUT	
1. Receiving Water Temperature (deg C):	22.2
2. Receiving Water pH:	8.9
3. Is salmonid habitat an existing or designated use?	Yes
4. Are non-salmonid early life stages present or absent?	Present
OUTPUT	
Using mixed temp and pH at mixing zone boundaries?	no
Ratio	13.500
FT	1.400
FPH	1.000
pKa	9.334
Unionized Fraction	0.269
Unionized ammonia NH3 criteria (mg/L as NH_3)	
Acute:	0.340
Chronic:	0.042
RESULTS	
Total ammonia nitrogen criteria (mg/L as N):	
Acute:	1.039
Chronic:	0.129

Facility	Emerald - Monitoring Point 002
Water Body Type	Freshwater
Rec. Water Hardness	104.86 mg/L

Dilution Factors:	Acute	Chronic
Aquatic Life	359.0	913.0
Human Health Carcinogenic		913.0
Human Health Non-Carcinogenic		913.0

Pollutant, CAS No. & NPDES Application Ref. No. Monitoring Point 002			COPPER - 744058 6M Hardness dependent	DI-n-BUTYL PHTHALATE 84742 26B	MERCURY 7439976 8M	NICKEL - 7440020 9M - Dependent on hardness	PHENOL 108952 10A
Effluent Data	# of Samples (n)		43	12	4	43	19
	Coeff of Variation (Cv)		0.9037	0.8258	0.6	0.2627	0.5141
	Effluent Concentration, ug/L (Max. or 95th Percentile)		20.82		0.05	25.93	
	Calculated 50th percentile Effluent Conc. (when n>10)		4.8	0.354		15.5	0.315
Receiving Water Data	90th Percentile Conc., ug/L		1.12		0.00242	0.95	
	Geo Mean, ug/L		0.65	0	0.00139	0.55	0
Water Quality Criteria	Aquatic Life Criteria, ug/L	Acute	17.7944	-	2.1	1473.39	-
		Chronic	11.8206	-	0.012	163.632	-
	WQ Criteria for Protection of Human Health, ug/L		1300	450	0.14	150	18000
	Metal Criteria Translator, decimal	Acute	0.996	-	0.85	0.998	-
		Chronic	0.996	-	-	0.997	-
	Carcinogen?		N	N	N	N	N

Aquatic Life Reasonable Potential

Effluent percentile value			0.950		0.950	0.950	
s	$s^2=\ln(CV^2+1)$		0.773	0.721	0.555	0.258	0.484
Pn	$Pn=(1\text{-confidence level})^{1/n}$		0.933		0.473	0.933	
Multiplier			1.00	1.88	2.59	1.00	1.33
Max concentration (ug/L) at edge of…		Acute	1.175		0.003	1.019	
		Chronic	1.141		0.003	0.977	
Reasonable Potential? Limit Required?			**NO**		**NO**	**NO**	

Human Health Reasonable Potential

s	$s^2=\ln(CV^2+1)$	0.77266	0.72108	0.55451	0.25833	0.48427
Pn	Pn=(1-confidence level)1/n	0.933	0.779	0.473	0.933	0.854
Multiplier		0.31472	0.57432	1.03846	0.67942	0.60015
Dilution Factor		913	913	913	913	913
Max Conc. at edge of Chronic Zone, ug/L		0.65455	0.00039	0.00145	0.56637	0.00035
Reasonable Potential? Limit Required?		**NO**	**NO**	**NO**	**NO**	**NO**

Facility	Emerald - Monitoring Point 002
Water Body Type	Freshwater
Rec. Water Hardness	104.86 mg/L

Dilution Factors:	Acute	Chronic
Aquatic Life	359.0	913.0
Human Health Carcinogenic		913.0
Human Health Non-Carcinogenic		913.0

Pollutant, CAS No. & NPDES Application Ref. No.	Monitoring Point 002		TOLUENE 108883 25V	1,2-TRANS-DICHLOROETHYLENE 156605 26V	ZINC- 7440666 13M hardness dependent
Effluent Data	# of Samples (n)		19	12	43
	Coeff of Variation (Cv)		0.9896	2.1336	0.849
	Effluent Concentration, ug/L (Max. or 95th Percentile)				38.81
	Calculated 50th percentile Effluent Conc. (when n>10)		0.0572	0.5415	10.7
Receiving Water Data	90th Percentile Conc., ug/L				52
	Geo Mean, ug/L		0	0	3.16
Water Quality Criteria	Aquatic Life Criteria, ug/L	Acute	-	-	119.143
		Chronic	-	-	108.796
	WQ Criteria for Protection of Human Health, ug/L		180	600	2300
	Metal Criteria Translator, decimal	Acute	-	-	0.996
		Chronic	-	-	0.996
	Carcinogen?		N	Y	N

Aquatic Life Reasonable Potential

Effluent percentile value				0.950
s	$s^2=\ln(CV^2+1)$	0.828	1.309	0.737
Pn	$Pn=(1\text{-confidence level})^{1/n}$			0.933
Multiplier		1.63	3.15	1.00
Max concentration (ug/L) at edge of…	Acute			51.963
	Chronic			51.985
Reasonable Potential? Limit Required?				**NO**

Human Health Reasonable Potential

s	$s^2=\ln(CV^2+1)$	0.82629	1.30928	0.73674
Pn	Pn=(1-confidence level)1/n	0.854	0.779	0.933
Multiplier		0.41846	0.36533	0.33209
Dilution Factor		913	913	913
Max Conc. at edge of Chronic Zone, ug/L		0.00006	0.00059	3.16826
Reasonable Potential? Limit Required?		**NO**	**NO**	**NO**

Comments/Notes:

References: WAC 173-201A,

Technical Support Document for Water Quality-based Toxics Control, US EPA, March 1991, EPA/505/2-90-001, pages 56/99

Appendix H--WET Tests Summary

Scheduled	Test Code	Collected (Start Date)	Duration	Organism	Endpoint	NOEC	LOEC	PMSD	Effluent Survival (100%)	Met Performance Standard?
2012 July	RMAR2960	7/18/2012 (7/19/2012)	Acute	*pimephales promelas* Fathead Minnow	96-Hour Survival	100%	>100%	2.5%	100.%	**Yes**
2012 July	RMAR2961	7/18/2012 (7/19/2012)	Chronic	*Ceriodaphnia dubia*	7-Day Survival	100%	>100%	N/A	N/A	**Yes**
					7-Day Reproduction	100%	>100%	17%		
2012 July	RMAR2962	7/18/2012 (7/19/2012)	Chronic	*pimephales promelas* Fathead Minnow	7-Day Survival	100%	>100%	8.8%	N/A	**Yes**
					7-Day Biomass	100%	>100%	13.80%		
					7-Day Weight	100%	>100%	11.50%		
2012 July	RMAR2959	7/18/2012 (7/19/2012)	Acute	*Ceriodaphnia dubia*	48-Hour Survival	100%	>100%	9.2%	100.0%	**Yes**
2013 February	RMAR2966	2/13/2013 (2/14/2013)	Chronic	*pimephales promelas* Fathead Minnow	7-Day Survival	100%	>100%	5.9%	N/A	**Yes**
					7-Day Growth	100%	>100%	15.8%		
					7-Day Weight	100%	>100%	17.0%		
2013 February	RMAR2963	2/13/2013 (2/14/2013)	Acute	*Ceriodaphnia dubia* Water Flea	48-Hour Survival	100%	>100%	5.0%	100.0%	**Yes**
2013 February	RMAR2964	2/13/2013 (2/14/2013)	Acute	*pimephales promelas* Fathead Minnow	96-Hour Survival	100%	>100%	4.6%	97.5%	**Yes**
2013 February	RMAR2965	2/13/2013 (2/14/2013)	Chronic	*Ceriodaphnia dubia*	7-Day Survival	100%	>100%	N/A	N/A	**Yes**
					7-Day Reproduction	100%	>100%	60.5%		

Appendix I--Response to Comments

Ecology made the draft permit and fact sheet available for public review and comment before issuing the final permit. Ecology published notice of the opportunity to comment on the renewal of this permit in The Daily News on November 12, 2020. In the notice, we invited public review of the proposed permit and provided a 36-day public comment period. The deadline for submittal of written comments was December 18, 2020.

During the comment period, we received one written comment from the Environmental Protection Agency (EPA).

Comment: EPA

Anti-backsliding. The fact sheet compares the proposed effluent limits with 2003 limits using Ecology's guidelines to evaluate anti-degradation. The fact sheet does not include a comparison with the current limits under the effective permit that expired in 2014. Comparing effluent limits in the active and proposed permits, it appears there are several parameters for Outfall 002 that have less stringent proposed limits. An anti-backsliding analysis should be included to explain why less stringent limits are allowed.

Response to Comment 1:

Table 16 of the fact sheet includes a comparison of the previous and proposed limits. The previous limits are from the permit issued in 2009 that expired in 2014. Ecology added language after Table 16 to address EPA's comment on anti-backsliding.

Other Changes to the Fact Sheet -

Based on internal review, Ecology made minor formatting changes and updates to the fact sheet following public notice.