FACT SHEET FOR NPDES PERMIT WA0000281

EMERALD KALAMA CHEMICAL, LLC

July 1, 2009

PURPOSE of this Fact Sheet

This fact sheet explains and documents the decisions Ecology made in drafting the proposed National Pollutant Discharge Elimination System (NPDES) permit for Emerald Kalama Chemical, LLC.

The Environmental Protection Agency (EPA) developed the NPDES permitting program as a tool to "restore and maintain the chemical, physical, and biological integrity of the Nation's waters." EPA delegated to Ecology the power and duty to write, issue, and enforce NPDES permits within Washington State. Both state and federal laws require any industrial facility to obtain a permit before discharging waste or chemicals to a water body.

An NPDES permit limits the types and amounts of pollutants the facility may discharge. Those limits are based either on (1) the pollution control or wastewater treatment technology available to the industry, or on (2) the receiving water's customary beneficial uses. 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.

PUBLIC ROLE in the 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 to the facility operator (Chapter 173-220-050 WAC). Copies of the fact sheet and draft permit for Emerald Kalama, NPDES permit WA0000281**,** are available for public review and comment from **May 20, 2009** until the close of business **June 19, 2009**. For more details on preparing and filing comments about these documents, please see **Appendix A - Public Involvement**.

Before publishing the draft NPDES permit, Emerald Kalama, reviewed it for factual accuracy. Ecology corrected any errors or omissions about the facility's location, product type or production rate, discharges or receiving water, or its history.

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

Ha Tran prepared the permit and this fact sheet.

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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 of permits (NPDES permits), 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).

Ecology adopted rules describing how it exercises its authority:

- Procedures Ecology follows for issuing NPDES permits (Chapter 173-220 WAC)
- Water quality criteria for surface waters (Chapter 173-201A WAC) and for ground waters (Chapter 173-200 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 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 (Chapter 173-220-050 WAC). See **Appendix A - Public Involvement** 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 comments. Ecology will summarize the responses to comments and any changes to the permit in **Appendix D.**

II. BACKGROUND INFORMATION

Table 1 - General Facility Information

Applicant:	Emerald Kalama Chemical, LLC
Facility Name and Address:	Emerald Kalama Chemical, LLC 1296 Third Street Northwest Kalama, WA 98625
Type of Treatment:	Biological treatment and anaerobic pretreatment
SIC Code:	2869 - Industrial organic chemicals 2865 - Cyclic organic crudes and intermediates and organic dyes and pigments
Discharge Location:	Columbia River at Mile 74 Latitude: 46º 01' 18" N Longitude: 122º 51' 35" W
Water Body ID Number:	1240014462974

A. Facility Description

History

Emerald Kalama Chemical, LLC (Emerald) operates an organic chemical manufacturing plant located in Kalama, Washington. The plant occupies a 140-acres property, 55-acres of which are developed for manufacturing. The plant borders the Columbia River to the west, Interstate 5 to the east, the wetland to the north, and RSG Forest Products to the south.

The Dow Chemical Company constructed the plant in 1962. The plant used toluene as raw material to produce phenol and other materials for the plywood industry. In 1971, three former Dow employees purchased the plant and renamed it Kalama Chemical. The owners expanded the production to specialty chemicals, which the plant produced using intermediates from toluene oxidation.

The facility underwent several ownership transfers. Kalama Chemical sold the facility to a Canadian-based company, Rogers Sugar, Ltd in 1990. Ownership passed to Freedom Chemical in 1994, Noveon in 2001, and Lubrizol in 2004. Emerald Performance Materials purchased the plant and property from Lubrizol in May 2006 and renamed the plant Emerald Kalama. The plant ended phenol production in December 2006.

The U.S. EPA classifies Emerald as a major NPDES facility.

Figure 1 - Aerial view of plant

Industrial Process

The chemical plant is in the Kalama Industrial Park on the east bank of the Columbia River. The plant receives its raw material, toluene, from ships at the dock and stores the toluene in tanks T-70 and T-71 prior to processing. The manufacturing process generates benzene, a by-product, which Emerald purifies and ships by railcars to benzene manufacturers.

Emerald operates continuously and employs about 124 people. The plant currently manufactures the following chemicals:

1. Benzoic acid
2. Sodium/potassium benzoate
3. Benzaldehyde
4. Plasticizers (dipropylene glycol dibenzoate, propylene glycol dibenzoate, and a blend of dipropylene glycol benzoate and diethylene glycol benzoate)
5. Benzyl alcohol
6. Hexyl cinnamic aldehyde
7. Hexanal, octanal, and decanal
8. Benzene
9. Cinnamic aldehyde
10. Benzyl benzoate
11. Amyl cinnamic aldehyde
12. Benzyl and dibenzyl amine
13. Benzyl acetate
14. Methyl cinnamic aldehyde
15. Butyl cinnamic aldehyde

The food, flavor/fragrance and pharmaceutical industries use the chemical compounds the plant produces. Emerald ships its products out in railcars, tank trucks, drums, and dry bags.

The previous permit considered the manufacturing of 237,000 tons of organic chemicals per year. By the end of 2006, Emerald has decreased its production to about 209,000 tons annually. Emerald shut down the phenol process and plans to increase the production of butyl cinnamic aldehyde, methyl cinnamic aldehyde, and hexyl cinnamic aldehyde. Following these changes, we expect plant production to be about 194,000 tons annually.

Wastewater Treatment

The plant owner constructed the wastewater treatment system 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 pretreat 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. The plant owner added a second aeration tank to biological treatment in 1980 and a second clarifier in 1985. In 1986, the facility added a dissolved air flotation (DAF) unit to treat bottoms from the clarifiers. 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. The facility later installed the SOMAT and removed the DAF from use.

The treatment system currently handles:

- Process wastewater.
- Groundwater from remedial activities.
- Non-contact and contact storm water collected in dikes and sumps.
- Spills to containment areas.

The discharge consists of effluent from the biological treatment plant and non-contact cooling water. The facility has a pump house drawing cooling water from the Columbia. Non-contact cooling water, which does not go through the treatment plant, makes up about 98 percent of the discharge. Emerald combines the cooling water with the effluent into one basin and discharges it to the river.

Emerald has an Industrial Storm Water General Permit (ISWGP) for the discharge of the storm water from toluene tanks T-70 and T-71 containment areas (dikes) to outfall 003. The facility currently routes this storm water stream to the treatment plant and requests to incorporate the stream into the new NPDES permit. Ecology reviewed the storm water flow and characteristics. Based on the review, we determine that the storm water loading will not exceed the treatment system capacity. The NPDES permit will cover the treatment and discharge of storm water from T-70 and T-71 dikes to the Columbia River.

The permit will also cover the discharge of storm water in T-70 and T-71 dikes to the outfall 003. There were no toluene spill to the dikes; Emerald has not discharged storm water to outfall 003 in over five years. Sampling in permit application shows the storm water was below

benchmark levels in the ISWGP for pH, oil & grease, phosphorus, and BOD_5 (**Appendix C - Table 26**); bench mark levels are values at or below which the discharge is unlikely to cause a water quality violation. Based on the information, Ecology determined that monitoring for pollutants required in the ISWGP is adequate for outfall 003 discharge. We included monitoring of toluene and benzene due to potential spills to dikes, which serve as spills containment for toluene storage tanks T-70 and T-71. The permit will require the facility to immediately report any spills to T-70 and T-71 dikes.

Solid Wastes

The biological treatment system generates an average of 43 tons of waste sludge per week. A SOMAT unit, which runs the sludge through a press, dewaters the sludge to about 9 percent solids. The sludge is registered as a fertilizer with the Department of Agriculture. Emerald loads the sludge into the trucks and sends it to Fire Mountain Farms in Lewis County for land farming.

Discharge Outfall

Outfall 001 extends about 170 ft into the Columbia River at a 45-degree angle to the flow. The submerged diffuser originally had a total of 756 ports along a 100-foot length at the end of the outfall pipe. In 1992, the facility modified the diffuser by plugging all ports in the onshore 50 ft of the pipe and all vertical ports on the remaining 50 ft. The diffuser is now 50 ft in length with about 300 functioning ports. The ports are 1.25 inch in diameter. The diffuser extends from a depth of about -25.25 ft to -45.5 ft mean sea level (MSL). The diffuser continuously discharges non-contact cooling water mixed with effluent from the biological treatment plant.

Emerald combines the effluent from the biological treatment plant (outfall 002) with non-contact cooling water and discharges it at outfall 001.

B. Permit Status

Emerald submitted an application for permit renewal on December 8, 2007. Ecology requested additional information from Emerald on January 22, 2008. Emerald resubmitted the application on February 12, 2008. Ecology accepted the application as complete on February 14, 2008.

Ecology issued the previous permit for this facility on July 25, 2002. The previous permit placed effluent limits on the following:

Table 2 - Previous Permit: Effluent Limits

Outfall	Parameter	Units	Average monthly	Maximum daily
001	Temperature	^oC	-	40.7
002	5-day Biochemical oxygen demand (BOD_5)	lbs/day	104	277
002	Total suspended solids (TSS)	lbs/day	127	412
002	Copper	lbs/day	0.67	1.54
002	Nickel	lbs/day	0.5	1.13
002	Zinc	lbs/day	0.49	1.19
002	Phenol	lbs/day	0.072	0.125
002	Bis(2-ethylhexyl) phthalate	lbs/day	0.495	1.34

Outfall	Parameter	Units	Average monthly	Maximum daily
001	Temperature	°C	-	40.7
002	5-day Biochemical oxygen demand (BOD_5)	lbs/day	104	277
002	Total suspended solids (TSS)	lbs/day	127	412
002	Copper	lbs/day	0.67	1.54
002	Nickel	lbs/day	0.5	1.13
002	Zinc	lbs/day	0.49	1.19
002	Phenol	lbs/day	0.072	0.125
002	Bis(2-ethylhexyl) phthalate	lbs/day	0.495	1.34
002	Toluene	lbs/day	0.125	0.384
002	Benzene	lbs/day	0.178	0.653
002	Ethylbenzene	lbs/day	0.154	0.519
002	Fluorene	lbs/day	0.106	0.283
002	Naphthalene	lbs/day	0.106	0.283
002	pH	Standard unit	Within the range of ≥ 6.0 and ≤ 9.0*	

* Excursions between 5.0 and 6.0 or 9.0 and 10.0 are not considered violations provided no single excursion exceed 60 minutes and total excursions do not exceed 7 hours and 30 minutes a month.

In the previous permit, Ecology calculated effluent limits for the treatment plant effluent and waived routine monitoring for the 49 pollutants listed in **Appendix C - Table 24**.

C. Summary of Compliance with Previous Permit Issued

Ecology conducted a sampling compliance inspection on **July 17, 2008**.

Emerald has complied with the effluent limits and permit conditions throughout the duration of the permit issued on July 25, 2002**.** Ecology assessed facility compliance based on its review of the facility's Discharge Monitoring Reports (DMRs) and on inspections conducted by Ecology.

D. Wastewater Characterization

The concentration of pollutants in the discharge was reported in the NPDES application and in discharge monitoring reports. The tabulated data represents the quality of the discharge from outfall 001 and outfall 002 in 2007. The discharge is characterized as follows:

Table 3 - Outfall 001 Wastewater Characterization

Parameter	Units	Maximum Daily	Maximum 30-Day	Long Term Average
Temperature, winter	°C	23.5	15.7	15.4
Temperature, summer	°C	36.0	35.3	34.1
Toluene*	µg/L	490	-	-
Arsenic	µg/L	1.2	-	-
PCB 1254	µg/L	< 1.3	-	-

*The previous permit required monthly toluene monitoring to detect spills. Toluene concentrations were non-detect (<10 µg/L) throughout the permit cycle, except on 12/03 and 1/04.

Table 4 - Outfall 002 Wastewater Characterization (continued in Appendix C – Table 26)

Parameter	Units	Maximum Daily	Maximum 30-Day	Long Term Average
BOD_5	mg/L	17	7	2
BOD_5	lbs/day	66	26	8
Total suspended solids (TSS)	mg/L	35	10	5
Total suspended solids (TSS)	lbs/day	104	38	16
pH	Standard unit	Daily minimum is 6.2, daily maximum is 7.8		
Copper, total	µg/L	39	39	12.5
Copper, total	lbs/day	0.108	0.100	0.038
Nickel, total	µg/L	21	21	4.9
Nickel, total	lbs/day	0.062	0.062	0.013
Zinc, total	µg/L	23	23	9.1
Zinc, total	lbs/day	0.085	0.085	0.027
Phenol	µg/L	11	11	0.85
Phenol	lbs/day	0.04	0.04	0.003
Phenol	lbs/day	0.04	0.04	0.003
Color	Color unit	30	-	-

E. Description of the Receiving Water

Emerald discharges to the Columbia River at River Mile 74. Other nearby point sources are the Port of Kalama, Kalama Sewage Treatment Plant, and Chemtrade Performance Chemical.

The ambient background data used for this permit includes the following:

Table 5 – Ambient Background Data

Parameter	Value used
Temperature (highest annual 1-DADMax), 90th percentile [(i)]	21.80°C
Temperature (highest annual 7-DADMax), 90th percentile [(i)]	21.50°C
pH [(ii)]	8.1
Alkalinity [(ii)]	53 mg/L $CaCO_3$
Ammonia-N [(ii)]	< 0.02 mg/L
Dissolved oxygen [(iii)]	8.6 mg/L
Turbidity [(iii)]	5.2 NTU
Hardness [(iii)]	62 mg/L $CaCO_3$
Cadmium [(iv)]	< 0.1µg/L
Chromium [(iv)]	0.47 µg/L
Lead, total recoverable [(iv)]	0.35 µg/L
Copper, total recoverable [(iv)]	1.8 µg/L
Nickel, total recoverable [(iv)]	0.33 µg/L
Zinc, total recoverable [(iv)]	20 µg/L
Phenol [(iv)]	< 0.06 µg/L
Manganese [(v)]	0.88 µg/L

Parameter	Value used
Iron [v]	9.7 µg/L
Arsenic [vi]	0.91 µg/L
Bis(2-ethylhexyl) phthalate [vi]	< 0.43 µg/L

(i) 2002-2006 ambient temperature study by Georgia Pacific at Camas, river mile 120. There are no significant thermal sources between Camas and Kalama, therefore Georgia Pacific temperature data are representative of conditions at the point of discharge. (ii) 1977 Water quality monitoring data at WRIA 27, station 27A070. (iii) 1991 Lower Columbia River Bi-state Program study at Sandy Island. (iv) 2006 and 2007 inspection sampling by Ecology, geometric mean. (v) 2005 Published NASQAN (USGS) data at river mile 53, geometric mean. (vi) 2003-2007 Discharge monitoring report, geometric mean.

F. SEPA Compliance

Regulation exempts reissuance or modification of any wastewater discharge permit from the SEPA process as long as the permit contains conditions are no less stringent than state rules and regulations. The exemption applies only to existing discharges, not to new discharges.

III. PROPOSED PERMIT CONDITIONS

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.

Nor does Ecology usually develop permit limits for pollutants that were not reported in the permit application but that 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, as described in 40 CFR 122.42(a), if significant changes occur in any constituent. Industries may be in violation of their permit until Ecology modifies the permit to reflect additional discharge of pollutants.

A. Design Criteria

Under Chapter 173-220-150 (1)(g) WAC, neither flows nor waste loadings may exceed approved design criteria. Ecology approved design criteria for this facility's treatment plant were obtained from the engineering report dated February 1995 prepared by Parametrix, Inc and amended in the January 15, 1999 addendum.

Table 6 - Design Criteria for Emerald Wastewater Treatment Plant

Parameter	Design Quantity
Peak wastewater flow	400 gpm
BOD loading	5,006 lbs/day

B. Technology-Based Effluent Limits

The federal effluent guidelines for Organic Chemical, Plastics, and Synthetic Fibers (OCPSF) 40 CFR Subparts 414.61 through 414.91 apply to Emerald Kalama process wastewater. The guidelines covered conventional pollutants (BOD_5, TSS) and toxic pollutants associated with the organic chemical industry. Appendix C contains the calculations for technology-based limits.

In general, Ecology considers effluent guidelines 5 years old or less equivalent to AKART. Effluent guidelines between 5 and 10 years old may be AKART, which Ecology determines by reviewing treatability data base and comparing the production processes, pollutants generated, and treatment efficiency to the development document. Effluent guidelines over 10 years old require at least the previous analysis and review of the process design.

The OCPSF effluent guidelines are over 10 years old. Ecology reviewed the development document and found that the facility's processes and operations remain consistent with the description in the development document. Ecology also reviewed the engineering report, which includes the removal efficiency study for the biological treatment plant. The treatment efficiency is greater than 95% for copper and zinc and greater than 99% for organics, including toluene, benzene, benzoic acid, and benzyl alcohol. Ecology reviewed the treatment plant's influent and effluent BOD_5 data from June 2003 to May 2008. The average BOD_5 removal efficiency is greater than 99%. Based on this review, Ecology believes that the Emerald treatment facility provides AKART and considers the federal effluent guideline AKART.

In the permit renewal application, Emerald requested the continuation of the waiver of routine monitoring of 49 specified pollutants on the basis that the pollutants are not detected in the discharge (see **Table 7**). The previous permit waived routine monitoring for 49 specified pollutants under 40 CFR 122.44(a)(2). For this permit, Ecology re-evaluated the applicability of this regulation as follow.

Under 40 CFR 122.44(a)(2), Ecology may grant a monitoring waiver for pollutants with technology-based limits if the discharger submits sampling and technical information demonstrating "the pollutant is not present in the discharge or is present only at background levels from intake water and without any increase in the pollutant due to activities of the discharger." The phrase "not present in the discharge" refers to process wastewater discharge prior to treatment and does not mean the treated effluent discharge to surface water. This interpretation is evident in the preamble to the final rule in the Federal Register (Volume 65, Number 94, page 308092). As described in the Federal Register the rule allows a waiver for pollutants if "a facility is not further adding pollutants to those already in its intake water." The waiver also applies to a pollutant that is not "in the manufacturing process as a raw material, is not present in the raw materials, is not generated as a product or by-product, and is not present in wastes from the manufacturing processes." The monitoring waiver applies to these cases, which have no potential to discharge the pollutants. The waiver does not apply to pollutants treated to non-detectable levels in the effluent, because there remains a potential to discharge should the treatment system fail or experience upsets.

Based on the evaluation above, Ecology cannot issue Emerald the monitoring waiver under 40 CFR 122.44(a)(2) because the facility did not submit data demonstrating that: 1) the pollutants is not present in the wastewater prior to treatment; or 2) the pollutants are present in the wastewater only in background levels from the intake water.

The facility qualifies for "Monitoring Reduction for Exemplary Performance." Monitoring reduction is dependent on the ratio of the long-term average over the last two years to the monthly average limit. Because Emerald did not do routine monitoring for 49 pollutants in the last permit, Ecology reviewed the priority pollutant scan data in the 1998, 1999, 2000, and 2007 permit renewal applications (see **Table 7** below). The data shows that recent process changes, such as phenol plant shut down, is unlikely increase pollutants in the discharge. The 49 pollutants are not present in the effluent above detection limits. Ecology used the detection limit in the analysis for monitoring reduction. For 48 pollutants, the ratio of the discharge concentration to the average monthly limit is 0.25 or less. For chlorobenzene, this ratio is 0.29; however, chlorobenzene is not in the process and is not used at the facility. Using the criteria in the 2008 Permit Writer Manual, Ecology reduced the monitoring frequency for these pollutants from monthly to biannually in the proposed permit.

Table 7 - Data for Specified Pollutants Previously Waived from Monitoring

Pollutants	Limit (lb/day)		Effluent (lb/day)			
	Monthly average	Max daily	1998	1999	2000	2007
Acenaphthene	0.056	0.149	< 0.004	< 0.004	< 0.005	< 0.021
Acrylonitrile	0.242	0.611	< 0.004	< 0.004	< 0.008	< 0.106
Carbon tetrachloride	0.045	0.096	< 0.011	< 0.011	< 0.022	< 0.021
Chlorobenzene	0.038	0.071	< 0.011	< 0.011	< 0.022	< 0.106
1,2,4-Trichlorobenzene	0.172	0.353	< 0.004	< 0.004	< 0.005	< 0.021
Hexachlrobenzene	0.038	0.071	< 0.007	< 0.008	< 0.009	< 0.021
Hexachloroethane	0.053	0.136	< 0.007	< 0.008	< 0.009	< 0.021
1,2-Dichloroethane	0.056	0.149	< 0.011	< 0.011	< 0.022	< 0.021
1,1,1-Trichloroethane	0.053	0.136	< 0.011	< 0.011	< 0.022	< 0.021
1,1-Dichloroethane	0.056	0.149	< 0.011	< 0.011	< 0.022	< 0.021
1,1,2-Trichloroethane	0.053	0.136	< 0.011	< 0.011	< 0.022	< 0.021
Chloroethane	0.262	0.676	< 0.011	< 0.011	< 0.022	< 0.021
Chloroform	0.053	0.116	< 0.011	< 0.011	< 0.022	< 0.021
2-Chlorophenol	0.078	0.247	< 0.004	< 0.004	< 0.005	< 0.021
1,2-Dichlorobenzene	0.194	0.411	< 0.004	< 0.004	< 0.005	< 0.021
1,3-Dichlorobenzene	0.078	0.111	< 0.004	< 0.004	< 0.005	< 0.021
1,4-Dichlorobenzene	0.038	0.071	< 0.004	< 0.004	< 0.005	< 0.021
1,1-Dichloroethylene	0.040	0.063	< 0.011	< 0.011	< 0.022	< 0.021
1,2-trans-Dichloroethylene	0.053	0.136	< 0.011	< 0.011	< 0.022	< 0.021
2,4-Dichlorophenol	0.098	0.283	< 0.007	< 0.008	< 0.009	< 0.021
1,2-Dichloropropane	0.386	0.580	< 0.011	< 0.011	< 0.022	< 0.021
1,3-Dichloropropylene	0.073	0.111	< 0.011	< 0.011	< 0.022	< 0.021
2,4-Dimethylphenol	0.045	0.091	< 0.004	< 0.004	< 0.005	< 0.021

Pollutants	Limit (lb/day)		Effluent (lb/day)			
	Monthly average	Max daily	1998	1999	2000	2007
2,4-Dinitrotoluene	0.285	0.719	< 0.007	< 0.008	< 0.009	< 0.021
2,6-Dinitrotoluene	0.644	1.618	< 0.007	< 0.008	< 0.009	< 0.021
Fluoranthene	0.063	0.172	< 0.004	< 0.004	< 0.005	< 0.021
Methylene chloride	0.101	0.225	< 0.011	< 0.011	0.004	< 0.042
Methyl chloride	0.217	0.479	< 0.011	< 0.011	< 0.022	< 0.106
Hexachlorobutadiene	0.050	0.124	< 0.004	< 0.004	< 0.005	< 0.021
Nitrobenzene	0.068	0.172	< 0.004	< 0.004	< 0.005	< 0.021
2-Nitrophenol	0.103	0.174	< 0.007	< 0.008	< 0.009	< 0.021
4-Nitrophenol	0.182	0.313	< 0.040	< 0.041	< 0.045	< 0.053
2,4-Dinitrophenol	0.179	0.310	< 0.040	< 0.041	< 0.045	< 0.053
4,6-Dinitro-o-cresol	0.197	0.699	< 0.040	< 0.041	< 0.045	< 0.021
Di-n-butyl phthalate	0.068	0.144	< 0.004	< 0.004	< 0.005	< 0.021
Diethyl phthalate	0.204	0.512	< 0.004	< 0.004	< 0.005	< 0.021
Dimethyl phthalate	0.048	0.119	< 0.004	< 0.004	< 0.005	< 0.021
Benzo(a)anthracene	0.056	0.149	< 0.004	< 0.004	< 0.005	< 0.021
Benzo(a)pyrene	0.058	0.154	< 0.004	< 0.004	< 0.005	< 0.021
3,4-Benzofluoranthene	0.058	0.154	< 0.004	< 0.004	< 0.005	< 0.021
Benzo(k)fluoranthene	0.056	0.149	< 0.004	< 0.004	< 0.005	< 0.021
Chrysene	0.056	0.149	< 0.004	< 0.004	< 0.005	< 0.021
Acenaphthylene	0.056	0.149	< 0.004	< 0.004	< 0.005	< 0.021
Anthracene	0.056	0.149	< 0.004	< 0.004	< 0.005	< 0.021
Phenanthrene	0.056	0.149	< 0.004	< 0.004	< 0.005	< 0.021
Pyrene	0.063	0.169	< 0.004	< 0.004	< 0.005	< 0.021
Tetrachloroethylene	0.056	0.141	< 0.011	< 0.011	< 0.022	< 0.021
Trichloroethylene	0.053	0.136	< 0.011	< 0.011	< 0.022	< 0.021
Vinyl chloride	0.262	0.676	< 0.011	< 0.011	< 0.022	< 0.021

C. Surface Water Quality-Based Effluent Limits

The Washington State Surface Water Quality Standards (Chapter 173-201A WAC) were 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 established surface water quality standards (Chapter 173-201A-510 WAC). 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 loading study (TMDL).

Numerical Criteria for the Protection of Aquatic Life and Recreation

Numerical water quality criteria are published in the Water Quality Standards for Surface Waters (Chapter 173-201A WAC). They specify the 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

The U.S. EPA has published 91 numeric water quality criteria for the protection of human health that are applicable to dischargers in Washington State (40 CFR 131.36). These criteria 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., Chapter 173-201A-240(1) WAC, 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 (Chapter 173-201A-200 WAC, 2006) and of all marine waters (Chapter 173-201A-210 WAC, 2006) in the State of Washington.

Antidegradation

The purpose of Washington's Antidegradation Policy (Chapter 173-201A-300-330 WAC, 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 all known, available, and reasonable methods of prevention, control, and treatment (AKART).
- Apply three Tiers of protection (described below) for surface waters of the state.

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

prevents the degradation of waters formally listed as "outstanding resource waters," and applies to all sources of pollution.

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

- The facility is planning a new or expanded action.
- Ecology regulates or authorizes the action.
- The action has the potential to cause measurable degradation to existing water quality at the edge of a chronic mixing zone.

This facility must meet Tier I requirements.

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

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

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 criteria, so long as the diluting wastewater doesn't interfere with designated uses of the receiving water body (e.g., recreation, water supply, and aquatic life and wildlife habitat, etc.). The pollutant concentrations outside of the mixing zones must meet water quality numeric criteria.

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

The state's water quality standards allow Ecology to authorize mixing zones for the facility's permitted wastewater discharges only if those discharges already receive all known, available, and reasonable methods of prevention, control and treatment (AKART). Mixing zones typically require compliance with water quality criteria within a specified distance from the point of discharge; and use no more than 25% of the available width of the water body for dilution.

Ecology uses modeling to estimate the amount of mixing within the mixing zone and determine the potential for violating the water quality standards at the edge of the mixing zone and derive 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 10 means the effluent comprises 10% by volume and the receiving water comprises 90% of the total volume 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 liters/day for drinking water
- 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 (Chapter 173-201A-400 WAC, 2006). 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.

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 and the pollution prevention activities practiced at Emerald meet the requirements of AKART (see "Technology based Limits").

3. Ecology must consider critical discharge conditions. Surface water quality-based limits are derived for the water body's critical condition, (the receiving water and waste discharge condition with the highest potential for adverse impact on the aquatic biota, human health, and existing or designated water body uses). The critical discharge condition is often pollutant-specific or water body-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: http://www.ecy.wa.gov/biblio/92109.html.

The following conditions were used to model the discharge:

- The seven day average low river flow with a recurrence interval of ten years (7Q10) of 87,585 cfs (cubic feet per second).
- Channel cross-sectional area of 91,880 square feet.
- Near shore current speed of 0.20 ft/s or 0.06 m/s.
- Ambient temperatures of 21.31ºC at the water surface, 21.23ºC at the depth of 1 meter, 21.20ºC at the depth of 2 meter, and 21.18ºC at the depth of 3 meter and below.
- 90th percentile maximum effluent temperature of 34 ºC.
- 90th percentile maximum effluent flow of 22.44 MGD for water quality criteria.
- Port number of 300.
- Port depth of 35 feet or 10.67 meter.
- Port elevation of 3.3 feet or 1 meter.
- Port diameter of 1.25 inch or 3.175 centimeter.
- Port spacing of 3.4 inch (alternate ports) for chronic mixing zone and 1.7 inch (same side ports) for acute mixing zone.
- Discharge angle of 0 degree vertical and 150 degree horizontal.

Ambient data at critical conditions in the vicinity of the outfall was taken from Beak Consultants, Inc. Mixing Zone Study Report, submitted to Ecology on June 29, 1993.

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, or**
- **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 protect all aquatic species.

EPA sets acute criteria for toxic chemicals assuming organisms are exposed to the pollutant at the criteria concentration for 1-hour. They set chronic criteria assuming organisms are exposed to the pollutant at the criteria concentration for 4 days. Dilution modeling under critical conditions generally shows that both acute and chronic criteria concentrations are reached within minutes of being discharged.

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 this effluent will not exceed 33 degrees C for more than 2 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.

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

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. Ecology concluded the discharge/receiving water mixture will not violate water quality criteria outside the boundary of the mixing zone if permit limits are met.

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

At any given time, the effluent plume uses only a portion of the acute and chronic mixing zone, which minimizes the volume of water involved in mixing. The plume rises through the water column as it mixes 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 and the receiving water is more completely mixed in a shorter time period. 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 10 years to perform the reasonable potential analysis.

The facility continues to conduct pollution prevention activities and has completed pollution prevention projects. These activities also minimize the concentrations of pollutants in the discharge. As required by the 2002 permit, the facility developed a pollution prevention plan for wastewater stream in two steps, phase I and phase II. Ecology approved the phase I report on January 24, 2005 and the phase II report on September 22, 2005. Phase I identified ten (10) pollution prevention opportunities for wastewater. The 2002 permit required the implementation of pollution prevention activities found to be technically and economically feasible. Emerald submits annual report on the status of the pollution prevention activities.

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 (or of the chronic mixing zone at the ten year low flow.

- **The pollutant concentration, duration and frequency of exposure to the discharge, will not create a barrier to migration or translocation of indigenous organisms to a degree that has the potential to cause damage to the ecosystem.**
  As described above the toxicity of any pollutant depends upon the exposure, the pollutant concentration and the time the organism is exposed to that concentration. Authorizing a limited acute mixing zone for this discharge assures that it will not create a barrier to migration. The effluent from this discharge will rise as it enters the receiving water, assuring that the rising effluent will not cause translocation of indigenous organism 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 (40 CFR 131.36). Criteria applicable to this facility's discharge are summarized below in **Table 8**.

- 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.

Table 8 – Aquatic Life Uses & Associated Criteria

Salmonid Spawning, Rearing, And Migration	
Temperature Criteria	• 1-D max of 20.0°C (68.0°F); or • When natural conditions exceed 1-D max of 20.0°C, no temperature increase will raise receiving water temperature higher than 0.3°C
Dissolved Oxygen Criteria	Greater than 90 percent of saturation
Turbidity Criteria	• 5 NTU over background when the background is 50 NTU or less; or • A 10 percent increase in turbidity when the background turbidity is more than 50 NTU
Total Dissolved Gas Criteria	Total dissolved gas shall not exceed 110 percent of saturation at any point of sample collection
pH Criteria	pH shall be within the range of 6.5 to 8.5 with a human-caused variation within the above range of less than 0.5 units

- The recreational uses are extraordinary primary contact recreation, primary contact recreation, and secondary contact recreation. The recreational uses for this receiving water are identified below.

Table 9 – Recreational Uses & 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 use**s are domestic, agricultural, industrial, and stock watering.
- The **miscellaneous fresh water use**s are wildlife habitat, harvesting, commerce and navigation, boating, and aesthetics.

The section of Columbia River at the point of discharge is on the 303(d) list. Water bodies on this list are considered impaired under the Clean Water Act. Total daily maximum loads (TMDL) may be developed for pollutants on the 303(d) list. The river is listed for the parameters below:

- Temperature – The temperature criteria is 20.0°C for 1-DMax. The section of the river at the point of discharge is listed for two temperature excursions detected in 1994 near Columbia City, which is six miles upstream of Kalama. The field study at the point of discharge showed a range of 20.8 to 21.4°C in river temperature (Beak Consultants, 1993). More recent study at the Lower Columbia River showed a 1-DMax of 21.80°C and 7-DADMax of 21.50°C (Georgia Pacific, 2006). EPA prepared a preliminary draft temperature TMDL in September 2002 however has delayed issuing a final document. Because the receiving water temperature is above criteria, no further measurable increase in temperature is allowed due to human activities. Ecology cannot allow an incremental increase in temperature greater than 0.3°C at the edge of the chronic mixing zone.
- Arsenic – In 1992 the USEPA adopted risk-based arsenic criteria for the protection of human health for the State of Washington. The 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 water ingestion. These criteria have caused confusion in implementation because they differ from the drinking water maximum contaminant level (MCL) of 10 μg/L, which is not risk-based, and because the human health criteria are sometimes exceeded by natural background concentrations of arsenic in surface water and ground water.

  In Washington, when a natural background concentration exceeds the criterion, the natural background concentration becomes the criterion, and no dilution zone is allowed. This could result in a situation where natural groundwater or surface water used as a municipal or industrial source-water would need additional treatment to meet numeric effluent limits even though no arsenic was added as waste. Although this is not the case for all dischargers, we do not have data at this time to quantify the extent of the problem.

  A regulatory mechanism to deal with the issues associated with natural background concentrations of arsenic in groundwater-derived drinking waters is currently lacking. Consequently, the Water Quality Program, at this time, has decided to use a three-pronged strategy to address the issues associated with the arsenic criteria. The three strategy elements are:

  1. Pursue, at the national level, a solution to the regulatory issue of groundwater sources with high arsenic concentrations causing municipal treatment plant effluent to exceed criteria. The revision of the drinking water MCL for arsenic offered a national

opportunity to discuss how drinking water sources can affect NPDES wastewater dischargers, however Ecology was unsuccessful in focusing the discussion on developing a national policy for arsenic regulation that acknowledges the risks and costs associated with management of the public exposure to natural background concentrations of arsenic through water sources. The current arsenic MCL of 10 µg/L could also result in municipal treatment plants being unable to meet criteria-based effluent limits. Ecology will continue to pursue this issue as opportunities arise.

2. Additional and more focused data collection. The Water Quality Program will in some cases require additional and more focused arsenic data collection, will encourage or require dischargers to test for source water arsenic concentrations, and will pursue development of a proposal to have Ecology's Environmental Assessment Program conduct drinking water source monitoring as well as some additional ambient monitoring data. At this time, Washington NPDES permits will contain numeric effluent limits for arsenic based only on treatment technology and aquatic life protection as appropriate.

3. Data sharing. Ecology will share data with USEPA as they work to develop new risk-based criteria for arsenic and as they develop a strategy to regulate arsenic.

Emerald performed quarterly monitoring of arsenic in the previous permit. Monitoring data are in **Table 10** below. The data characterize the receiving water and the discharge as describe in the strategy above. Therefore, no further monitoring is necessary. Because the facility draws cooling water from the river and discharges it with treatment plant effluent, the discharge contains arsenic from the receiving water. Sampling variability, uncertainty associated with laboratory analysis, and evaporative losses in the process may account for some of the differences in arsenic levels between the receiving water and the discharge.

Table 10 - Arsenic Monitoring Data

	2003		2004		2005		2006		2007	
	RW	DIS	RW	DIS	RW	DIS	RW	DIS	RW	DIS
Jan	-	-	0.8	1.0	0.8	0.9	0.7	0.9	0.8	0.9
April	-	-	1.2	1.1	0.8	0.9	1.0	1.1	1.0, 0.8	1.0, 0.8
May	-	-	-	-	-	-	1.2	1.2	-	-
July	0.9	1.0	0.9	0.8	0.9	1.0	0.9	0.8	0.6	0.8
Oct	1.0	0.9	1.0	1.2	0.9	1.0	0.9	0.9	1.0	1.0

RW = receiving water (Columbia River) concentration, DIS = discharge concentration. Concentrations are in µg/L.

In the permit renewal application, Emerald states there are no sources of arsenic at the facility. The Remedial Investigation Report states arsenic is a naturally-occurring element in the soil and groundwater at the plant. Remedial activities extract the groundwater, which Emerald treats in its biological treatment system. Treated groundwater makes up a fraction of the discharge. The average detected arsenic concentration in untreated groundwater was 20 µg/L (Parametrix, 1995).

- Bis(2-ethylhexyl) phthalate – Concentration in a tissue sample exceeds water quality criteria. Ecology does not require a TMDL because the sample may not represent actual condition. We use human health criteria (National Toxics Rule 40 CFR 131.36) to evaluate this pollutant.
- 4,4'-DDE – Ecology does not have a TMDL for the pollutant at this time. Emerald did not detect pollutant in its discharge, therefore Ecology did not propose a limit for this pollutant in the permit.
- Dioxin (2,3,7,8-TCDD) – USEPA established TMDL on February 25, 1991 for pulp and paper mills that used chlorine bleaching process. Emerald was not assigned a TMDL. Emerald did not detect this pollutant in its discharge, therefore Ecology did not propose a limit for this pollutant in the permit.
- Total dissolved gas – Ecology established the TMDL in the lower Columbia River on November 2, 2002. The source of total dissolve gas is spilled events at the dams, which entrains air bubbles. Emerald's waste load allocation (WLA) for total dissolved gas is zero. The facility is not a source of dissolved gas, therefore Ecology did not propose a limit for this pollutant in the permit.
- Dieldrin – The TMDL is required but has not been developed for this pollutant. Emerald did not detect dieldrin in its discharge, therefore Ecology did not propose a limit for this pollutant in the permit.
- PCB-1254 – The TMDL is required, but has not been developed for this pollutant. Emerald did not detect PCBs in its discharge, therefore Ecology did not propose a limit for this pollutant in the permit.

E. 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.

Pollutant concentrations in the proposed discharge exceed water quality criteria despite using technology-based controls which Ecology determined fulfills AKART. Ecology therefore authorizes a mixing zone in accordance with the geometric configuration, flow restriction, and other restrictions imposed on mixing zones described in Chapter 173-201A WAC.

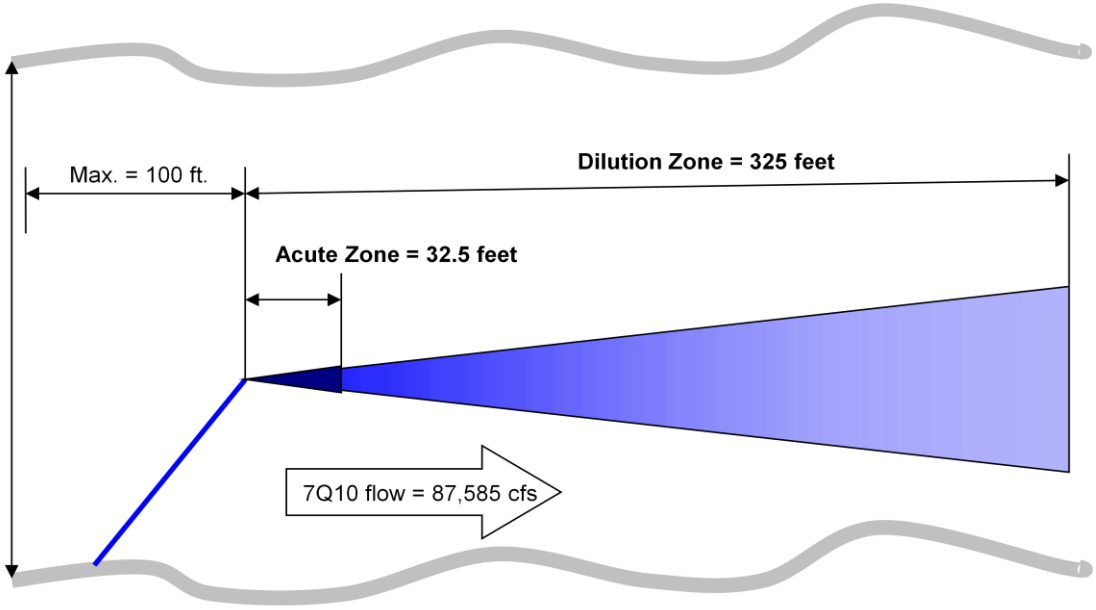

Figure 2 - Mixing Zone Plan View (not to scale)

The diffuser at Outfall 001 is 50-feet long with an inside diameter of 30 inches. The diffuser has a total of 300 1.25-inch diameter ports. There are 100 rows of ports with 6 inches between each row. Ecology obtained this information from Beak Consultants' Mixing Zone Study Report submitted on June 29, 1993.

Chronic Mixing Zone

Chapter 173-201A-400(7)(a) WAC 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 river bottom to the top of the water surface.

Acute Mixing Zone

Chapter 173-201A-400(8)(a) WAC 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 acute mixing zone extends from the river bottom to the top of the water surface. The dilution factor is based on this distance.

Ecology determined the dilution factors of effluent to receiving water that occur within these zones at the critical condition using the Mixing Zone Study report, submitted by Beak Consultants Inc. on June 29, 1993. The consultant used RSB to model dilution at the edge of the chronic mixing zone. UM model with PLUMES interface, which estimates dilution closer to the

diffuser than the RSB model, determines the dilution at the acute mixing zone. The dilution factors are listed in the table below:

Table 11 - Dilution Factors (DF)

Criteria	Outfall 002 to Outfall 001	Outfall 001 Acute	Outfall 001 Chronic	Outfall 002 Acute	Outfall 002 Chronic
Aquatic Life	43.3	8.3	21.1	359	913
Human Health, Carcinogen	43.3	1	1	1	1
Human Health, Non-carcinogen	43.3	1	1	1	1

Ecology determined the impacts of immediate oxygen deficiency, temperature, pH, metals, and other toxics 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.

BOD_5 - This discharge (with technology-based limits) results in a small amount of BOD loading relative to the large amount of dilution occurring in the receiving water at critical conditions. Technology-based limits will ensure that dissolved oxygen criteria are met in the receiving water.

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

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

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

- **Annual summer maximum and supplementary spawning/rearing criteria**

Each water body has an annual maximum temperature criterion (Chapter 173-201A-200(1) (c), 210(1)(c) WAC 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) (Chapter 173-201A-602 WAC, 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 (Chapter 173-201A-200(1)(c)(i)-(ii), 210(1)(c)(i)-(ii) WAC). The incremental warming criteria apply at the edge of the chronic mixing zone.

At locations and times when background temperatures are cooler than the assigned threshold criterion, point sources are permitted to warm the water by only a defined increment. These increments are permitted only to the extent doing so does not cause temperatures to exceed either the annual maximum or supplemental spawning criteria.

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

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

- **Temperature Acute Effects**

Instantaneous lethality to passing fish: The upper 99th percentile daily maximum effluent temperature must not exceed 33°C; unless a dilution analysis indicates ambient temperatures will not exceed 33°C 2-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.

Annual summer maximum and incremental warming criteria: Beak Consultants conducted a temperature field study on the first week of September 1992. The consultant measured background temperature and temperature in the mixing zone from the water surface to a depth of 15 meter. The study included transects at the diffuser, along the mixing zone, and 200 feet upstream. The effluent temperature was 33.74ºC at the time of the study. At critical condition receiving water temperature is 21.5ºC. The heat dissipation factor is 89.

Ecology calculated the reasonable potential for the discharge to exceed the annual summer maximum and the incremental warming criteria at the edge of the chronic mixing zone during critical conditions. Ecology used its spreadsheet tools to demonstrate that Emerald's

discharge does not increase the temperature above the 0.3 °C incremental allowance (see **Appendix C – Table 23).** No reasonable potential exists to exceed the temperature criterion where:

(Criterion + 0.3) > (Criterion + ($T_{effluent95}$ – Criterion))/DF.

(20.0 + 0.3) > (20.0 + (35.69– 20.0))/89).

General lethality and migration blockage: The receiving water conditions are listed in **Table 5** of the fact sheet. The Columbia River near the point of the discharge does not exceed a 1DMax of 23°C or a 7DADMax of 22°C.

Instantaneous lethality to passing fish: The 1992 field study measured temperature within the mixing zone. The study collected data at the diffuser from the surface to the depth of 11 meters (36 feet), in increments of 1 meter. The temperature increased with depth and ranged from 21.1651 to 21.8374°C. Temperature at the diffuser did not exceed 33°C, demonstrating no reasonable potential for instantaneous lethality to passing fish.

pH - Ecology modeled the impact of the effluent pH on the receiving water using the calculations from EPA, 1988. The receiving water input variables used are listed above in **Table 5**. The effluent input variables used are in **Table 4**. Ecology used the chronic dilution factor of 913.

The models predict no violation of the pH criteria under critical conditions. Therefore, Ecology placed the technology-based effluent limits for pH in the permit. The effluent pH must be within the range of 6.0 to 9.0 at all times. For continuous pH monitoring 40 CFR 401.17 allows excursions, provided a single excursion period does not exceed 1 hour and the monthly excursion does not exceed 7 hours and 26 minutes (40 CFR 401.17).

Turbidity - Due to the large degree of dilution, Ecology expects no violations of the turbidity criteria outside the designated mixing zone.

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

The following toxic pollutants are present in the discharge:

- Arsenic
- Cadmium
- Chromium
- Copper
- Iron
- Lead
- Nickel
- Zinc

Ecology conducted a reasonable potential analysis (see **Appendix C – Table 20**) on these parameters to determine whether it would require effluent limits in this permit.

Ammonia's toxicity depends on that portion which is available in the unionized form. The amount of unionized ammonia depends on the temperature and pH in the receiving freshwater.

To evaluate ammonia toxicity, Ecology used the available receiving water information for ambient station 27A070 and Ecology spreadsheet tools.

Valid ambient background data was available for arsenic, cadmium, chromium, copper, iron, lead, 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, arsenic, cadmium, chromium, copper, iron, lead, nickel, and zinc pose no reasonable potential to exceed the water quality criteria at the critical condition using procedures given in EPA, 1991 (**Appendix C – Table 20**) and as described above. Ecology's determination assumes that this facility meets the other effluent limits of this permit.

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 Chapter 173-201A-240(3) WAC; 2006). Emerald may provide data clearly demonstrating the seasonal partitioning of the dissolved metal in the ambient water in relation to an effluent discharge. Ecology may adjust metals criteria on a site-specific basis when data is available clearly demonstrating the seasonal partitioning in the ambient water in relation to an effluent discharge.

Ecology may also adjust metals criteria using the water effects ratio approach established by the EPA, as generally guided by the procedures in U.S. EPA Water Quality Standards Handbook, December 1983, as supplemented or replaced.

G. Whole Effluent Toxicity

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

- *Acute toxicity tests measure mortality as the significant response* to the toxicity of the effluent. Dischargers who monitor their wastewater with acute toxicity tests find early indications of any potential lethal effect of the effluent on organisms in the receiving water.

- *Chronic toxicity tests measure various sublethal toxic responses* such as reduced growth or reproduction. Chronic toxicity tests often involve either a complete life cycle test on an organism with an extremely short life cycle, or a partial life cycle test during a critical stage of a test organism's life. Some chronic toxicity tests also measure survival.

Ecology-accredited WET testing laboratories use the proper WET testing protocols, fulfill the data requirements, and submit results in the correct reporting format. Accredited laboratory staff know how to calculate an NOEC, LC_{50}, $EC_{50,}$ IC_{25}, etc. Ecology gives all accredited labs the most recent version of Ecology Publication # WQ-R-95-80, *Laboratory Guidance and Whole Effluent Toxicity Test Review Criteria* (http://www.ecy.wa.gov/biblio/9580.html) which is referenced in the permit. Ecology recommends that each regulated facility send a copy of the acute or chronic toxicity sections(s) of its NPDES permit to the laboratory.

The plant added a plasticizer, isodecyl benzoate, to its product line by using a new compound, isodecanol, in its process. NIOSH International Chemical Safety Card describes isodecanol as potentially harmful to fish and the environment. Emerald submitted worse-case analysis on the isodecanol loading to the wastewater. The isodecanol processing is in batches and contributes about 0.009% of the total process wastewater. The analysis demonstrates the worse-case concentration of isodecanol in the effluent (145 µg/L) is below the no effect concentration for fish (LC_0 of 400 µg/L). Ecology reviewed the analysis and determined that no effluent re-characterization is necessary.

H. Human Health

Washington's water quality standards include 91 numeric human health-based criteria that Ecology must consider when writing NPDES permits. These criteria were established in 1992 by the U.S. EPA in its National Toxics Rule (40 CFR 131.36). The National Toxics Rule allows states to use mixing zones to evaluate whether discharges comply with human health criteria.

Ecology determined the effluent may contain chemicals of concern posing a risk to human health. Ecology determined this because (1) the volume of wastewater flow to the receiving water, (2) data or process information indicate regulated chemicals occur in the discharge, or (3) the receiving water is a water body that is 303(d) listed (quality impaired) for a regulated chemical, that is known or expected to be in the discharge.

Ecology conducted a determination of 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 (Ecology Publication 92-109, July 2006) to make this reasonable potential determination. Our evaluation showed that the discharge has no reasonable potential to cause a violation of water quality standards, thus an effluent limit is not warranted (see **Appendix C – Table 21**).

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 (Chapter 173-204-400 WAC). You can obtain additional information about sediments at the Aquatic Lands Cleanup Unit website: http://www.ecy.wa.gov/programs/tcp/smu/sediment.html

Through a review of the discharger characteristics and of the effluent characteristics, Ecology determined that this discharge has no reasonable potential to violate the Sediment Management Standards.

J. Ground Water Quality Limits

The Ground Water Quality Standards, (Chapter 173-200 WAC), protect beneficial uses of ground water. Permits issued by Ecology must not allow violations of those standards (Chapter 173-200-100 WAC).

Emerald does not discharge wastewater to ground and therefore Ecology imposed no permit limits to protect ground water.

K. Comparison of Effluent Limits with Limits of the Previous Permit Issued on July 25, 2002

Ecology considers changes in the facility's processes wastewater operations following the issuance of the previous permit. We revised the permit limit for the following:

- BOD_5 – The facility produces organic chemicals in more than one subcategory and has plant-specific BOD_5 limits that are "production-proportioned concentration limits" (40 CFR 414.11). "Production-proportioned concentration limits" take into account the percent production in the bulk, commodity, and specialty chemical subcategories. Since the previous permit Emerald shifted more of its production from commodity to specialty chemicals. Ecology re-evaluated the BOD_5 limits for process wastewater based on new production data. Ecology also re-evaluated the storm water and groundwater contributions to BOD_5 loading using the 99% treatment efficiency determined to meet AKART. The BOD_5 limit for the combined treated process wastewater, storm water, and groundwater is lower than in the previous permit limit.
- TSS – The facility produces organic chemicals in more than one subcategory and has plant-specific TSS limits that are "production-proportioned concentration limits" (40 CFR 414.11). "Production-proportioned concentration limits" take into account the percent production in the bulk, commodity, and specialty chemical subcategories. Since the previous permit Emerald shifted more of its production from commodity to specialty chemicals. Ecology re-evaluated the TSS limits for process wastewater based on recent production data. The increase in the production of specialty chemicals, which have higher technology-based limits than commodity chemicals, results in higher TSS limits than in the previous permit. Ecology gives no allowance for TSS in storm water and groundwater.
- Copper, nickel, and zinc – The technology-based limits are the concentrations listed in 40 CFR 414.91 times the flow from the respective metal-bearing waste streams. Emerald has updated the metal-bearing waste stream flow, which Ecology used to determine new limits. The proposed limits are lower than limits in the previous permit.

Table 12 - Comparison of Effluent Limits

				Previous Effluent Limits		Proposed Effluent Limits	
Parameter	**Outfall**	**Basis of Limit**	**Units**	**Ave Monthly**	**Max Daily**	**Ave Monthly**	**Max Daily**
Temperature	001	Technology	°C	None	40.7	None	40.7
pH	002	Technology	Std. unit	≥ 6.0 and ≤ 9.0, excursions allowed (see Table 2)		Same as previous permit limits	
Biochemical oxygen demand (BOD_5)	002	Technology	lb/day	104	277	95	258

Parameter	Outfall	Basis of Limit	Units	Previous Effluent Limits Ave Monthly	Previous Effluent Limits Max Daily	Proposed Effluent Limits Ave Monthly	Proposed Effluent Limits Max Daily
Total suspended solids (TSS)	002	Technology	lb/day	127	412	129	418
Copper	002	Technology	lb/day	0.67	1.54	0.267	0.621
Nickel	002	Technology	lb/day	0.50	1.13	0.426	1.00
Zinc	002	Technology	lb/day	0.49	1.19	0.193	0.480

Emerald has technology-based limits for Outfall 002 priority pollutants. The limits are based on federal effluent guidelines (40 CFR 414.91) and are the same as those in the previous permit. Ecology used the wastewater volume of 400 gpm to derive the pollutant loading limits. The wastewater volume includes process wastewater and groundwater extracted from remedial action at the site. Ecology reviewed the process and remedial wastewater data and found they contain similar concentrations of the pollutants listed in **Table 13**. The similar concentrations are due to the remediation water containing materials spilled from past plant operations. The remedial water does not dilute these pollutants in the process wastewater. Therefore, Ecology applied technology-based limits to both the process and remedial wastewater streams for the pollutants in **Table 13**.

Table 13 – Comparison of Outfall 002 Technology-based Effluent Limit (lb/day)

Toxic Pollutant	Previous Effluent Limits Monthly Average	Previous Effluent Limits Maximum Daily	Proposed Effluent Limits Monthly Average	Proposed Effluent Limits Maximum Daily
Phenol	0.072	0.125	0.072	0.125
Bis(2-ethyl-hexyl) phthalate	0.495	1.340	0.495	1.340
Toluene	0.125	0.384	0.125	0.384
Benzene	0.178	0.653	0.178	0.653
Ethylbenzene	0.154	0.519	0.154	0.519
Fluorene	0.106	0.283	0.106	0.283
Naphthalene	0.106	0.283	0.106	0.283
Acenaphthene	0.106	0.283	0.106	0.283
Acenaphthylene	0.106	0.283	0.106	0.283
Acrylonitrile	0.461	1.163	0.461	1.163
Anthracene	0.106	0.283	0.106	0.283
Benzo(a)anthracene	0.106	0.283	0.106	0.283
3,4-Benzofluoranthene	0.110	0.293	0.110	0.293
Benzo(k)fluoranthene	0.106	0.283	0.106	0.283
Benzo(a)pyrene	0.110	0.293	0.110	0.293
Carbon tetrachloride	0.086	0.183	0.086	0.183
Chlorobenzene	0.072	0.135	0.072	0.135
Chloroethane	0.500	1.287	0.500	1.287
Chloroform	0.101	0.221	0.101	0.221
2-Chlorophenol	0.149	0.471	0.149	0.471

Toxic Pollutant	Previous Effluent Limits		Proposed Effluent Limits	
	Monthly Average	Maximum Daily	Monthly Average	Maximum Daily
Chrysene	0.106	0.283	0.106	0.283
Di-n-butyl phthalate	0.130	0.274	0.130	0.274
1,2-Dichlorobenzene	0.370	0.783	0.370	0.783
1,3-Dichlorobenzene	0.149	0.211	0.149	0.211
1,4-Dichlorobenzene	0.072	0.135	0.072	0.135
1,1-Dichloroethane	0.106	0.283	0.106	0.283
1,2-Dichloroethane	0.327	1.014	0.327	1.014
1,1-Dichloroethylene	0.077	0.120	0.077	0.120
1,2-trans-Dichloroethylene	0.101	0.259	0.101	0.259
2,4-Dichlorophenol	0.187	0.538	0.187	0.538
1,2-Dichloropropane	0.735	1.105	0.735	1.105
1,3-Dichloropropylene	0.139	0.211	0.139	0.211
Diethyl phthalate	0.389	0.975	0.389	0.975
2,4-Dimethylphenol	0.086	0.173	0.086	0.173
Dimethyl phthalate	0.091	0.226	0.091	0.226
4,6-Dinitro-o-cresol	0.375	1.331	0.375	1.331
2,4-Dinitrophenol	0.341	0.591	0.341	0.591
2,4-Dinitrotoluene	0.543	1.369	0.543	1.369
2,6-Dinitrotoluene	1.225	3.079	1.225	3.079
Fluoranthene	0.120	0.327	0.120	0.327
Hexachlorobenzene	0.072	0.135	0.072	0.135
Hexachlorobutadiene	0.096	0.235	0.096	0.235
Hexachloroethane	0.101	0.259	0.101	0.259
Methyl chloride	0.413	0.913	0.413	0.913
Methylene chloride	0.192	0.428	0.192	0.428
Nitrobenzene	0.130	0.327	0.130	0.327
2-Nitrophenol	0.197	0.331	0.197	0.331
4-Nitrophenol	0.346	0.596	0.346	0.596
Phenanthrene	0.106	0.283	0.106	0.283
Pyrene	0.120	0.322	0.120	0.322
Tetrachloroethylene	0.106	0.269	0.106	0.269
1,2,4-Trichlorobenzene	0.327	0.673	0.327	0.673
1,1,1-Trichloroethane	0.101	0.259	0.101	0.259
1,1,2-Trichloroethane	0.101	0.259	0.101	0.259
Trichloroethylene	0.101	0.259	0.101	0.259
Vinyl chloride	0.500	1.287	0.500	1.287

IV. MONITORING REQUIREMENTS

Ecology requires monitoring, recording, and reporting (Chapter 173-220-210 WAC 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.

The monitoring schedule is detailed in the proposed permit under Condition S.2. Specified monitoring frequencies take into account the quantity and variability of the discharge, the treatment method, past compliance, significance of pollutants, and cost of monitoring.

Ecology may authorize a discharger subject to technology-based effluent limitation guideline and standards to forgo sampling of pollutants found at 40 CFR Subchapter N if the discharger demonstrated through sampling and other technical factors that the pollutant is not present in the discharge *prior to treatment* or is present only at background levels from intake water and without any increase in the pollutant due to activities of the discharger (40 CFR 122.44(a)(2)). During the permit term, Emerald will have an opportunity to submit sampling and other technical information to apply for the permit waiver. If the facility meets the requirements of 40 CFR 122.44(a)(2), Ecology will waive the monitoring for the pollutants.

Ecology reviewed the monitoring frequency for the following:

- Arsenic – The previous permit requires receiving water monitoring because the section of the river at the point of discharge is 303(d)-listed for arsenic. Monitoring in the previous permit provided arsenic data on the effluent and receiving water (see Section III.D). The proposed permit does not require effluent or receiving water monitoring.
- Bis(2-ethylhexyl) phthalate – The source of the pollutant may be from PVC joint rings in the plant process sewer (ThermoRetec, 2000). Bis(2-ethylhexyl) phthalate is in the groundwater being remediated and has the potential of being in the discharge. The pollutant is occasionally detected in the discharge at levels above the background. Based on our review of data in the past two years, Ecology found the facility meets the "Reduced Monitoring for Exemplary Performance" criteria; the long-term average discharge is less than 5% of the average monthly limit (**Appendix C - Table 28**). **Figure 3** on page 64 shows the effluent discharge is well below the limit for the past two years. The proposed permit reduces the monitoring frequency from monthly to once every six months as prescribed in the 2008 Ecology's Water Quality Program Permit Writer Manual.

  The previous permit requires receiving water monitoring because the section of the river at the point of discharge is 303(d)-listed for bis(2-ethylhexyl) phthalate. Sampling during the previous permit provided sufficient data to characterize the receiving water. The proposed permit does not require receiving water monitoring.
- PCB 1254 – The previous permit requires receiving water monitoring because the section of the river at the point of discharge is 303(d)-listed for PCB 1254. Monitoring and inspection data during the previous permit show no difference between PCB 1254 levels in the discharge and receiving water. The pollutant detected in the discharge is from the receiving water, which Emerald uses and discharges as non-contact cooling water. The facility is not a source of PCB 1254. No further monitoring is required.

- Phenol – Phenol has been below method reporting limit following the phenol plant shut down in December 2006. Phenol was non-detect during the entire permit cycle except for one sample in November 2006, which Emerald took prior to the phenol shut down. Ecology sampled the discharge during our 2007 and 2008 inspections using lower detection limits. The sampling shows phenol is present in the effluent at 0.06 and 0.71 µg/L and above the receiving water level of < 0.06 µg/L. The facility will continue monitoring for this pollutant. Based on our review of data in the past two years, Ecology found the facility meets the "Reduced Monitoring for Exemplary Performance criteria; the long-term average discharge is less than 34% of the average monthly limit (**Appendix C - Table 28**). **Figure 3** on page 64 shows the discharge is well below the limit for the past two years. The proposed permit reduces the monitoring frequency from monthly to quarterly as prescribed in the 2008 Ecology's Water Quality Program Permit Writer Manual.

The proposed permit retains the monitoring requirements for outfall 001 in the previous permit. The facility will continue monthly monitoring of toluene at outfall 001 due to the potential for spills. Outfall 002 monitoring frequency for flow, pH, BOD_5, TSS, copper, nickel, zinc, toluene, benzene, ethylbenzene, and naphthalene are the same as the previous permit.

A. Lab Accreditation

Ecology requires that facilities must use a laboratory registered or accredited under the provisions of Chapter 173-50 WAC, *Accreditation of Environmental Laboratories* to prepare all monitoring data (with the exception of certain parameters). Ecology accredited the laboratory at this facility for: pH, total suspended solids, and BOD_5.

V. OTHER PERMIT CONDITIONS

A. Reporting and Recordkeeping

Ecology based permit condition S3 on our authority to specify any appropriate reporting and recordkeeping requirements to prevent and control waste discharges (Chapter 173-220-210 WAC).

B. Non-Routine and Unanticipated Discharges

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 non-routine and unanticipated discharges 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. 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 update this plan and submit it to Ecology.

D. 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.

This proposed permit requires this facility to update the approved solid waste control plan designed to prevent solid waste from causing pollution of waters of the state. The updated plan must be submitted to Ecology for approval (RCW 90.48.080).

E. Effluent Mixing Study

Ecology estimated the amount of mixing of discharge with receiving water that occurs within the authorized mixing zone. Based on the estimate it determined 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 current discharge volume is about 30 percent less than the discharge used the 1993 mixing study by Beaks Consultant. However, the facility expected to resume discharge consistent with the 1993 study.

Ecology used the UM3 model to determine the effects of the reduced discharge volume and if the facility will need to update the mixing zone study. Ecology modeled the current discharge conditions and 1993 discharge conditions. We compared the results of the three-dimensional UM3 model against the two-dimensional UM and RSB models in the previous study (**Table 27**). Ecology's modeling predicts higher dilution at the mixing zones than the previous study.

The discharge pipe and port configuration are the same as in 1993 study; the facility performed routine inspection of the discharge pipe. Therefore, Ecology will not require Emerald to update the mixing zone and temperature study.

F. Outfall Evaluation

Ecology requires Emerald to conduct an outfall inspection and submit a report detailing the findings of that inspection (proposed permit **Condition S.12**). The facility must inspect its discharge pipe and diffusers to determine their physical condition, and to evaluate the extent of sediment accumulations in the vicinity of the outfall.

G. Treatment System Operating Plan

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 Chapter 173-220-150 (1)(g) WAC). The facility has prepared an operation and maintenance manual as required by state regulation for the construction of wastewater treatment facilities (Chapter 173-240-150 WAC). Implementation of the procedures in the Treatment System Operating Plan ensures the facility's compliance with the terms and limits in the permit.

H. Pollution Prevention Plan

Pollution Prevention is inherent in the goals of the Clean Water Act (zero discharge). In the previous permit, the facility prepared and submitted the wastewater pollution prevention in two phases. Phase I identified pollution prevention activities. Phase II determined the technical and economical feasibility for the pollution prevention activities. The pollution prevention opportunities are as follow:

Table 14 - Wastewater Pollution Prevention

Pollution Prevention Opportunity	Goal	Status
Pollution prevention training for employees	Stress the importance of P2 as company goal and allows employees and contractor to submit suggestions for pollution prevention opportunities	Ongoing
Use treatment plant effluent as cooling water	Reduces municipal water use	Ongoing
Benzoate wastewater reclamation and reuse	Reduces benzoate wastewater loading	On hold
Installation of distributive control system (DCS) [a]	Reduces wastewater loading	Completed
Use treatment plant effluent to premix polymer	Reduce municipal water use	Completed
Use nitrogen stripper to recover volatile aromatics	Reduces toluene and benzene loading from the phenol process to wastewater	Eliminated [b]

[a] DCS reduces 2 gpm of wastewater by optimizing the plant processes.
[b] The opportunity was eliminated due to the phenol process shut down. Emerald routed the wastewater to benzoic process for reclamation.

Ecology proposes to retain the pollution prevention conditions in the permit. The plan ensures the continuing emphasis on pollution prevention as Emerald's goal and identification of new

pollution prevention opportunities. The permit proposes to update the plan to include new wastewater pollution prevention opportunities.

I. Priority Pollutant Scan

The permit requires a priority pollutant scan of the effluent. Ecology reviewed the effluent data on a case-by-case basis to determine the frequency the scan.

Ecology reviewed pollutant data in Emerald's permit renewal application. About 27 of the pollutants on the list are below detection levels in Appendix A of the proposed permit. An additional 17 pollutants are PCBs and pesticides not found in the effluent or not used on site. The permit already requires monthly, quarterly, or semi-annual monitoring of 63 pollutants on the list. Therefore, Ecology requires priority pollutant scan once every two year.

In additional to the pollutants in the federal regulations, the permit may include monitoring for Ecology's persistent, bioaccumulative toxins (PBTs). The PBTs are the following polycyclic aromatic hydrocarbons (PAHs):

- Benzo(r,s,t)pentaphene
- Dibenzo(a,j)acridine
- Dibenzo(a,h)acridine
- Dibenzo(a,e)pyrene
- Dibenzo(a,h)pyrene
- 3-methyl cholanthrene
- Perylene

Common sources of PAHs are crude oil and coal and the incomplete combustion of coal/wood. Emerald tested for other PAHs, including as anthracene and pyrene, and did not detected them in the effluent; the facility is not a source of these compounds. Ecology removed the above PBTs from the priority pollutant scan.

J. General Conditions

Ecology bases the standardized General Conditions on state and federal law and regulations. They 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 waters, 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 five years.

VII. REFERENCES FOR TEXT AND APPENDICES

Environmental Protection Agency (EPA)

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Laws and Regulations(http://www.ecy.wa.gov/laws-rules/index.html)

Permit and Wastewater Related Information
(http://www.ecy.wa.gov/programs/wq/wastewater/index.html

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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. The permit prescribes operating conditions and wastewater discharge limits. This fact sheet describes the facility and Ecology's reasons for requiring permit conditions.

Ecology will place a Public Notice on May 20, 2009 in The Daily News to inform the public and to invite comment on the proposed National Pollutant Discharge Elimination System permit as drafted.

The Notice –

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

Ecology has published a document entitled **Frequently Asked Questions about Effective Public Commenting** which is available on our website at:

http://www.ecy.wa.gov/biblio/0307023.html.

You may obtain further information from Ecology by telephone, (360) 407-6064, or by writing to the permit writer at the address listed below:

Water Quality Permit Coordinator
Department of Ecology
Industrial Section
PO Box 47706
Olympia, WA 98504-7600

The primary author of this permit and fact sheet is Ha Tran.

APPENDIX B - 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 period of time, 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, Chapters 173-200-030(2)(c)(ii) and 173-216-110(1)(a) WAC.

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) - The average of the daily flow volumes anticipated to occur over a calendar year.

Average Monthly Discharge Limit - The average of the measured values obtained over a calendar month's time.

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.

BOD_5 - Determining the 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 BOD_5 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 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.

Chlorine - Chlorine is 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.

Detection Limit - See Method Detection Level.

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 e.g., a dilution factor of 10 means the effluent comprises 10% by volume and the receiving water 90%.

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

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.

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 storm water and, also, leachate from solid waste facilities.

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 Lim–t - 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) - The minimum concentration of a substance that can be measured and reported with 99% confidence that the pollutant concentration is above zero and is determined from analysis of a sample in a given matrix containing the pollutant.

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 Z–e--An area that surrounds an effluent discharge within which water quality criteria may be exceeded. The area of the authorized mixing zone is specified in a facility permit and follows procedures outlined in state regulations (Chapter 173-201A WAC).

National Pollutant Discharge Elimination System (NPDE–) - 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.

Overflow – A release of wastewater to the environment or areas outside of containment. Overflow does not include releases to containment.

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.

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.

Quantitation Level (QL) - The smallest detectable concentration of analyte greater than the Detection Limit (DL) where the accuracy (precision &bias) achieves the objectives of the intended purpose. This may also be called Minimum Level or Reporting Level.

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).

Technology-based Effluent Limit - A permit limit that is based on the ability of a treatment method to reduce the pollutant.

Total Suspended Solids (TSS) - Total suspended solids is the particulate material in an effluent. Large quantities of TSS discharged to receiving waters 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.

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.

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 storm water drainage system into a defined surface water body, or a constructed infiltration facility.

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 facility. 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 on the concentration of an effluent parameter that is intended to prevent the concentration of that parameter from exceeding its water quality criterion after it is discharged into receiving waters.

APPENDIX–C - 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 homepage at: http://www.ecy.wa.gov/programs/eap/pwspread/pwspread.html.

Table 15 -Technology-Based Toxic Pollutant Limits for Process Wastewater

Toxic Pollutant	Flow [a] (gpm)	Limit (µg/L) [b]		Limit (lbs/day) [c]	
		Monthly Average	Maximum Daily	Monthly Average	Maximum Daily
Acenaphthene	400	22	59	0.056	0.149
Acenaphthylene	400	22	59	0.056	0.149
Acrylonitrile	400	96	242	0.242	0.611
Anthracene	400	22	59	0.056	0.149
Benzene	400	37	136	0.093	0.343
Benzo(a)anthracene	400	22	59	0.056	0.149
3,4-Benzofluoranthene	400	23	61	0.058	0.154
Benzo(k)fluoranthene	400	22	59	0.056	0.149
Benzo(a)pyrene	400	23	61	0.058	0.154
Bis(2-ethylhexyl) phthalate	400	103	279	0.260	0.704
Carbon tetrachloride	400	18	38	0.045	0.096
Chlorobenzene	400	15	28	0.038	0.071
Chloroethane	400	104	268	0.262	0.676
Chloroform	400	21	46	0.053	0.116
2-Chlorophenol	400	31	98	0.078	0.247
Chrysene	400	22	59	0.056	0.149
Di-n-butyl phthalate	400	27	57	0.068	0.144
1,2-Dichlorobenzene	400	77	163	0.194	0.411
1,3-Dichlorobenzene	400	31	44	0.078	0.111
1,4-Dichlorobenzene	400	15	28	0.038	0.071
1,1-Dichloroethane	400	22	59	0.056	0.149
1,2-Dichloroethane	400	68	211	0.172	0.532
1-1-Dichloroethylene	400	16	25	0.040	0.063
1,2-trans-Dichloroethylene	400	21	54	0.053	0.136
2,4-Dichlorophenol	400	39	112	0.098	0.283
1,2-Dichloropropane	400	153	230	0.386	0.580
1,3-Dichloropropylene	400	29	44	0.073	0.111
Diethyl phthalate	400	81	203	0.204	0.512
2,4-Dimethylphenol	400	18	36	0.045	0.091
Dimethyl phthalate	400	19	47	0.048	0.119
4,6-Dinitro-o-cresol	400	78	277	0.197	0.699
2,4-Dinitrophenol	400	71	123	0.179	0.310
2,4-Dinitrotoluene	400	113	285	0.285	0.719
2,6-Dinitrotoluene	400	255	641	0.644	1.618

Toxic Pollutant	Flow [a] (gpm)	Limit (µg/L) [b]		Limit (lbs/day) [c]	
		Monthly Average	Maximum Daily	Monthly Average	Maximum Daily
Ethylbenzene	400	32	108	0.081	0.273
Fluoranthene	400	25	68	0.063	0.172
Fluorene	400	22	59	0.056	0.149
Hexachlorobenzene	400	15	28	0.038	0.071
Hexachlorobutadiene	400	20	49	0.050	0.124
Hexachloroethane	400	21	54	0.053	0.136
Methyl chloride	400	86	190	0.217	0.479
Methylene chloride	400	40	89	0.101	0.225
Naphthalene	400	22	59	0.056	0.149
Nitrobenzene	400	27	68	0.068	0.172
2-Nitrophenol	400	41	69	0.103	0.174
4-Nitrophenol	400	72	124	0.182	0.313
Phenanthrene	400	22	59	0.056	0.149
Phenol	400	15	26	0.038	0.066
Pyrene	400	25	67	0.063	0.169
Tetrachloroethylene	400	22	56	0.056	0.141
Toluene	400	26	80	0.066	0.202
Chromium	0	1110	2770	0.0	0.0
Copper	15.3	1450	3380	0.267	0.621
Cyanide	0	420	1200	0.0	0.0
Lead	0	320	690	0.0	0.0
Nickel	21	1690	3980	0.426	1.004
Zinc	15.3	1050	2610	0.193	0.480
1,2,4-Trichlorobenzene	400	68	140	0.172	0.353
1,1,1-Trichloroethane	400	21	54	0.053	0.136
1,1,2-Trichloroethane	400	21	54	0.053	0.136
Trichloroethylene	400	21	54	0.053	0.136
Vinyl chloride	400	104	268	0.262	0.676

(a) For metals, this is the metal-bearing stream flow associated with specific plant processes (e.g. hexyl cinnamic aldehyde production, benzoic acid containment, benzyl/benzyl amine production). (b) From 40 CFR 414.91.
(c) Limit (lbs/day) = Flow (gpm) × limits (µg/L) × conversion factor (0.000012).

Table 16 - Technology-based BOD_5 Limits for Process Wastewater

40 CFR	Sub Category	% Produced [a]	Subcategorical limit (mg/L)		Production-proportioned limit (mg/L) [b]	
			Monthly ave	Max daily	Monthly ave	Max daily
414.61	Commodity	11.93	30	80	3.58	9.55
414.71	Bulk	55.09	34	92	18.73	50.69
414.81	Specialty	32.97	45	120	14.84	39.57
Plant-specific limit (mg/L) [c]					37	100
Plant-specific limit (lb/day) [d]					94	252

(a) 2006 Average production data in permit renewal application
(b) Percent produced × subcategorical limit × 0.01
(c) Sum of production-proportioned limits for all subcategory
(d) BOD_5 limit (mg/L) × process wastewater flow (210 gpm) × conversion factor (0.012). Process wastewater flow is the biological plant effluent (400 gpm) minus groundwater flow (150 gpm) and low-COD storm water (40 gpm).

Table 17 - Technology-based TSS Limits for Process Wastewater

40 CFR	Sub Category	% Produced [a]	Subcategorical limit (mg/L)		Production-proportioned limit (mg/L) [b]	
			Monthly ave	Max daily	Monthly ave	Max daily
414.61	Commodity	11.93	46	149	5.49	17.78
414.71	Bulk	55.09	49	159	27.00	87.60
414.81	Specialty	32.97	57	183	18.79	60.34
Plant-specific limit (mg/L) [c]					51	166
Plant-specific limit (lb/day) [d]					129	418

(a) 2006 Average production data, based on permit renewal application
(b) Percent produced × subcategorical limit × 0.01
(c) Sum of production-proportioned limits for all subcategory
(d) TSS limit (mg/L) × process wastewater flow (210 gpm) × conversion factor (0.012). Process wastewater flow is the biological plant effluent (400 gpm) minus groundwater flow (150 gpm) and low-COD storm water (40 gpm).

Table 18 – BOD_5 Limit for Outfall 002 Effluent

	Flow gpm	BOD_5 limit (mg/L) Average monthly	BOD_5 limit (mg/L) Maximum daily	BOD_5 limit (lb/day) Average monthly	BOD_5 limit (lb/day) Maximum daily
Process wastewater [(a)]	210	37	100	94	252
Storm water, groundwater	190[(b)]	0.5[(c)]	2.4[(c)]	1.0[(d)]	5.6[(d)]
Total effluent limit		38	102	95	258

(a) Limits from **Table 17**
(b) Sum of design groundwater (150 gpm) and storm water (40 gpm) flows
(c) Limit is equal to (1 – treatment efficiency) × BOD_5. Treatment efficiency is 99 percent based on treatment data. BOD_5 is based on 70 percent of the chemical oxygen demand measured in the comingled storm water and groundwater streams from January 2007 to September 2008. BOD_5 is 244 mg/L maximum and 46 mg/L average.
(d) BOD_5 limit (mg/L) × flow × conversion factor (0.012)

Table 19 – TSS Limit for Outfall 002 Effluent

	Flow gpm	TSS limit (mg/L) Average monthly	TSS limit (mg/L) Maximum daily	TSS limit (lb/day) Average monthly	TSS limit (lb/day) Maximum daily
Process wastewater [(a)]	210	51	166	129	418
Storm water, groundwater	190[(b)]	0[(c)]	0[(c)]	0[(c)]	0[(c)]
Total effluent limit		51	166	129	418

(a) Limits from **Table 18**
(b) Sum of design groundwater (150 gpm) and storm water (40 gpm) flows
(c) Ecology expects no significant contributions of TSS from groundwater and storm water. No allowance is given.
(d) BOD_5 limit (mg/L) × flow × conversion factor (0.012)

Table 20 - Analysis of Reasonable Potential to Exceed Water Quality Standards

Pollutant	Metal Criteria Translator		Ambient Concentration, µg/L (metal as dissolved concentration) [a]	State Water Quality Standard, µg/L		Maximum Concentration µg/L at edge of mixing zone…		LIMIT REQUIRED?	Effluent percentile value	Max effluent concentration, µg/L (metal as total recoverable)	Number of samples *n*	Multiplier	Acute Dilution Factor [b]	Chronic Dilution Factor [b]
	Acute	Chronic		Acute	Chronic	Acute	Chronic							
Ammonia-N [c]			< 20	303	42	4.3	1.7	NO	0.95	250	1	6.20	359	913
Arsenic, outfall 001	1.0	1.0	1.58	360	190	1.6	1.6	NO	0.95	1.2	22	1.32	8.3	21.1
Cadmium	0.94	0.94	< 0.1	2.21	0.72	0.003	0.001	NO	0.95	0.19	1	6.20	359	913
Chromium, hex- [d]	0.982	0.962	0.80	15	10	0.82	0.81	NO	0.95	0.90	1	6.20	359	913
Chromium, tri- [d]			0.82	370.97	120.34	0.83	0.82	NO	0.95	0.90	1	6.20	359	913
Copper	1.0	1.0	3.3	10.85	7.54	3.70	3.46	NO	0.95	143.0	55	1.02	359	913
Iron			17		1000		17.16	NO	0.95	48.0	1	6.20	359	913
Lead	0.47	0.47	0.28	38.24	1.49	0.28	0.28	NO	0.95	0.03	1	6.20	359	913
Nickel	0.998	0.997	0.57	944.6	104.9	0.77	0.65	NO	0.95	72.2	55	1.02	359	913
Zinc	1.0	1.0	< 5.0	76.3	69.7	0.07	0.03	NO	0.95	25.3	55	1.02	359	913

(a) Ambient concentrations are taken from data in **Table 5**. For 20 or less data points, Ecology uses the geometric mean of the ambient concentrations multiplied by 1.74 to estimate the 90th percentile. Ambient metal (total recoverable) concentrations are multiplied by the corresponding metal translators to convert into dissolved form.
(b) Acute and chronic dilution factors from **Table 11**.
(c) Ecology determines water quality criteria in **Table 23**.
(d) Maximum effluent concentration is for chromium total recoverable and does not distinguish between tri- and hexavalent.

Table 21 - Analysis of Reasonable Potential to Exceed Human Health Criteria

Pollutant	Ambient concentration (geometric mean) µg/L [a]	Water quality criteria for Protection of human health, µg/L	Max concentration at edge of chronic mixing zone, µg/L	LIMIT REQUIRED?	Percentile at 95% confidence	Max effluent concentration, µg/L	Number of samples, *n*	Multiplier	50th percentile effluent concentration (if *n* >10)	Dilution Factor [b]
Bis(2-ethylhexyl) phthalate	< 0.12	1.8	0.0224	NO	0.50	2.4	57	0.41	0	43
Copper [c]	3.1	1000	3.32	NO	0.50	143	58	0.41	14	43
Iron	17	300	19.2	NO	0.50	48.0	1	2.49		43
Manganese	1.53	50	1.84	NO	0.50	5.9	1	2.49		43
Nickel	0.57	610	0.81	NO	0.50	72.2	58	0.41	11	43
Nitrate/nitrite - N	< 0.02	10000	128	NO	0.50	2230	1	2.49		43
Phenol [c]	< 0.06	300	0.102	NO	0.50	11	58	0.63	0	43
Zinc [c]	< 5.0	5000	0.11	NO	0.50	25.3	58	0.41	4.8	43

(a) Ambient concentrations are taken from data in Table 6. For less than 20 or less data points, Ecology uses the geometric mean of the ambient concentrations multiplied by 1.74 to estimate the 90th percentile.
(b) Dilution factors from **Table 11**.
(c) Apply organoleptic criteria, which are more stringent than human health criteria.

Table 22 – Freshwater Un-ionized Ammonia Criteria

INPUT	
1. Temperature (deg C):	21.80
2. pH:	8.10
3. Is salmonid habitat an existing or designated use?	Yes
4. Are non-salmonid early life stages present or absent?	Present
OUTPUT	
1. Unionized ammonia NH_3 criteria ($mgNH_3/L$)	
Acute:	0.303
Chronic:	0.042
2. Total ammonia nitrogen criteria (mgN/L):	
Acute:	4.641
Chronic:	0.648
Criteria based Chapter 173-201A WAC, using the Technical Support Document (TSD) spreadsheet calculation. Spreadsheet amended on November 20, 2006.	

Table 23 – Temperature Limit Calculation

INPUT	Core Summer Criteria	Supplemental Criteria
1. Chronic dilution factor at mixing zone boundary	89.0	89.0
2. 1-DMax Ambient temperature (upstream background 90th percentile)	21.8 °C	21.8 °C
3. 1-DMax Effluent temperature (95th percentile)	35.7 °C	35.7 °C
4. Aquatic life temperature WQ criterion in fresh water	20.0 °C	None
OUTPUT		
5. Temperature at chronic mixing zone boundary:	22.0 °C	22.0 °C
6. Incremental temperature increase or decrease:	0.2 °C	0.2 °C
7. Incremental temperature increase 28/(T+7) if T≤ criteria:	---	---
8. Maximum allowable temperature at mixing zone	22.1 °C	22.1 °C
A. If ambient temperature is warmer than WQ criterion		
9. Does temp fall within this warmer temp range?	YES	YES
10. Temp increase allowed at mixing zone boundary, if	NO LIMIT	NO LIMIT
B. If ambient temperature is cooler than WQ criterion but within 28/(T_{amb}+7) and within 0.3 °C of the criterion		
11. Does temp fall within this incremental temp range?	---	---
12. Temp increase allowed at mixing zone boundary, if	---	---
C. If ambient temp is cooler than (WQ criterion-0.3) but within 28/(T_{amb}+7) of the criterion		
13. Does temp fall within this incremental temp range?	---	---
14. Temp increase allowed at mixing zone boundary, if	---	---
D. If ambient temp is cooler than (WQ criterion - 28/(T_{amb}+7))		
15. Does temp fall within this incremental temp range?	---	---
16. Temp increase allowed at mixing zone boundary, if	---	---
17. Do any of the above cells show a temp increase?	**NO**	**NO**
18. Temperature limit if required?	**NO LIMIT**	**NO LIMIT**

Criteria based on Chapter 173-201A-200(1)(c)(i),(ii) WAC and Water Quality Program guidance, using Technical Support Document (TSD) spreadsheet calculation. Spreadsheet dated August 30, 2008. Spreadsheet was revised to evaluate reasonable potential to exceed using 1-DMax data to correspond with 1-DMax fresh water quality criterion. Core summer criterion is applicable from July 1 to September 14. Supplemental spawning criteria do not apply to the receiving water.
Line 1 input is from Beaks Consultant Mixing Zone field study in 1993.
Line 2 input is from **Table 5 - Ambient Background Data**.
Line 3 is based on 2007 Discharge Monitoring Reports.
Line 4 is from **Table 8 – Aquatic Life Uses & Associated Criteria**.

Table 24 - Previous Permit: Outfall 002 Effluent Limits, Monitoring Waived

	Limit (lbs/day)	
Toxic Pollutant	**Monthly Average**	**Maximum Daily**
Acenaphthene	0.106	0.283
Acenaphthylene	0.106	0.283
Acrylonitrile	0.461	1.163
Anthracene	0.106	0.283
Benzo(a)anthracene	0.106	0.283
3,4-Benzofluoranthene	0.110	0.293
Benzo(k)fluoranthene	0.106	0.283
Benzo(a)pyrene	0.110	0.293
Carbon tetrachloride	0.086	0.183
Chlorobenzene	0.072	0.135
Chloroethane	0.500	1.287
Chloroform	0.101	0.221
2-Chlorophenol	0.149	0.471
Chrysene	0.106	0.283
Di-n-butyl phthalate	0.130	0.274
1,2-Dichlorobenzene	0.370	0.783
1,3-Dichlorobenzene	0.149	0.211
1,4-Dichlorobenzene	0.072	0.135
1,1-Dichloroethane	0.327	1.014
1,2-Dichloroethane	0.327	1.014
1,1-Dichloroethylene	0.077	0.120
1,2-trans-Dichloroethylene	0.101	0.259
2,4-Dichlorophenol	0.187	0.538
1,2-Dichloropropane	0.735	1.105
1,3-Dichloropropylene	0.139	0.211
Diethyl phthalate	0.389	0.975
2,4-Dimethylphenol	0.086	0.173
Dimethyl phthalate	0.091	0.226
4,6-Dinitro-o-cresol	0.375	1.331
2,4-Dinitrophenol	0.341	0.591
2,4-Dinitrotoluene	0.543	1.369
2,6-Dinitrotoluene	1.225	3.079
Fluoranthene	0.120	0.327
Hexachlorobenzene	0.072	0.135
Hexachlorobutadiene	0.096	0.235
Hexachloroethane	0.101	0.259
Methyl chloride	0.413	0.913
Methylene chloride	0.192	0.428
Nitrobenzene	0.130	0.327
2-Nitrophenol	0.197	0.331

Toxic Pollutant	Limit (lbs/day) Monthly Average	Maximum Daily
4-Nitrophenol	0.346	0.596
Phenanthrene	0.106	0.283
Pyrene	0.120	0.322
Tetrachloroethylene	0.106	0.269
1,2,4-Trichlorobenzene	0.327	0.673
1,1,1-Trichloroethane	0.101	0.259
1,1,2-Trichloroethane	0.101	0.259
Trichloroethylene	0.101	0.259
Vinyl chloride	0.500	1.287

Table 25 - Outfall 002 Wastewater Characterization (continued from Table 4)

Parameter	Maximum Daily Value µg/L	lbs/day
Chemical oxygen demand (COD)	19000	40
Total organic carbon (TOC)	11400	24
Ammonia	250	0.53
Nitrate-nitrite (as N)	2230	4.74
Nitrogen-N, total organic	1200	2.6
Oil and grease	< 5000	< 10.6
Sulfate	19600	41.6
Cobalt, total	223	0.47
Iron, total	48	0.1
Manganese, total	5.9	0.01
Tin, total	0.3	0.0006
Antimony	0.08	0.0002
Arsenic	3.8	0.008
Beryllium	< 0.02	< 0.01
Cadmium	0.19	< 0.01
Chromium	0.9	0.002
Lead, total	0.03	< 0.01
Mercury, total	< 0.2	< 0.01
Selenium, total	< 5.0	< 0.011
Silver, total	< 0.02	< 0.01
Thallium, total	< 0.02	< 0.01
Cyanide, total	< 0.01	< 0.01
Phenols, total	< 0.01	< 0.01
2,3,7,8-Tetrachlorodibenzo-p-dioxin	< 0.00001	-
Acrolein	< 50	< 0.106
Acrylonitrile	< 50	< 0.106
Benzene	< 10	< 0.021

	Maximum Daily Value	
Parameter	**µg/L**	**lbs/day**
Bis(chloromethyl) ether	< 9.6	< 0.020
Bromoform	< 10	< 0.021
Carbon tetrachloride	< 10	< 0.021
Chlorobenzene	< 50	< 0.106
Chlorodibromomethane	< 10	< 0.021
Chloroethane	< 10	< 0.021
2-Chloroethylvinyl ether	< 50	< 0.106
Chloroform	< 10	< 0.021
Dichlorobromoethane	< 10	< 0.021
Dichlorodifluoromethane	< 10	< 0.021
1,1-Dichloroethane	< 10	< 0.021
1,2-Dichloroethane	< 10	< 0.021
1,1-Dichloroethylene	< 10	< 0.021
1,2-Dichloropropane	< 10	< 0.021
1,3-Dichloropropylene	< 10	< 0.021
Ethylbenzene	< 10	< 0.021
Methyl bromide	< 50	< 0.106
Methyl chloride	< 50	< 0.106
Methylene chloride	< 20	< 0.042
1,1,2,2,-Tetrachloroethane	< 10	< 0.021
Tetrachloroethylene	< 10	< 0.021
Toluene	< 10	< 0.021
1,2-trans-Dichloroethylene	< 10	< 0.021
1,1,1-Trichloroethane	< 10	< 0.021
1,1,2-Trichloroethane	< 10	< 0.021
Trichloroethylene	< 10	< 0.021
Trichlorofluoromethane	< 10	< 0.021
Vinyl chloride	< 10	< 0.021
2-Chlorophenol	< 9.7	< 0.021
2,4-Dichlorophenol	< 9.7	< 0.021
2,4-Dimethylphenol	< 9.7	< 0.021
4,6-Dinitro-o-cresol	< 9.7	< 0.021
2,4-Dinitrophenol	< 25	< 0.053
2-Nitrophenol	< 9.7	< 0.021
4-Nitrophenol	< 25	< 0.053
p-Chloro-m-cresol	< 25	< 0.053
Pentachlorophenol	< 25	< 0.053
2,4,6-Trichlorophenol	< 9.7	< 0.021
Acenaphthene	< 9.7	< 0.021
Acenaphthylene	< 9.7	< 0.021
Anthracene	< 9.7	< 0.021

	Maximum Daily Value	
Parameter	**µg/L**	**lbs/day**
Benzidine	< 49	< 0.104
Benzo(a)anthracene	< 9.7	< 0.021
Benzo(a)pyrene	< 9.7	< 0.021
3,4-Benzofluoranthene	< 9.7	< 0.021
Benzo(ghi)perylene	< 9.7	< 0.021
Benzo(k)fluoranthene	< 9.7	< 0.021
Bis(2-chloroethoxy) methane	< 9.7	< 0.021
Bis(2-chloroethyl) ether	< 9.7	< 0.021
Bis(2-chloroisopropyl) ether	< 9.7	< 0.021
Bis(2-ethylhexyl) phthalate	< 9.7	< 0.021
4-Bromophenyl phenyl ether	< 9.7	< 0.021
Butyl benzyl phthalate	< 9.7	< 0.021
2-Chloronaphthalene	< 9.7	< 0.021
4-Chlorophenyl phenyl ether	< 9.7	< 0.021
Chrysene	< 9.7	< 0.021
Dibenzo(a,h) anthracene	< 9.7	< 0.021
1,2-Dichlorobenzene	< 10	< 0.021
1,3-Dichlorobenzene	< 10	< 0.021
1,4-Dichlorobenzene	< 10	< 0.021
3,3-Dichlorobenzidine	< 25	< 0.053
Diethyl phthalate	< 9.7	< 0.021
Dimethyl phthalate	< 9.7	< 0.021
Di-n-butyl phthalate	< 9.7	< 0.021
2,4-Dinitrotoluene	< 9.7	< 0.021
2,6-Dinitrotolune	< 9.7	< 0.021
Di-n-octyl phthalate	< 9.7	< 0.021
1,2-Diphenyl hydrazine	< 9.7	< 0.021
Fluoranthene	< 9.7	< 0.021
Fluorene	< 9.7	< 0.021
Hexachlorobenzene	< 9.7	< 0.021
Hexachlorobutadiene	< 9.7	< 0.021
Hexachlorocyclopentadiene	< 9.7	< 0.021
Hexachloroethane	< 9.7	< 0.021
Indeno(1,2,3-cd) pyrene	< 9.7	< 0.021
Isophorone	< 9.7	< 0.021
Naphthalene	< 9.7	< 0.021
Nitrobenzene	< 9.7	< 0.021
N-Nitrosodimethylamine	< 25	< 0.053
N-Nitrosdi-n propylamine	< 9.7	< 0.021
N-Nitrosodiphenylamine	< 9.7	< 0.021
Phenanthrene	< 9.7	< 0.021

Parameter	Maximum Daily Value µg/L	Maximum Daily Value lbs/day
Pyrene	< 9.7	< 0.021
1,2,4-Trichlorobenzene	< 9.7	< 0.021
Aldrin	< 0.0098	< 0.01
α-BHC	< 0.0098	< 0.01
β-BHC	< 0.015	< 0.01
γ-BHC	< 0.0098	< 0.01
δ-BHC	< 0.0098	< 0.01
Chlordane	< 0.20	< 0.01
4,4-DDT	< 0.0098	< 0.01
4,4-DDE	< 0.0098	< 0.01
4,4-DDD	< 0.0098	< 0.01
Dieldrin	< 0.0098	< 0.01
α-Endo-sulfan	< 0.0098	< 0.01
β-Endo-sulfan	< 0.0098	< 0.01
Endosulfan sulfate	< 0.0098	< 0.01
Endrin	< 0.0098	< 0.01
Endrin aldehyde	< 0.0098	< 0.01
Heptachlor	< 0.0098	< 0.01
Heptachlor epoxide	< 0.0098	< 0.01
PCB-1242	< 9.8	< 0.002
PCB-1254	< 9.8	< 0.002
PCB-1221	< 9.8	< 0.002
PCB-1232	< 9.8	< 0.002
PCB-1248	< 9.8	< 0.002
PCB-1260	< 9.8	< 0.002
PCB-1016	< 9.8	< 0.002
Toxaphene	< 9.8	< 0.002

Table 26 - Outfall 003 Storm Water Characterization

Parameter	Unit	Sampling Results	Benchmark value [a]
Turbidity	NTU	-	25
pH[b]	Standard unit	7.03	6 to 9
Zinc	µg/L	-	117
BOD_5	mg/L	< 3.0	30
Chemical oxygen demand[b]	mg/L	12	-
Toluene	µg/L	<10	-
Benzene	µg/L	<10	-
Oil and grease	mg/L	< 5.0	15
Nitrate/Nitrite as N	mg/L	-	0.68
Phosphorus, total	mg/L	0.01	2
Total suspended solids	mg/L	2.7	-
Total organic nitrogen	mg/L	1.4	-

(a) Benchmark values are established in the Industrial Storm Water General Permit issued
(b) The values are average of permit application sampling and monitoring data collected from 1999 to 2002

Table 27 – Mixing Zone Dilution Modeling

	1993 Beaks Consultant Modeling	Ecology Modeling	
		1993 Discharge	Current Discharge
Input Conditions			
Flow, MGD [a]	22.44	22.44	15.9
Effluent temp,°C [a]	34	34	35.6
Port depth, ft	35	35	35
Port elevation, ft	3.3	3.3	3.3
Dilution Factors			
Acute mixing zone	8.3 [b]	14	16
Chronic mixing zone	21.1	32	36

(a) Models use 90th percentile effluent flow and temperature.
(b) The model estimates a dilution factor of about 20.4 at the acute mixing zone (32.5 feet). Beaks Consultant uses the initial dilution, which is 8.3 as a more conservative estimate.

Table 28 – Reduced Monitoring for Exemplary Performance

Date	Phenol (lb/day)	Bis(2-ethylhexyl) phthalate (lb/day)
January 2007	< 0.001	0.003
February 2007	< 0.001	0.002
March 2007	< 0.001	0.002
April 2007	< 0.014	< 0.001
April 2007 – Ecology inspection results	0.0002	0.0004
May 2007	< 0.032	< 0.001
June 2007	< 0.025	0.142[(a)]
July 2007	< 0.021	0.002
August 2007	< 0.020	0.001
September 2007	< 0.022	0.001
October 2007	< 0.032	< 0.001
November 2007	< 0.022	< 0.001
December 2007	< 0.033	< 0.001
January 2008	< 0.049	< 0.002
February 2008	< 0.042	< 0.001
March 2008	< 0.030	< 0.001
April 2008	< 0.028	< 0.001
May 2008	< 0.029	0.002
June 2008	< 0.034	< 0.001
July 2008	< 0.023	0.001
July 2008 – Ecology inspection results	0.0015	0.0009
August 2008	< 0.026	< 0.001
September 2008	< 0.018	< 0.001
October 2008	< 0.023	< 0.001
November 2008	< 0.034	< 0.001
December 2008	< 0.029	< 0.001
Longterm average (LTA)	0.02454	0.001
Average monthly limit (AML)	0.072	0.260
Ratio, LTA/AML [(b)]	34%	0.5%

(a) The elevated value is due to sample contamination in the lab. Ecology did not include this value in the determination of the longterm average. For samples that are non-detect, we assume the detection limit.
(b) Ecology uses this ratio to determine reduction of monitoring frequency. Phenol monitoring is reduced from monthly to quarterly. Bis(2-ethylhexyl) phthalate monitoring is reduced from monthly to semi-annually.

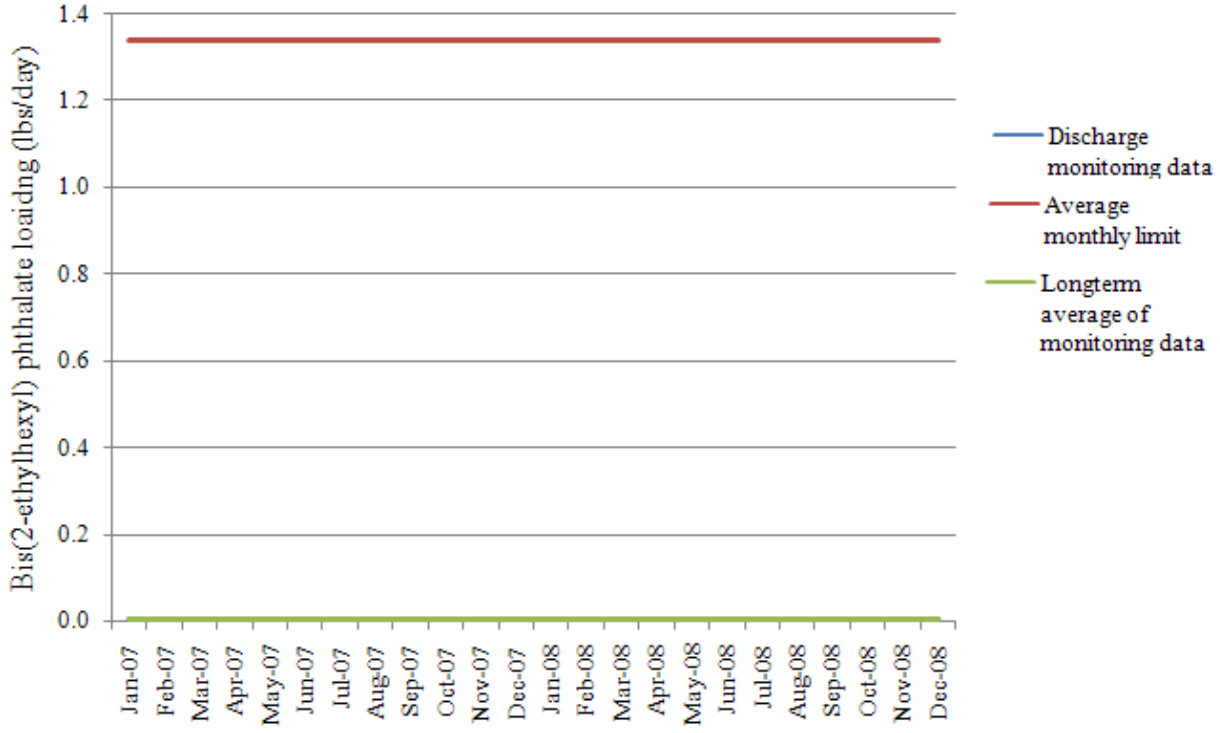

Figure 3 – Bis(2-ethylhexyl) Phthalate Data: Average Discharge vs. Permit Limit

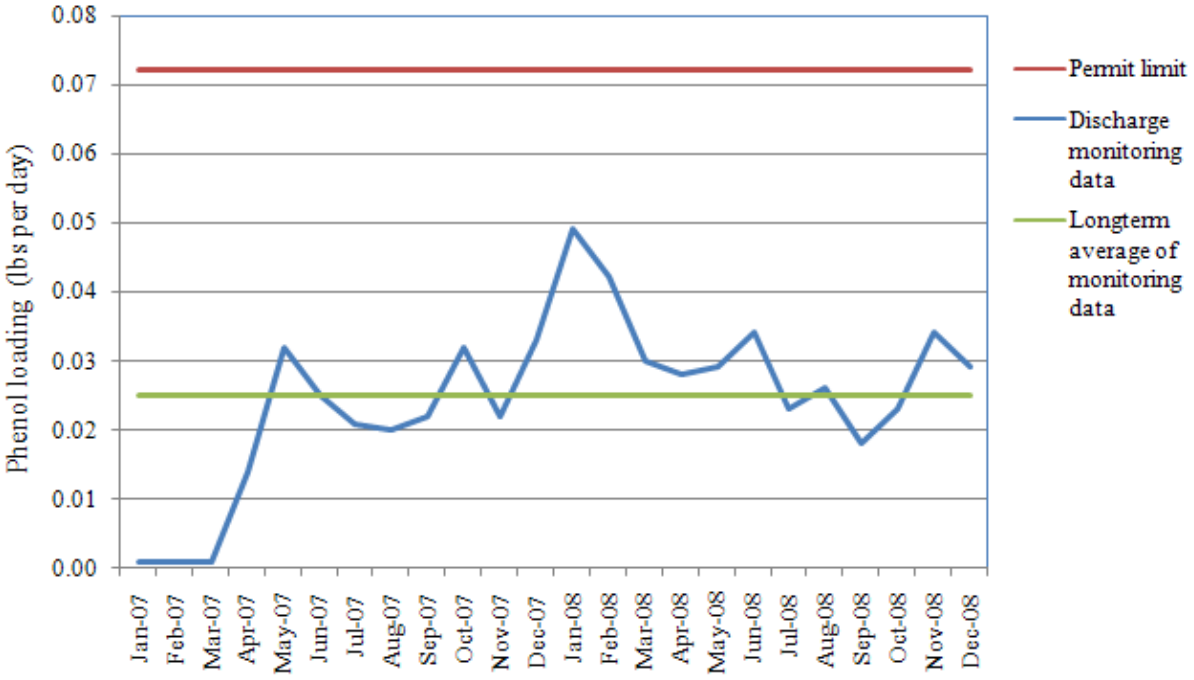

Figure 4 – Phenol Data: Average Discharge vs. Permit Limit

APPENDIX D - RESPONSE TO COMMENTS

Ecology published the public notice for issuance of Emerald Kalama's proposed NPDES permit on May 20, 2009 with a closing date of June 19, 2009.

Ecology received one comment dated June 1, 2009 from the Department of Natural Resources (DNR). Ecology completed its review of the comment and provided the response below. Ecology will send a copy of this document in its entirety to commenter of the draft documents.

There are no revisions to the proposed permit based on the comment received.

Comment #1 from Denise Wilhelm, Land Manager, Cowlitz County Department of Natural Resources

Emerald Kalama have improvements (outfall 001) in the Columbia that encumber State-owned Aquatic Lands. DNR records do not indicate that Emerald has a current use authorization for the improvements. DNR will require Emerald to apply for a use authorization for all improvements.

Response to Comment #1

Comment noted. The facility has certificates issued in 1962 and 1974 authorizing the use of non-contact cooling water from the Columbia. The certificates were issued by the State Supervisor of Water Resource and the Department of Ecology, respectively. The certificates require the return of the water to the river, which the facility complied through outfall 001. Ecology noted that additional requirements may be applicable and has notified Emerald Kalama of DNR's requirement. The requirement will be addressed separately from this permit.