

Fact Sheet for NPDES Permit WA0000680

Alcoa Wenatchee LLC

June 14, 2021

Purpose of this fact sheet

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

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

Ecology makes the draft permit and fact sheet available for public review and comment at least thirty (30) days before issuing the final permit. Copies of the fact sheet and draft permit for Alcoa Wenatchee, NPDES permit WA0000680, are available for public review and comment from June 15, 2021 until July 16, 2021. For more details on preparing and filing comments about these documents, please see **Appendix A - Public Involvement Information**.

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

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

Summary

Alcoa operates a wastewater treatment plant that discharges to the Columbia River. Ecology issued the previous permit for this facility on December 5, 2014.

On January 22, 2016, Ecology received a letter from Alcoa notifying Ecology that the facility had begun their 100% curtailment on December 18, 2015. Ecology issued a permit modification on January 5, 2017 including changes to the monitoring requirements and submittal dates for wastewater characterization/AKART study and engineering report, sediment monitoring, and acute/chronic toxicity testing. The facility remains in 100% curtailment at the time that this permit is being issued.

The proposed permit retains all of the effluent limits and monitoring frequencies for the process and sanitary wastewater from the modified permit issued in 2017 and adds new requirements as follows:

- Heat load limit
- Completion of the sediment monitoring study
- Entrainment performance study for the cooling water intake structure
- Monitoring to demonstrate compliance with the new bacteria standard

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I. Introduction

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

The following regulations apply to industrial NPDES permits:

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

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

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

II. Background Information

Table 1 General Facility Information

Applicant:	Alcoa Wenatchee LLC
Facility Name and Address	Alcoa Wenatchee LLC, 6200 Malaga/Alcoa Highway, Malaga, WA 98828-9784
Contact at Facility	Name: David Hulse Telephone #: 509-663-9206
Responsible Official	Name: David Hulse Title: Site Manager Address: 6200 Malaga Hwy, Malaga, WA 98828-9784
Industry Type	Primary Aluminum Smelting
Categorical Industry	40 CFR Part 421, Subpart B
Type of Treatment	Primary and Secondary Treatment System
SIC Codes	3334
NAIC Codes	331313
Facility Location (NAD83/WGS84 reference datum)	Latitude: 47.358056 Longitude: 120.121944
Discharge Waterbody Name and Location (NAD83/WGS84 reference datum)	Columbia River Latitude: 47.358056 Longitude: 120.121944
Intake Structures	Latitude: 47.359762 Longitude: -120.124066

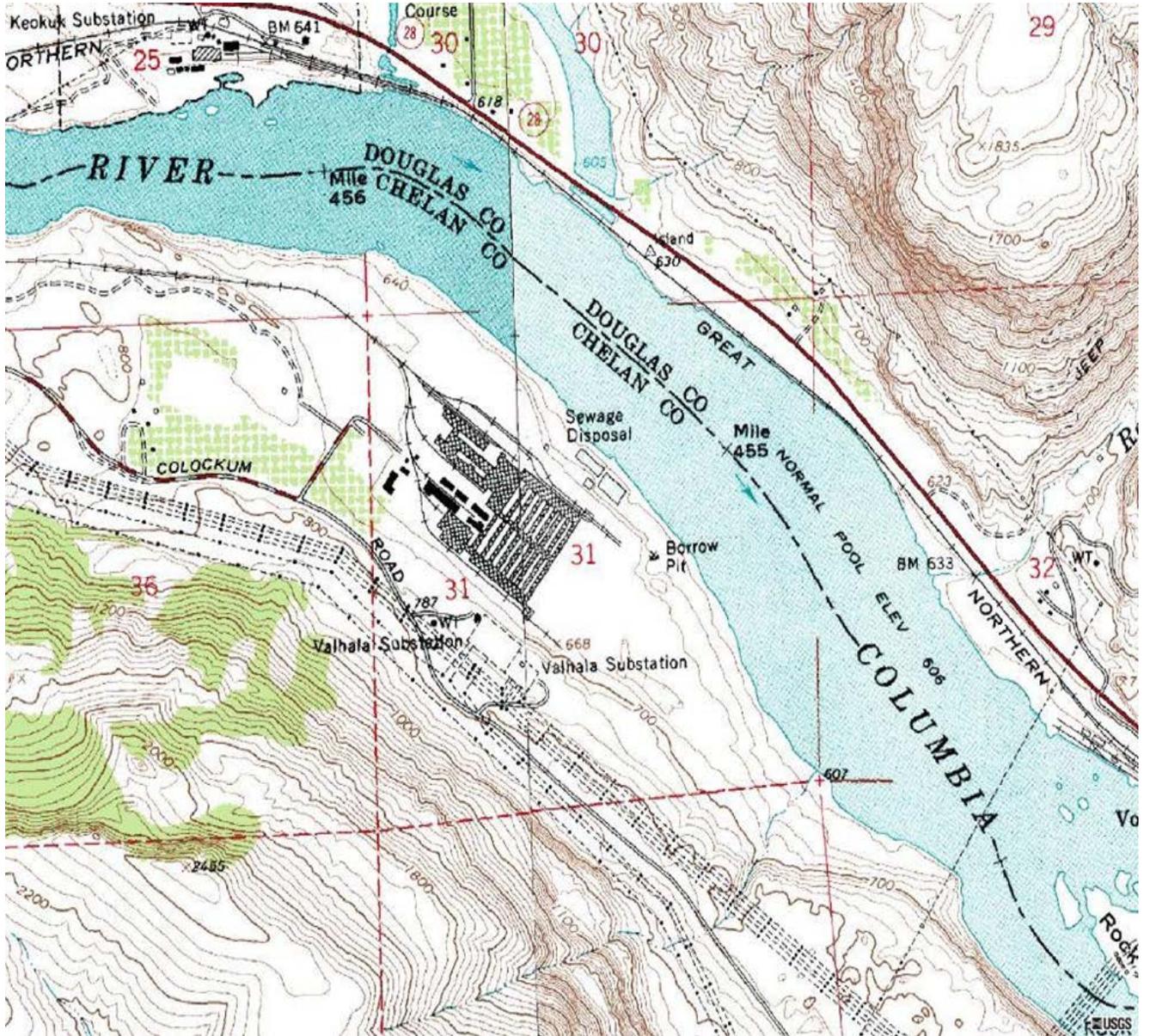
Table 2 Permit Status

Renewal Date of Previous Permit	December 5, 2014
Application for Permit Renewal Submittal Date	June 27, 2019
Date of Ecology Acceptance of Application	October 7, 2019

Table 3 Inspection Status

Date of Last Sampling Inspection	May 9, 2018
Date of Last Non-sampling Inspection Date	September 29, 2020

Figure 1 Facility Location Map



A. Facility description

History

The Alcoa Wenatchee primary aluminum smelter facility is located on the west side of the Columbia River just south of Wenatchee and near Malaga, Washington. The facility began operating the Wenatchee Works primary aluminum smelter in 1952 with Potlines 1, 2, 3, and 4. The facility added Potline 5 in 1967. Alcoa produces primary aluminum metal by the Hall-Heroult reduction process which involves the electrolytic decomposition of alumina into metallic aluminum and gaseous oxygen.

Up until December 2015, the facility was operating three potlines (Nos. 1, 2, and 5). Potline 4 was demolished in 2004 and Potline 3 was demolished in 2019. Alcoa produced an average of 400 tons of aluminum per day from January 1, 2015 to December 17, 2015. The facility has been in 100% curtailment since December 18, 2015. Ecology issued a permit modification on January 5, 2017 that revised the requirements related to monitoring frequencies and for conducting studies. The facility currently employs approximately 12 people.

Cooling water intake structure

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

Alcoa withdraws cooling water from the Columbia River through an estimated 13 ft wide concrete intake structure that is perpendicular to river flow. The structure extends approximately 30 ft offshore at normal water levels and is 613 ft above sea level. The cooling water is pumped to the plant after flowing through a 1.5-inch trash screen and a 0.25 inch perforated traveling screen. The intake structure for Alcoa was designed and constructed in 1952.

Alcoa’s CWIS was designed to withdraw 17 million gallons per day (MGD). The actual withdrawal averages 3.08 MGD with approximately 76% used exclusively for cooling. Maximum intake velocity is estimated at 0.204 feet per second (fps).

Alcoa submitted an information and compliance report for the CWIS to Ecology on July 1, 2019. Alcoa’s existing CWIS complies with the Impingement Mortality Standard specified in 40 CFR 125.94(c)(2) which requires that the through-screen design velocity of the CWIS be less than 0.5 fps. Alcoa has not yet conducted an entrainment performance study for the CWIS.

Industrial processes

The Alcoa Wenatchee facility was designed to produce primary aluminum metal by the Hall-Heroult reduction process. The facility consists of a carbon anode production plant, four pre-bake aluminum reduction potlines, an ingot casting facility, a machine shop, and various offices and utility buildings. The facility has 608 center worked anode reduction cells (pots).

The facility is capable of producing approximately 440 million pounds (220,000 tons) of aluminum per year at full production. Molten aluminum is siphoned from the pots and transported to the ingot plant, where it is cast on-site into various sizes and forms of ingots and pigs.

Wastewater treatment processes

The facility's wastewater treatment systems treat various wastewaters including: process wastewater, domestic wastewater, and stormwater runoff.

The process wastewater consists of non-contact cooling water, boiler blowdown, oily wastewater, and other miscellaneous wastewater. The facility treats some of its process wastewater with pH neutralization and an oil water separator.

The facility treats its sanitary wastewater in a primary and secondary treatment system. Sanitary wastewater treatment consists of an extended aeration/activated sludge system with a secondary clarifier, ultraviolet (UV) disinfection, and back-up chlorination.

The facility collects its non-contact cooling water from the ingot casthouse in a lined lagoon. The facility pumps the water from the lagoon to infiltration basins. The system was originally designed to biologically degrade soluble oil used in the ingot casting process. Soluble oil is no longer used in the ingot process.

The facility controls pollutants in the stormwater runoff by implementing Best Management Practices (BMPs). BMPs consist of preventive maintenance, good housekeeping, spill prevention and response procedures, and employee training. The stormwater runoff commingles with treated process wastewater and sanitary wastewater prior to discharge.

The final effluent passes through a monitoring station where pH is measured prior to being discharged to Outfall 001. As a precaution, when the pH level drops below 7.0 or rises above 9.0, the facility diverts the final effluent to diversion ponds where the water is allowed to evaporate and percolate into the ground. The facility resumes discharge to Outfall 001 when the pH level is between 7.0 and 9.0. The facility also diverts the final effluent to the diversion ponds for routine maintenance activities or to prevent discharge of spilled materials to the river when spills occur on-site and enter the stormwater system.

The facility draws an average of 3.08 MGD from the Columbia River to use for process water supply. The domestic water for the facility, supplied from on-site wells, typically makes up approximately 1% of the overall water usage.

Solid wastes

The facility manages various solid wastes on-site including: wastewater sludge, scrap steel, concrete, recycled furnace brick, used oil, paper, scrap wood, packing coke, filter bags, batteries, insulation, and cast iron. Some of these solid wastes are transported to off-site permitted landfills and others are recycled.

Discharge outfall

The facility discharges treated and disinfected effluent into the Columbia River through a 36-inch diameter submerged diffuser with 11 ports.

The discharge outfall is located 1.8 miles upstream of the Rock Island Dam, on the west side of the Columbia River. The diffuser rests on the river bed at an average depth of 36 feet below the surface of the water. The effluent discharge is continuous. From January 2015 through October 2020, the monthly average discharge flow was 1.00 MGD.

B. Description of the receiving water

The facility discharges to the Columbia River through Outfall 001. The discharge is located 1.8 miles upstream of the Rock Island Dam on the west side of the Columbia River.

The only nearby point source outfall is AMG Aluminum North America LLC. Significant nearby non-point sources of pollutants include Ravenwing Ranch. Section III.E. of this fact sheet describes any receiving waterbody impairments.

The ambient background data used for this permit includes the data from the NPDES Compliance Wastewater Discharge and Receiving Water Data Report prepared by Parametrix, Inc. and submitted to Ecology on February 1999 and the Rock Island Dam monitoring station which is the nearest monitoring station to Alcoa's discharge:

Table 4 Ambient Background Data

Parameter	Value Used
Temperature (highest annual 1-DMax)	20.6 °C
pH (Maximum / Minimum)	8.04 / 7.62 standard units
Dissolved Oxygen	8.96 mg/L
Hardness	66 mg/L as CaCO ₃
Aluminum, Total	28.7 µg/L
Cadmium, Total	0.07 µg/L
Lead, Total	0.069 µg/L
Mercury, Total	0.00045 µg/L
Copper, Total	0.74 µg/L
Zinc, Total	1.63 µg/L

C. Wastewater characterization

Alcoa reported the concentration of pollutants in the discharge in the permit renewal application and in monthly discharge monitoring reports. The tabulated data represents the quality of the wastewater effluents discharged from 2018-2019. The wastewater effluents are characterized as follows:

Table 5 Wastewater Characterization for final effluent

Parameter	Units	Long Term Average Value	Maximum Daily Value
Total Suspended Solids (TSS)	lbs/day	8.4	91
Fluoride	lbs/day	0.26	45
Aluminum	lbs/day	0.91	16
Oil & Grease	lbs/day	3.7	15
pH	Standard Unit	7.63 Minimum	8.79 Maximum
Flow	MGD	0.46	0.95
Temperature (Winter)	Degree C	6.6	10.6
Temperature (Summer)	Degree C	20.1	23.4

Table 6 Wastewater Characterization for Sanitary Waste Discharge

Parameter	Units	Long Term Average Value	Maximum Daily Value
Biochemical Oxygen Demand (BOD ₅)	lbs/day	0.82	5.4
Total Suspended Solids (TSS)	lbs/day	3.2	10
Fecal Coliform	#Colonies/100 ml	<2.2	<2.2
pH	Standard Unit	7.5 Minimum	8.6 Maximum
Flow	MGD	0.048	0.095

D. Summary of compliance with previous permit issued

The previous permit placed effluent limits on TSS, fluoride (F), aluminum (Al), oil & grease, and pH for process wastewater and BOD, TSS, total residual chlorine, pH, fecal coliform, and number of operating UV Tubes for the sanitary wastewater.

Alcoa has complied with the effluent limits and permit conditions throughout the duration of the permit issued on December 5, 2014, except for the days listed in table below. Ecology assessed compliance based on its review of the facility's information in the Ecology Permitting and Reporting Information System (PARIS), discharge monitoring reports (DMRs) (available for review at <https://apps.ecology.wa.gov/paris/PermitLookup.aspx>), and inspections.

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

Table 7 Violations

Date	Parameter	Monthly Ave Limit (lbs/day)	Daily Max Limit (lbs/day)	Monthly Ave Reported Value (lbs/day)	Daily Max Reported Value (lbs/day)
3/23/2015	Al	--	46	--	99
3/23/2015	F	--	150	--	212
4/6/2015	Al	--	46	--	68
4/6/2015	F	--	150	--	167
4/27/2015	TSS	100	500	175	1288
11/1/2015	TSS % Removal	>85%	--	68%	--
12/1/2015	TSS % Removal	>85%	--	55%	--
12/1/2015	BOD % Removal	>85%	--	71%	--
12/7/2015	F	--	46	--	426
12/7/2015	TSS	--	500	--	1300
12/7/2015	Al	--	46	--	246
12/31/2015	F	25	--	61	--
12/31/2015	TSS	100	--	165	--
12/31/2015	Al	15	--	32	--

Ecology issued Notice of Violation #11639 and Agreed Order #13280 for all of these violations.

The following table summarizes compliance with report submittal requirements over the permit term. Certain submittals were suspended due to the facility's 100% curtailment. The requirements for these submittals will be resumed after the facility restarts. Those submittals are noted as being delayed in the table.

Table 8 Permit Submittals

Submittal	Due Date	Received Date
Sediment Sampling and Analysis Plan	7/1/2015	7/1/2015
O & M Manual Review Confirmation Letter	January 31 (Annually)	January 31 (Annually)
Stormwater Pollution Prevention Plan Update	7/1/2015	7/1/2015
Spill Control Plan Update	1/1/2016	1/1/2016
Outfall Evaluation	3/31/2017	3/31/2017
CWIS Information and Compliance Report	7/1/2019	7/1/2019
Solid Waste Control Plan Update	7/1/2019	7/1/2019
Application for Permit Renewal	7/1/2019	7/1/2019
Priority Pollutant Testing for Final Effluent	Delayed	N/A
Metal Testing for Ingot Cast-house Effluent	Delayed	N/A
Priority Pollutant Testing for Ingot Cast-house Effluent	Delayed	N/A
Wastewater Characterization Study Sampling and Analysis Plan	Delayed	N/A
Engineering Report	Delayed	N/A
Sediment Analysis Report	Delayed	N/A

E. State environmental policy act (SEPA) compliance

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

III. Proposed Permit Limits

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

Technology-based limits are based upon the treatment methods available to treat specific pollutants. Technology-based limits are set by the EPA and published as a regulation, or Ecology develops the limit on a case-by-case basis (40 CFR 125.3 and chapter 173-220 WAC).

Water quality-based limits are calculated so that the effluent will comply with the Surface Water Quality Standards (chapter 173-201A WAC), Ground Water Standards (chapter 173-200 WAC), Sediment Quality Standards (chapter 173-204 WAC), or the Federal water quality criteria applicable to Washington (40 CFR 131.45).

Ecology must apply the most stringent of these limits to each parameter of concern. These limits are described below.

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

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

A. Design criteria

Under WAC 173-220-150 (1)(g), neither flows and waste loadings must not exceed approved design criteria. However, Ecology does not have an engineering report that specifies the design criteria for the wastewater treatment plant at this facility. The previous permit required Alcoa to prepare an engineering report that provides the design criteria for existing treatment technology and any proposed changes to that technology to meet AKART. However, this report was not conducted or completed before the facility was curtailed. The proposed permit requires the report within 12 months of restarting the facility. See Section III.I. of this fact sheet.

B. Technology-based effluent limits

Technology-based limitations are set by regulations or developed on a case-by-case basis. EPA periodically evaluates specific industries, such as primary aluminum smelting, and publishes federal effluent guidelines which represent technology-based effluent limitations.

In Washington, state law imposes a requirement to provide all known available and reasonable methods of treatment (AKART), and this requirement is functionally an overlay on the federal requirements. AKART may dictate more stringent technology-based limits that the federal effluent guidelines.

EPA has established technology-based limits for a number of industrial categories, including the non-ferrous metals manufacturing industry. These limits are specified in 40 CFR 421. The applicable federal effluent limit guidelines for the primary aluminum smelting subcategory (Subpart B) were first proposed on March 8, 1984. These guidelines contain effluent limits based on the degree of pollutant reduction attainable by the application of the best practicable control technology currently available (BPT) and the application of the best available technology economically achievable (BAT).

Also, new source performance standards (NSPS) apply to sources constructed after the promulgation of the NSPS, which occurred on March 8, 1984.

The BPT guidelines apply to the total wastewater generated by the aluminum smelting process (40 CFR 421.22), but the BAT effluent limit guidelines apply to the different processes involved in aluminum smelting listed in 40 CFR 421.23.

The fluoride, TSS, and pH limits in 40 CFR 421.22 apply to all existing facilities subject to 40 CFR 421 Subpart B. According to the permit renewal application, Alcoa does not have any wastewater discharges from the subcategories in 40 CFR Part 421.23 so these effluent limitations do not apply.

Ecology used Best Professional Judgment (BPJ) to establish effluent limitations in the previous permit for toxic, nonconventional, and conventional pollutants. The performance-based limits are more stringent than the federal effluent guidelines for fluoride and TSS.

The effluent limits for Outfall 001 from the previous permit issued in 2006 are performance-based and were developed by running a statistical analysis on the last two years of representative monitoring data using a method consistent with EPA and Ecology effluent limit setting guidelines.

The proposed Average Monthly and Maximum Daily limits for total suspended solids (TSS), oil and grease (O&G), fluoride (F), and aluminum (Al) remain unchanged from the previous permit. Ecology checked these limits against Alcoa's treatment facility performance during the last permit cycle.

Alcoa's treatment facility achieves effluent concentrations below EPA Best Available Technology Economically Achievable (BAT) treatability levels. Alcoa continues to achieve these concentrations by using Best Management Practices (BMPs) for their non-contact cooling water, boiler blowdown, and stormwater.

The pH range effluent limitation in the proposed permit will continue to be 6.0 to 9.0. This limitation is based on Best Practicable Control Technology Currently Available (BPT) guidelines in 40 CFR Part 421.22. Operating within this range (6.0 to 9.0) will not result in water quality violations. The source of the Permittee's non-domestic water supply is the Columbia River, where the pH typically ranges from 7.9 to 8.2.

Historically, the Permittee had benzo(a)pyrene (B(a)P) effluent limitations for the anode contact cooling water which is one of the subcategories in 40 CFR Part 421 Subpart B. Currently, a small quantity of water is used to mist and cool the anode; however the water evaporates and is not discharged. The proposed permit includes an effluent monitoring requirement for B(a)P on a relatively infrequent basis to verify its absence in the cooling water.

Cyanide monitoring is required because of the presence of cyanide in wastes generated and stored on-site.

NETTING OUT

The source of Alcoa’s industrial water supply is the Columbia River. The TSS and Al levels in the incoming source water do not meet the technology-based limits for primary aluminum smelters that are based upon the amount of aluminum metal produced. Since the TSS and Al levels in the effluent at Outfall 001 are not fully representative of the impacts from the smelter, the proposed permit allows the Permittee to “net out” incoming pollutants in the intake water. Netting out allows the Permittee to subtract the amount of TSS and Al in the intake water from the values in the effluent to determine compliance with effluent limits. The effluent limits established for Outfall 001 are for the net discharge of TSS and Al.

Netting out is allowed in federal regulation, 40 CFR 122.45(g). There is a restriction that the discharge is to the same water body as the intake water unless there is a finding of no environmental degradation. Ecology policy uses the results of whole effluent toxicity (WET) tests as the criteria for determining environmental degradation. WET tests for Outfall 001 indicate that there is no reasonable potential for acute or chronic receiving water toxicity.

The permit will be reopened and the netting out provision for TSS and Al will be removed if any new information, such as the results of WET testing, shows that the receiving water environment is adversely affected by these constituents.

Table 9 Proposed Effluent Limits For Outfall 001

Parameter	Average Monthly Limit	Maximum Daily Limit
Total Suspended Solids (TSS)	100 lbs/day	500 lbs/day
Oil and Grease	50 lbs/day	250 lbs/day
Aluminum	15 lbs/day	46 lbs/day
Fluoride	25 lbs/day	150 lbs/day
Free Cyanide	--	--
B(a)P	--	--

Table 10 pH Limits For Outfall 001

Parameter	Daily Minimum	Daily Maximum
pH	6.0 standard units	9.0 standard units

EPA has not established specific technology based guidelines for privately owned sanitary wastewater treatment plants. However, state regulations contain discharge standards for all domestic wastewater facilities, including privately owned facilities. The effluent from the sanitary treatment plant at Alcoa must meet the effluent requirements specified in WAC 173-221-040.

Table 11 Proposed Effluent Limits For Sanitary Wastewater Treatment Plant Discharge

Parameter	30-Day Average	7-Day Average
Biochemical Oxygen Demand (BOD)	25 mg/l 19 lbs/day	45 mg/l 34 lbs/day
BOD Removal Efficiency	85% of influent concentration minimum	N/A
Total Suspended Solids (TSS)	30 mg/l 22 lbs/day	45 mg/l 34 lbs/day
TSS Removal Efficiency	85% of influent concentration minimum	N/A
Fecal Coliform	200 # colonies/100mls	400 # colonies/100mls

Parameter	Minimum	Maximum
Chlorine	0.1 ppm	2.0 ppm
pH	6.0 SU	9.0 SU
UV Tubes Operating	9	N/A

WAC 173-221-050 allows Ecology to establish alternate BOD and TSS percent removal requirements when a domestic wastewater facility receives less concentrated influent. The proposed permit includes a 65% removal limit during curtailment and no removal requirements during operations or curtailment when the mass loading in the sanitary effluent is below 5 lbs/day. Alcoa must meet the requirements in WAC 173-221-050(4)(b) to qualify for the alternate discharge standards.

C. Surface water quality-based effluent limits

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

Numerical criteria for the protection of aquatic life and recreation

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

When surface water quality-based limits are more stringent or potentially more stringent than technology-based limits, the discharge must meet the water quality-based limits.

Numerical criteria for the protection of human health

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

On May 13, 2020, the EPA published in the federal register (85 FR 28494) a rule to withdraw the new and revised federal human health criteria previously finalized by EPA. This withdrawal effectively approved of all but two of the revised standards that were originally submitted by Ecology on August 1, 2016. The EPA also approved Ecology's revised standards for dioxin and thallium. These changes were effective on June 12, 2020. All the new federal human health criteria promulgated in 2016 at 40 CFR 131.45 were withdrawn with the exception of criteria for arsenic, methyl mercury, and bis(2-chloro-1-methylethyl) ether. Ecology is appealing this action.

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

Note that at the time of the creation of this fact sheet, criteria for inorganic arsenic, methyl mercury, and bis(2-chloro-2-methylethyl) ether have not yet be incorporated into WAC 173-201A-240, and instead can be found at 40 CFR 131.45.

Narrative criteria

Narrative water quality criteria (e.g., WAC 173-201A-240(1); 2006) limit the toxic, radioactive, or other deleterious material concentrations that the facility may discharge to levels below those which have the potential to:

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

Narrative criteria protect the specific designated uses of all fresh waters (WAC 173-201A-200, 2006) and of all marine waters (WAC 173-201A-210, 2006) in the state of Washington.

Antidegradation

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

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

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

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

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

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

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

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

- Dischargers must maintain and protect existing and designated uses. Ecology must not allow any degradation that will interfere with, or become injurious to, existing or designated uses, except as provided for in chapter 173-201A WAC.

Mixing zones

A mixing zone is the defined area in the receiving water surrounding the discharge port(s), where wastewater mixes with receiving water.

Within mixing zones, the pollutant concentrations may exceed water quality numeric standards, so long as the discharge doesn't interfere with designated uses of the receiving water body (for example, recreation, water supply, and aquatic life and wildlife habitat, etc.) The pollutant concentrations outside of the mixing zones must meet water quality numeric standards.

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

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

Ecology uses modeling to estimate the amount of mixing within the mixing zone. Through modeling Ecology determines the potential for violating the water quality standards at the edge of the mixing zone and derives any necessary effluent limits. Steady-state models are the most frequently used tools for conducting mixing zone analyses. Ecology chooses values for each effluent and for receiving water variables that correspond to the time period when the most critical condition is likely to occur (see Ecology's *Permit Writer's Manual*). Each critical condition parameter, by itself, has a low probability of occurrence and the resulting dilution factor is conservative. The term "reasonable worst-case" applies to these values.

The mixing zone analysis produces a numerical value called a dilution factor (DF). A dilution factor represents the amount of mixing of effluent and receiving water that occurs at the boundary of the mixing zone. For example, a dilution factor of 4 means the effluent is 25% and the receiving water is 75% of the total volume of water at the boundary of the mixing zone. Ecology uses dilution factors with the water quality criteria to calculate reasonable potentials and effluent limits. Water quality standards include both aquatic life-based criteria and human health-based criteria. The former are applied at both the acute and chronic mixing zone boundaries; the latter are applied only at the chronic boundary.

The concentration of pollutants at the boundaries of any of these mixing zones may not exceed the numerical criteria for that zone.

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

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

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

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

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

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

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

The proposed permit requires the Permittee to conduct an engineering analysis to confirm that the current treatment methods provided at Alcoa meet the requirements of AKART.

3. Ecology must consider critical discharge conditions.

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

Critical discharge conditions are those conditions that result in reduced dilution or increased effect of the pollutant. Factors affecting dilution include the depth of water, the density stratification in the water column, the currents, and the rate of discharge. Density stratification is determined by the salinity and temperature of the receiving water. Temperatures are warmer in the surface waters in summer. Therefore, density stratification is generally greatest during the summer months. Density stratification affects how far up in the water column a freshwater plume may rise.

The rate of mixing is greatest when an effluent is rising. The effluent stops rising when the mixed effluent is the same density as the surrounding water. After the effluent stops rising, the rate of mixing is much more gradual. Water depth can affect dilution when a plume might rise to the surface when there is little or no stratification. Ecology's *Permit Writer's Manual* describes additional guidance on criteria/design conditions for determining dilution factors. The manual can be obtained from Ecology's website at: <https://fortress.wa.gov/ecy/publications/documents/92109.pdf>

Table 12 Critical Conditions Used to Model the Discharge

Critical Condition	Value
The seven-day-average low river flow with a recurrence interval of ten years (7Q10)	4108 cubic meters per second
The thirty-day low river flow with a recurrence interval of five years (30Q5)	3350 cubic meters per second
River velocity	0.611 meter per second
Manning roughness coefficient	0.042
Slope	0.000021 ft/ft
Channel width	1925 feet
Maximum average monthly effluent flow for chronic and human health non-carcinogen	4.1 million gallons per day (MGD)
Annual average flow for human health carcinogen	1.9 MGD
Maximum daily flow for acute mixing zone	4.6 MGD
7-DAD MAX Effluent temperature	22.8 degrees C

Ecology obtained ambient data at critical conditions in the vicinity of Outfall 001 from the Alcoa Wenatchee Works Outfall 001 Dilution Ratio study prepared by ERM in October 2013.

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

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

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

EPA sets acute criteria for toxic chemicals assuming organisms are exposed to the pollutant at the criteria concentration for one hour.

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

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

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

Because Outfall 001 discharges domestic wastewater, the effluent contains fecal coliform bacteria. Ecology developed the water quality criteria for fecal coliform (discussed below) to assure that people swimming (primary contact recreation) in water meeting the criteria would not develop gastroenteric illnesses. Ecology has authorized a mixing zone for this discharge. The discharge is subject to a technology-based effluent limit of 400 colony forming units/100mL of fecal coliform and a chronic dilution factor of 99.

Starting on January 1, 2021, the recreational water quality criteria for bacteria changed to *E.coli* for freshwater. At this time, due to the relatively low sanitary flow and the fact that *E. coli* is a portion of fecal coliform, Ecology has determined that the technology based standard will be protective of the new water quality standard. The draft permit requires the facility to conduct *E. coli* testing upon restart of the facility to establish a relationship between *E. coli* and fecal coliform and to determine whether the technology-based limit will continue to be protective of the new standard.

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

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

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

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

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

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

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

7. Maximum size of mixing zone.

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

8. Acute mixing zone.

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

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

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

As described above, the toxicity of any pollutant depends upon the exposure, the pollutant concentration, and the time the organism is exposed to that concentration.

Authorizing a limited acute mixing zone for this discharge assures that it will not create a barrier to migration. The effluent from this discharge will rise as it enters the receiving water, assuring that the rising effluent will not cause translocation of indigenous organisms near the point of discharge (below the rising effluent).

- **Comply with size restrictions.**

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

9. Overlap of Mixing Zones.

This mixing zone does not overlap another mixing zone.

D. Designated uses and surface water quality criteria

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

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

Table 13 Freshwater Aquatic Life Uses and Associated Criteria – Salmonid Spawning, Rearing, and Migration

Criteria	Value
Temperature Criteria – Highest 7-DAD MAX	17.5°C (63.5°F)
Dissolved Oxygen Criteria – Lowest 1-Day Minimum	8.0 mg/L
Turbidity Criteria	<ul style="list-style-type: none"> • 5 NTU over background when the background is 50 NTU or less; or • A 10 percent increase in turbidity when the background turbidity is more than 50 NTU.
Total Dissolved Gas Criteria	Total dissolved gas must not exceed 110 percent of saturation at any point of sample collection.
pH Criteria	The pH must measure within the range of 6.5 to 8.5 with a human-caused variation within the above range of less than 0.5 units.

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

Table 14 Recreational Uses and Associated Criteria

Recreational Use	Criteria
Primary Contact Recreation	<i>E. coli</i> organism levels must not exceed a geometric mean value of 100 CFU or MPN <i>E. coli</i> organism levels must not exceed a geometric mean value of 100 CFU or MPN per 100 mL, with not more than 10 percent of all samples (or any single sample when less than ten sample points exist) obtained within the averaging period exceeding 320 CFU or MPN per 100 mL, with not more than 10 percent of all samples (or any single sample when less than ten sample points exist) obtained within the averaging period exceeding 320 CFU or MPN per 100 mL.

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

E. Water quality impairments

Ecology has not documented temperature impairment in the receiving water in the vicinity of the outfall however Ecology considers the entire Columbia River impaired for temperature.

On May 18, 2020, EPA issued a TMDL for temperature in the Columbia and lower Snake Rivers. EPA used heat load (the product of temperature, flow, and a conversion factor) to determine wasteload allocations (WLAs) for three main source categories: tributaries, current and future point sources subject to NPDES permits, and nonpoint source impacts from dams and reservoirs. Alcoa Wenatchee’s facility is listed in the TMDL as receiving a WLA of 5.31×10^8 kilocalories per day (kcal/day) of heat load. EPA calculated the WLA for Alcoa Wenatchee’s facility using a flow of 5.5 MGD and a temperature of 25.6 °C. A conversion factor of approximately 3.77×10^6 was used to multiply 5.5 MGD with 25.6 °C to get the heat load of 5.31×10^8 kcal/day.

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

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

For more information on how Ecology assesses water quality data and determines if water bodies are polluted, see Water Quality Policy 1-11 at <https://ecology.wa.gov/Water-Shorelines/Water-quality/Water-improvement/Assessment-of-state-waters-303d/Assessment-policy-1-11>.

For more information on specific listings, enter the Listing ID number on the Washington State Water Quality Assessment search tool at <https://apps.ecology.wa.gov/ApprovedWQA/ApprovedPages/ApprovedSearch.aspx>.

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

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

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

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

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

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

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

The diffuser at Outfall 001 is 431 feet long with a diameter of 36 inches. The diffuser has a total of eleven 0.71 inch diameter ports. The distance between ports is 19 feet. The average diffuser depth is 36 feet. Ecology obtained this information from the Dilution Ratio Study Report submitted on October 10, 2013.

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

The horizontal distance of the chronic mixing zone is 336 feet. The mixing zone extends from the bottom to the top of the water column.

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

The horizontal distance of the acute mixing zone is 33.6 feet. The mixing zone extends from the bottom to the top of the water column. The dilution factor is based on this distance.

Ecology determined the dilution factors that occur within these zones at the critical condition using information provided in the Outfall 001 Dilution Ratio Study report submitted to Ecology on October 10, 2013. The dilution factors are listed below.

Table 15 Dilution Factors (DF)

Criteria	Acute	Chronic
Aquatic Life	33	99
Human Health, Carcinogen	N/A	210
Human Health, Non-carcinogen	N/A	192

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

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

Ecology predicts no violation of the pH criteria under critical conditions. Therefore, the proposed permit includes technology-based effluent limits for pH of 6.0 to 9.0.

Fecal Coliform—In the previous permit cycle, Ecology modeled the numbers of fecal coliform by simple mixing analysis using the technology-based limit of 400 organisms per 100 ml and a dilution factor of 99 (See Table 21). That analysis showed no violation of the fecal coliform water quality criterion under critical conditions. The changes to the State’s surface water quality criteria for bacteria did not affect the domestic technology based limits for fecal coliform in WAC 173-221. As discussed above, due to the relatively low sanitary flow and the fact that E. coli is a portion of fecal coliform, Ecology has determined that the technology based standard will be protective of the new water quality standard. The draft permit requires the facility to conduct E. Coli testing upon restart of the facility to establish a relationship between E. Coli and fecal coliform to determine whether the technology based limit will continue to be protective of the new standard.

Turbidity--Ecology evaluated the impact of turbidity based on the range of turbidity in the effluent and turbidity of the receiving water. Based on visual observation of the facility's effluent, 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: ammonia, aluminum, iron, and manganese. Ecology conducted a reasonable potential analysis (See **Appendix E**) 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 and Ecology spreadsheet tools.

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

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

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

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

- Annual summer maximum and supplementary spawning/rearing criteria

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

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

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

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

- Incremental warming criteria

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

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

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

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

EPA issued a TMDL for temperature on the Columbia and Lower Snake Rivers on May 18, 2020. The TMDL addresses Washington State's antidegradation policy by limiting the heat load discharged from tributaries, current and future NPDES point sources, and nonpoint source impacts from dams and reservoirs. Alcoa Wenatchee's Outfall 001 discharge will have an average monthly heat load limit of 5.31×10^8 kcal/day applied from July through October. Further discussion regarding the temperature TMDL is in Section III.E, "Water Quality Impairments".

- Protections for temperature acute effects

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

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

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

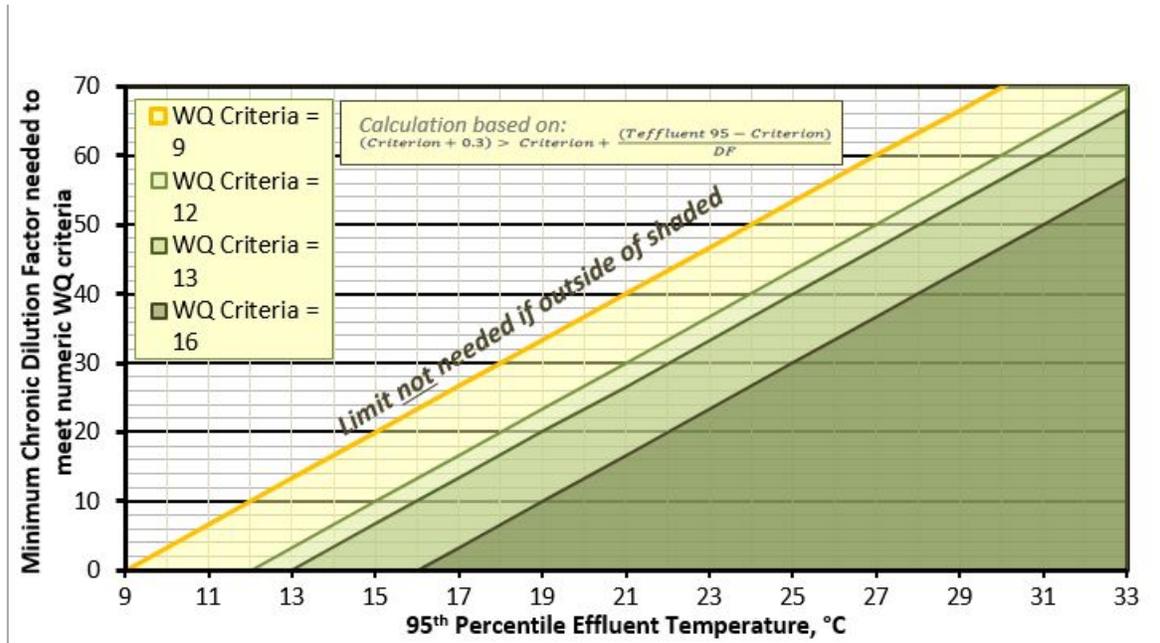
Reasonable Potential Analysis

Annual summer maximum, supplementary spawning criterion, and incremental warming criteria: Ecology calculated the reasonable potential for the discharge to exceed the annual summer maximum, the supplementary spawning criterion, and the incremental warming criteria at the edge of the chronic mixing zone during critical condition. No reasonable potential exists to exceed the temperature criterion where:

$$(\text{Criterion} + 0.3) > [\text{Criterion} + (\text{Teffluent95} - \text{Criterion})/\text{DF}]$$

The figure below graphically portrays the above equation and shows the conditions when a permit limit will apply.

Figure 2 Dilution Necessary to Meet Criteria at Edge of Mixing Zone



Note: show calculation above with your specific discharge data filled in below.

$$(17.5 + 0.3) > (17.5 + (22.27 - 17.5)/99)$$

Therefore, the proposed permit does not include a specific temperature limit in addition to the heat load allocation from EPA's Columbia River Temperature TMDL. The permit requires additional monitoring of effluent. Ecology will reevaluate the reasonable potential during the next permit renewal.

H. Human health

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

Ecology determined the effluent may contain chemicals of concern for human health based on data or information indicating the discharge contains regulated chemicals.

Ecology evaluated the discharge's potential to violate the water quality standards as required by 40 CFR 122.44(d) by following the procedures published in the *Technical Support Document for Water Quality-Based Toxics Control* (EPA/505/2-90-001) and Ecology's *Permit Writer's Manual* to make a reasonable potential determination. The evaluation showed that the discharge has no reasonable potential to cause a violation of water quality standards and an effluent limit is not needed.

I. Sediment quality

The aquatic sediment standards (chapter 173-204 WAC) protect aquatic biota and human health. Under these standards Ecology may require a facility to evaluate the potential for its discharge to cause a violation of sediment standards (WAC 173-204-400).

You can obtain additional information about sediments at the Aquatic Lands Cleanup Unit website. <https://ecology.wa.gov/Spills-Cleanup/Contamination-cleanup/Sediment-cleanups>

Alcoa submitted a draft sediment sampling and analysis plan to Ecology in July 2015. Ecology provided comments on the plan in March 2016. A revised plan was not submitted due to the facility's temporary curtailment. The proposed permit requires the facility to submit a revised plan and conduct the sediment sampling in the vicinity of Outfall 001 despite the fact the facility remains in temporary curtailment.

J. Groundwater quality limits

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

Alcoa discharges ingot non-contact cooling water and some stormwater into clay-lined retention ponds. The effluent from the retention ponds is routed to a series of unlined infiltration basins, where the water generally evaporates or infiltrates into the ground. The infiltration basins are designed to degrade oily materials. The bacteria, vegetation, and fauna in the soil of the basins ingest and metabolize the oils.

The retention ponds, infiltration basins, and diversion ponds are adjacent to the Columbia River. The water from these ponds could potentially discharge to groundwater. Because of the proximity of the ponds and basins to the river, any water discharged from the ponds or basins to groundwater will likely discharge directly into the river.

The 2006 permit required Alcoa to conduct annual priority pollutant scans for the final effluent and the ingot non-contact cooling water effluent. The results showed that the concentrations of detectable pollutants in the two effluents were less than the Ground Water Quality and Surface Water Quality Standards except for arsenic and cyanide. The arsenic concentrations exceeded ground water quality standards and cyanide concentrations exceeded surface water quality standards once during the 2010 monitoring period.

The maximum concentrations of arsenic measured in the final effluent and the ingot non-contact cooling water effluent were 0.48 µg/l and 0.41 µg/l, respectively, while the ground water quality standard is 0.05 µg/l. The maximum concentrations of cyanide measured in the final effluent and the ingot non-contact cooling water effluent were 42 µg/l and 35 µg/l, respectively, while the surface water quality standard is 22 µg/l acute and 5.2 µg/l chronic. Arsenic and cyanide were not detected during the last two years of the monitoring conducted between 2006 and 2013.

Incidental leakage of effluent of this quality, and in this location, should have undetectable or minimal impacts to ground water quality.

The volume of groundwater, which would potentially be impacted, would be very small. The impacts would occur just prior to ground water entering the Columbia River, which would provide additional mixing. As such, there is no reasonable potential for the Permittee to exceed the Water Quality Standards for arsenic or cyanide. Therefore, no limitations or actions are required to protect the groundwater and the receiving water.

Alcoa has not been discharging the ingot non-contact cooling water into the clay-lined retention ponds since the facility has been in curtailment. The proposed permit requires the Permittee to continue to perform annual priority pollutant scans for the final effluent and the ingot non-contact cooling water effluent when the facility restarts.

K. Whole effluent toxicity

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

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

Laboratories accredited by Ecology for WET testing know how to use the proper WET testing protocols, fulfill the data requirements, and submit results in the correct reporting format. Accredited laboratory staff know how to calculate an NOEC, LC50, EC50, IC25, etc. Ecology gives all accredited labs the most recent version of Ecology Publication No. WQ-R-95-80, *Laboratory Guidance and Whole Effluent Toxicity Test Review Criteria* (<https://fortress.wa.gov/ecy/publications/documents/9580.pdf>) which is referenced in the permit. Ecology recommends that each regulated facility send a copy of the acute or chronic toxicity sections(s) of its NPDES permit to the laboratory.

During the previous permit term, the facility began conducting effluent characterization for acute and chronic toxicity. The WET tests were suspended due to the facility curtailment. The proposed permit requires Alcoa to conduct the WET tests within 12 months of the facility restart.

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

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

L. Comparison of effluent limits with the previous permit modified on January 5, 2017.

Table 16 Comparison of Previous and Proposed Effluent Limits – Outfall 001

Parameter	Basis of Limit	Units	Previous Effluent Limit: Average Monthly	Previous Effluent Limit: Average Weekly	Proposed Effluent Limit: Average Monthly	Proposed Effluent Limit: Average Weekly
Oil and Grease	Technology	lbs/day	50	250	50	250
Total Suspended Solids	Technology	lbs/day	100	500	100	500
Fluoride	Technology	lbs/day	25	150	25	150
Aluminum	Technology	lbs/day	15	46	15	46
Heat Load	WQ Based	Kcal/day	--	--	5.31 x 10 ⁸	--

Parameter	Basis of Limit	Units	Previous Limit	Proposed Limit
pH	Technology	Standard Unit	6.0 to 9.0	6.0 to 9.0

Table 17 Comparison of Previous and Proposed Effluent Limits - Sanitary Wastewater Monitoring (00SC)

Parameter	Basis of Limit	Units	Previous Limit: 30-Day Average	Previous Limit: 7-Day Average	Proposed Limit: 30-Day Average	Proposed Limit: 7-Day Average
Fecal Coliform Bacteria	Technology	#colonies/100mls	200	400	200	400
Biochemical Oxygen Demand (5-day)	Technology	mg/l lbs/day	25.0 19.0	45.0 34.0	25.0 19.0	45.0 34.0
Total Suspended Solids (TSS)	Technology	mg/l lbs/day	30.0 22.0	45.0 34.0	30.0 22.0	45.0 34.0
UV Tubes Operating	Technology	# of tubes	9	--	9	--

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Parameter	Basis of Limit	Units	Previous Limit	Proposed Limit
pH	Technology	Standard Unit	6.0 to 9.0	6.0 to 9.0
Residual Chlorine	Technology	ppm	0.1 to 2.0	0.1 to 2.0

V. Monitoring Requirements

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

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

A. Wastewater monitoring

The monitoring schedule for Outfall 001 and sanitary wastewater discharge is detailed in the proposed permit under Special Condition S2. Specified monitoring frequencies take into account the quantity and variability of the discharge, the treatment method, past compliance, significance of pollutants, and cost of monitoring.

B. 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: turbidity, BOD, fluoride, oil and grease, pH, TSS, and fecal coliform.

Table 18 Alcoa Wenatchee Laboratory Accredited Parameters

Company Name	Matrix Description	Method Name	Analyte Name
Alcoa Wenatchee Works Laboratory	Non-Potable Water	EPA 1664A_1_1999	n-Hexane Extractable Material (O&G)
Alcoa Wenatchee Works Laboratory	Non-Potable Water	SM 2130 B-2011	Turbidity
Alcoa Wenatchee Works Laboratory	Non-Potable Water	SM 2510 B-2011	Specific Conductance
Alcoa Wenatchee Works Laboratory	Non-Potable Water	SM 2540 D-2011	Solids, Total Suspended
Alcoa Wenatchee Works Laboratory	Non-Potable Water	SM 4500-CI G-2011	Chlorine (Residual), Total

Company Name	Matrix Description	Method Name	Analyte Name
Alcoa Wenatchee Works Laboratory	Non-Potable Water	SM 4500-F ⁻ E-2011	Fluoride
Alcoa Wenatchee Works Laboratory	Non-Potable Water	SM 4500-H+ B-2011	pH
Alcoa Wenatchee Works Laboratory	Non-Potable Water	SM 5210 B-2011	Biochemical Oxygen Demand (BOD)
Alcoa Wenatchee Works Laboratory	Non-Potable Water	SM 9221 B+E1+C (LTB/BGB/EC-MPN)	Fecal coliform-count

VI. Other Permit Conditions

A. Reporting and record keeping

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

B. Non routine and unanticipated wastewater

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

The permit authorizes the discharge of non-routine and unanticipated wastewater under certain conditions. The facility must characterize these waste waters for pollutants and examine the opportunities for reuse. Depending on the nature and extent of pollutants in this wastewater and on any opportunities for reuse, Ecology may:

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

C. 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].

Alcoa 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 with the permit renewal application.

D. Solid waste control plan

Alcoa 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 facility must submit the updated plan to Ecology for approval with the permit renewal application (RCW 90.48.080). You can obtain an Ecology guidance document, which describes how to develop a Solid Waste Control Plan, at:

<https://fortress.wa.gov/ecy/publications/documents/0710024.pdf>

E. Outfall evaluation

The proposed permit requires Alcoa to conduct an outfall inspection and submit a report detailing the findings of that inspection (Special Condition S12.). The inspection must evaluate the physical condition of the discharge pipe and diffusers, and evaluate the extent of sediment accumulations in the vicinity of the Outfall 001.

G. Operation and maintenance manual

Ecology requires industries to take all reasonable steps to properly operate and maintain their wastewater treatment system in accordance with state and federal regulations [40 CFR 122.41(e) and WAC 173-220-150 (1)(g)]. The facility has prepared an operation and maintenance manual as required by state regulation for the construction of wastewater treatment facilities (WAC 173-240-150). Implementation of the procedures in the operation and maintenance manual ensures the facility's compliance with the terms and limits in the permit. The proposed permit requires the Permittee to review the O&M manual at least annually and confirm the review by letter to Ecology. The Permittee must also submit any substantial changes or updates to Ecology for review.

H. Stormwater pollution prevention plan

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

The SWPPP must identify potential sources of stormwater contamination from industrial activities and identify how it plans to manage those sources of contamination to prevent or minimize contamination of stormwater. Alcoa must continuously review and revise the SWPPP as necessary to assure that stormwater discharges do not degrade water quality.

It must retain the SWPPP on-site or within reasonable access to the site and available for review by Ecology.

Best Management Practices (BMPs)

BMPs are the actions identified in the SWPPP to manage, prevent contamination of, and treat stormwater. BMPs include 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 also include treatment systems, operating procedures, and practices used to control plant site runoff, spillage or leaks, sludge or waste disposal, and drainage from raw material storage. Alcoa must ensure that its SWPPP includes the operational and structural source control BMPs listed as “applicable” in Ecology’s stormwater management manuals. Many of these “applicable” BMPs are sector-specific or activity-specific, and are not required at facilities engaged in other industrial sectors or activities.

Ecology-Approved Stormwater Management Manuals

Consistent with RCW 90.48.555 (5) and (6), the proposed permit requires the facility to implement BMPs contained in the Stormwater Management Manual for Western Washington (2005 edition), or any revisions thereof, or practices that are demonstrably equivalent to practices contained in stormwater technical manuals approved by Ecology. This should ensure that BMPs will prevent violations of state water quality standards, and satisfy the state AKART requirements and the federal technology-based treatment requirements under 40 CFR part 125.3. The SWPPP must document that the BMPs selected provide an equivalent level of pollution prevention, compared to the applicable Stormwater Management Manuals, including: The technical basis for the selection for all stormwater BMPs (scientific, technical studies, and/or modeling) which support the performance claims for the BMPs selected.

An assessment of how the BMPs will satisfy AKART requirements and the applicable technology-based treatment requirements under 40 CFR part 125.3.

Operational Source Control BMPs

Operational source control BMPs include a schedule of activities, prohibition of practices, maintenance procedures, employee training, good housekeeping, and other managerial practices to prevent or reduce the pollution of waters of the state. These activities do not require construction of pollution control devices but are very important components of a successful SWPPP. Employee training, for instance, is critical to achieving timely and consistent spill response. Pollution prevention is likely to fail if the employees do not understand the importance and objectives of BMPs. Prohibitions might include eliminating outdoor repair work on equipment and certainly would include the elimination of intentional draining of crankcase oil on the ground. Good housekeeping and maintenance schedules help prevent incidents that could result in the release of pollutants. Operational BMPs represent a cost-effective way to control pollutants and protect the environment.

The SWPPP must identify all the operational BMPs and how and where they are implemented. For example, the SWPPP must identify what training will consist of, when training will take place, and who is responsible to assure that employee training happens.

Structural Source Control BMPs

Structural source control BMPs include physical, structural, or mechanical devices or facilities intended to prevent pollutants from entering stormwater. Examples of source control BMPs include erosion control practices, maintenance of stormwater facilities (e.g., cleaning out sediment traps), construction of roofs over storage and working areas, and direction of equipment wash water and similar discharges to the sanitary sewer or a dead end sump. Structural source control BMPs likely include a capital investment but are cost effective compared to cleaning up pollutants after they have entered stormwater.

Treatment BMPs

Operational and structural source control BMPs are designed to prevent pollutants from entering stormwater. However, even with an aggressive and successful program, stormwater may still require treatment to achieve compliance with water quality standards. Treatment BMPs remove pollutants from stormwater. Examples of treatment BMPs are detention ponds, oil/water separators, biofiltration, and constructed wetlands.

Volume/Flow Control BMPs

Ecology recognizes the need to include specific BMP requirements for stormwater runoff quantity control to protect beneficial water uses, including fish habitat. New facilities and existing facilities undergoing redevelopment must implement the requirements for peak runoff rate and volume control identified by volume 1 of the *Western Washington SWMM* and chapter 2 in the *Eastern Washington SWMM* as applicable to their development. Chapter 3 of volume 3 *Western Washington SWMM* and chapter 6 in the *Eastern Washington SWMM* lists BMPs to accomplish rate and volume control. Existing facilities in western Washington should also review the requirements of volumes 1 (Minimum Technical Requirements) and chapter 3 of volume 3 in the *Western Washington SWMM*. Chapter 2 (Core Elements for New Development and Redevelopment) in the *Eastern Washington SWMM* contains the minimum technical requirements for facilities east of the Cascades. Although not required to implement these BMPs, controlling rate and volume of stormwater discharge maintains the health of the watershed. Existing facilities should identify control measures that they can implement over time to reduce the impact of uncontrolled release of stormwater.

I. Wastewater Characterization/AKART Study

In 2013, Alcoa's monthly Discharge Monitoring Reports showed pH levels less than 7.0 on a frequent basis, requiring the facility to divert the final effluent to the diversion ponds in accordance with Permit Condition S1.A. Although the facility has generally been in compliance with their permit, the frequency of diversions causes Ecology some concern.

The previous permit required the Permittee to conduct a wastewater characterization study to assess the characteristics of several of its wastewater streams including non-contact cooling water, boiler blowdown, oily wastewater, stormwater runoff, and other miscellaneous wastewater. The Permittee must determine if the current treatment method for each wastewater stream meets all known, available, and reasonable methods of prevention, control, treatment, and best management practices (AKART).

The Permittee must submit an engineering report to Ecology detailing the findings of the wastewater characterization study and AKART analysis.

This requirement was suspended due to the facility curtailment. The proposed permit requires the Permittee to submit a sampling and analysis plan for the wastewater characterization study for review and approval within 12 months of the facility restart.

J. Cooling Water Intake Structure

Ecology must ensure the location, design, construction, and capacity of cooling water intake structures reflect the best technology available for minimizing adverse environmental impact, per CWA § 316(b), 33 U.S.C. § 1326(b), and 40 CFR 401.14. EPA finalized rules on cooling water intake structures (CWIS) in May 2014. The rule includes specific requirements that apply to existing facilities that have a greater than 2 million gallons per day (MGD) cumulative design intake flow and uses 25 percent or more of the intake water exclusively for cooling. Existing facilities exceeding these thresholds must comply with the Best Technology Available (BTA) standards set forth in 40 CFR 125.94 and other applicable requirements in 40 CFR 125 Subpart J.

Since July 2013, Ecology has required a supplemental application for all applicants using EPA Form 2C. Alcoa selected “Yes” on this form when asked if a cooling water intake is associated with the facility. Alcoa’s design intake flow is 17 MGD. Alcoa withdraws an average of 3.08 MGD during a normal operation and 2.0 MGD during curtailment. 76% of intake water is used exclusively for cooling.

Alcoa’s cooling water intake system (CWIS) is required to meet the CWA § 316(b) rule. Alcoa submitted with their permit application the information required by 40 CFR Part 125 Subpart J. Alcoa’s CWIS is located at approximately RM 455.3, Latitude: 47.359761, Longitude: -120.124066, and extends approximately 30 feet offshore at normal water level. The CWIS has three pumps with a capacity of 4,000 gpm each. The CWIS information is summarized as follows:

- Intake Structure: Area of 113.52 square feet (sf) and Velocity of 0.0235 feet per second (fps)
- Trash Rack: Area of 256.75 sf and Velocity of 0.104 fps
- Travel Screen: Area of 130.85 sf and Velocity of 0.204 fps

Impingement BTA Determination

Alcoa must identify the chosen impingement compliance method from the list of prescribed best technology available (BTA) standards listed in 40 CFR 125.94(c).

Alcoa complies with this by having a design through-screen maximum velocity equal to or less than 0.5 feet per second. At the design flowrate of 17.0 MGD, the calculated through-screen velocity is 0.204 feet per second (velocity is calculated by a Washington State Professional Engineer using a 12,000 gpm flow rate, maximum pumping capacity). Based on these calculations and evaluations of screen design velocity under various operating conditions, it is demonstrated that the current CWIS design complies with the CWIS Impingement.

Entrainment BTA Determination

Alcoa must also meet BTA standards for entrainment. Unlike the impingement standards, the EPA has not promulgated specific compliance options for the entrainment standard. 40 CFR 125.94(d) states that the director must establish BTA standards for entrainment and each intake on a site-specific basis. 40 CFR 125.98(f) requires that the administrator include the below four factors with the entrainment determination.

1. Number and types of organisms entrained
2. Impact of changes in particulate emissions or other pollutants associated with entrainment technologies
3. Land availability
4. Remaining useful plant life

Alcoa has not conducted an entrainment performance study for the CWIS before and did not include a description of existing entrainment technologies or operational measures and a summary of their performance, including but not limited to reductions in entrainment due to intake location and reductions in total withdrawals and usage, with the renewal application. The proposed permit requires Alcoa to conduct an entrainment performance study for the CWIS with a site specific analysis of entrainment technologies or operational measures. Alcoa must provide information to address the four factors above and propose their chosen method of compliance with the entrainment standards.

Ongoing Operation and Maintenance

The permit includes general operation and maintenance requirements as well as reporting requirements to ensure that the cooling water intake structure continues to be operated as designed.

K. 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.

VII. 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 5 years.

VIII. References for Text and Appendices

Environmental Protection Agency (EPA)

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

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

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

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July 2018. *Permit Writer's Manual*. Publication Number 92-109
(<https://fortress.wa.gov/ecy/publications/documents/92109.pdf>)

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

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

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

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

February 2007. *Focus Sheet on Solid Waste Control Plan, Developing a Solid Waste Control Plan for Industrial Wastewater Discharge Permittees*, Publication Number 07-10-024. <https://fortress.wa.gov/ecy/publications/documents/0710024.pdf> Wright, R.M., and A.J. McDonnell.

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Appendix A--Public Involvement Information

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

Ecology will place a Public Notice of Draft on June 15, 2021 in Wenatchee World to inform the public and to invite comment on the proposed draft National Pollutant Discharge Elimination System permit and fact sheet.

The notice:

- Tells where copies of the draft Permit and Fact Sheet are available for public evaluation (a local public library, the closest Regional or Field Office, posted on our website).
- Offers to provide the documents in an alternate format to accommodate special needs.
- Urges people to submit their comments, in writing, before the end of the Comment Period
- Tells how to request a public hearing of comments about the proposed NPDES permit.
- Explains the next step(s) in the permitting process.

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

You may obtain further information from Ecology by telephone, (360) 407-6955, or by writing to 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 Liem Nguyen.

Appendix B--Your Right to Appeal

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

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

File your appeal and a copy of this permit with the PCHB (see addresses below). Filing means actual receipt by the PCHB during regular business hours.

Serve a copy of your appeal and this permit on Ecology in paper form - by mail or in person. (See addresses below.) E-mail is not accepted.

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

ADDRESS AND LOCATION INFORMATION

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

Appendix C--Glossary

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

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

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

AKART -- The acronym for “all known, available, and reasonable methods of prevention, control and treatment.” AKART is a technology-based approach to limiting pollutants from wastewater discharges, which requires an engineering judgment and an economic judgment. AKART must be applied to all wastes and contaminants prior to entry into waters of the state in accordance with RCW 90.48.010 and 520, WAC 173-200-030(2)(c)(ii), and WAC 173-216-110(1)(a).

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

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

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

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

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

Average monthly discharge limit -- The average of the measured values obtained over a calendar month's time.

Background water quality -- The concentrations of chemical, physical, biological or radiological constituents or other characteristics in or of groundwater at a particular point in time upgradient of an activity that has not been affected by that activity, [WAC 173-200-020(3)].

Background water quality for any parameter is statistically defined as the 95% upper tolerance interval with a 95% confidence based on at least eight hydraulically upgradient water quality samples. The eight samples are collected over a period of at least one year, with no more than one sample collected during any month in a single calendar year.

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

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

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

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

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

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

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

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

Compliance inspection-with sampling -- A site visit for the purpose of determining the compliance of a facility with the terms and conditions of its permit or with applicable statutes and regulations. In addition, it includes as a minimum, sampling and analysis for all parameters with limits in the permit to ascertain compliance with those limits; and, for municipal facilities, sampling of influent to ascertain compliance with the 85 percent removal requirement. Ecology may conduct additional sampling.

Composite sample -- A mixture of grab samples collected at the same sampling point at different times, formed either by continuous sampling or by mixing discrete samples.

May be "time-composite" (collected at constant time intervals) or "flow-proportional" (collected either as a constant sample volume at time intervals proportional to stream flow, or collected by increasing the volume of each aliquot as the flow increased while maintaining a constant time interval between the aliquots).

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

- Inhibits or disrupts the POTW, its treatment processes or operations, or its sludge processes, use or disposal; and
- Therefore is a cause of a violation of any requirement of the POTW's NPDES permit (including an increase in the magnitude or duration of a violation) or of the prevention of sewage sludge use or disposal in compliance with the following statutory provisions and regulations or permits issued thereunder (or more stringent State or local regulations): Section 405 of the Clean Water Act, the Solid Waste Disposal Act (SWDA) (including title II, more commonly referred to as the Resource Conservation and Recovery Act (RCRA), and including State regulations contained in any State sludge management plan prepared pursuant to subtitle D of the SWDA), sludge regulations appearing in 40 CFR Part 507, the Clean Air Act, the Toxic Substances Control Act, and the Marine Protection, Research and Sanctuaries Act.

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

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

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

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

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

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

Method detection level (MDL) -- See Detection Limit.

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

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

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

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

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

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

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

Point of compliance -- The location in the groundwater where the enforcement limit must not be exceeded and a facility must comply with the Ground Water Quality Standards. Ecology determines this limit on a site-specific basis.

Ecology locates the point of compliance in the groundwater as near and directly downgradient from the pollutant source as technically, hydrogeologically, and geographically feasible, unless it approves an alternative point of compliance.

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

- a. Exceeds 0.5 % of treatment plant design capacity criteria and discharges <25,000 gallons per day or;
- b. Is a member of a group of similar industrial users which, taken together, have the potential to cause pass through or interference at the POTW (e.g. facilities which develop photographic film or paper, and car washes).
Ecology may determine that a discharger initially classified as a potential significant industrial user should be managed as a significant industrial user.

Quantitation level (QL) -- Also known as Minimum Level of Quantitation (ML) – The lowest level at which the entire analytical system must give a recognizable signal and acceptable calibration point for the analyte. It is equivalent to the concentration of the lowest calibration standard, assuming that the lab has used all method-specified sample weights, volumes, and cleanup procedures. The QL is calculated by multiplying the MDL by 3.18 and rounding the result to the number nearest to $(1,2,\text{or } 5) \times 10^n$, where n is an integer. (64 FR 30417).

ALSO GIVEN AS:

The smallest detectable concentration of analyte greater than the Detection Limit (DL) where the accuracy (precision & bias) achieves the objectives of the intended purpose. (Report of the Federal Advisory Committee on Detection and Quantitation Approaches and Uses in Clean Water Act Programs Submitted to the US Environmental Protection Agency December 2007).

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

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

Sample Maximum -- No sample may exceed this value.

Significant industrial user (SIU)

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

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

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

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

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

Soil scientist -- An individual who is registered as a Certified or Registered Professional Soil Scientist or as a Certified Professional Soil Specialist by the American Registry of Certified Professionals in Agronomy, Crops, and Soils or by the National Society of Consulting Scientists or who has the credentials for membership. Minimum requirements for eligibility are: possession of a baccalaureate, masters, or doctorate degree from a U.S. or Canadian institution with a minimum of 30 semester hours or 45 quarter hours professional core courses in agronomy, crops or soils, and have 5,3, or 1 years, respectively, of professional experience working in the area of agronomy, crops, or soils.

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

Soluble BOD₅ -- Determining the soluble fraction of Biochemical Oxygen Demand of an effluent is an indirect way of measuring the quantity of soluble organic material present in an effluent that is utilized by bacteria. Although the soluble BOD₅ test is not specifically described in Standard Methods, filtering the raw sample through at least a 1.2 um filter prior to running the standard BOD₅ test is sufficient to remove the particulate organic fraction.

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

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

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

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

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

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

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

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

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

Appendix D--Technical Calculations

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

Simple Mixing:

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

$$C_{mz} = C_a + \frac{(C_e - C_a)}{DF}$$

where: C_e = Effluent Concentration
 C_a = Ambient Concentration
 DF = Dilution Factor

Reasonable Potential Analysis:

The spreadsheets Input 2 – Reasonable Potential, and LimitCalc in Ecology’s PermitCalc Workbook determine reasonable potential (to violate the aquatic life and human health water quality standards) and calculate effluent limits. The process and formulas for determining reasonable potential and effluent limits in these spreadsheets are taken directly from the *Technical Support Document for Water Quality-based Toxics Control*, (EPA 505/2-90-001). The adjustment for autocorrelation is from EPA (1996a), and EPA (1996b).

Calculation of Water Quality-Based Effluent Limits:

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

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

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

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

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

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

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

where: $\sigma^2 = \ln[CV^2 + 1]$
 $z = 2.326$
 $CV = \text{coefficient of variation} = \text{std. dev.} / \text{mean}$

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

where: $\sigma^2 = \ln[(CV^2 \div 4) + 1]$
 $z = 2.326$

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

MDL = Maximum Daily Limit

$$MDL = LTA \cdot e^{(z\sigma - 0.5\sigma^2)}$$

where: $\sigma^2 = \ln[CV^2 + 1]$
 $z = 2.326 \cdot (99\text{th percentile occurrence})$
 $LTA = \text{Limiting long term average}$

AML = Average Monthly Limit

$$AML = LTA \cdot e^{(z\sigma_n - 0.5\sigma_n^2)}$$

where: $\sigma^2 = \ln[(CV^2 \div n) + 1]$
 $n = \text{number of samples/month}$
 $z = 1.645 \cdot (95\text{th \% occurrence probability})$
 $LTA = \text{Limiting long term average}$

Appendix E—Reasonable Potential to Exceed Analysis

Table 19 Reasonable Potential Analysis

Instructions		Reasonable Potential Calculation																															
<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 20%;">Facility</td> <td>Alcoa Wenatchee LLC</td> </tr> <tr> <td>Water Body Type</td> <td>Freshwater</td> </tr> <tr> <td>Rec. Water Hardness</td> <td>66 mg/L</td> </tr> </table>		Facility	Alcoa Wenatchee LLC	Water Body Type	Freshwater	Rec. Water Hardness	66 mg/L	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td colspan="2">Dilution Factors:</td> <td style="text-align: center;">Acute</td> <td style="text-align: center;">Chronic</td> </tr> <tr> <td>Aquatic Life</td> <td></td> <td style="text-align: center;">33.0</td> <td style="text-align: center;">99.0</td> </tr> <tr> <td>Human Health Carcinogenic</td> <td></td> <td></td> <td style="text-align: center;">210.0</td> </tr> <tr> <td>Human Health Non-Carcinogenic</td> <td></td> <td></td> <td style="text-align: center;">192.0</td> </tr> </table>										Dilution Factors:		Acute	Chronic	Aquatic Life		33.0	99.0	Human Health Carcinogenic			210.0	Human Health Non-Carcinogenic			192.0
Facility	Alcoa Wenatchee LLC																																
Water Body Type	Freshwater																																
Rec. Water Hardness	66 mg/L																																
Dilution Factors:		Acute	Chronic																														
Aquatic Life		33.0	99.0																														
Human Health Carcinogenic			210.0																														
Human Health Non-Carcinogenic			192.0																														
Pollutant, CAS No. & NPDES Application Ref. No.		AMMONIA, Criteria as Total NH3	ALUMINUM, total recoverable, pH 6.5-9.0 7429905	IRON 7439896	MANGANESE 7439965																												
Effluent Data		# of Samples (n)	1	52	1	1																											
		Coeff of Variation (Cv)	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6																				
		Effluent Concentration, ug/L (Max. or 95th Percentile)	10	2100	70	11																											
		Calculated 50th percentile Effluent Conc. (when n>10)																															
Receiving Water Data		90th Percentile Conc., ug/L																															
		Geo Mean, ug/L																															
Water Quality Criteria		Aquatic Life Criteria, ug/L	7,823	750	-	-	✔	✔	✔	✔	✔	✔	✔																				
		Acute	1,348	87	1000	-	✔	✔	✔	✔	✔	✔	✔																				
		Chronic					✔	✔	✔	✔	✔	✔	✔																				
		WQ Criteria for Protection of Human Health, ug/L	-	-	300	50	✔	✔	✔	✔	✔	✔	✔																				
		Metal Criteria	-	-	-	-	✔	✔	✔	✔	✔	✔	✔																				
		Translator, decimal	-	-	-	-	✔	✔	✔	✔	✔	✔	✔																				
		Chronic	-	-	-	-	✔	✔	✔	✔	✔	✔	✔																				
		Carcinogen?	N	N	N	N	✔	✔	✔	✔	✔	✔	✔																				
Aquatic Life Reasonable Potential																																	
Effluent percentile value			0.950	0.950	0.950																												
s $s^2 = \ln(CV^2 + 1)$			0.555	0.555	0.555																												
Pn $Pn = (1 - \text{confidence level})^{1/n}$			0.050	0.944	0.050		✔	✔	✔	✔	✔	✔	✔																				
Multiplier			6.20	1.00	6.20		✔	✔	✔	✔	✔	✔	✔																				
Max concentration (ug/L) at edge of...		Acute	2	63.636	13.147		✔	✔	✔	✔	✔	✔	✔																				
		Chronic	1	21.212	4.382		✔	✔	✔	✔	✔	✔	✔																				
Reasonable Potential? Limit Required?			NO	NO	NO		✔	✔	✔	✔	✔	✔	✔																				
Aquatic Life Limit Calculation																																	
# of Compliance Samples Expected per month			✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔																				
LTA Coeff. Var. (CV), decimal			✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔																				
Permit Limit Coeff. Var. (CV), decimal			✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔																				
Point Load Allocation, ug/L		Acute					✔	✔	✔	✔	✔	✔	✔																				
		Chronic					✔	✔	✔	✔	✔	✔	✔																				
Long Term Averages, ug/L		Acute					✔	✔	✔	✔	✔	✔	✔																				
		Chronic					✔	✔	✔	✔	✔	✔	✔																				
Limiting LTA, ug/L							✔	✔	✔	✔	✔	✔	✔																				
Metal Translator or 1?							✔	✔	✔	✔	✔	✔	✔																				
Average Monthly Limit (AML), ug/L							✔	✔	✔	✔	✔	✔	✔																				
Maximum Daily Limit (MDL), ug/L							✔	✔	✔	✔	✔	✔	✔																				
Human Health Reasonable Potential																																	
s $s^2 = \ln(CV^2 + 1)$			0.554513	0.55451																													
Pn $Pn = (1 - \text{confidence level})^{1/n}$			0.050	0.050																													
Multiplier			2.489527	2.48953																													
Dilution Factor			192	192																													
Max Conc. at edge of Chronic Zone, ug/L			0.90764	0.14263																													
Reasonable Potential? Limit Required?			NO	NO																													

Table 20 Reasonable Potential Analysis for Temperature Criteria**Freshwater Temperature Reasonable Potential and Limit Calculation**

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

	Core Summer Criteria	Supplemental Criteria
INPUT	July 1-Sept 14	Sept 15-July 1
1. Chronic Dilution Factor at Mixing Zone Boundary	99.0	99.0
2. 7DADMax Ambient Temperature (T) (Upstream Background 90th percentile)	20.6 °C	20.6 °C
3. 7DADMax Effluent Temperature (95th percentile)	23.4 °C	20.1 °C
4. Aquatic Life Temperature WQ Criterion in Fresh Water	17.5 °C	17.5 °C
OUTPUT		
5. Temperature at Chronic Mixing Zone Boundary:	20.6 °C	20.6 °C
6. Incremental Temperature Increase or decrease:	0.0 °C	0.0 °C
7. Maximum Allowable Incremental Temperature Increase:	0.3 °C	0.3 °C
8. Maximum Allowable Temperature at Mixing Zone Boundary:	20.9 °C	20.9 °C
A. If ambient temp is warmer than WQ criterion		
9. Does temp fall within this warmer temp range?	YES	YES
10. Temperature Limit if Required:	NO LIMIT	NO LIMIT
B. If ambient temp is cooler than WQ criterion but within $28/(T_{amb}+7)$ and within 0.3 °C of the criterion		
11. Does temp fall within this incremental temp. range?	---	---
12. Temp increase allowed at mixing zone boundary, if required:	---	---
C. If ambient temp is cooler than (WQ criterion-0.3) but within $28/(T_{amb}+7)$ of the criterion		
13. Does temp fall within this Incremental temp. range?	---	---
14. Temp increase allowed at mixing zone boundary, if required:	---	---
D. If ambient temp is cooler than (WQ criterion - $28/(T_{amb}+7)$)		
15. Does temp fall within this Incremental temp. range?	---	---
16. Temp increase allowed at mixing zone boundary, if required:	---	---
RESULTS		
17. Do any of the above cells show a temp increase?	NO	NO
18. Temperature Limit if Required?	NO LIMIT	NO LIMIT

Table 21 Reasonable Potential Analysis for pH Criteria

Calculation of pH of a Mixture of Two Flows

Based on the procedure in EPA's DESCON program (EPA, 1988. Technical Guidance on Supplementary Stream Design Conditions for Steady State Modeling. USEPA Office of Water, Washington D.C.)

INPUT		
	@ Acute Boundary	@ Chronic Boundary
1. Dilution Factor at Mixing Zone Boundary	33.0	99.0
2. Ambient/Upstream/Background Conditions		
Temperature (deg C):	20.60	20.60
pH:	7.62	8.04
Alkalinity (mg CaCO3/L):	66.00	66.00
3. Effluent Characteristics		
Temperature (deg C):	23.40	23.40
pH:	7.63	8.79
Alkalinity (mg CaCO3/L):	0.00	0.00
4. Aquatic Life Use Designation	Char spawning & rearing and/or core summer habitat	
OUTPUT		
1. Ionization Constants		
Upstream/Background pKa:	6.38	6.38
Effluent pKa:	6.36	6.36
2. Ionization Fractions		
Upstream/Background Ionization Fraction:	0.95	0.98
Effluent Ionization Fraction:	0.95	1.00
3. Total Inorganic Carbon		
Upstream/Background Total Inorganic Carbon (mg CaCO3/L):	70	67
Effluent Total Inorganic Carbon (mg CaCO3/L):	0	0
4. Conditions at Mixing Zone Boundary		
Temperature (deg C):	20.68	20.63
Alkalinity (mg CaCO3/L):	64.00	65.33
Total Inorganic Carbon (mg CaCO3/L):	67.66	66.76
pKa:	6.38	6.38
5. Allowable pH change	NA	0.20
RESULTS		
pH at Mixing Zone Boundary:	7.62	8.04
pH change at Mixing Zone Boundary:	0.00	0.00
Is permit limit needed?	NO	NO

Table 22 Reasonable Potential Analysis for Fecal Coliform Criteria

INPUT	
Chronic Dilution Factor	99.0
Receiving Water Fecal Coliform, #/100 ml	?
Effluent Fecal Coliform - worst case, #/100 ml	400
Surface Water Criteria, #/100 ml	14
OUTPUT	
Fecal Coliform at Mixing Zone Boundary, #/100 ml	4
Difference between mixed and ambient, #/100 ml	4

Appendix F--Response to Comments

Alcoa Wenatchee's comment:

Comment on proposed change to TSS and BOD percent removal requirement: Alcoa believes that the proposed change in the TSS and BOD percent removal requirement is not consistent with the requirements in WAC 173-221-050(4)(a)(ii). This section of the WAC allows Ecology to set an alternate mass loading limit on the effluent in lieu of the percent removal requirement in cases where the sewage influent loading is less concentrated. There is no basis in the rule to tie this alternate limit to influent loading. We believe that footnote "k" on page 9 should be changed to read, "In addition, if the 30-Day Average effluent mass loading for BOD or TSS is greater than 5 lbs/day, the 30- Day Average percent removal for these parameters shall be greater than or equal to 85 percent during normal operation or 65 percent during curtailment. If the 30-Day average effluent mass loading for BOD or TSS is equal or less than 5 lbs/day, the 30-Day average percent removal limits for these parameters shall not apply."

Ecology's response:

Ecology revised the footnote "k" in the permit as follows:

In addition, if the 30-Day average effluent mass loading for BOD or TSS is greater than 5 lbs/day, the 30-Day average percent removal for these parameters shall be greater than or equal to 85 percent during normal operations or 65 percent during curtailment.

If the 30-Day average effluent mass loading for BOD or TSS is equal or less than 5 lbs/day, the 30-Day average percent removal limits for these parameters shall not apply.