ALASKA POLLUTANT DISCHARGE ELIMINATION SYSTEM
PERMIT FACT SHEET –PRELIMINARY DRAFT

Permit Number: AK0022543

Eagle River Wastewater Treatment Facility

ALASKA DEPARTMENT OF ENVIRONMENTAL CONSERVATION
Wastewater Discharge Authorization Program
555 Cordova Street
Anchorage, AK 99501

Public Comment Start Date: Preliminary Draft
Public Comment Expiration Date: Preliminary Draft

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Proposed issuance of an Alaska Pollutant Discharge Elimination System (APDES) permit to:

MUNICIPALITY OF ANCHORAGE, ANCHORAGE WATER & WASTEWATER UTILITY

For wastewater discharges from

Eagle River Wastewater Treatment Facility
15524 Artillery Road
Eagle River, AK, 99577

The Alaska Department of Environmental Conservation (the Department or DEC) proposes to reissue an APDES individual permit (permit) to the Municipality of Anchorage, Anchorage Water and Wastewater Utility. The permit authorizes and sets conditions on the discharge of pollutants from this facility to waters of the United States. In order to ensure protection of water quality and human health, the permit places limits on the types and amounts of pollutants that can be discharged from the facility and outlines best management practices to which the facility must adhere.

This fact sheet explains the nature of potential discharges from the Eagle River Wastewater Treatment Facility and the development of the permit including:

- information on public comment, public hearing, and appeal procedures
- a listing of proposed effluent limitations and other conditions
- technical material supporting the conditions in the permit
- monitoring requirements in the permit

Public Comment

Persons wishing to comment on, or request a public hearing for the draft permit, may do so in writing by the expiration date of the public comment period.

Commenters are requested to submit a concise statement on the permit condition(s) and the relevant facts upon which the comments are based. Commenters are encouraged to cite specific permit requirements or conditions in their submittals.

A request for a public hearing must state the nature of the issues to be raised, as well as the requester's name, address, and telephone number. The Department will hold a public hearing whenever the Department finds, on the basis of requests, a significant degree of public interest in a draft permit. The Department may also hold a public hearing if a hearing might clarify one or more issues involved in a permit decision or for other good reason, in the Department's discretion. A public hearing will be held at the closest practicable location to the site of the operation. If the Department holds a public hearing, the Director will appoint a designee to preside at the hearing. The public may also submit written testimony in lieu of or in addition to providing oral testimony at the hearing. A hearing will be tape recorded. If there is sufficient public interest in a hearing, the comment period will be extended to allow time to public notice the hearing. Details about the time and location of the hearing will be provided in a separate notice.

All comments and requests for public hearings must be in writing and should be submitted to the Department at the technical contact address, fax, or email identified above (see also the public comments section of the attached public notice). Mailed comments and requests must be postmarked on or before the expiration date of the public comment period.

After the close of the public comment period and after a public hearing, if applicable, the Department will review the comments received on the draft permit. The Department will respond to the comments received in a Response to Comments document that will be made available to the public. If no substantive comments are received, the tentative conditions in the draft permit will become the proposed final permit.

The proposed final permit will be made publicly available for a five-day applicant review. The applicant may waive this review period. After the close of the proposed final permit review period, the Department will make a final decision regarding permit issuance. A final permit will become effective 30 days after the Department's decision, in accordance with the state's appeals process at 18 Alaska Administrative Code (AAC) 15.185.

The Department will transmit the final permit, fact sheet (amended as appropriate), and the Response to Comments to anyone who provided comments during the public comment period or who requested to be notified of the Department's final decision.

Appeals Process

The Department has both an informal review process and a formal administrative appeal process for final APDES permit decisions. An informal review request must be delivered within 20 days after receiving the Department's decision to the Director of the Division of Water at the following address:

Director, Division of Water
Alaska Department of Environmental Conservation
555 Cordova Street
Anchorage AK, 99501

Interested persons can review 18 AAC 15.185 for the procedures and substantive requirements regarding a request for an informal Department review.

See http://dec.alaska.gov/commish/review-guidance/informal-reviews for information regarding informal reviews of Department decisions.

An adjudicatory hearing request must be delivered to the Commissioner of the Department within 30 days of the permit decision or a decision issued under the informal review process. An adjudicatory hearing will be conducted by an administrative law judge in the Office of Administrative Hearings within the Department of Administration. A written request for an adjudicatory hearing shall be delivered to the Commissioner at the following address:

Commissioner
Alaska Department of Environmental Conservation
Mail: P.O. Box 11180
Juneau, AK 99811
In Person: 555 Cordova Street
Anchorage, AK 99501

Interested persons can review 18 AAC 15.200 for the procedures and substantive requirements regarding a request for an adjudicatory hearing. See http://dec.alaska.gov/commish/review-guidance/adjudicatory-hearing-guidance for information regarding appeals of Department decisions.

Documents are Available

The permit, fact sheet, application, and related documents can be obtained by visiting or contacting DEC between 8:00 a.m. and 4:30 p.m. Monday through Friday at the addresses below. The permit, fact sheet, application, and other information are located on the Department's Wastewater Discharge Authorization Program website: http://dec.alaska.gov/water/wastewater/.

Alaska Department of Environmental Conservation Division of Water Wastewater Discharge Authorization Program 555 Cordova Street Anchorage, AK 99501 (907) 269-6285	Alaska Department of Environmental Conservation Division of Water Wastewater Discharge Authorization Program **Mail**: P.O. Box 111800 **In Person**: 410 Willoughby Avenue, Suite 303 Juneau, AK 99811-1800 (907) 465-5180

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1.0 INTRODUCTION

1.1 Applicant

This fact sheet provides information on the Alaska Pollutant Discharge Elimination System (APDES) permit for the following entity:

Permittee:	Municipality of Anchorage, Anchorage Water & Wastewater Utility
Facility:	Eagle River Wastewater Treatment Facility
APDES Permit Number:	AK0022543
Facility Location:	15524 Artillery Road Eagle River, AK 99577
Mailing Address:	3000 Arctic Boulevard, Anchorage, AK 99503
Facility Contact:	Mr. David A. Persinger, P.E. General Manager

1.2 Authority

Section 301(a) of the Clean Water Act (CWA) and Alaska Administrative Code (AAC) 18 AAC 83.015 provide that the discharge of pollutants to water of the U.S. is unlawful except in accordance with an APDES permit. The individual permit reissuance is being developed per 18 AAC 83. A violation of a condition contained in the Permit constitutes a violation of the CWA and subjects the permittee of the facility with the permitted discharge to the penalties specified in Alaska Statutes (AS) 46.03.760 and AS 46.03.761.

1.3 Permit History

The Eagle River Wastewater Treatment Facility (ER WWTF) began operation in 1971 as a 0.156- million gallons per day (mgd) Aerated Lagoon System. The present facility began operation on November 5, 1973. The United States Environmental Protection Agency (EPA) issued the first National Pollutant Discharge Elimination System (NPDES) permit to the facility authorizing domestic wastewater discharge on July 10, 1974. The EPA completed and finalized a Total Maximum Daily Load (TMDL) for a section the Eagle River in 1995 with a Wasteload Allocation (WLA) and margin of safety for the ER WWTF for the pollutants ammonia, chlorine, lead and copper. Eagle River was placed in Category 4a in the 2002/2003 Integrated Water Quality Monitoring and Assessment Report (2002 Integrated Report) and remained there until it was determined by DEC to be back in attainment in the 2018 Integrated Report, finalized in June 2020. More information about the Eagle River TMDL and DEC's determination can be found in Fact Sheet Part 4.4.

The final EPA reissued NPDES permit became effective on May 1, 2006, and expired at midnight on May 1, 2011. Authority of the permit transferred to DEC on October 31, 2008, upon EPA's approval of DEC's application to administer the NPDES Program under the APDES Program. APDES permit AK0022543 was reissued by the DEC on May 23, 2014, becoming effective on July 1, 2014, and expired on June 30, 2019. DEC reissued the permit on January 13, 2020, becoming effective on March 1, 2020, and expired on February 28, 2025.

The Administrative Procedures Act and state regulation 18 AAC 83.155(c) allow for a federally issued NPDES permit or a state APDES permit to be administratively continued (i.e., continues inforce and effect) provided that the permittee submits a timely and complete application for a new permit prior to expiration of the permit. The Municipality of Anchorage, Anchorage Water & Wastewater Utility (AWWU) submitted a timely and complete application to DEC on August 30, 2024. Accordingly, DEC notified AWWU that the permit was administratively continued per a letter dated February 21, 2025; therefore, the 2020 permit is administratively extended until such time a new permit is reissued.

2.0 BACKGROUND

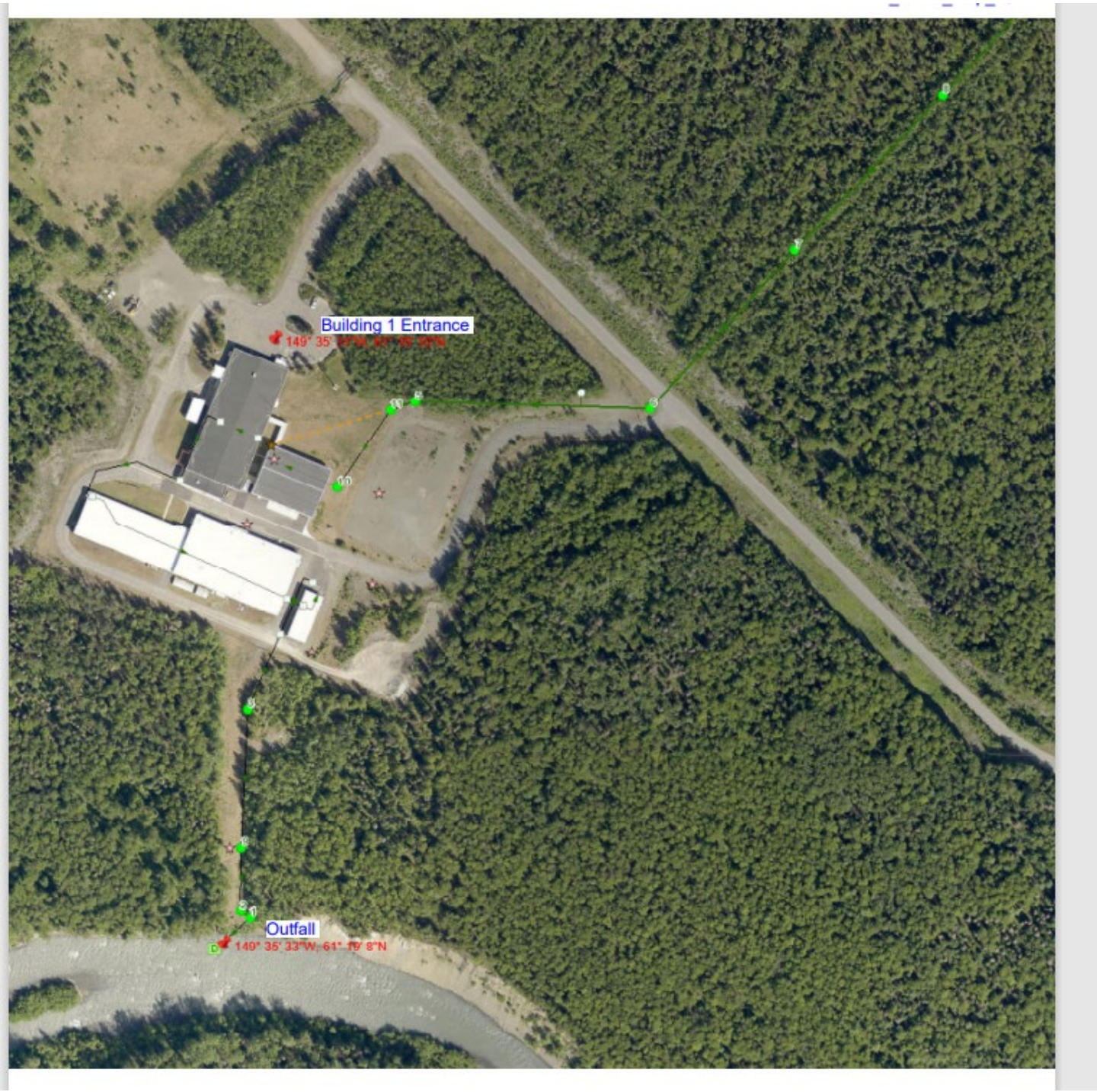
2.1 Facility Information

The Municipality of Anchorage, AWWU owns, operates and maintains the ER WWTF, which is a publicly owned treatment works (POTW) in Eagle River, Alaska. The facility treats domestic wastewater from the community of Eagle River with an approximate population of 18,000. The facility does not receive significant contributions from industrial users nor is the collection system combined with a storm water sewer system. Fact Sheet, Figure 2 provides a schematic of the facility's process flow system. The majority of the WWTF is automated operation. Wastewater enters the WWTF by gravity flow via a 30-inch influent line. The treated wastewater is discharged to Eagle River through a twelve-inch pipe extending 52 feet and terminating in Outfall 001A, a single port discharge unit. Outfall 001A discharges treated effluent into Eagle River near the bottom of the center channel of the river, approximately 1.5-miles west of the Glenn Highway crossing. The outfall terminus is positioned approximately two meters closer to the bank on the north side of the river than to the south bank.

During this ADPES permit reissuance, planned design and construction improvements for both the UV treatment system and washwater system were scheduled to be completed, with an estimated start date of summer, 2025. See Fact Sheet section 2.2 for further information on Wastewater Treatment upgrades and disinfection.

Figure 1 depicts the location of the Eagle River WWTF effluent outfall.

Figure 1: Eagle River Wastewater Treatment Facility Vicinity Map



2.2 Wastewater Treatment

Wastewater is treated to secondary treatment standards at the facility. Treatment at the facility consists of preliminary treatment via grit chambers and screening, primary treatment via clarifiers, secondary treatment via activated sludge, further clarification via secondary clarifiers, effluent filtration via sand filters, and ultraviolet (UV) disinfection. The average daily design flow rate for the ER WWTF is 2.5 mgd.

Influent is directed to four parallel screening channels where grit is initially screened from the influent using Rotary Drum Fine Screens in three of the channels with the fourth acting as a screening bypass channel. After the initial grit screening, flow continues to parallel Multi-Tray Vortex Grit Removal Systems. The screened wastewater travels through a distribution channel to three rectangular primary clarifiers. Two or three primary clarifiers are usually in operation at the same time. Primary effluent is then combined with return activated sludge and flows to a pair of aeration basins (at least one aeration basin is always operational) where the

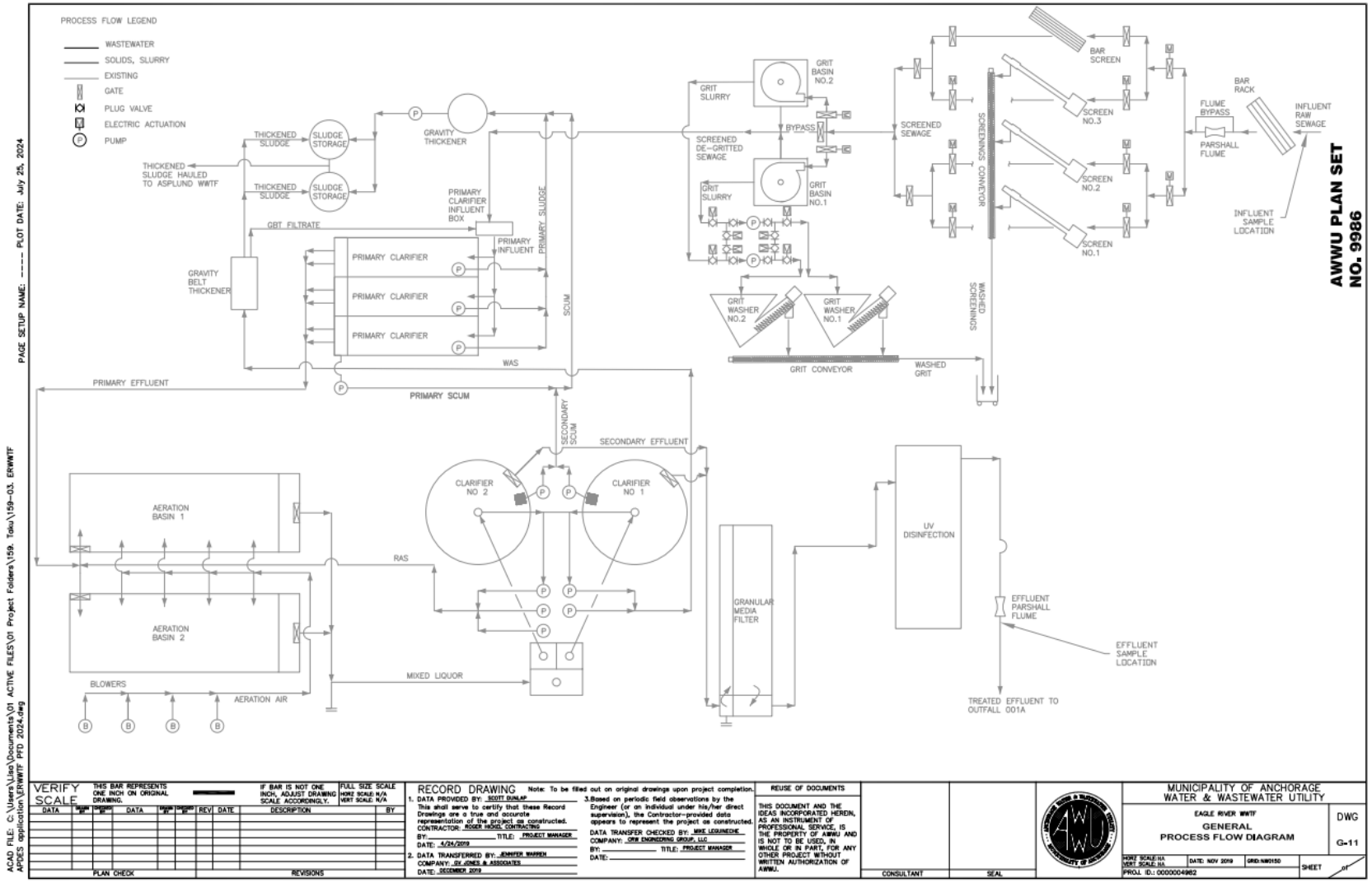
effluent is aerated by submerged fine bubble air diffusers. Carbonaceous oxidation of organic waste takes place in the presence of oxygen supplied by the bubble air diffusers. To prevent inhibition of ammonia nitrification, pH is increased by the addition soda ash. From the aeration basin, the fully mixed an aerated solution flows to the secondary clarifiers where scum is removed from the surface and flocculated activated sludge settles to be pumped by the return activated sludge pumps. Two secondary clarifiers are usually in operation at a time. The remaining effluent is piped to the effluent sand filter. Further removal of suspended solids then occurs in the effluent sand filter, which acts as a gravity filter. The sand filters are backwashed approximately once every four hours and the back-flushed material is transmitted back to the beginning of the plant for treatment. Effluent is then passed through UV disinfection chambers located in Building 3. Building 4 is used to house headworks and support systems. Building 4 deploys raw sewage flow metering, fine screening and grit removal, and odor control. Grit and screenings solids handling equipment prepares grit and screenings to be disposed of directly at the Anchorage Regional Landfill. The headworks accommodated design flows and had the ability to accommodate projected future build-out flows of the plant. The UV disinfection system utilizes high intensity, low pressure germicidal lamps to inactivate organisms in the waste stream. Flow control gates and UV intensity are automatically adjusted to compensate for the dynamic nature of the incoming wastewater. Back-up UV chambers are available for use during routine maintenance or operational problems. Following disinfection, the final effluent flows past sample collection points and a Parshall Flume ultrasonic flow meter prior to discharging to Eagle River through a single port 12-inch outfall pipe. See Fact Sheet Figure 2, for a process flow diagram.

Sludge from the treatment process is thickened and dewatered to about 6.5 percent by a gravity belt thickener prior to entering one of two sludge holding tanks. Sludge is then hauled to the Asplund Water Pollution Control Facility in Anchorage, Alaska for treatment and subsequent disposal. See Fact Sheet Part 8.3 for further information.

Modifications to both the UV treatment system and washwater system are scheduled to be completed this 2025 year, with an estimated start date of summer, 2025. In the prior permit cycle, the APDES permit included more stringent effluent disinfection limits for fecal coliform. As a result of these new discharge limits, the rated design flow of the existing UV disinfection system decreased and was shown not be able to treat the projected 20-year peak hour flow of 4.60 mgd while maintaining full equipment redundancy. The planned UV improvements will rectify this by installing a third UV bank in each of the two respective treatment channels. This will bring the total capacity of each channel to 4.63 mgd and provide full redundancy for the 20-year peak flow condition. As part of the UV improvements, the existing channel concrete surfaces and metal components will also be rehabilitated where degradation is present. Additionally, a backup supply of washwater for the plant will also be provided through this project. Washwater is taken directly from the disinfected UV effluent, but there is currently no backup supply source for this water. To address the lack of washwater redundancy, the project includes the installation of a 905-gallon water storage tank and a pump skid to supply the stored water back into the plant system. The tank will provide a reservoir of stored water to maintain critical plant functions if the existing non-potable water supply is ever compromised or taken offline for maintenance.

Figure 2 depicts a schematic of the Eagle River wastewater treatment process.

Figure 2: Eagle River Wastewater Treatment Facility Schematic



2.3 Pollutants of Concern

Pollutants of concern known to be present in the effluent of the ER WWTF consist of domestic wastewater conventional pollutants regulated in the technology-based effluent limits (TBELs) via the secondary treatment standards, including Biochemical Oxygen Demand (BOD_5), Total Suspended Solids (TSS), pH, and fecal coliform (FC). Additional domestic wastewater pollutants: temperature, dissolved oxygen (DO), total dissolved solids (TDS), and ammonia. Additional parameters of concern identified as being present in the discharge through expanded testing included NO_3/NO_2, zinc, mercury, and WAD cyanide. Cyanide (CN), a monitoring requirement, was detected in concentrations both above and below water quality criteria; however, the results may be erroneously high due to the use of sodium hydroxide (NaOH) as a preservative in the analytical test. See Fact Sheet Section 3.3.6 for more details.

There was a TMDL finalized for the Eagle River that identified chlorine, ammonia, lead and copper as pollutants of concern, assigning WLAs for these parameters to the ER WWTF. Effective June 2020, the DEC determined the Eagle River to be back into attainment, however, ammonia, lead, and copper remain as pollutants of concern in the permit. More information about the removal of the Eagle River TMDL can be found in the Fact Sheet Part 4.4. As indicated in the ERWWTF submittal provided by GV Jones (ERWWTF RPA and MZ Update), limited monitoring has also been performed in the current and/or previous permit cycles for additional metals (antimony, beryllium, cadmium, chromium, nickel, selenium, silver, thallium) as well as the priority pollutants listed in APDES Application form 2A (volatile organic, acid-extractable, and base-neutral compounds). These were found to either be non-detect or at levels well below water quality standards. Based on this, no additional POCs have been identified based on the data collected in the current permit cycle. Pollutants observed in the effluent at least once that did not meet water quality criteria or permit limits between June 2020 and June 2025 are depicted in Table 2, below.

Table 1: Pollutants observed in effluent Above Water Quality Criteria

Pollutant	Units [a]	Maximum Observed Concentration	Water Quality Criteria or Permit Limit
Ammonia-as Nitrogen [b]	milligrams per liter (mg/L)	2.02 (June 1-September 30)	5.72 acute, 2.47 chronic (June 1- September 30)
Copper [b,c]	micrograms per liter (µg/L)	7.33 (June 1-September 30)	9.8 acute, 6.7 chronic (June 1-September 30)
		8.31 (October 1- May 31)	15.6 acute, 10.3 chronic (October 1- May 31)
Lead [b,c]	µg/L	1.5 (June 1- September 30)	2.0 chronic
Zinc [b,c]	µg/L	112 (June 1- September 30)	87 acute and chronic
Total Dissolved Solids (TDS)	mg/L	644 (June 1-September 30) 658 (October 1- May 31)	500 daily maximum
Dissolved Oxygen (DO)	mg/L	4.2 (June 1- September 30) 4.3 (October 1- May 31)	7.0 daily minimum
Temperature	Degrees Celsius (°C)	16 (June 1- September 30) 16 (October 1-May 31)	13 daily maximum
Cyanide [d]	µg/L	12 (June 1- September 30)	22 acute, 5.2 chronic (June 1- September 30)
		2.3 (October 1- May 31)	5.2 chronic (October 1-May 31)

Pollutant	Units [a]	Maximum Observed Concentration	Water Quality Criteria or Permit Limit
Total Nitrate and Nitrate as Nitrogen (N)	mg/L	38.9 (June 1-September 30) 47.4 (October 1- May 31)	10 mg/L
WET	chronic toxic units (TUc)	5.1	1 daily maximum

Footnotes:

a. Units: mgd = million gallons per day, mg/L = milligrams per liter, lbs/day = pounds per day, cfu/100 mL = colony forming units per 100 milliliters, µg/L = micrograms per liter, mg/L = milligrams per liter, and SU= standard units.
b. Summer season = (June 1 to September 30), winter season = (October 1 to May 31).
c. All metals were analyzed and reported as total recoverable metals.
d. Monitoring results may be erroneously high due to the use of NaOH as a preservative in the analytical test. See Section 3.3.6 for further details

2.4 Compliance History

DEC reviewed Discharge Monitoring Reports (DMRs) from June 1, 2020 to June 30, 2025 to determine the facility's compliance with effluent limits. No permit exceedances were found during the review of the ER WWTF DMRs. A total of 2 Non-compliance notifications and one Spill Notification have been received during the previous permit cycle. Table 3 summarizes DEC Compliance and Enforcement actions at the Eagle River WWTF.

Table 2: Compliance and Enforcement Actions taken at the ERWWTF

Date	Activity	Summary
March 9, 2022	Routine Inspection	Observations included violations resulting from two instances of failure to monitor. One from Table 2 and one from Table 3 of the permit. No other violations identified during inspection.
April 7, 2022	Notice of Violation	Two instances of failure to monitor (one from Table 2 requirements, one from Table 3) from July 15, 2020 through August 15, 2020.
December 11, 2024	Routine Inspection	No violations identified during the inspection

3.0 EFFLUENT LIMITS AND MONITORING REQUIREMENTS

3.1 Basis for Permit Effluent Limits

Per 18 AAC 83.015, the Department prohibits the discharge of pollutants to waters of the U.S. unless the permittee has first obtained a permit issued by the APDES Program that meet the purposes of AS 46.03 and is in accordance with the CWA Section 402. Per these statutory and regulatory provisions, the Permit includes effluent limits that require the discharger to (1) meet standards reflecting levels of technological capability, (2) comply with 18 AAC 70 –WQS, and (3) comply with other state requirements that may be more stringent.

The CWA requires that the limits for a particular pollutant be the more stringent of either technology-based effluent limits (TBELs) or water quality-based effluent limits (WQBELs). TBELs are set according to the level of treatment that is achievable using available technology. A WQBEL is designed to ensure that the water quality standards of a waterbody are met. WQBELs may be more stringent than TBELs.

The permit contains a combination of both TBELs and WQBELs. The Department first determines if TBELs are required to be incorporated into the permit. TBELs for publicly owned treatment works (POTW), which

apply to the Eagle River WWTF, are derived from the secondary treatment standards found in Title 40 Code of Federal Regulations (40 CFR) §133.102 and 40 CFR §133.105, adopted by reference at 18 AAC 83.010(e). The following section summarizes the proposed effluent limits. A more expansive technical and legal basis for the proposed effluent limits is provided in Appenix A Basis for Effluent Limitations.

3.2 Basis for Effluent and Receiving Water Monitoring

In accordance with AS 46.03.110(d), the Department may specify in a permit the terms and conditions under which waste material may be disposed. Monitoring in a permit is required to determine compliance with effluent limits. Monitoring may also be required to gather effluent and receiving water data to determine if additional effluent limits are required and/or to monitor effluent impact on the receiving waterbody quality.

The permit also requires the permittee to perform the additional effluent monitoring required by the APDES application Form 2A for POTWs, so that this data will be available when the permittee applies to reissue the APDES permit. The permittee is responsible for conducting the monitoring and submitting the results with the application for renewal of the APDES permit. The permittee should consult and review Form 2A upon permit issuance to ensure that the required monitoring in the application will be completed prior to submitting a request for permit renewal. A copy of Form 2A can be found at: https://dec.alaska.gov/water/wastewater/permit-entry/domestic-and-municipal/

3.3 Effluent Limits and Monitoring Requirements

This permit contains a combination of both TBELs and WQBELs. The following summarizes the proposed effluent limits. A more expansive technical and legal basis for the proposed effluent limits is provided in Appendix A Basis for Effluent Limitations. The permit requires monitoring of secondary treated domestic wastewater effluent that is discharged through Outfall 001A for flow, BOD5, TSS, pH, FC bacteria, Escherichia coli (E. coli), pH, temperature, dissolved oxygen (DO), TDS, WAD Cyanide, mercury, ammonia, copper, zinc, lead, NO_3/NO_2, and WET. This permit contains new or revised WQBELs for the seasonal summer limits for NO_3/NO_2 only. The limits for flow, BOD5, TSS, FC, E. coli, pH, WET along with the winter and summer seasonal copper and lead and winter NO_3/NO_2 will be carried forward from the previous permit. Data will be used to conduct future reasonable potential analysis to determine if discharges of these parameters might cause an exceedance of the WQS in the receiving waterbody.

Monitoring frequencies are based on the nature and effect of the pollutant, as well as a determination of the minimum sampling necessary to adequately monitor the facility's performance. The permittee has the option of taking more frequent samples than required under the permit. These additional samples must be used for averaging (for pollutants results reported on a monthly or weekly average) if they are conducted using the Department – approved test methods (found in 18 AAC 70 and 40 CFR Part 136, adopted by reference in 18 AAC 83.010) and if the method detection limits are less than the effluent limits.

Zinc, temperature, DO, TDS, mercury, and WAD Cyanide contain reporting only monitoring requirements. The following summarizes the monitoring requirements for these parameters.

3.3.1 Zinc

Alaska WQS at 18 AAC 70.020(11) states that the concentration of substances in water may not exceed the numeric criteria for drinking water and human health for consumption of drinking water and aquatic organisms shown in the Alaska Water Quality Criteria Manual. In the prior permit, zinc was identified as being a possible pollutant of concern through expanded testing. For this permit cycle, DEC evaluated zinc data from June 2020 to June 2025 totaling 23 samples that were then split out by summer and winter seasons and analyzed using the RPA tool. It was demonstrated through the RPA that zinc does have reasonable potential to exceed water quality at end of pipe and is included in both the summer (June 1 -September 30) and winter (October 1 – May 31) mixing zones with zinc being the driver for the summer acute mixing zone. The acute and chronic aquatic life zinc concentration may not exceed 87 µg/L. These criteria are based on the 15th percentile of upstream

Eagle River hardness of 68. There is no limit established for zinc, but it fits well within the chronic mixing zones and the monitoring requirement of 2/period per season shall be carried forward in this permit reissuance.

3.3.2 Temperature

Alaska WQS at 18 AAC 70.020(b)(10) states that temperature for fresh water for the growth and propagation of fish, shellfish and other aquatic life, and wildlife in spawning and egg and fry incubation areas may not exceed 13 degrees ºC. DEC reviewed temperature monitoring data from June 2020 to June 2025. During this period the temperature ranged from a minimum of 10 º C to a maximum of 16 º C. It is reasonable to assume that the discharge will continue to exceed water quality criteria. Temperature effluent limits are not included; however, DEC determined that temperature meets water quality criteria at approximately 1.6 meters and fits within the mixing zone sized for NO_3/NO_2. Monitoring for temperature will be carried forward as in the prior permit at five times per week.

3.3.3 Dissolved Oxygen (DO)

Alaska WQS at 18 AAC 70.020(b)(3)(C), states that the most stringent Alaska WQS for DO is that the concentration of DO must be greater than 7 mg/L in waters used by anadromous or resident fish. DO monitoring was included as a requirement in the prior permit cycle and a total of 61 DO samples were collected with a range of 4.2 – 8.4 mg/L. Based on the results from the previous monitoring, it is probable that DO in the effluent will continue to exceed Alaska WQS at the end of the pipe and therefore DO will continue to be included in the mixing zones. Monthly DO monitoring will be carried forward in this permit reissuance.

3.3.4 Total Dissolved Solids (TDS)

Alaska WQS at 18 AAC 70.020(b)(4) states the most stringent Alaska WQS for TDS is a concentration of 500 mg/L. TDS monitoring was required to be sampled 2/period per season this past permit cycle, with a total of 61 TDS samples collected with a range of 431 - 658 mg/L. These results indicate that TDS does not meet water quality criteria at end of pipe and that TDS will continue to be included in the mixing zones. TDS monitoring 2/period per season will be carried forward in this permit reissuance.

3.3.5 Mercury

In the prior permit, mercury was identified as being a possible pollutant of concern through expanded testing. A total of 14 samples were submitted during this permit cycle with only 7 that were quantifiable ranging from 0.00105 - 0.00499 µg/L and one outlier of 0.34 µg/L. This was determined by the RPA tool as well as there was no reasonable potential to exceed chronic water quality criteria of 0.012 µg/L. Mercury will not be included in the mixing zone, however monitoring of 2/period per season will be carried forward into this permit reissuance and for future RPA during permit reissuance.

3.3.6 WAD Cyanide

Cyanide was identified as being a possible pollutant of concern in the prior permit cycle. DEC reviewed a total of 14 samples. 11 samples were below detection limit, one reported as 12 µg/L, 1.7 µg/L, and 2.3 µg/L. Reasonable potential analysis of the data points determined the 12 µg/L to be an outlier, and the other two were reported as 1.7 µg/L and 2.3 µg/L which did not exceed water quality criteria (acute 22 µg/L, chronic 5.2 µg/L) Additionally, after reviewing lab reports submitted to the DEC, it is possible that some of the results may be erroneously high due to the use of sodium hydroxide (NaOH) as a preservative in the analytical test. When sodium NaOH is used as a preservative in cyanide samples, they cannot be analyzed in less than 15 minutes or a possible interference will occur with the cyanide test result and erroneously lead to high cyanide concentrations. The research paper, “Problems Associated with Using Current EPA Approved Total CN Analytical Methods for Determining Municipal Wastewater Treatment Plant NPDES Permit Compliance”, states that EPA is aware of these challenges and is considering amendments to 40 CFR 136 that will provide guidance on eliminating NaOH as part of the method. In lieu of or in addition to existing guidelines, EPA has proposed the adoption of

cyanide preservation procedures in ASTM Standard Practice D7365-09a. This practice specifies that a hold-time study should be conducted prior to the elimination of NaOH as a preservative. NaOH may then be omitted as a preservative as long as the sample is analyzed within the determined hold time. Where the cyanide monitoring results are questionable due to the possible interference of NaOH, they are unreliable for determining compliance with water quality criteria. In order to assess the possible interference of NaOH in the CN test, the DEC recommends the permittees to conduct a hold-time study and submit the results to DEC for review. If approved by DEC, NaOH may then be omitted as a preservative. For this permit reissuance, WAD cyanide will not be included in the mixing zone and the monitoring requirements of 2/period per season shall be carried forward in this permit reissuance.

For all effluent monitoring, the permittee must use a sufficiently sensitive EPA approved test method that quantifies the pollutants to a level lower than applicable limits or water quality standards or use the most sensitive test method available, per Title 40 Code of Federal Regulations (CFR) §136 (Guidelines Establishing Test Procedures for the Analysis of Pollutants), adopted by reference at 18 AAC 83.010(f).

Monitoring frequencies are based on the nature and effect of the pollutant, as well as a determination of the minimum sampling necessary to adequately monitor the facility's performance. The permittee has the option of taking more frequent samples than required under the permit. These additional samples must be used for averaging (for pollutants results reported on a monthly or weekly average) if they are conducted using the Department – approved test methods (generally found in 18 AAC 70 and 40 CFR Part 136 [adopted by reference in 18 AAC 83.010]).

Influent and effluent monitoring requirements and effluent limits are summarized in Tables 5 and 6.

Table 3 Outfall 001A: Effluent Limits and Monitoring Requirements (June 1 – September 30)

Parameter	Effluent Limits					Monitoring Requirements		
	Units [a]	Daily Minimum	Monthly Average	Weekly Average	Daily Maximum	Sample Location	Sample Frequency	Sample Type
Total Discharge Flow	mgd	N/A	Report	N/A	2.5	Effluent	Continuous	Recorded
Biochemical Oxygen Demand (BOD_5)	mg/L	N/A	30	45	60	Influent and Effluent [b]	1/Week	24-hour Composite [c]
	lbs/day [d]		625	938	1,251			Calculated
Total Suspended Solids (TSS)	mg/L	N/A	30	45	60	Influent and Effluent	1/Week	24-hour Composite
	lbs/day		625	938	1,251			Calculated
BOD_5 & TSS Minimum Percent (%) Removal	%	N/A	85 [e]	N/A	N/A	Influent and Effluent	1/Month	Calculated
Fecal coliform Bacteria (FC)	FC/ 100 mL	N/A	20 [f]	N/A	40 [g]	Effluent	1/Week	Grab
pH	SU	6.5	N/A	N/A	8.5	Effluent	5/Week	Grab
Temperature	° C	N/A	N/A	N/A	Report	Effluent	5/Week	Grab
Dissolved Oxygen (DO)	mg/L	Report	N/A	N/A	N/A	Effluent	1/Month	Grab
Total Dissolved Solids (TDS)	mg/L	N/A	N/A	N/A	Report	Effluent	2/Period [j]	24-hour Composite
Cyanide, as free cyanide	µg/L	N/A	N/A	N/A	Report	Effluent	2/Period	Grab
Mercury	µg/L	N/A	N/A	N/A	Report	Effluent	2/Period	Grab
Copper, total recoverable	mg/L	N/A	N/A	N/A	0.025	Effluent	2/Period	24-hour Composite
	lbs/day	N/A	N/A	N/A	0.52			Calculated
Lead, total recoverable	mg/L	N/A	N/A	N/A	0.030	Effluent	2/Period	24-hour Composite
	lbs/day	N/A	N/A	N/A	0.63			Calculated
Zinc, total recoverable	µg/L	N/A	N/A	N/A	Report	Effluent	2/Period	24-hour Composite
Escherichia coli (E. coli)	cfu/ 100 mL	N/A	126 [f]	N/A	410 [g]	Effluent	1/Month [h]	Grab
Total Nitrate/Nitrite, as N	mg/L	N/A	44.8	N/A	50.4	Effluent	1/Month [i]	24-hour Composite
	lbs/day	N/A	934	N/A	1051			Calculated
Total Ammonia, as N	mg/L	N/A	5.9	N/A	19.7	Effluent	1/Month	24-hour Composite
	lbs/day	N/A	123	N/A	410			Calculated

Footnotes:

a. Units: mgd = million gallons per day, mg/L = milligrams per liter, lbs/day = pounds per day [(design flow in million gallons per day (mgd)) x (concentration in mg/L) x 8.34], FC/100 mL = Fecal Coliform per 100 milliliters, SU= standard units, °C= degrees Celsius, µg/L = micrograms per liter, cfu/100 mL = colony forming units per 100 milliliters.

b. Limits apply to effluent. Report average monthly influent concentration. Influent and effluent composite samples shall be collected during the same 24-hour period.

c. See APPENDIX C for definition.

d. lbs/day = concentration (mg/L) x flow (mgd) x 8.34 (conversion factor)

e. Minimum % Removal = [(monthly average influent concentration in mg/L – monthly average effluent concentration in mg/L) / (monthly average influent concentration in mg/L x 100. The monthly average percent removal must be calculated using the arithmetic mean of the influent value and the arithmetic mean of the effluent value for that month.

f. If more than one FC bacteria or *E. coli* sample is collected within the reporting period, the average result must be reported as the geometric mean. When calculating the geometric mean, replace all results of zero, 0, with a one, 1. The geometric mean of "n" quantities is the "nth" root of the product of the quantities. For example the geometric mean of 100, 200, and 300 is $(100 \text{ X } 200 \text{ X } 300)^{1/3} = 181.7$.

g. When only one sample is collected, the effluent limit cannot be exceeded. If ten or more samples are collected during the monthly reporting period, not more than 10% of the samples may exceed the effluent limit.

h. Monitoring required once per month only during the time period **May-September**. When an *E. coli* sample is taken, a FC sample must be taken concurrently.

i. Monitoring to be conducted at the same time as monitoring for ammonia.

j. Monitoring to be conducted a minimum of 60 days apart during the time period June 1 – September 30.

Table 4: Outfall 001A: Effluent Limits and Monitoring Requirements (October 1 - May 31)

Parameter	Effluent Limits					Monitoring Requirements		
	Units [a]	Daily Minimum	Monthly Average	Weekly Average	Daily Maximum	Sample Location	Sample Frequency	Sample Type
Total Discharge Flow	mgd	N/A	Report	N/A	2.5	Effluent	Continuous	Recorded
Biochemical Oxygen Demand (BOD_5)	mg/L	N/A	30	45	60	Influent and Effluent [b]	1/Week	24-hour Composite [c]
	lbs/day [d]		625	938	1,251			Calculated
Total Suspended Solids (TSS)	mg/L	N/A	30	45	60	Influent and Effluent	1/Week	24-hour Composite
	lbs/day		625	938	1,251			Calculated
BOD_5 & TSS Minimum Percent (%) Removal	%	N/A	85 [e]	N/A	N/A	Influent and Effluent	1/Month	Calculated
Fecal coliform Bacteria (FC)	FC/ 100 mL	N/A	20 [f]	N/A	40 [g]	Effluent	1/Week	Grab
pH	SU	6.5	N/A	N/A	8.5	Effluent	5/Week	Grab
Temperature	° C	N/A	N/A	N/A	Report	Effluent	5/Week	Grab
Dissolved Oxygen (DO)	mg/L	Report	N/A	N/A	N/A	Effluent	1/Month	Grab
Total Dissolved Solids (TDS)	mg/L	N/A	N/A	N/A	Report	Effluent	2/Period [j]	24-hour Composite
Cyanide, as free cyanide	µg/L	N/A	N/A	N/A	Report	Effluent	2/Period	Grab
Mercury	µg/L	N/A	N/A	N/A	Report	Effluent	2/Period	Grab
Copper, total recoverable	mg/L	N/A	N/A	N/A	0.025	Effluent	2/Period	24-hour Composite
	lbs/day	N/A	N/A	N/A	0.52			Calculated
Lead, total recoverable	mg/L	N/A	N/A	N/A	0.018	Effluent	2/Period	24-hour Composite
	lbs/day	N/A	N/A	N/A	0.37			Calculated
Zinc, total recoverable	µg/L	N/A	N/A	N/A	Report	Effluent	2/Period	24-hour Composite
Escherichia coli (E. coli)	cfu/ 100 mL	N/A	126 [f]	N/A	410 [g]	Effluent	1/Month [h]	Grab
Total Nitrate/Nitrite, as N	mg/L	N/A	44.9	N/A	66.4	Effluent	1/Month [i]	24-hour Composite
	lbs/day	N/A	936	N/A	1,385			Calculated
Total Ammonia, as N	mg/L	N/A	4.7	N/A	11.5	Effluent	1/Month	24-hour Composite
	lbs/day	N/A	98	N/A	240			Calculated

Footnotes:

a. Units: mgd = million gallons per day, mg/L = milligrams per liter, lbs/day = pounds per day [(design flow in million gallons per day (mgd)) x (concentration in mg/L) x 8.34], FC/100 mL = Fecal Coliform per 100 milliliters, SU= standard units, °C= degrees Celsius, µg/L = micrograms per liter, cfu/100 mL = colony forming units per 100 milliliters.

b. Limits apply to effluent. Report average monthly influent concentration. Influent and effluent composite samples shall be collected during the same 24-hour period.

c. See APPENDIX C for definition.

d. lbs/day = concentration (mg/L) x flow (mgd) x 8.34 (conversion factor)

e. Minimum % Removal = [(monthly average influent concentration in mg/L – monthly average effluent concentration in mg/L) / (monthly average influent concentration in mg/L x 100. The monthly average percent removal must be calculated using the arithmetic mean of the influent value and the arithmetic mean of the effluent value for that month.

f. If more than one FC bacteria or *E. coli* sample is collected within the reporting period, the average result must be reported as the geometric mean. When calculating the geometric mean, replace all results of zero, 0, with a one, 1. The geometric mean of "n" quantities is the "nth" root of the product of the quantities. For example the geometric mean of 100, 200, and 300 is $(100 \text{ X } 200 \text{ X } 300)^{1/3} = 181.7$.

g. When only one sample is collected, the effluent limit cannot be exceeded. If ten or more samples are collected during the monthly reporting period, not more than 10% of the samples may exceed the effluent limit.

h. Monitoring required once per month only during the time period **May-September**. When an *E. coli* sample is taken, a FC sample must be taken concurrently.

i. Monitoring to be conducted at the same time as monitoring for ammonia.

j. Monitoring to be conducted a minimum of 120 days apart during the time period October 1 – May 31.

3.4 Whole Effluent Toxicity Monitoring

Alaska WQS at 18 AAC 70.030 require that an effluent discharged to a water may not impart chronic toxicity to aquatic organisms, expressed as 1.0 chronic toxic unit (TUc), at the point of discharge, or if the Department authorizes a mixing zone in a permit, approval, or certification, at or beyond the mixing zone boundary, based on the minimum effluent dilution achieved in the mixing zone. 18 AAC 83.435 requires that a permit contain limitations on whole effluent toxicity (WET) when a discharge has reasonable potential to cause or contribute to an exceedance of a WQS. 18 AAC 83.335 recommends chronic testing for facilities with dilution factors less than 100:1 at the boundary of the mixing zone, acute testing for facilities with dilution factors greater than 1000:1 at the boundary of the mixing zone, and either acute or chronic testing for dilution factors between 100:1 and 1000:1 at the boundary of the mixing zone.

WET tests are laboratory tests that measure total toxic effect of an effluent on living organisms. WET tests use small vertebrate and invertebrate species and/or plants to measure the aggregate toxicity of an effluent. WET testing is included in the permit to demonstrate any potential toxicity resulting from the WWTF discharge. The two different durations of toxicity tests are: acute and chronic. Acute toxicity tests measure survival over a 96-hour exposure. Chronic toxicity tests measure reductions in survival, growth, and reproduction over a 7-day exposure.

The previous permit required that AWWU conduct annual chronic toxicity tests with the water flea, *Ceriodaphnia dubia* (survival and reproduction test) and the fathead minnow *Pimpehales promelas* (larval survival and growth test). The organisms were tested at the following effluent concentrations: 54.8%, 27.4%, 13.7%, 6.8%, 3.4%, and a control (0%) for the summer season between June 1 and September 30. For the winter season, between October 1 and May 31, the dilution series was: 78.4%, 39.2%, 19.6%, 9.8%, 4.9%, and a control (0%). The 0% was the control dilution, specific to the season the sample was gathered. A total of five chronic toxicity tests for both species were conducted that included five annual tests performed during the calendar years of 2019-2023. Tests were conducted on 24-hour flow composited final effluent samples. Results from four of the five *Ceriodaphnia dubia* tests exhibited no chronic effects or toxic response for either survival or reproduction as defined by the permit. The *Ceriodaphnia dubia* test conducted in winter 2021 exhibited no chronic effects or toxic response for survival; and a toxic response in reproduction, where the reproduction NOEC was 19.6% effluent, resulting in 5.1 TUc. The survival EC25 and reproduction IC25 were both >100% effluent, resulting in <1.0 TUc for both end points. As indicated in the WET submittal, the TUc remained well within the permit winter trigger. For *Pimephales promelas,* five tests exhibited no chronic effects or toxic response for either survival or growth.

In order to provide ongoing assessment of the toxicity of the ER WWTF's wastewater discharge, and ensure compliance with 18 AAC 83.335, effluent monitoring for WET is required in the permit. WET monitoring in this permit will also satisfy the WET monitoring requirements in Application Form 2A, the form required when reapplying for permit reissuance.

There are no chronic toxicity effluent limits for this discharge. The test dilution series and the TUc triggers have been adjusted in this permit from the previous permit. For winter sampling events, chronic WET testing requires dilution of effluent in the following series: 63.6%, 31.8%, 15.9%, 8%, 4 %, and a control (0%). For summer sampling events, the chronic WET testing effluent dilution series is: 78.4%, 39.2%, 19.6%, 9.8%, 4.9%, and a control (0%). The tests will be performed on an annual basis in alternating seasons defined as summer: (June 1 – September 30) and winter: (October 1 – May 31). WET testing dilution in the current permit is based on the dilution of the chronic mixing zone for the summer and winter seasons, respectively.

DEC conducted a RPA with the WET results submitted for each season. Not accounting for dilution provided in the mixing zone, WET has reasonable potential to exceed the water quality criteria of 1.0 TUc defined as 100/No Observed Effect Concentration (NOEC), at the end of the pipe. The highest reported TUc between October 1 and May 31 was 5.1 TUc and all of the samples between June 1 and September 30 were less than the water quality criterion of 1 TUc. For this discharge, WET will be included in the mixing zone and the chronic WET permit triggers are any one test result greater than a critical effluent dilution of 15.9% (100/6.3 TUc = 15.9%) in the winter season or greater than a critical effluent dilution of 19.6% (100/5.1 TUc = 19.6 %) in the summer season. A TUc equals 100/NOEC (e.g., If NOEC = 100, then toxicity = 1 TUc).

The current permit also requires accelerated WET testing if toxicity is greater than 19.6 TUc in the summer season or 15.9 TUc in the winter season in any test. If the toxicity exceeds the permit triggers, six bi-weekly WET tests (every two weeks over a 12 week period) is required. If AWWU demonstrated corrective actions have been implemented, only one accelerated test is required. If toxicity is greater than 19.6 TUc or 15.9 TUc for the summer or winter seasons, respectively, in any of the accelerated tests, AWWU must initiate a Toxicity Reduction Evaluation (TRE). A TRE is required so that specific cause of the toxicity can be identified and mitigated (see Section 1.4.11 of the permit for further details).

3.5 Receiving Waterbody Monitoring Requirements

The permit requires upstream monitoring for temperature, pH and water hardness in Eagle River. The WQC of certain metals, including copper, lead, and zinc, are water hardness dependent. Additionally, ammonia also remains as a pollutant of concern and ammonia WQC is dependent upon receiving waterbody temperature and pH as well. Receiving water monitoring for water hardness will allow continued accurate characterization of ambient conditions for water-hardness-dependent metals of concern in the next permit cycle. The permittee must monitor the Eagle River for pH, temperature, and hardness in summer and winter at a location upstream of the influence of the facility's discharge. (See Permit section 1.5) Table 5 contains Eagle River upstream monitoring requirements.

Table 5: Eagle River Upstream Monitoring Requirements

Parameter	Units [a]	Sample Frequency	Sample Type
pH	SU	Twice per season [b]	Grab
Temperature	° C	Twice per season [b]	Grab
Hardness as $CaCO_3$	mg/L	Twice per season [b]	Grab

Footnotes:

a. Units: SU= standard units, °C= degrees Celsius, mg/L = milligrams per liter,

b. Summer season: June 1 – September 30; Winter season: October 1 – May 31.

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4.0 RECEIVING WATERBODY

4.1 Description of Receiving Waterbody

Eagle River lies within the Cook Inlet Basin. Eagle River is a typical Alaskan river located in South-central Alaska that is fed by mountain and glacial runoff. The river's main source is Eagle Lake which is fed by Eagle Glacier, which are both located southeast of the community in the Chugach Mountains. The river flows in a northwesterly direction to its mouth in Eagle Bay, a part of Knik Arm in Cook Inlet. The river is approximately 25 miles long and has an approximate hydraulic gradient of 110 feet per mile, which yields a moderately turbulent flow, especially during warmer months when melting is exacerbated. The river is also characterized by a high suspended solids sediment load, which is typical of glacial streams.

4.2 Low Flow Conditions

7Q10 flow represents the lowest stream flow for seven consecutive days that would be expected to occur once in ten years and is largely used to determine critical receiving water conditions for modeling chronic mixing zones in stream settings. 1Q10 flow represents the lowest stream flow for one day that would be expected to occur once in ten years and is largely used to determine critical receiving water conditions for modeling acute mixing zones in stream settings. Low flow conditions (7Q10 and 1Q10) for Eagle River were determined from historic United States Geological Survey (USGS) data measured from 1965 through 1981. In the prior permit, there was more recent river flow data, but it was determined not to be useful for calculating low flow as it only includes high flow data from the months of May through October or early November when equipment is removed for the winter. Actual United States Geological Survey (USGS) gauging station data were used to determine the 1Q10 flow. The 7Q10 and 1Q10 low flows for the winter were determined to be the same rate; 31.2 cubic feet per second (cfs). 7Q10 and 1Q10 low flows for the summer months were determined to be very similar at 205 cfs and 212.8 cfs, respectively. DEC recommends that the 7Q10 and 1Q10 flows be updated with new information during the permit cycle. The updated flow information should be submitted with the facility's application for reissuance. The rate of melting of Eagle Glacier, the source of Eagle River, has increased since 1981 and this could potentially cause the summer season flow to be greater than the flow calculated from the measurements taken in 1965 - 1981. Dryer winters and longer summer seasons also may have affected the winter season 7Q10 and 1Q10 calculations. DEC is suggesting that AWWU determine the feasibility of conducting a study in order to collect year-round flow data for Eagle River during the permit cycle. More information can be found in Fact Sheet Part 7.3.

4.3 Outfall Description

The ER WWTF discharges treated effluent into Eagle River near the bottom of the center channel of the river. The outfall terminus is positioned approximately two meters closer to the bank on the north side of the river than to the south bank. Geographic coordinates of the outfall are 61.318889 North latitude and 149.592500 West longitude. The Outfall 001A terminus is a single port discharge unit without a diffuser and does not have intermittent or periodic discharges.

4.4 Water Quality Standards

Section 301(b)(1)(C) of the CWA required the development of limits in permits necessary to meet water quality standards by July 1, 1977. Per 18 AAC 83.435, APDES permits must include conditions to ensure compliance with WQS. Additionally, regulations in 18 AAC 70 require that the conditions in permits ensure compliance with the WQS. The state's WQS are composed of waterbody use classifications, numeric and/or narrative water quality criteria, and an Antidegradation Policy. The use classification system identifies the designated uses that each waterbody is expected to achieve. The numeric and/or narrative water quality criteria are the criteria deemed necessary by the state to support the designated use classification of each waterbody. The antidegradation policy ensures that the existing uses and the level of water quality necessary to protect the uses are maintained and protected.

Water bodies in Alaska are designated for all uses unless the water has been reclassified under 18 AAC 70.230 as listed under 18 AAC 70.230(e). Some waterbodies in Alaska can also have site–specific water quality criterion per 18 AAC 70.235, such as those listed under18 AAC 70.236(b). The receiving water for this discharge, Eagle River, has not been reclassified, nor have site-specific water quality criteria been established. Therefore, existing uses and designated uses are the same and Eagle River must be protected for all freshwater use classes listed in 18 AAC 70.020(a)(1). These fresh water designated uses consist of the following: water supply for drinking, culinary, and food processing; water supply for agriculture, including irrigation and stock watering; water supply for aquaculture and industry; contact and secondary recreation, and growth and propagation of fish, shellfish, other aquatic life, and wildlife.

4.5 Water Quality Status of Receiving Water

Any part of a waterbody for which the water quality does not, or is not expected to, intrinsically meet applicable WQS is defined as a "water quality limited segment" and placed on the state's impaired waterbody list. For an impaired waterbody, Section 303(d) of the CWA requires states to develop a TMDL management plan for the waterbody. The TMDL documents the amount of a pollutant a waterbody can assimilate without violating a state's WQS and allocates that load to known point sources and nonpoint sources.

EPA completed and finalized a TMDL for Eagle River in 1995 with a WLA and margin of safety for the ER WWTF for the pollutants, ammonia, chlorine, lead and copper; however, a TMDL management plan was never finalized. Eagle River was later placed in Category 4a in the 2002/2003 *Integrated Water Quality Monitoring and Assessment Report* (2002 Integrated Report) and remained there until the DEC determined that Eagle River was back in attainment and DEC made the decision to change the status of Eagle River to Category 2 in the 2018 *Integrated Water Quality Monitoring and Assessment Report* and further demonstrated that Eagle River was attaining water quality standards for all designated uses for copper, silver, lead, ammonia, and chlorine. A team from the Anchorage Water and Wastewater Utility (AWWU) collected ambient water samples at a monitoring location upstream of the ERWTF to evaluate natural background pollutant concentrations for copper, lead, ammonia, and silver in Eagle River. A summary of that data and subsequent analysis was used and presented in the attainment determination and was determined sufficient to establish that the water quality criteria for the aquatic life acute and chronic designated uses for Eagle River were being met. This decision was finalized on March 2020 and approved by EPA in June 2020.

4.6 Mixing Zone Analysis

In accordance with state regulations at 18 AAC 70.240, the Department may authorize a mixing zone in a permit. Determination of the mixing zones requires an evaluation of critical conditions of the flow regimes of the receiving waterbody, effluent characterization and concentration projections, and discharges rates. These critical conditions are addressed in the permit application. A chronic mixing zone is sized to protect the ecology of the waterbody as a whole and an acute mixing zone is sized to prevent lethality to passing organisms.

In the previous permit, the acute and chronic mixing zones and calculated dilution factors were modelled using CORMIX modeling software for both summer (June 1-September 30) and winter (October 1-May 31) seasons. Inputs included the maximum expected effluent concentrations and the acute and chronic WQ criteria of parameters that demonstrated RP (see Appendix A for details on the RPA), as well as any site-specific discharge and ambient data. NO_3/NO_2 required the most dilution of the parameters that demonstrated RP to exceed water quality criteria, and therefore determined the final chronic mixing zone size for both the summer and winter seasons. Temperature, DO, copper, lead, TDS, and WET fit within the chronic mixing zone sized for NO_3/NO_2. The chronic NO_3/NO_2 mixing zone had a dilution factor of 7.3 for the summer season, and a dilution factor of 5.1 for the winter season.

For the present permit, acute and chronic aquatic life criteria were calculated for ammonia, lead, copper, and zinc using data from the ambient water quality monitoring data and the *APDES Permits Reasonable Potential Analysis and Effluent Limits Development Guide*. The most stringent criteria for metals is the chronic criteria for the protection of aquatic life. The WQC for metals in the Toxics manual are given as dissolved criteria. 18 AAC 83.525 requires that effluent limits for a metal must be expressed in terms of "total recoverable metal"

as defined in 40 CFR § 136, adopted by reference in 18 AAC 83.010. Metals data was expressed as total recoverable, except for copper and zinc which are dissolved. Dissolved criteria were used for copper and zinc as it was expressed on their data submittals as being higher and therefore more conservative.

For the critical upstream concentrations of metals and other parameters present in the receiving water, the 85th percentile of measured pollutant concentrations was used in the Reasonable Potential Analysis (RPA). For ammonia, the 85th percentile of the receiving water concentration was used for both the summer and winter seasons. Since ammonia is a pH and temperature dependent parameter, the 85th percentile of pH and temperature were used to calculate the acute and chronic WQCs, used in the RPA for summer and winter. Ambient water temperature, pH, and hardness data was utilized to calculate acute and chronic aquatic life criteria for copper, lead and zinc. The calculated WQC for water hardness-dependent metals are higher for the summer season in the permit, compared to WQC calculated in the previous permit because the 15th percentile of the summer water hardness data is 68 mg/L (proposed permit); lower than the summer water hardness value of 53 mg/L in the prior permit. For winter, the 15th percentile of the receiving waterbody winter hardness data is 112 mg/L; higher than the estimated winter receiving waterbody hardness of 110 mg/L in the previous permit.

DEC received AWWU's application for reissuance of the permit on August 31, 2024. As part of the application, AWWU had a data summary prepared (by GV Jones and SLR) of the effluent data and receiving water monitoring required by the previous permit. GV Jones/SLR used the Cornell Mixing Zone Expert System (CORMIX) modeling program, a widely used and broadly accepted modeling tool. To simulate reasonable worst case conditions, the following were used in the mixing zone modeling: the facility's maximum daily design flow rate of 2.5 mgd and calculated Maximum Projected Effluent Concentrations (MECs) for ammonia, lead, copper, WAD cyanide, mercury, zinc, and TDS. For the NO_3/NO_2, a pollutant of concern and current mixing zone drive for both summer (June 1 to September 30) and winter (October 1 to May 31) chronic mixing zones, a human health criterion (HHC) was assessed using averages which is not correct and does not follow DEC *APDES Permits Reasonable Potential Analysis and Effluent Limits Development Guide* in which we are instructed to use the MECs. GV Jones/SLR also compiled an effluent data summary and subsequently performed a Reasonable Potential Analysis (RPA) on each pollutant of concern. In the analysis, GV Jones/SLR determined that the driving parameter for the summer chronic mixing zone was WAD Cyanide and the winter chronic driving parameter was ammonia with proposed mixing zone and dilution factor modifications included in their submittal for AWWU. They also requested that WAD cyanide, mercury, and zinc also be included in the mixing zone.

In accordance with 18 AAC 70.240, DEC also modeled the acute and chronic mixing zones and calculated dilution factors using the CORMIX version 12.0 modeling program. DEC's models yielded different mixing zone sizes than those proposed by GV Jones/SLR, as well as a different driving parameter for the chronic mixing zones in both the summer and winter seasons. DEC's analysis was based on inputs to CORMIX that included the MECs and the acute and chronic WQS numeric criteria of parameters that demonstrated RP to exceed water quality criteria at the end of pipe prior to discharge, as well as site-specific discharge and ambient data, effluent performance data from the ER WWTF's discharge and the maximum daily design flow of 2.5 mgd. See Fact Sheet APPENDIX A for details on the RPA. Differences between GV Jones/SLR and DEC's CORMIX models were primarily due to RPA and modeling criteria for ammonia, WAD cyanide, mercury and NO_3/NO_2.

In DEC's analysis, NO_3/NO_2 required the most dilution of the parameters that demonstrated RP to exceed water quality criteria, and therefore determined the final chronic mixing zone size for both the summer and winter seasons. Temperature, zinc, copper, lead, DO, TDS, and WET fit within the chronic mixing zone sized for NO_3/NO_2. The chronic NO_3/NO_2 mixing zone has a dilution factor of 5.1 for the summer season, and a dilution factor of 6.3 for the winter season. The chronic summer mixing zone has a length, parallel to the downstream course of Eagle River, of 76 feet and a width of 8.5 feet. The chronic winter mixing zone has a length of 1188 feet and a width of 31 feet. The mixing zone extends from the river bed to the surface. The WQC may be exceeded within the authorized chronic mixing zones. All WQC will be met and apply at the boundary of the chronic mixing zone.

Table 6 shows the dilution factors and mixing zone sizes used in the previous permit compared to the dilution factors and mixing zone sizes for this permit.

Table 6: Mixing Zone Dilution Factors (DF) and Sizes for Current Permit

Mixing Zone		DF Current	Length (ft) Current	Width (ft) Current
Summer [a]	Acute	2.4	15	4
	Chronic	5.1	76	8.5
Winter [b]	Acute	1.3	1	2
	Chronic	6.3	1188	31

Footnotes:
a. Summer is June 1 through September 30
b. Winter is October 1 through May 31

There is a smaller, initial, acute mixing zone surrounding the outfall and contained within the larger chronic mixing zone for both the winter and summer seasons. For the summer season, zinc is the acute driver and for the winter season, temperature is the acute driver. Other parameters, other than zinc and temperature, that indicated there was RP to exceed Alaska WQS at the boundary of the acute mixing zone for summer and winter were TDS, copper, lead, and ammonia which are contained within the boundary of the chronic mixing zone for NO_3/NO_2 .The summer season acute mixing zone has a dilution factor of 2.4, with a length of 15 feet and a width of 4 feet. The winter season acute mixing zone has a dilution factor of 1.3, with a length of 1feet and a width of 2 feet. Acute aquatic life criteria will be met and apply at and beyond the boundary of this smaller initial mixing zone surrounding the outfall.

According to EPA (1991) and 18 AAC 70.240, lethality to passing organisms would not be expected if an organism passing through the plume along the path of maximum exposure is not exposed to concentrations exceeding the acute criteria when averaged over a one hour time period. Furthermore, the travel time of an organism drifting through the acute mixing zone must be less than approximately 15 minutes if a one hour exposure is not to exceed the acute criterion. DEC determined that the travel time of an organism drifting through the acute mixing zone to be approximately 1.2 seconds for the winter acute mixing zone and approximately 0.66 seconds during the summer acute mixing zone; therefore, there will be no lethality to organisms passing through the acute mixing zone for either season.

Other data required for the mixing zone modeling included: the input of receiving water characteristics at the outfall, such as the depth of the receiving water at the outfall, the ambient velocity, wind velocity, bank configuration and distance of the outfall from the bank, and other features. Based on the inputs, CORMIX predicted the distance at which the parameters would meet WQC as well as the corresponding dilution at the point. Table 11 provides a list of inputs used in the CORMIX modeling program.

Fact Sheet APPENDIX D outlines criteria that must be met in order for the Department to authorize a mixing zone. These criteria include the size of the mixing zone, treatment technology, existing uses of the waterbody, human consumption, spawning areas, human health, aquatic life, and endangered species. The following summarizes the Department's mixing zone analysis:

4.6.1 Size

In accordance with 18 AAC 70.240(k), the mixing zone must be as small as practicable. In order to ensure that the mixing zone is as small as practicable, DEC used CORMIX to model the chronic and acute mixing zones for seasonal flow rates, effluent temperatures, effluent flow rates and ambient density profiles.

18 AAC 70.240(b)(2) requires the Department to consider the characteristics of the effluent after treatment of the wastewater. DEC reviewed the most recent five years of DMRs from June 2020 through June 2025 and AWWU's wastewater discharge application, Form 2A, to determine which parameters had RP to exceed WQ

criteria at the end of pipe, and then which of the parameters required the most dilution to meet WQ criteria for the chronic and acute mixing zones. NO_3/NO_2 required the most dilution in the chronic mixing zone to meet chronic human health WQ criteria. NO_3/NO_2 was modeled in CORMIX to determine the smallest practicable chronic mixing zone size for both summer (June 1-September 30) and winter (October 1-May 31) seasons.

The maximum expected concentrations for NO_3/NO_2, corresponding NO_3/NO_2 human health WQ criteria, and assumed ambient NO_3/NO_2 concentrations were entered into CORMIX. For the ambient concentration of NO_3/NO_2, the Department followed its RPA and Effluent Limit Development Guide, which stipulates when no ambient data exists, the permit writer shall assume that the ambient concentration of the pollutant is 15% of the most stringent applicable water quality criterion. Accordingly, an assumed ambient concentration of 1.5 mg/L of NO_3/NO_2 was used as it represents 15% of the human health-drinking water NO_3/NO_2 numeric WQ criteria (10.0 mg/L * .15 = 1.5 0 mg/L). This was the same criterion for both the summer and winter seasons. Other pollutants in the chronic mixing zone include; zinc, dissolved oxygen, copper, lead, temperature, TDS, and WET.
For the acute mixing zones, the summer maximum expected concentration for zinc was 184 µg/L with an assumed ambient concentration of 13 µg/L, and an acute aquatic life criterion of 87 µg/L. The winter maximum expected concentration for temperature was 17.3 º C with an assumed ambient concentration of 1.9 º C and an acute aquatic life criterion of 13 º C. More information about mixing zone dilutions and sizes are shown in Table 6 and more information about zinc, temperature, and NO_3/NO_2 can be found in Fact Sheet APPENDIX A.

In accordance with 18 AAC 70.240, the Department determined that the size of the mixing zone for ER WWTF's discharge is appropriate. The dilution factors and sizes of the chronic and acute mixing zones for both summer and winter seasons have changed from the previous permit issuance. The summer chronic mixing zone decreased in size from 169-feet long by 13-feet wide with a dilution factor of 7.3 in the prior permit issuance to 76-feet long by 8.5-feet wide and a dilution factor of 5.1 in the proposed permit. The winter chronic mixing zone increased in size with a higher dilution factor. In the previous permit, the winter chronic mixing zone size was 790 feet long by 26 feet wide with a 5.1 dilution factor. In the proposed permit, the winter chronic mixing zone dimensions are 1188-feet long by 31-feet wide with a dilution factor of 6.3. See Table 6.

The relationship between dilution and factors and mixing zone sizes is predicted by CORMIX modeling.
18 AAC 83.135 (b)(2) states that the department has cause to modify a permit when the Department receives new information that was not available at the time of permit issuance, and the new information would have justified the imposition of different permit conditions at the time of issuance.

The acute mixing zone in summer (June 1-September 30), driven by zinc, is sized according to the dilution required by zinc to meet acute aquatic life water quality criteria. The acute mixing zone for winter (October 1-May 31), driven by temperature, is sized according to the dilution required by temperature to meet acute aquatic life water quality criteria. Both acute mixing zones are based on five years of effluent data submitted by the permittee from June 2020 to June 2025. The CORMIX model indicates that the water quality criteria would be met relatively rapidly, approximately parallel to the direction of the ambient (in both summer and winter seasons). The mixing zone is sized to ensure: 1) the water quality criteria found in 18 AAC 70 are met at the boundary of the mixing zones, 2) the mixing zone is as small as practicable, and 3) compliance with all other applicable mixing zone regulations.

Table 10 summarizes basic CORMIX inputs that were used to model the mixing zones.

Table 7: Summary of DEC CORMIX Model Inputs

Parameter Modeled	Maximum Expected Concentration	Ambient Concentration	Acute Aquatic Life Criterion	NO_3/NO_2 Human Health Drinking Water Criteria
Total Nitrate/Nitrite (NO_2/NO_3)	42.9 mg/L [a]	1.5 mg/L [a, b]	**N/A**	10 mg/L [a, b]
	53.2 mg/L [b]			
Zinc (Total recoverable)	184 µg/L [a]	13 µg/L [a]	87 µg/L [a]	**N/A**
Temperature	17.3 º C [b]	1.9 º C [b]	13 º C [b]	
Outfall Characteristics				
Outfall Type & Length	15.85 meters (52 foot) long outfall pipe oriented at a 2% vertical downward grade to the river, resting on river bed, no diffuser			
Port Height above Streambed	0.01 m [a, b]			
Nearest bank	Right [a, b]			
Distance to nearest bank	7 m [a]			
	5 m [b]			
Port Characteristics [a, b]	Diameter = 0.3 m, Vertical angle Theta = 90 º, Horizontal angle Sigma = 0 º, Port Height above Channel Bottom = 0.01 m			
Effluent Characteristics				
Flow rate	2.5 mgd design flow			
Temperature	14.6 º C [a]			
	11.6 º C [b]			
Ambient Receiving Water Conditions				
River Depth	0.4 m [a]			
	0.28 m [b]			
Discharge Depth	0.35 m [a]			
	0.31 m [b]			
Wind Speed	2 mph [a, b]			
Receiving water flow rate (7Q10 ambient flow rate)	205 cfs [a]			
	31.2 cfs [b]			
River Width	24 m [a]			
	13.5 m [b]			
Manning's n	0.035 [a, b]			
Water Temperature	8.4 º C [a]			
	4.0 º C [b]			

Footnotes:

a. Determined for the summer season (June 1 through September 30).

b. Determined for the winter season (October 1 through May 31).

4.6.2 Technology

In accordance with 18 AAC 70.240(c)(1), the Department finds that available evidence reasonably demonstrates that the wastewater at the ER WWTF will be treated to remove, reduce, and disperse pollutants using methods found by the Department to be the most effective and technological and economical feasible, consistent with the highest statutory and regulatory treatment requirements.

The ER WWTF wastewater treatment system includes preliminary treatment, primary treatment; secondary treatment via extended aeration activated sludge, secondary clarifiers, a sand filtration system and UV disinfection. The facility rarely violates permit limits and routinely produces high quality effluent. Wastewater effluent at the ER WWTF often exceeds minimal percent removal secondary treatment requirements. The facility averages 98.8% removal of TSS and over 98.6% removal of BOD_5.

4.6.3 Low Flow Design

In accordance with 18 AAC 70.240(l), DEC incorporated low flow data from USGS for Eagle River. Low flow conditions (7Q10 and 1Q10) for Eagle River were determined from historic United States Geological Survey (USGS) data measured from 1965 through 1981. Actual United States Geological Survey (USGS) gauging station data were used to determine the 1Q10 flow. The 7Q10 and 1Q10 low flows for the winter were determined to be the same rate; 31.2 cubic feet per second (cfs). 7Q10 and 1Q10 low flows for the summer months were determined to be very similar at 205 cfs and 212.8 cfs, respectively.

4.6.4 Existing Use

In accordance with 18 AAC 70.240(c)(2)and (3) and18 AAC 70.240(c)(4)(B) and (C), the mixing zone has been appropriately sized to fully protect the existing uses of Eagle River. The Eagle Rivers existing uses and biological integrity have been maintained ad protected under the terms of the previous permit and shall continue to be maintained and protected under the terms of the reissued permit. Water quality criteria are developed to specifically protect the uses of the waterbody as a whole. Because water quality criteria for pollutants that demonstrated reasonable potential to exceed water quality criteria will be met prior to or at the boundary of the mixing zones, designated and existing uses in the Eagle River that are beyond the boundary of the mixing zones will be maintained and protected.

Furthermore, the results of the most recent five years of WET testing have indicated that toxicity does not exist at levels that would be expected to result in any biological impairment of the waterbody or cause an environmental effect or damage to the ecosystem that the department considers so adverse that a mixing zone is not appropriate. DEC has determined that the existing uses and biological integrity of the waterbody will be maintained and fully protected under the terms of the permit as required at
18 AAC 70.240(c)(2) and 18 AAC 70.240(c)(3).

4.6.5 Human Consumption

In accordance with the conditions of the permit, and in accordance with 18 AAC 70.240(d)(6) the pollutants discharged cannot produce objectionable color, taste, or odor in aquatic resources harvested for human consumption. There is no indication that the pollutants discharged have produced objectionable color, taste, or odor in aquatic resources harvested for human consumption. Signs are required to be posted to inform the public that certain activities such as harvesting of aquatic life for raw consumption should not take place in the mixing zone.

4.6.6 Spawning Areas

In accordance with 18 AAC 70.240(f), a mixing zone is not authorized in an area of anadromous fish spawning or resident fish for spawning redds for Arctic grayling, northern pike, lake trout, brook trout, sheefish, burbot, landlocked coho salmon, chinook salmon, sockeye salmon, or anadromous or resident rainbow trout, Arctic char, Dolly Varden, whitefish, or cutthroat trout.

The Alaska Department of Fish and Game (ADF&G) Catalog of Waters Important for Spawning, Rearing, or Migration of Anadromous Fishes available at https://www.adfg.alaska.gov/static-sf/AWC/PDFs/2022sea_CATALOG.pdf does not identify the Eagle River near the Eagle River WWTF outfall as important for the spawning, rearing, or migration of anadromous fishes.

4.6.7 Human Health

In accordance with 18 AAC 70.240(d)(1), the mixing zone must not contain bioaccumulating, bioconcentrating, or persistent chemicals above natural or significantly adverse levels. 18 AAC 70.240(d)(2), states that the mixing zone must not present an unacceptable risk to human health from carcinogenic, mutagenic, teratogenic, or other effects as determined using risk assessment methods approved by DEC and consistent with 18 AAC 70.025. An analysis of the effluent data that was included with AWWU's application for permit reissuance, DMR's, and the results of the RPA conducted on pollutants of concern indicated that the level of treatment is protective of human health. The effluent data was then used in conjunction with applicable WQC, which serve the purpose of protecting human and aquatic life, to size the mixing zone to ensure all WQC are met in the waterbody at the boundary of the mixing zones.

4.6.8 Aquatic Life and Wildlife

In accordance with 18 AAC 70.240, the mixing zone authorized in the permit shall be protective of aquatic life and wildlife. The mixing zone does not form a barrier to migratory fish species or fish passage nor will it result in a reduction of fish population levels. A toxic effect will not occur in the water column, sediments, or biota outside the boundaries of the mixing zones. The CORMIX mixing zone modeling conducted for this discharge incorporated the most stringent water quality criteria in the models for protection of the growth and propagation of fish, shellfish, other aquatic life, and wildlife, and all water quality criteria will be met at the boundary of the authorized mixing zones

4.6.9 Endangered Species

In accordance with 18 AAC 70.240(c)(4)(F), the mixing zone will not cause an adverse effect on threatened or endangered species. The DEC contacted via email The United States Fish and Wildlife Service (USFWS) on August 13, 2025, for a list of any known or potentially threatened or endangered species under their jurisdictions in the vicinity of the Eagle River wastewater discharge outfall.

The United States Fish and Wildlife Service (USFWS) responded to DEC's request on August 21, 2025 and recommended the DEC review their website at https://ecos.fws.gov/ipac/ in regards to the vicinity of the Eagle River WWTF Outfall. The USFWS also provided additional information regarding the Migratory Bird Treaty Act (MBTA) as it pertains to vegetation clearing, ground disturbance, and other site construction activities, however none of which will be occurring in or around the Eagle River WWTF outfall.

DEC will provide a copy of the permit and fact sheet to NMFS and USFWS when it is publicly noticed. Any comments received from the agencies regarding endangered species will be considered prior to issuance of the permit.

5.0 ANTIBACKSLIDING

18 AAC 83.480 requires that "interim effluent limitations, standards, or conditions must be at least as stringent as the final effluent limitations, standards, or conditions in the previous permit, unless the circumstances on which the previous permit was based have materially and substantially changed since the permit was issued, and the change in circumstances would cause for permit modification or revocation and reissuance under 18 AAC 83.135." 18 AAC 83.480(c) also states that a permit may not be reissued "to contain an effluent limitation that is less stringent than required by effluent guidelines in effect at the time the permit is renewed or reissued."

Effluent limitations may be relaxed as allowed under 18 AAC 83.480, CWA §402(o) and CWA §303(d)(4). 18 AAC 83.480(b) allows relaxed limitations in renewed, reissued, or modified permits when there have been material and substantial alterations or additions to the permitted facility that justify the relaxation, or, if the Department determines that technical mistakes were made.

The length of the chronic mixing zone during the winter season has been increased in length from the length of the chronic winter mixing zone authorized in the previous permit, because an RPA of effluent monitoring data, collected during the previous permit cycle for NO_3/NO_2 demonstrated that a longer and wider chronic mixing zone in the winter season, was required in order to meet water quality standards at the boundaries of the mixing zone. See Fact Sheet Part 4.6.1 and APPENDICES A for more information on the size of the winter chronic mixing zone.

The effluent limitations in this permit reissuance are consistent with 18 AAC 83.480. Therefore, the permit effluent limitations, standards, and conditions in AK0022543 are as stringent as in the previously issued permit. Accordingly, no further backsliding analysis is required for this permit reissuance.

6.0 ANTIDEGRADATION

Section 303(d)(4) of the CWA states that, for water bodies where the water quality meets or exceeds the level necessary to support the waterbody's designated uses, WQBELs may be revised as long as the revision is consistent with the State's Antidegradation policy. The State's Antidegradation policy is found in the 18 AAC 70 Water Quality Standards (WQS) regulations at 18 AAC 70.015. The Department's approach to implementing the Antidegradation policy is found in 18 AAC 70.016, *Antidegradation implementation methods for discharges authorized under the federal Clean Water Act*. Both the Antidegradation policy and the implementation methods are consistent with 40 CFR 131.12 and approved by EPA. This section analyzes and provides rationale for the Department's decisions in the permit issuance with respect to the Antidegradation policy and implementation methods.

Using the policy and corresponding implementation methods, the Department determines a Tier 1 or Tier 2 classification and protection level on a parameter by parameter basis. A Tier 3 protection level applies to a designated water. At this time, no Tier 3 waters have been designated in Alaska.

18 AAC 70.015(a)(1) states that the existing water uses and the level of water quality necessary to protect existing uses must be maintained and protected (Tier 1 protection level).

The Eagle River is not listed as impaired (Category 4 or 5) in *Alaska's Integrated Water Quality Assessment Report* (Alaska's 2024 Integrated Report)*;* therefore, this antidegradation analysis conservatively assumes that the Tier 2 protection level applies to all parameters, consistent with 18 AAC 70.016(c)(1).

18 AAC 70.015(a)(2) states that if the quality of water exceeds levels necessary to support propagation of fish, shellfish, and wildlife and recreation in and on the water, that quality must be maintained and protected, unless the Department authorizes a reduction in water quality (Tier 2 protection level).

The Department may allow a reduction of water quality only after the specific analysis and requirements under 18 AAC 70.016(b)(5)(A-C), 18 AAC 70.016(c)(7)(A-F), and 18 AAC 70.016(d) are met. The Department's findings are as follows:

18 AAC 70.016(b)(5)

(A) *existing uses and the water quality necessary for protection of existing uses have been identified based on available evidence, including water quality and use related data, information submitted by the applicant, and water quality and use related data and information received during public comment;*

(B) *existing uses will be maintained and protected; and*

(C) *the discharge will not cause water quality to be lowered further where the department finds that the parameter already exceeds applicable criteria in 18 AAC 70.020(b), 18 AAC 70.030, or 18 AAC 70.236(b).*

18 AAC 70.020 and 18 AAC 70.050 specify all fresh waters are protected for all uses; therefore, the most stringent water quality criteria found in 18 AAC 70.020 and in the *Alaska Water Quality Criteria Manual for Toxic and Other Deleterious Organic and Inorganic Substances (DEC 2022)* manual apply and were evaluated. This will ensure existing uses and the water quality necessary for protection of existing uses of the receiving waterbody are fully maintained and protected.

The permit places limits and conditions on the discharge of pollutants. The limits and conditions are established after comparing TBELs and WQBELs and applying the more restrictive of these limits. The WQ criteria, upon which the permit effluent limits are based, serve the specific purpose of protecting the existing and designated uses of the receiving water. WQBELs are set equal to the most stringent water quality criteria available for any of the protected water use classes. This also ensures that the resulting water quality at and beyond the boundary of any authorized mixing zone will fully protect all existing and designated uses of the receiving waterbody as a whole.

The portion of Eagle River where the discharge is located was designated as a Category 4a impaired waterbody for ammonia, chlorine, copper, and lead with an associated TMDL going back to 1995. Effective June 2020, the Eagle River was determined to be back in attainment and moved from Category 4 to Category 2 on the 2018 Integrated Report 305(b) list for attainment of the copper, silver, lead, ammonia, and chlorine standards for all designated uses. Therefore, the Eagle River was no longer considered Tier 1 and subject to antidegradation analysis as was required for those parameters at that location. More information about the Eagle River TMDL and attainment can be found in Fact Sheet Part 4.5.

The Department concludes the terms and conditions of the permit will be adequate to fully protect and maintain the existing uses of the water and that the findings under 18 AAC 70.016(b)(5) are met.

18 AAC 70.016(c)

(c) ***Tier 2 analysis for the lowering or potential lowering of water quality not exceeding applicable criteria****. Tier 2 applies when the water quality for a parameter in a water of the United States within this state does not exceed the applicable criteria under 18 AAC 70.020(b), 18 AAC 70.030, or 18 AAC 70.236(b) and receives the protection under 18 AAC 70.015(a)(2).*

(3) *the department will not conduct a Tier 2 antidegradation analysis for*

(A) *reissuance of a license or general or individual permit for a discharge that the applicant is not proposing to expand;*

In the prior APDES permit cycle, DEC determined that the Eagle River WWTF had a new discharge for the NO_3/NO_2 which was determined to be the chronic mixing zone driver for both summer and winter seasons. At that time DEC also conservatively assumed that the discharge from the Eagle River WWTF into Eagle River was a discharge to a Tier 2 waterbody and accordingly conducted a Tier 2 antidegradation analysis. DEC determined that the Eagle River WWTF permit would meet the Antidegradation Policy and the Department's July 14, 2010, Policy and Procedure Guidance for Interim Antidegradation Implementation Methods requirements. The Interim Guidance has been superseded by the 18 AAC 70.016 regulations

18 AAC 70.016(c)(2)(A) states that when evaluating development of a license or general or individual permit for a discharge, the department will conduct a Tier 2 antidegradation analysis for a proposed new or expanded discharge. 18 AAC 70.990(75) states that new or expanded with respect to discharges means discharges that are regulated for the first time or discharges that are expanded such that they could result in an increase in a permitted parameter load or concentration or other changes in discharge characteristics that could lower water quality or have other adverse environmental impacts. Discharge is further defined in 18 AAC 83.990(22) as a discharge of a pollutant.

All pollutants regulated under the permit were also regulated under the prior permit, therefore, not considered a new discharge. The discharge covered under AK0022543 is not expanded from the previous permit. There will

not be an increase in a permitted parameter load, concentration, or other change in discharge characteristics that could lower water quality or have other adverse environmental impacts.

18 AAC 70.016(c)(3)(A) states that the Department will not conduct a Tier 2 antidegradation analysis for reissuance of a license or general or individual permit for a discharge that the applicant is not proposing to expand. Therefore, consistent with 18 AAC 70.016(c)(2)(A) and 18 AAC 70.16(c)(3)(A), DEC is not conducting a Tier 2 antidegradation analysis for this permit reissuance

7.0 OTHER PERMIT CONDITIONS

7.1 Quality Assurance Project Plan

The permittee is required to develop procedures to ensure that the monitoring data submitted are accurate and to explain data anomalies if they occur. The permittee is required to update, implement and/or maintain the Quality Assurance Project Plan (QAPP). The QAPP shall consist of standard operating procedures the permittee must follow for collecting, handling, storing and shipping samples; laboratory analysis; precision and accuracy requirements; data reporting, including method detection/reporting limits; and quality assurance/quality control criteria. The permittee is required to amend the QAPP whenever any procedure addressed by the QAPP is modified. The plan shall be retained on site and made available to the Department upon request.

7.2 Operation and Maintenance Plan

The permit requires the permittee to properly operate and maintain all facilities and systems of treatment and control. Proper operation and maintenance is essential to meeting discharge limitations, monitoring requirements, and all other permit requirements at all times. The permittee is required to review and update the OMP that was required under the previous permit within 180 days of the effective date of the final permit to ensure that it includes appropriate best management practices and pollution prevention measures. The plan shall be retained on site and made available to the Department upon request.

7.3 Receiving Water Flow Study

The Department recommends that the permittee determine whether a study of seasonal flow rates for Eagle River is feasible during the present permit cycle. According to the permittee's information from the application form 2A, the seasonal flow rates used in mixing zone calculations for the present permit are based on United States Geological Survey (USGS) gaging data collected from 1965 – 1981. Updated flow data could potentially provide more accurate mixing zone models and may result in effluent limits more protective of water quality in future permits. If feasible, DEC is requesting that AWWU obtain available USGS gaging data for Eagle River through the end of the present permitting cycle, if it is available, and determine whether it is technologically possible to supplement any missing flow data (e. g., flow rates from the winter or low flow seasons) if that data is not available from the USGS. The new data would be used to compare with known1Q10 and 7Q10 flow calculations used in the present permit. Updated flow data may also be used to determine whether the seasonal divisions by month may be revised in future permits. The present seasonal divisions are as follows: Summer season is June 1 – September 30 and winter season is October 1 – May 31. If new flow data indicates that these seasonal divisions should be revised, this can be done in subsequent permits when new mixing zones are modeled.

7.4 Industrial User Survey

18 AAC 83.340 requires POTWs to identify and locate all Significant Industrial Users (SIUs) that discharge process wastewaters and associated pollutants to their wastewater treatment system. General and specific pretreatment prohibitions at 40 CFR 403.5, adopted by reference at 18 AAC 83.010(g)(2), contain prohibitions that apply to each industrial user introducing pollutants into a POTW, whether or not the industrial user is subject to other National Pretreatment Standards, or any national, State, or local Pretreatment Requirements. Therefore, in order to assess whether an industry or business has the potential to violate any general or specific

pretreatment prohibition, and to determine if a pretreatment program should be developed and/or if pretreatment requirements should be included in the ER WWTF wastewater discharge permit, the permittee is required to submit with their permit reissuance application, Form 2A, a list of those industries or businesses that discharge and/or have the potential to discharge non-domestic wastewater to the ER WWTF''s collection system. DEC may request further information on specific industries or business to assist in this evaluation.

7.5 Electronic Discharge Monitoring Report

The permittee must submit DMR data electronically through NetDMR per Phase I of the E-Reporting Rule (40 CFR 127) upon the effective date of the permit. Authorized persons may access permit information by logging into the NetDMR Portal (https://cdxnodengn.epa.gov/oeca-netdmr-web/action/login). DMRs submitted in compliance with the E-Reporting Rule are not required to be submitted as described in permit APPENDIX A – Standard Conditions unless requested or approved by the Department. Any DMR data required by the Permit that cannot be reported in a NetDMR field (e.g. mixing zone receiving water data, etc.), shall be included as an attachment to the NetDMR submittal. DEC has established an e-Reporting Information website at https://dec.alaska.gov/water/compliance/electronic-reporting-rule that contains general information about this new reporting format. Training materials and webinars for NetDMR can be found at https://usepa.servicenowservices.com/oeca_icis?id=netdmr_homepage .

Phase II of the E-Reporting rule will integrate electronic reporting for all other reports required by the Permit (e.g., Annual Reports and Certifications) and implementation is expected to occur during the term of the permit. Permittees should monitor DEC's E-Reporting Information website (http://dec.alaska.gov/water/compliance/electronic-reporting-rule) for updates on Phase II of the E-Reporting Rule and will be notified when they must begin submitting all other reports electronically. Until such time, other reports required by the Permit may be submitted in accordance with permit APPENDIX A – Standard Conditions.

7.6 Standard Conditions

APPENDIX A of the permit contains standard regulatory language that must be included in all APDES permits. These requirements are based on the regulations and cannot be challenged in the context of an individual APDES permit action. The standard regulatory language covers requirements such as monitoring, recording, reporting requirements, compliance responsibilities, and other general requirements.

8.0 OTHER LEGAL REQUIREMENTS

8.1 Endangered Species Act

The Endangered Species Act (ESA) requires federal agencies to consult with the National Oceanic and Atmospheric Administration (NOAA), NMFS and the USFWS if their actions could beneficially or adversely affect any threatened or endangered species or habitats. NMFS is responsible for administration of the ESA for listed cetaceans, seals, sea lions, sea turtles, anadromous fish, marine fish, marine plants, and corals. All other species (including polar bears, walrus, and sea otters) are administered by the USFWS.

As a state agency, DEC is not required to consult with these federal agencies regarding permitting actions; however, DEC voluntarily contacted the agencies to notify them of the proposed permit issuance and to obtain listings of threatened and endangered species near the discharge.

DEC contacted the USFWS on August 13, 2025 and the NMFS on August 14, 2025, respectively, and requested them to identify any threatened or endangered species under their jurisdiction in the vicinity of the ERWWTF outfall. The United States Fish and Wildlife Service (USFWS) responded to DEC's request on August 21, 2025 and recommended the DEC review their website at https://ecos.fws.gov/ipac/ in regards to the vicinity of the Eagle River WWTF Outfall. The USFWS also provided additional information regarding the Migratory Bird Treaty Act (MBTA) as it pertains to vegetation clearing, ground disturbance, and other site construction activities, however none of which will be occurring in or around the Eagle River WWTF outfall.

DEC also reviewed their website at https://www.fisheries.noaa.gov/alaska/endangered-species-conservation/endangered-threatened-and-candidate-species-alaska and did not identify any threatened or endangered species in the vicinity of the ERWWTF outfall as well.

This fact sheet and the permit will be submitted to the agencies for review during the public notice period and any comments received from these agencies will be considered prior to issuance of the permit.

8.2 Essential Fish Habitat

The Magnuson-Stevens Fishery Conservation and Management Act (January 21, 1999) designates EFH in waters used by anadromous salmon and various life stages of marine fish under NMFS jurisdiction. EFH refers to those waters and associated river bottom substrates necessary for fish spawning, breeding, feeding, or growth to maturity—including aquatic areas and their associated physical, chemical, and biological properties that are used by fish and may include aquatic areas historically used by fish. Spawning, breeding, feeding, or growth to maturity covers a species' full life cycle necessary for fish from commercially-fished species to spawn, breed, feed, or grow to maturity.The EFH regulations define an adverse effect as any impact which reduces quality and/or quantity of EFH and may include direct (e.g. contamination or physical disruption), indirect (e.g. loss of prey, reduction in species' fecundity), site-specific, or habitat-wide impacts, including individual, cumulative, or synergistic consequences of actions.

Section 305(b) of the Magnuson-Stevens Act 916 USC 1855(b)) requires federal agencies to consult NMFS when any activity proposed to be permitted, funded, or undertaken by a federal agency may have an adverse effect on designated EFH as defined by the Act. As a State agency, DEC is not required to consult with NMFS regarding permitting actions, but voluntarily contacts NMFS to notify them of the proposed permit issuance and to obtain listings of EFH in the area

DEC contacted NMFS and NOAA on August 13, 2025, to provide them the opportunity to share concerns with DEC regarding EFH. NOAA responded on August 18, 2025, identifying that the Eagle River is a waterway for all five species of Pacific salmon; however, DEC consulted ADF&G's Catalog of Waters Important for Spawning, Rearing, or Migration of Anadromous Fishes available at https://www.adfg.alaska.gov/static-sf/AWC/PDFs/2025scn_CATALOG.pdf and did not identify the Eagle River near the ERWWTF outfall as important for the spawning, rearing, or migration of anadromous fishes.

This fact sheet and the permit will be submitted to the agencies for review during the public notice period and any comments received from these agencies will be considered prior to issuance of the permit.

8.3 Sludge (Biosolids) Requirements

Sludge means any solid, semi-solid, or liquid residue removed during the treatment of municipal wastewater or domestic sewage. State and federal requirements regulate the management and disposal of sewage sludge (biosolids). The permittee must consult both state and federal regulations to ensure proper management of the biosolids and compliance with applicable requirements.

8.3.1 State Requirements

The Department separates wastewater and biosolids permitting. The permittee should contact the Department's Solid Waste Program for information regarding state regulations for biosolids. The permittee can access the Department's Solid Waste Program web page for more information and who to contact.

8.3.2 Federal Requirements

EPA is the permitting authority for the federal sewage sludge regulations at 40 CFR Part 503. Biosolids management and disposal activities are subject to the federal requirements in Part 503. The Part 503 regulations are self-implementing, which means that a permittee must comply with the regulations even if no federal biosolids permit has been issued for the facility.

A POTW is required to apply for an EPA biosolids permit. The permittee should ensure that a biosolids permit application has been submitted to EPA. In addition, the permittee is required to submit a biosolids permit

application to EPA for the use or disposal of sewage sludge at least 180 days before this APDES permit expires in accordance with 40 CFR §§122.21(c)(2) and 122.21(q) [see also 18 AAC 83.110(c) and 18 AAC 83.310, respectively]. The application form is NPDES Form 2S and can be found on EPA's website, www.epa.gov, under NPDES forms. A completed NPDES Form 2S should be submitted to:

U.S. Environmental Protection Agency
Region 10, NPDES Permits Unit OWW-130
Attention: Biosolids Contact
1200 Sixth Avenue, Suite 900
Seattle, WA 98101-3140

The EPA Region 10 telephone number is 1-800-424-4372. Information about EPA's biosolids program and CWA Part 503 is available at www.epa.gov and either search for 'biosolids' or go to the EPA Region 10 website link and search for 'NPDES Permits'.

8.4 Permit Expiration

The permit will expire five years from the effective date of the permit.

9.0 References

Alaska Department of Environmental Conservation, “Alaska’s Final 2024 Integrated Water Quality Monitoring and Assessment Report,” February 26, 2025.

Alaska Department of Environmental Conservation, “Alaska’s Final 2014-16 Integrated Water Quality Monitoring and Assessment Report,” April 12, 2019.

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APPENDIX A. BASIS FOR EFFLUENT LIMITATIONS

A.1 Statutory and Regulatory Basis

18 Alaska Administrative Code (AAC) 70.010 prohibits conduct that causes or contributes to a violation of the water quality standards (WQS). 18 AAC 15.090 requires that permits include terms and conditions to ensure criteria are met, including operating, monitoring, and reporting requirements.

The regulations require the permitting authority to make this evaluation using procedures that account for existing controls on point and nonpoint sources of pollution, the variability of the pollutant in the effluent, species sensitivity (for toxicity), and where appropriate, dilution in the receiving waterbody. The limits must be stringent enough to ensure that WQS are met and must be consistent with any available wasteload allocation (WLA).The Clean Water Act (CWA) requires a Publicly Owned Treatment Works (POTWs) to meet effluent limits based on available wastewater treatment technology, specifically, secondary treatment effluent limit standards found at Title 40 Code of Federal Regulations (CFR) 133, adopted by reference at 18 AAC 83.010(e). The Alaska Department of Environmental Conservation (Department or DEC) may find, by analyzing the effect of an effluent discharge on the receiving waterbody, that secondary treatment effluent limits are not sufficiently stringent to meet Alaska WQS. In such cases, the Department is required to develop more stringent water quality-based effluent limits (WQBELs), which are designed to ensure that the WQS of the receiving waterbody are met.

Secondary treatment effluent limits for POTWs do not limit every pollutant that may be present in the effluent. Limits have only been developed for five-day biochemical oxygen demand (BOD5), total suspended solids (TSS), and pH. Effluent from a POTW may contain other pollutants, such as bacteria, ammonia, or metals, depending on the type of treatment system used and the quality of the influent to the POTW. When technology-based effluent limits (TBELs) do not exist for a pollutant expected to be present in the effluent, the Department must determine if the pollutant may cause or contribute to an exceedance of a water-quality criterion for the waterbody. If a pollutant causes or contributes to an exceedance of a water-quality criterion, a WQBEL for the pollutant must be established in the permit. Table A-1 summarizes the basis for effluent limits contained in the permit. Further details for each effluent limit follow in this section.

Table A-1- Basis for Effluent Limits

Parameter	Units [a]	EFFLUENT LIMITS				
		Daily Minimum	Monthly Average	Weekly Average	Daily Maximum	Basis for Limit
Flow	mgd	---	----	---	2.5	18 AAC 72.245
BOD_5	mg/L	---	30	45	60	18 AAC 83.010(e)
	lbs/day	---	625	938	1,251	18 AAC 83.540
TSS	mg/L	---	30	45	60	18 AAC 83.010(e)
	lbs/day	---	625	938	1,251	18 AAC 83.540
BOD_5 & TSS Minimum Percent (%) Removal	%	85				18 AAC 83.010(e)
pH	SU	6.5	---	---	8.5	18 AAC 70.020(b)(6)
Fecal coliform Bacteria (FC)	FC/100 mL	---	20	---	40	18 AAC 70.020(b)(2)
Escherichia coli (E. coli)	cfu/100mL	---	126	---	410	18 AAC 70.020(b)(2)(B)
Lead, total recoverable (June 1-September 30)	mg/L	---	---	---	0.030	18AAC 70.020(b)(11)
	lbs/day				0.63	18 AAC 83.435(b) 18 AAC 83.540
Lead, total recoverable (October 1-May 31)	mg/L	---	---	---	0.018	18AAC 70.020(b)(11)
	lbs/day				0.37	18 AAC 83.435(b) 18 AAC 83.540
Copper, total recoverable (June 1-September 30)	mg/L	---	---	---	0.026	18 AAC 83.435(b)
	lbs/day				0.55	18 AAC 83.540
Copper, total recoverable (October 1-May 31)	mg/L	---	---	---	0.025	18 AAC 83.435(b)
	lbs/day				0.52	18 AAC 83.540
Total Nitrate/Nitrite, as N (June 1-September 30)	mg/L	---	44.8	---	50.4	18 AAC 83.435(b)
	lbs/day		934		1051	18 AAC 83.540
Total Nitrate/Nitrite, as N (October 1-May 31)	mg/L	---	44.9	---	66.4	18 AAC 83.435(b)
	lbs/day		936		1385	18 AAC 83.540
Total Ammonia, as Nitrogen (June 1-September 30)	mg/L	---	5.9	---	19.7	18 AAC 70.020(b)(11)
	lbs/day		123		410	18 AAC 83.435(b) 18 AAC 83.540
Total Ammonia, as Nitrogen (October 1-May 31)	µg/L	---	4.7	---	11.5	18 AAC 70.020(b)(11) 18 AAC 83.435(b) 18 AAC 83.540
	lbs/day	---	98	---	240	

Footnotes:

a. Units: mgd = million gallons per day, mg/L = milligrams per liter, lbs/day = pounds per day, SU= standard units, FC/100 mL = Fecal Coliform per 100 milliliters, µg/L= micrograms per liter

A.2 Secondary Treatment Effluent Limitations

The CWA requires a POTW to meet requirements based on available wastewater treatment technology. Section 301 of the CWA established a required performance level, referred to as "secondary treatment," that all POTWs were required to meet by July 1, 1977. The secondary treatment standards in 40 CFR §133.102, which the Department has adopted in 18 AAC 83.010(e), are TBELs that apply to all municipal wastewater treatment plants and identify the minimum level of effluent quality attainable by application of secondary treatment in terms of BOD_5, TSS, and pH. In addition to the federal secondary treatment regulations in 40 CFR Part 133, the State of Alaska requires maximum daily limitations (MDLs) of 60 milligrams per liter (mg/L) for BOD_5 and TSS in its own secondary treatment regulations
[18 AAC 72.990(59)]. The secondary treatment effluent limits are listed in Table B-1.

Table A-2: Secondary Treatment Effluent Limits

Parameter	Units	Average Monthly Limit	Average Weekly Limit	Maximum Daily Limit	Average Monthly Minimum Removal
BOD_5	mg/L	30	45	60	85%
TSS	mg/L	30	45	60	
pH	s.u.	6.0 – 9.0 s.u. at all times			

A.3 Water Quality-Based Effluent Limitations

WQBELs included in Alaska Pollutant Discharge Elimination System (APDES) permits are derived from WQS. APDES regulation 18 AAC 83.435(a)(2) requires that permits include WQBELs that can achieve WQS established under CWA Section 303, including state narrative criteria for water quality. The State's WQS are composed of use classifications, numeric and/or narrative water quality criteria, and an antidegradation policy. The use classification system identifies the designated uses that each waterbody is expected to achieve. The numeric and/or narrative water quality criteria are the criteria deemed necessary by the state to support the designated use classification of each waterbody. Designated uses are those uses specified in WQS for each waterbody or segment whether or not they are being attained [40 CFR Section 131.3(f)]. Existing uses are those uses actually attained in a waterbody on or after November 28, 1975, whether or not they are included in the WQS [40 CFR Section 131.3].

Waterbodies in Alaska are designated for all uses unless the water has been reclassified under 18 AAC 70.230 as listed under 18 AAC 70.230(e). Some waterbodies in Alaska can also have site–specific water quality criteria per 18 AAC 70.235, such as those listed under 18 AAC 70.236(b).

The receiving waterbody for the discharge, the Eagle River, has been reclassified from Category 4a to Category 2, effective June 2020, and determined by the DEC to be in attainment for copper, silver, lead, ammonia, and chlorine standards for all designated uses . Therefore, the Eagle River must be protected for all fresh water designated uses. The WQS at 18 AAC 70.020(a) designates classes of water for beneficial uses of water supply, water recreation, and of growth and propagation of fish, shellfish, other aquatic life, and wildlife

A.4 Reasonable Potential Analysis

The Department used the process described in the Technical Support Document (TSD) for Water Quality-Based Toxics Control (Environmental Protection Agency, 1991) and DEC's guidance, *APDES Permits Reasonable Potential Analysis and Effluent Limits Development Guide* (June 30, 2014) to evaluate the Eagle River Wastewater Treatment Facility (WWTF) effluent. Discharge monitoring reports (DMRs) from June 2020 to June 2025 and Form 2A Application to Discharge Effluent and Expanded Effluent Testing Data were reviewed to identify pollutants of concern. Pollutants of concern are those pollutants that already have a TBEL or WQBEL for a particular pollutant, pollutants with a total maximum load waste load allocation or watershed

analysis, pollutants identified as present in the effluent through monitoring, or those pollutants that are likely to be present in the effluent based on the nature of the operation. The monitoring of the Eagle River WWTF's effluent as reported in the above documents, revealed the presence of NO_3/NO_2, copper, lead, zinc, mercury, WAD cyanide, total dissolved solids (TDS), temperature, and WET at levels above water quality criteria; therefore, these pollutants are pollutants of concern and were selected for further reasonable potential analysis (RPA). DEC assesses reasonable potential to exceed both acute and chronic criterion. Appendix B contains more details on the RPA conducted for this permit.

When evaluating the effluent to determine if WQBELs based on chemical-specific numeric criteria are needed, the Department projects the receiving waterbody concentration for each pollutant of concern downstream of where the effluent enters the receiving waterbody. The chemical-specific concentration of the effluent and receiving waterbody and, if appropriate, the dilution available from the receiving waterbody, are factors used to project the receiving waterbody concentration. If the projected concentration of the receiving waterbody exceeds the numeric criterion for a limited parameter, then there is a reasonable potential that the discharge may cause or contribute to an excursion above the applicable water quality standard, and a WQBEL must be developed. DEC assesses reasonable potential to exceed both acute and chronic criterion. Appendix B contains more details on the RPA conducted for this permit.

The Department may authorize a small volume of receiving water to provide dilution of the effluent; this volume is called a mixing zone. Mixing zone allowances will increase the allowable mass loadings of the pollutant to the waterbody. A mixing zone can be used only when there is adequate receiving waterbody flow volume, and the concentration of the pollutant of concern in the receiving waterbody is below the numeric water quality criterion necessary to protect the designated uses of the waterbody.

A.4.1 Specific Water Quality-Based Effluent Limits in the Eagle River WWTF Permit

A.4.1.1 *Fecal Coliform Bacteria*

The WQS at 18 AAC 70.020(b)(2)(A)(i) Water Supply: drinking, culinary and food processing, states that the fecal coliform (FC) bacteria criteria require that in a 30-day period, the geometric mean of samples may not exceed 20 FC/100 mL and not more than 10% of the samples may exceed 40 Fecal Coliform colonies (FC)/100 milliliters (mL).

The DEC reviewed the ER WWTF effluent monitoring data for FC bacteria from June 2020 – June 2025. In these five years, the facility's performance demonstrated that the effluent could consistently meet FC bacteria effluent limits that are required at the majority of secondary treatment facilities statewide. There were 61 total FC bacteria samples collected for the daily maximums and none of the samples exceeded the WQC of 40 FC/100 mL. The ER WWTF has demonstrated that it can meet the Alaska WQS for FC at the end of the pipe through its disinfection methods. Therefore a mixing zone for FC is not required and the Average Monthly Limit (AML) corresponding to the WQC for FC of a 30-day geometric mean of 20 FC/100 mL and the Maximum Daily Load (MDL) of 40 FC/100 mL will be carried forward for this permit at 1/week. Additionally, the FC WQC is that not more than 10% of the samples may exceed 40 FC/100 mL, therefore, the permit requirements are if more than ten FC bacteria samples are collected during the monthly reporting period, not more than 10% of the samples may exceed 40 FC/100 mL. If fewer than ten FC bacteria samples are collected during the monthly reporting period, no sample results may exceed 40 FC/100 mL.

A.4.1.2 *Total Ammonia (as Nitrogen)*

Total ammonia is the sum of ionized (NH_4^+) and un-ionized ammonia (NH_3). Temperature, pH, and salinity affect which form, NH_4^+ or NH_3 is present. NH_3 is more toxic to aquatic organisms than NH_4^+ and predominates with higher temperature and pH. Biological wastewater treatment processes reduce the amount of total nitrogen in domestic wastewater; however, without advanced treatment, wastewater effluent may still contain elevated levels of ammonia nitrogen. Excess ammonia as nitrogen in the environment can lead to dissolved oxygen depletion, eutrophication, and toxicity to aquatic organisms. Alaska WQS at 18 AAC 70.020(b)(11) contain acute and chronic freshwater ammonia criteria for aquatic life. The water quality criteria are dependent on the presence or absence of early life stages of fish and the pH and temperature of the receiving water.

For this permit cycle, ammonia monitoring results were reviewed from June 2020 to June 2025. A total of 61 samples were evaluated and ran through the RPA tool in order to determine reasonable potential to exceed water quality criteria. 2 of the 61 samples showed to have potential to exceed WQC with maximum observed concentrations 2.02 mg/L and 4.51 mg/L. The 4.51 mg/L was determined to be an outlier, but the 2.02 mg/L remained initially in the data set to be analyzed with the other results. DEC used the 85th percentile of the Eagle River pH and temperature monitoring data collected by the Eagle River WWTF over the permit term and then split it out by summer (June 1-September 30) and winter (October 1- May 31) seasons with summer having the highest maximum observed concentration of 2.02 mg/L. The 2.02 mg/L was then used to establish a chronic ammonia water quality criterion of 2.47 mg/L and an acute ammonia water quality criterion of 5.7 mg/L. It was later determined that the 2.02 mg/L was also an outlier and the remaining 59 data points were used to do an additional reasonable potential analysis showing that there was no potential for ammonia to exceed water quality criteria for either summer or winter seasons with a maximum observed concentration of 0.33 mg/L for the summer and a maximum observed concentration of 0.31 mg/L for the winter. These values were below the ammonia aquatic life Alaska WQS and indicated that ammonia does not have reasonable potential to violate WQS at the boundary of the authorized mixing zone and can meet Alaska WQS at the end of the pipe.

Effective June 2020, the Eagle River was determined to be back in attainment for ammonia, however, in the prior permit cycle and development of ammonia limits, the 1995 Eagle River TMDL was still being imposed and included ammonia WLAs for the ER WWTF effluent, calculated as mass-based effluent limits. The 1995 TMDL summer ammonia WLA for the ER WWTF was 410 lbs/day. A back-calculation of 410 lbs/day, in concentration units of mg/L is 19.7 mg/L (410 lbs/day ÷ (2.5 mgd x 8.34). The 1995 TMDL winter ammonia WLA for the ER WWTF was 240 lbs/day. A back calculation of 240 lbs/day, in concentration units of mg/L is 11.5 (240 lbs/day ÷ (2.5 mgd x 8.34). WQS-WQBELs are described above and are the freshwater acute MDLs and chronic AMLs Alaska WQC for ammonia, applied seasonally. The calculated Daily Maximum effluent limit (Daily Maximum) for the summer and winter seasons are the same as the summer and winter Daily Maximum limits in the previous permit; therefore, the previous limit for the summer and winter Daily Maximums have been retained. The facility routinely demonstrated that it has been able to meet the ammonia permit limits for the subject time periods. Additionally, 18 AAC 83.480 requires that "interim effluent limitations, standards, or conditions must be at least as stringent as the final effluent limitations, standards, or conditions in the previous permit, unless the circumstances on which the previous permit was based have materially and substantially changed since the permit was issued, and the change in circumstances would cause for permit modification or revocation and reissuance under 18 AAC 83.135." 18 AAC 83.480(c) also states that a permit may not be reissued "to contain an effluent limitation that is less stringent than required by effluent guidelines in effect at the time the permit is renewed or reissued." (See Permit Section 5.0) In order to prevent backsliding, the monthly monitoring provision for ammonia for both the summer and winter seasons will be carried forward in this permit and evaluated in the next reissuance.

A.4.1.3 *Escherichia coli (E. coli) Bacteria*

E. coli bacteria are indicator organisms of harmful pathogens recommended by EPA as the best indicator of health risk in fresh water used for recreation. E. coli bacteria are also a better indicator of acute gastrointestinal illness arising from swimming-associated activities than FC bacteria.

Since the Significant Threshold Value for the *E. coli* AWQC is that not more than 10% of the samples may exceed 410 CFU/100 mL, the permit requirements are if more than ten *E. coli* bacteria samples are collected during the monthly reporting period, not more than 10% of the samples may exceed 410 CFU/100 mL. If fewer than ten *E. coli* bacteria samples are collected during the monthly reporting period, no sample result may exceed 410 CFU/100 mL. The ER WWTF has demonstrated that it can meet the Alaska WQS for FC at the end of the pipe through its disinfection methods as there were no exceedances during this last permit cycle. DEC determined that the same disinfection methods should be effective against *E. coli* bacteria and it is assumed that WQS for *E. coli* can be met at the end of the pipe. Therefore, a mixing zone for *E. coli* is not required and the Monthly Average effluent limit (Monthly Average) corresponding to the 30-day geometric mean of 126 cfu/100 mL for *E. coli* and the Daily Maximum of 410 cfu/100 mL will be required for this permit.

A.4.1.4 *Total Nitrate/Nitrite (as Nitrogen)*

The WQS at 18 AAC 70.020(b)(11) states, "The concentration of substances in water may not exceed the numeric criteria for drinking water and human health for consumption of water and aquatic organisms" shown in the Toxics manual. The Total Nitrate/Nitrite (NO3/NO2) criterion for Drinking Water is 10 mg/L and is the same for the summer and winter seasons.

The DEC review of 60 ER WWTF effluent monitoring results for NO_3/NO_2 from June 2020 to June 2025 indicated a range of values from 27.2 mg/L to 47.4 mg/L with an average value of 34.1 mg/L. Due to the absence of site-specific receiving water NO_3/NO_2 data, and per the DEC's RPA and Effluent Limit Development Guidance, the assumption of 15% of the most stringent applicable NO_3/NO_2 Human Health Drinking Water numeric criterion was used (10 mg/L * .15 = 1.5 mg/L) for the RPA effluent limits calculation and mixing zone modeling for summer (June 1-September 30) and winter (October 1-May 31) seasonal limits.

The MEC for NO_3/NO_2 was calculated to be 42.9 mg/L for the summer season which was a decrease from the prior permit cycle which had a MEC of 64.23 mg/L. For the winter season, the MEC was calculated to be 53.2 mg/L which was an increase from the prior permit cycle that calculated to be 45.39 mg/L. Separate calculations are required for the summer and winter seasons, even though the Human Health Drinking Water (HHDW) criterion remains the same, because the receiving water flow rate varies between summer, at 205 cubic feet per second (cfs), and 31.2 cfs for the winter. NO_3/NO_2 was the parameter that required the greatest dilution to meet the HHDW criterion for both seasons. The dilution factor for the chronic mixing zone for the summer season was decreased from 7.3 to 5.1 and the dilution factor for the acute mixing zone for the winter season had an increase from 5.1 to 6.3. For the summer season, more stringent WQBELs were developed with 44.8 mg/L as the Human Health WLA and 50.4 mg/L as the Human Health Daily Maximum for the summer season. For the winter season, the Human Health WLA of 44.8 mg/L was calculated and 66.8 mg/L was calculated as the Human Health MDL ,so the more stringent limits determined in the last permit cycle with a Human Health WLA was 44.85 mg/L and 66.94 mg/L as the Human Health MDL shall be retained and carried forward in this permit for the winter season.

The DEC follows EPA's recommended approach for calculating WQBELs for toxic pollutants for human health protection by setting the Monthly Average equal to the WLA calculated from the human health toxic pollutant criterion and to calculate the Daily Maximum from the AML. The NO_3/NO_2 WQBELs are protective of the waterbody as a whole. See Fact Sheet APPENDIX B for details on RPA and APPENDIX C for details on permit limit derivation.

A.4.1.5 *Copper*

Alaska WQS at 18 AAC 70.020(11) states that the concentration of substances in water may not exceed the numeric criteria for drinking water and human health for consumption of drinking water and aquatic organisms shown in the Alaska Water Quality Criteria Manual. In the prior permit, the DEC review of 21 ER WWTF effluent monitoring results for copper from September, 2014 to August, 2018. The reported values ranged from 6.3 µg/L to 18.8 µg/L for the summer effluent monitoring results and the winter monitoring for copper ranged from 4.9 µg/L to 16.4 µg/L. The Department authorized summer and winter mixing zones with dilution factors for meeting acute and chronic criteria. Based on this and using the RPA Effluent guide, new limits were calculated with a Daily Maximum of 26.2 µg/L for the summer conditions and a Daily Maximum of 24.8 µg/L for winter conditions which were more stringent than the prior 1995 TMDL copper limits calculated by EPA. The 1995 TMDL summer copper WLA for the ER WWTF was 2.5 lbs/day. This amount is greater than the 0.55 lbs/day mass-based Daily Maximum limit in the current permit for copper. 0.55 lbs/day is the summer Daily Maximum effluent limit for copper in mass units, calculated from 26.2 µg/L concentration units, using the formula [lbs/day = concentration (mg/L) x average monthly flow (mgd) x 8.34 (conversion factor)]. The 1995 TMDL winter copper WLA for the ER WWTF was 1.4 lbs/day. A calculation for the winter Daily Maximum effluent limit of 24.83 µg/L yields a mass-based effluent limit of 0.52 lbs/day for the Daily Maximum effluent

limit. Additionally, the 1995 TMDL for Eagle River was determined by the DEC to be back in attainment and approved by EPA in June 2020.

For this permit reissuance, DEC conducted RPAs for copper using effluent and receiving water data results from June 2020- June 2025. The 15th percentile of the receiving water hardness was used to determine acute and chronic copper water quality criteria. RPAs were conducted for summer season (June 1 to September 30) and winter season (October 1-May 31). During both seasons, copper demonstrated reasonable potential to exceed water quality criteria at the boundary of the mixing zone; summer data results ranged from 4.9 µg/L – 7.2 µg/L with a maximum expected concentration of 8.55 µg/L. The acute water quality criteria was calculated at 9.8 µg/L and the chronic water quality criteria was calculated at 6.7 µg/L. Winter data results ranged from 4.08 µg/L – 8.31 µg/L with a maximum expected concentration of 10.6 µg/L. the acute water quality criteria was calculated at 15.6 µg/L and the chronic water quality criteria was calculated at 10.3 µg/L.
Copper was the driving parameter in the prior permit cycle for both acute and chronic mixing zones for both summer and winter seasons. That is not the case for this reissuance as the RPA indicates that copper does have RP to violate AWQC at the boundary of the authorized mixing zone, but the dilution factor was still lower than other pollutants of concern and copper fits well within the proposed mixing zone for this permit reissuance. Additionally, the permit limits calculated with a Daily Maximum of 26.2 µg/L for the summer conditions and a Daily Maximum of 24.8 µg/L for winter conditions were determined to be the most stringent and protective, therefore they will be carried forward in this permit issuance.

A.4.1.6 *Lead*

Alaska WQS at 18 AAC 70.020(11) states that the concentration of substances in water may not exceed the numeric criteria for drinking water and human health for consumption of drinking water and aquatic organisms shown in the Alaska Water Quality Criteria Manual. In the prior permit DEC derived lead criteria from the Department's RPA and Effluent Limitation Guidance. The 15th percentile of the hardness receiving water data collected by AWWU from Eagle River from February 2013 – July 2015 was used to extrapolate the lead criteria from tables contained in the Department's RPA tool. Receiving water hardness data was separated into summer and winter seasons and used in separate effluent limitation calculations, then DEC performed a reasonable potential analysis with effluent monitoring results for lead from September, 2014 to August, 2018. This calculated limits that were less stringent than those modeled by EPA in the prior issuance which were calculated based on the Eagle River TMDL which became effective in 1995 and lead was included in that TMDL. Since that time and in the prior permit cycle, the DEC determined that Eagle River is back into attainment as of June 2020, which was approved by the EPA.

For this permit reissuance, DEC conducted RPAs for copper using effluent and receiving water data results from June 2020- June 2025. The 15th percentile of the receiving water hardness was used to determine acute and chronic lead water quality criteria. RPAs were conducted for summer season (June 1 to September 30) and winter season (October 1-May 31). Summer data results ranged from 0.37 µg/L- 1.5 µg/L which calculated a maximum expected concentration of 2.69 µg/L with an acute water quality criteria of 50.6 µg/L and a chronic water quality criteria of 2 µg/L. Winter data results ranged from 0.05 µg/L – 1.5 µg/L which calculated a maximum expected concentration of 2.64 µg/L with an acute water quality criteria of 94.7 µg/L and a chronic water quality criteria of 3.6 µg/L. Based on this analysis , there is reasonable potential for lead to exceed water quality criteria at the boundary of the mixing zone during the summer and there is no reasonable potential to exceed in winter. Lead still fits within the proposed modeled mixing zone, therefore will be included in the mixing zone and the current limit for the summer season of 30 µg/L as the MDL and 18 µg/L as the MDL for the winter season will be carried forward in this permit and evaluated in the next reissuance for reasonable potential.

A.4.1.7 *pH*

Alaska WQS at 18 AAC 70.020(b)(6)(A)(i)(iii) (Water Supply – drinking, culinary, and food processing) and 18 AAC 70.020(b)(6)(B)(i)(Water Recreation – contact recreation) and 18 AAC 70.020(b)(6)(C) (Growth and

Propagation of Fish, Shellfish, Other Aquatic Life, and Wildlife) states that the pH water quality criteria may not be less than 6.5 or greater than 8.5. Standard Units (SU).

DEC reviewed pH effluent monitoring results of the ER WWTF from June 2020 – June 2025. During this time period, the average minimum pH value observed was 6.6. SU and the average maximum pH value was 8.2 SU. The previous permit implemented WQBELs for pH that required a minimum of 6.5.SU and a maximum of 8.5.SU, monitored at a frequency of five times per week. This WQBEL and monitoring frequency requirement is carried forward in the present permit.

APPENDIX B. REASONBLE POTENTIAL DETERMINATION

he following describes the process the Alaska Department of Environmental Conservation (the Department or DEC) used to determine if the discharge authorized in the draft permit has the reasonable potential (RP) to cause or contribute to a violation of Alaska Water Quality Standards (AWQS). The Department used the process described in the *Technical Support Document (TSD) for Water Quality-Based Toxics Control* (Environmental Protection Agency, 1991) and DEC's guidance, *Alaska Pollutant Discharge Elimination System (APDES) Permits Reasonable Potential Analysis (RPA) and Effluent Limits Development Guide* (June 30, 2014) to determine the RP for any pollutant to exceed a numeric water quality criterion (WQC).

To determine if there is RP for the discharge to cause or contribute to an exceedance of a WQC for a given pollutant, the Department compares the maximum projected receiving waterbody concentration to the criteria for that pollutant. RP to exceed exists if the projected receiving waterbody concentration exceeds WQS numeric criteria, and a water quality-based effluent limit (WQBEL) must be included in the permit (18 AAC 83.435).

Total Nitrate/Nitrite (NO_3/NO_2) for the winter season is used as an example to demonstrate the RP determination process for the Eagle River Wastewater Treatment Facility (ER WWTF). The most stringent WQS numeric criterion for NO_3/NO_2 is the Human Health Drinking Water (HHDW) standard at 10 milligrams per liter (mg/L). The ambient concentration in the mass balance equation is based on a reasonable worst-case estimate of the pollutant concentration upstream from the discharge. For criteria that are expressed as maxima, the 85th percentile of the ambient data is generally used as an estimate of the worst-case. The Department's *APDES Permits Reasonable Potential Analysis and Effluent Limits Development Guide* directs permit writers to use an assumed 15% of the most stringent WQ numeric criterion in cases where a site-specific ambient concentration data for a pollutant is not otherwise available. Accordingly, 15% of 10 mg/L, or 1.5 mg/L, was the assumed ambient or receiving water concentration of NO_3/NO_2.

This section discusses how the maximum projected receiving waterbody concentration is determined and presents the RP analysis done for all pollutants examined in Table B-1 and Table B-2.

B.1 Mass Balance

For a discharge to a flowing waterbody, the maximum projected receiving waterbody concentration is determined using a steady state model represented by the following mass balance equation:

$$C_d Q_d = C_e Q_e + C_u Q_u \qquad \text{(Equation B-1)}$$

Where,

C_d = Receiving waterbody concentration downstream of the effluent discharge

C_e = Maximum projected effluent concentration

C_u = Assumed receiving waterbody ambient concentration

Q_d = Receiving waterbody flow rate = $Q_e + Q_u$

Q_e = Effluent flow rate (set equal to the design flow of the wastewater treatment facility (WWTF)

Q_u = Receiving waterbody flow rate upstream of the discharge (1Q10, 7Q10 or 30B3)

When the mass balance equation is solved for C_d, it becomes:

$$C_d = \frac{C_e Q_e + C_u Q_u}{Q_e + Q_u} \qquad \text{(Equation B-2)}$$

The above form of the equation is based on the assumption that the discharge is rapidly and completely mixed with the receiving waterbody. If a mixing zone based on a percentage of the critical flow in the receiving waterbody is authorized based on the assumption of incomplete mixing with the receiving waterbody, the equation becomes:

$$C_d = \frac{C_e Q_e + C_u(Q_U \times MZ)}{Q_e + (Q_u \times MZ)} \quad \text{(Equation B-3)}$$

Where, MZ = the fraction of the receiving waterbody flow available for dilution.

Where mixing is rapid and complete, MZ is equal to 1 and equation C-2 is equal to equation C-3 (i.e., all of the critical low flow volume is available for mixing). If a mixing zone is not authorized, dilution is not considered when projecting the receiving waterbody concentration, and

$$C_d = C_e \quad \text{(Equation B-4)}$$

In other words, if a mixing zone is not authorized, the Department considers only the concentration of the pollutant in the effluent regardless of the upstream flow and concentration. If the concentration of the pollutant in the effluent is less than the AWQS, the discharge cannot cause or contribute to a water quality violation for that pollutant. In this case, the mixing or dilution factor (% MZ) is equal to zero and the mass balance equation is simplified to $C_d = C_e$.

Equation C-2 can be simplified by introducing a dilution factor (D):

$$D = \frac{Q_e + Q_u}{Q_e} \quad \text{(Equation B-5)}$$

After the D simplification, this becomes:

$$C_d = \frac{(C_e - C_u)}{D} + c_u \quad \text{(Equation B-6)}$$

B.2 Maximum Expected Concentration

To calculate the maximum projected effluent concentration, the Department used the procedure described in Section 3.3 of the *TSD*, "*Determining the Need for Permit Limits with Effluent Monitoring Data*" and the process described in section 2.4 of DEC's guidance, *APDES Permits Reasonable Potential Analysis and Effluent Limits Development Guide* In this procedure, the 99th percentile of the effluent data is the maximum projected effluent concentration which is used in the calculation of the maximum projected receiving waterbody concentration.

Since there are a limited number of data points available, the 99th percentile is calculated by multiplying the maximum observed effluent concentration (MOC) by a reasonable potential multiplier (RPM). The RPM is the ratio of the 99th percentile concentration to the MOC and accounts for the statistical uncertainty in the effluent data. The RPM is calculated from the coefficient of variation (CV) of the data and the number of data points. The CV is defined as the ratio of the standard deviation of the data set to the mean. When fewer than 10 data points are available, the *TSD* and DEC's *APDES Permits RPA and Effluent Limits Development Guide* recommends making the assumption that the CV is equal to 0.6. A CV value of 0.6 is a conservative estimate that assumes a relatively high variability. ProUCL, a statistical software program used by DEC, will calculate a CV value when there are fewer than 10 data samples. In the example of the seasonal summer NO_3/NO_2, the Department used ProUCL, a statistical software program, to determine a CV of 0.0797. ProUCL indicated that the data set follows a lognormal statistical distribution. Therefore, the RPM equation in section 2.4.2.1 of the RPA Guide is used to determine the RPM for NO_3/NO_2.

$$RPM = \frac{\mu_n + z_{99}\,\sigma}{\mu_n + p_n\,\sigma} \quad \text{(Equation B-7)}$$

Where,

z_{99} = the z − statistic at the 99th percentile = 2.326

μ_n = mean calculated by ProUCL = 10.43

σ = the standard deviation calculated by ProUCL = .080

p_n = the z − statistic at the 95th percent confidence level of $(1 - 0.95)^{\frac{1}{n}} = 0.86$

n = number of valid data samples = 20

RPM = 1.1 (rounded)

The maximum expected concentration (MEC) is determined by multiplying the MOC by the RPM:

MEC = (RPM)(MOC) (Equation B-8)

MOC = 38.9 milligrams per liter (mg/L)

In the case of NO_3/NO_2 for the winter season,

MEC = (1.1) * (38.9) = 42.79 mg/L*

* The above MEC calculation is simplified for illustrative purposes. The MEC is calculated in the RPA tool with an RPM prior to rounding. The actual MEC as calculated in the Department's RPA tool is 42.94 mg/L.

Comparison with fresh water WQS numeric criteria for NO_3/NO_2:

In order to determine if RP exists for this discharge to violate WQC, numeric criteria, the highest projected concentrations at the boundary of the mixing zone is compared with human health drinking water WQC

HHDW criterion (chronic)	42.79 mg/L > 10.0 mg/L	**YES**, there is a RP to violate criterion

Since there is RP for the effluent to cause an exceedance of water quality criteria for protection of aquatic life, and because NO_3/NO_2 is the parameter requiring the most dilution of pollutants that demonstrate reasonable potential to exceed water quality criteria, a WQBEL for NO_3/NO_2 is required. See Appendix C for that calculation.

Table B-1 summarizes the data, multipliers, and criteria used to determine RP to exceed WQC at the end of the pipe and at the boundary of the chronic mixing zones for the summer season. Table C-2 summarizes the data, multipliers, and criteria used to determine RP to exceed WQC at the end of the pipe and at the boundary of the chronic mixing zones for the winter season. Since there is a reasonable potential for the effluent to cause an exceedance of human health WQC for NO_3/NO_2 ,water quality based effluent limits (WQBELs) are required.

See Fact Sheet APPENDIX C for the calculations.

Table B-1: Reasonable Potential Analysis Results and Determination for the Summer Season (June 1 – September 30)

Parameter	MOC	Number of Samples	CV	RPM	MEC	Most stringent Water Quality Criteria	Reasonable Potential (yes or no)
Ammonia (mg/L)	0.33	18	0.3175	1.3	0.43	2.47 (chronic)	No
						5.7 (acute)	No
Copper (µg/L)	7.33	13	0.1220	1.2	8.55	6.7 (chronic)	No
						9.8 (acute)	No
Cyanide (µg/L) [b]	0	7	0.6000	9.3	0	5.2 (chronic)	No
						22.0 (acute)	No
Lead (µg/L)	1.50	13	0.4042	1.8	2.69	1.9 (chronic)	No
						50.6 (acute)	No
Mercury (µg/L)	0	5	0.6000	3.4	0	0.012 (chronic)	No [c]
						2.4 (acute)	No [c]
Zinc (µg/L)	112	12	0.3284	1.6	184	87 (acute and chronic)	Yes
							No [c]
Temperature	16	21	0.0617	1.1	17.12	13 ° C	Yes
Total Nitrate/ Nitrite (mg/L)	38.9	20	0.0797	1.1	42.9	10.0 (HHDW)	Yes
Total Dissolved Solids (mg/L) [c]	644	21	0.1017	1.1	715	500 (HHDW)	Yes

Footnotes:

a. Calculated using CORMIX acute dilution factor of 3.6 and chronic dilution factor of 7.3.
b. Insufficient sample results for valid calculation.
c. All samples below detection limit or less than minimum detection limit
d. User-defined CV from ProUCL.

Table B- 2: Reasonable Potential Analysis Results and Determination for the Winter Season (October 1 – May 31)

Parameter	MOC	Number of Samples	CV	RPM	MEC	Most stringent Water Quality Criteria	Reasonable Potential (yes or no)
Ammonia (mg/L)	0.31	40	0.2461	1.2	0.36	3.4 (chronic)	No
						9.0 (acute)	No
Copper (µg/L)	8.31	10	0.1837	1.3	10.6	10.3 (chronic)	No
						15.6 (acute)	Yes
Cyanide (µg/L)	3.7	4	0.6000	2.5	9.39	5.2 (chronic)	No [c]
						22.0 (acute)	No
Lead (µg/L)	1.5	11	0.7088	1.8	2.64	3.69 (chronic)	No
						94.7 (acute)	No
Mercury (µg/L)	0	3	0.6000	2.6	0.1	0.012 (chronic)	No [c]
						2.4 (acute)	No [c]
Zinc (µg/L)	81.00	1	0.6000	9.0	732.41 [c]	70.0 (acute and chronic)	No [c]
							No [c]
Total Nitrate/ Nitrite (mg/L)	47.4	40	0.1346	1.1	53.2	10.0 (HHDW)	Yes
Termperature	16	46	0.1282	1.1	17.37	13 [o] Celsius	Yes
Total Dissolved Solids (mg/L) [c]	606	39	0.0743	1.1	641	500 (HHDW)	Yes

Footnotes:

a. Calculated using CORMIX acute dilution factor of 3.6 and chronic dilution factor of 7.3.
b. Back-calculated from 1995 TMDL WLA.
c. Insufficient sample results for valid calculation.
d. Upstream concentration from calculation of 85th percentile of receiving water monitoring data.
e. User-defined CV from ProUCL.

APPENDIX C. EFFLUENT LIMIT CALCULATION

If the Alaska Department of Environmental Conservation (the Department or DEC) does not authorize a mixing zone, Alaska water quality criteria (AWQC) are applied at the end of the pipe, and technology-based effluent limits (TBELs) are selected for those parameters that are solely technology based.

When DEC authorizes a mixing zone, parameters are identified in the mixing zone that will require dilution to meet water quality standards (WQS) numeric criteria. If there are TBELs for an identified parameter in the mixing zone, TBELs apply at the end of the pipe, and WQS numeric criteria for that parameter, apply at the boundary of the mixing zone. If the reasonable potential analysis (RPA) requires the development of water-quality based effluent limits (WQBELs) for specific parameters in order to protect aquatic life at the boundary of the mixing zone, WQBELs are applied as end-of-pipe effluent limits. Those parameters that are not identified in the authorized mixing zone, must meet applicable AWQC at the end of pipe. In the absence of WQ criteria for a particular pollutant, such as for 5-day biochemical oxygen demand (BOD_5) and total suspended solids (TSS), TBELs are applied as end-of pipe effluent limits.

In the case of the Eagle River Wastewater Treatment Facility (ER WWTF), total nitrate/nitrite (NO_3/NO_2) demonstrated reasonable potential (RP) to exceed at the end of pipe and required the most dilution to meet WQS numeric criteria at the boundary of the authorized mixing zone; therefore, the Department developed WQBELs for NO_3/NO_2.

C.1 Effluent Limit Calculation

Once the Department determines that the effluent has a reasonable potential to exceed an AWQC, a WQBEL for the pollutant is developed. The Department used the process described in the *Technical Support Document (TSD) for Water Quality-Based Toxics Control* (Environmental Protection Agency, 1991) and DEC's guidance, *Alaska Pollutant Discharge Elimination System (APDES) Permits Reasonable Potential Analysis (RPA) and Effluent Limits Development Guide* (June 30, 2014) to calculate WQBELs for NO_3/NO_2 . The first step in calculating WQBELs is the development of wasteload allocations (WLAs) for the pollutant.

C.2 Mixing Zone-based WLA

When the Department authorizes a mixing zone for the discharge, the WLA is calculated using the available dilution, background concentrations of the pollutant, and the WQS. For human health criteria, the WLA is applied directly as an average monthly limit (AML). The maximum daily limit (MDL) is then calculated from the AML by applying a multiplier.

C.3 "End-of-Pipe" WLAs

In many cases, there is no dilution available, either because the receiving waterbody exceeds the criteria or because the Department does not authorize a mixing zone for a particular pollutant. When there is no dilution available, the criterion becomes the WLA. Establishing the criterion as the WLA ensures that the permittee's discharge does not contribute to an exceedance of the criterion. When a human health criteria applies to a pollutant, the chronic dilution factor is used to calculate a WLA.

C.4 Permit Limit Derivation

The Department applies the statistical approach described in Chapter 5 of the *TSD* to calculate the maximum daily limit (MDL) and average monthly limit (AML). This approach takes into account effluent variability (using the coefficient of variation (CV)), and sampling frequency.

The MDL is based on the CV of the data and the probability basis, while the AML is dependent on these two variables and the monitoring frequency. As recommended in the TSD, the Department used a probability basis of 95% for the AML calculation and 99% for the MDL calculation.

The following is a summary of the steps to derive WQBELs from WQS numeric criteria for pollutants that have reasonable potential to exceed water quality numeric criteria. These steps are found in the Department's

Reasonable Potential Analysis (RPA) and Effluent Limitation Guidance and the guidance's accompanying Microsoft Excel RPA Tool. The guidance and tool were used to calculate the MDL and AML for NO_3/NO_2 in the ER WWTF permit. NO_3/NO_2 in the June to September season is illustrated below as an example.

Step 1- Determine the WLA

The acute and chronic aquatic life criteria are converted to acute and chronic waste load allocations using the following equations:

$$WLA_{a,c,hh} = (WQC_{a,c,hh})(D_{a,c,hh}) + C_s(1 - D_{a,c,hh})$$

$$WLA_{a,c,hh} = WQC_{a,c,hh}\left(\frac{Q_d + Q_s}{Q_d}\right) + C_s\left(1 - \left[\frac{Q_d + Q_s}{Q_d}\right]\right)$$

Where: $D_{a,c} = Dilution = \frac{(Q_d + Q_s)}{Q_d}$

$D_{hh}(Dilution\ [Human\ Health]) = D_c\ (Dilution[Chronic\ Aquatic\ Life])$

$Q_s = Critical\ Upstream\ Flow$

$Q_d = Critical\ Discharge\ Flow$

$C_s = Critical\ Upstream\ Concentration$

$WLA_{a,c,hh} = Wasteload\ Allocation\ (acute, chronic, or\ human\ health)$

$WQC_{a,c,hh} = C_r = Water\ Quality\ Criterion(acute, chronic, or\ human\ health)$

For NO_3/NO_2 for the human health WLA (WLA_{hh}) for the summer season at the ER WWTF, based on the largest Dilution Factor modeled for chronic criteria, D_c, the calculation is:

$D_c = D_{hh} = 5.1$

$C_s = 1.5$ *mg/L* (15% of the most stringent NO_3/NO_2 AWQC

$WLA_{hh} = 44.8$ *mg/L*

Step 2 - Determine the Long-Term Average (LTA)

The WLAs are converted to LTAs using multipliers that are derived from equations in section 5.4 of the TSD:

$$LTA_a = WLA_a * exp(0.5\sigma^2 - z_{99}\sigma)$$

$$LTA_c = WLA_c * exp(0.5\sigma_4^2 - z_{99}\sigma_4)$$

Where:

$z_{99} = the\ z - statistic\ at\ the\ 99^{th} percentile = 2.326$

$LTA_a\ only: \sigma = ln[CV^2 + 1]^{1/2}$

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

$LTA_c\ only: \sigma_4 = ln\left[\left(\frac{CV^2}{4}\right) + 1\right]^{1/2}$

$$LTA_c\ only\text{: } \sigma_4^2 = ln\left[\left(\frac{CV^2}{4}\right) + 1\right]$$

$$CV\ = coefficient\ of\ variation = \frac{standard\ deviation}{mean}$$

$$LTA_{chronic}\ =\ WLA_{chronic} *\ e^{(0.5\sigma^2\ -z\sigma)}$$

For Human Health (HH) AWQC, the exposure period of concern is generally longer (e.g., often a lifetime exposure) and the average exposure, rather than the maximum exposure, is of concern. The approach recommended in the *TSD* is to not calculate LTAs for HH WQBELs.

Therefore, for NO_3/NO_2, in the ER WWTF permit, no LTAs have been calculated.

Step 3 - Most Limiting LTA

To protect a waterbody from both acute and chronic effects, the more limiting of the two LTAs is used to derive the effluent limits. The *TSD* recommends using the 95th percentile for the Average Monthly Limit (AML) and the 99th percentile for the Maximum Daily Limit (MDL).

- For NO_3/NO_2, no LTAs have been calculated because the AWQC is a HH criterion, so there is no limiting LTA.

Step 4 - Calculate the Permit Limits

The Daily Maximum and Monthly Average are calculated using the following equations that are found in table 5-2 of the TSD:

$$MDL_{aquatic\ life} = LTA * exp(z_{99}\sigma - 0.5\sigma^2)$$

Where:

$$z_{99} = the\ z - statistic\ at\ the\ 99^{th} percentile = 2.326$$

$$\sigma_n = ln[CV^2 + 1]^{1/2}$$

$$\sigma_n^2 = ln[CV^2 + 1]$$

$$CV = coefficient\ of variation$$

$$AML_{aquatic\ life} = LTA * exp(z_{95}\sigma_n\ - 0.5\sigma_n^2)$$

Where:

$$z_{95} = the\ z - statistic\ at\ the\ 95^{th} percentile = 1.645$$

$$\sigma_n =\ ln\left[\left(\frac{CV^2}{n}\right) + 1\right]^{1/2}$$

$$\sigma_n^2 = ln\left[\left(\frac{CV^2}{n}\right) + 1\right]$$

$$CV\ = coefficient\ of\ variation = \frac{standard\ deviation}{mean}$$

$$n = number\ of\ samples\ per\ month$$

For NO_3/NO_2 during the summer season:

The maximum daily limit (MDL) and the average monthly limit (AML) are calculated as follows:

$$AML_{human\ health} = WLA_{human\ health}$$

$$MDL_{human\ health} = WLA_{human\ health} * Multiplier\ based\ on\ sampling\ frequency$$

where,

AML = WLA_{hh} = 44.8 mg/L

MDL = 50.4 mg/L

C.5 Mass Based Limits

Alaska Pollutant Discharge Elimination System regulations at 18 Alaska Administrative Code (AAC) 83.540 require that effluent limits be expressed in terms of mass unless they cannot appropriately be expressed by mass, if it is infeasible, or if the limits can be expressed in terms of other units of measurement. In addition, 18 AAC 83.520 requires that effluent limits for a publicly owned treatment works be calculated based on the design flow of the facility. Expressing limitations in terms of concentration as well as mass encourages the proper operation of a facility at all times. The mass-based limits are expressed in pounds per day and are calculated as follows:

mass-based limit (pounds (lbs)/day) = concentration limit (mg/L) × design flow (million gallons per day (mgd)) × 8.34 (lbs/gallon)

C.6 Flow

Flow is based on the hydraulic design capacity of the WWTF (flow rate as gallons or mgd) and is determined by a professional engineer and approved by the Department during the WWTF plan review process conducted per 18 AAC 72. A flow limit based on the design capacity ensures that the WWTF operates within its capabilities to receive and properly treat sustained average flow quantities and specific pollutants.

C.7 Effluent Limit Summary

Table C-1 provides a summary and reference to those parameters in the Eagle River WWTF that contain effluent limits at the point of discharge

Table C-1: Summary of Effluent limits

Parameter	Fact Sheet Reference	Type of Effluent Limit
BOD_5	Appendix A-Section A.2	TBEL
TSS	Appendix A-Section A.2	TBEL
pH	Appendix A- Section A.4.1.7	WQBEL
FC Bacteria	APPENDIX A- Section A.4.1.1	WQBEL
E. coli	APPENDIX A- Section A.4.1.3	WQBEL
Total Ammonia, as Nitrogen	Appendix A- Section A.4.1.2	WQBEL
Total Nitrate/Nitrite as Nitrogen	Appendix A- Section A.4.1.4	WQBEL

Parameter	Fact Sheet Reference	Type of Effluent Limit
Copper	Appendix A- Section A.4.1.5	WQBEL
Lead	Appendix A- Section A.4.1.6	WQBEL

APPENDIX D. MIXING ZONE ANALYSIS CHECKLIST

The purpose of the Mixing Zone Checklist is to guide the permit writer through the mixing zone regulatory requirements to determine if all the mixing zone criteria at 18 AAC 70.240 are satisfied, as well as provide justification to authorize a mixing zone in an Alaska Pollutant Discharge Elimination System (APDES) permit. More information about the Eagle River Wastewater Treatment Facility (ER WWTF) and the mixing zone analysis can be found in Fact Sheet Part 4.6.

Criteria	Description	Answer & Resources	Regulation
Size	Is the mixing zone as small as practicable?	-Technical Support Document for Water Quality-Based Toxics Control -DEC's Reasonable Potential Analysis Guidance -Environmental Protection Agency's Permit Writers' Manual -CORMIX	18 AAC 70.240 (k)
Technology	Were the most effective technological and economical methods used to disperse, treat, remove, and reduce pollutants?		18 AAC 70.240 (c)(1)
Low Flow Design	**For river, streams, and other flowing fresh waters.** - Determine low flow calculations or documentation for the applicable parameters.		18 AAC 70.240(*l*)
Existing Use	Does the mixing zone… (1) maintain and protect designated uses of the waterbody as a whole? **If yes, mixing zone may be approved as proposed or authorized with conditions**		18 AAC 70.240(c)(2)
	(2) impair overall biological integrity of the waterbody? **If yes, mixing zone may be approved as proposed or authorized with conditions**		18 AAC 70.240(c)(3)
	(3) create a public health hazard that would preclude or limit existing uses of the waterbody for water supply or contact recreation? **If yes, mixing zone may be approved as proposed or authorized with conditions**		18 AAC 70.240(c)(4)
	(4) preclude or limit established processing activities or established commercial, sport, personal use, or subsistence fish and shellfish harvesting? **If yes, mixing zone may be approved as proposed or authorized with conditions**		18 AAC 70.240(c)(4)(C)

Criteria	Description	Answer & Resources	Regulation
Human consumption	Does the mixing zone… (1) produce objectionable color, taste, or odor in aquatic resources harvested for human consumption? **If yes, mixing zone may be approved as proposed or authorized**		18 AAC 70.240(d)(6)
Spawning Areas	Does the mixing zone… (1) discharge in a spawning area for anadromous fish or Arctic grayling, northern pike, rainbow trout, lake trout, brook trout, cutthroat trout, whitefish, sheefish, Arctic char (Dolly Varden), burbot, and landlocked coho, king, and sockeye salmon? **If yes, mixing zone prohibited.**		18 AAC 70.240(f)
Human Health	Does the mixing zone… (1) contain bioaccumulating, bioconcentrating, or persistent chemical above natural or significantly adverse levels? **If yes, mixing zone may be approved as proposed or authorized with conditions.**		18 AAC 70.240(d)(1)
	(2) contain chemicals expected to present a unacceptable risk to human health from carcinogenic, mutagenic, teratogenic, or other effects as determined using risk assessment methods approved by the Department? **If yes, mixing zone may be approved as proposed or authorized with conditions.**		18 AAC 70.240(d)(2)
	(3) Create a public health hazard through encroachment on water supply or through contact recreation? **If yes, mixing zone prohibited.**		18 AAC 70.240(c)(4)(B)
	(4) meet human health and aquatic life quality criteria at the boundary of the mixing zone? **If no, mixing zone prohibited.**		18 AAC 70.240(g)(1)(A), (c)(4)(A)
	(5) occur in a location where the department determines that a public health hazard reasonably could be expected? **If yes, mixing zone may be approved as proposed or authorized with conditions.**		18 AAC 70.240(k)(4)
Aquatic Life	Does the mixing zone… (1) create a significant adverse effect to anadromous, resident, or shellfish spawning or rearing? **If yes, mixing zone prohibited.**		18 AAC 70.240(e),(f)
	(2) form a barrier to migratory species? **If yes, mixing zone may be approved as proposed or authorized with conditions.**		18 AAC 70.240(c)(4)(G)

Criteria	Description	Answer & Resources	Regulation
	(3) fail to provide a zone of passage? **If yes, mixing zone prohibited.**		
	(4) result in undesirable or nuisance aquatic life? **If yes, mixing zone may be approved as proposed or authorized with conditions.**		18 AAC 70.240(d)(5)
	(5) result in permanent or irreparable displacement of indigenous organisms? **If yes, mixing zone may be approved as proposed or authorized with conditions.**		18 AAC 70.240(c)(4)(E)
	(6) result in a reduction in fish or shellfish population levels? **If yes, mixing zone may be approved as proposed or authorized with conditions.**		18 AAC 70.240(c)(4)(D)
	(7) prevent lethality to passing organisms; or exceed acute aquatic life criteria at and beyond the boundaries of a smaller initial mixing zone surrounding the outfall, the size of which shall be determined using methods approved by the Department? **If yes, mixing zone may be approved as proposed or authorized with conditions.**		18 AAC 70.240(d)(7) 18 AAC 70.240(d)(8)
	(8) cause a toxic effect in the water column, sediments, or biota outside the boundaries of the mixing zone? **If yes, mixing zone may be approved as proposed or authorized with conditions.**		18 AAC 70.240(c)(4)(A)
Endangered Species	Are there threatened or endangered species (T/E spp) at the location of the mixing zone? If yes, are there likely to be adverse effects to T/E spp based on comments received from the United States Fish and Wildlife Service or National Oceanic and Atmospheric Association. If yes, will conservation measures be included in the permit to avoid adverse effects?		18 AAC 70.240(c)(4)(F),