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 Period Start Date: DRAFT
Public Comment Period Expiration Date: DRAFT
Alaska Online Public Notice System

Technical Contact: Jeanne Swartz
Alaska Department of Environmental Conservation
Division of Water
Wastewater Discharge Authorization Program
555 Cordova Street
Anchorage, AK 99501
(907) 269-8198
Fax: (907) 269-3487
jeanne.swartz@alaska.gov

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 for this facility, 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 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. Timothy H. Forbus

The map in APPENDIX A, Figure 3 shows the location of the treatment plant and the location of the outfall. The process flow diagram in APPENDIX A, Figure 4 illustrates the treatment process.

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; however, a TMDL management plan was never finalized. More information about the Eagle River TMDL can be found in Fact Sheet Part 4.4. The section of Eagle River adjacent to the ER WWTF was listed in Category 4A in *Alaska's Final 2010 Integrated Water Quality Monitoring and Assessment Report* (Alaska's 2010 Integrated Report), July 15, 2010; and remained unchanged in status in the most recent Alaska Integrated Report, *Alaska's Final 2014-16 Integrated Water Quality Monitoring and Assessment Report* (Alaska's 2014-16 Integrated Report), April 12, 2019.

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 issued on May 23, 2014, became effective on July 1, 2014 and expired on June 30, 2019. 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 December 21, 2018. Accordingly, DEC notified AWWU that the permit was administratively continued per a letter dated June 12, 2019.

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. Since the previous APDES permit issuance, major modifications to the facility include the structural, architectural, civil, electrical, building mechanical, process mechanical, and instrumentation and controls upgrades. Fact Sheet APPENDIX A, Figure 4 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.

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. The UV disinfection system utilized 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 APPENDIXAPPENDIX A: FACILITY INFORMATION Figure 4, 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.

Major modification to the facility implemented since the previous APDES permit replaced the existing undersized headworks in Building 1 by constructing a new building (Building 4) to house new headworks and support systems. New headworks 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 new headworks accommodates current design flows and has the ability to accommodate projected future build-out flows of the plant. The use of UV for disinfection of effluent was fully operable at the ER WWTF beginning December 3, 2009.

Design criteria for the ER WWTF is provided in Table 1.

Table 1: Design Criteria for Eagle River Wastewater Treatment Facility

Average Daily Flow Rate	2.5 million gallons per day (mgd)
Maximum Daily Flow Rate	6.8 mgd
Average Biological Oxygen Demand, 5-day (BOD_5) Load:	4,800 pounds per day (lbs/day)
Maximum Daily BOD_5 Load	8,600 lbs/day
Average Total Suspended Solids (TSS) Load:	4,500 lbs/day
Maximum Daily TSS Load	8,100 lbs/day
BOD_5 and TSS Percent Removal	85%

2.3 Wastewater Characterization and 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), and pH. Additional domestic wastewater pollutants: temperature, dissolved oxygen (DO), total dissolved solids (TDS), ammonia, and fecal coliform (FC) bacteria are known to be present in the discharge. DEC adopted new regulations that require facilities that discharge to fresh water to monitor *Esherichia coli* (*E. coli*) bacteria, in addition to FC bacteria. More information about *E. coli* can be found in Fact Sheet Part 3.4 and APPENDIX B: B.3.4.6. As the ER WWTF has a design flow larger than 1.0 mgd, Whole Effluent Toxicity (WET) is a pollutant of concern as required under 18 AAC 83.335(b)(1). More information about WET requirements can be found in Fact Sheet Part 3.4.

The TMDL finalized for the Eagle River identified chlorine, ammonia, lead and copper as pollutants of concern, assigning WLAs for these parameters to the ER WWTF. More information about the Eagle River TMDL can be found in the Fact Sheet Part 4.4. Chlorine is no longer a pollutant of concern, as the ER WWTF has not used chlorine in its disinfection processes since 2009. However, ammonia, lead, and copper remain as pollutants of concern in the permit.

The previous APDES permit identified additional pollutants of concern from expanded effluent testing conducted prior to reissuance and the required additional monitoring for specific parameters. Additional monitoring was required to provide a robust dataset to establish water quality-based effluent limit (WQBELs), if necessary. The parameters monitored in the previous APDES permit cycle were: cyanide, antimony, cadmium, and total nitrate/nitrite (NO_3/NO_2). Based on the additional monitoring results, NO_3/NO_2 and cyanide remain as pollutants of concern, with monitoring required in the previous APDES permit to continue in the permit cycle. Test results for detected pollutants for the ER WWTF required for monitoring by the previous permit are summarized in Table 2. Other pollutants of concern in the present permit cycle are mercury and zinc, identified from six expanded effluent monitoring events. Expanded effluent test results for detected pollutants for the ER WWTF not required for monitoring by the previous permit are summarized in Table 3. Pollutants detected in the expanded effluent monitoring events for which Alaska Water Quality Standards (WQS) numeric criteria do not exist include: Kjeldahl nitrogen, total phosphorous, bis (2-ethylhexyl)-phthalate, diethyl phthalate, dimethyl phthalate, total phenolic compounds, and chloroform. Pollutants detected in the expanded effluent testing and found to be at levels ten per cent or less than the most stringent water quality standards are: chromium, nickel, selenium, silver, and toluene. The permit does not require monitoring of these parameters beyond that already required for expanded effluent testing.

Table 2: Eagle River Wastewater Treatment Facility Effluent Data Summary

Pollutant	Units [a]	Range (Minimum – Maximum)	Average of Numeric Result
Ammonia-as Nitrogen [b]	lbs/day	1.31 – 24.2	3.09
	mg/L	0.12 – 2.32	0.283
Five-Day Biochemical Oxygen Demand (BOD_5) Daily Maximum:	lbs/day	20.06 – 198.37	44.54
	mg/L	1.81 – 18.51	4.08
BOD_5 Monthly Average	mg/L	2 - 10	4.0
BOD_5 Percent Removal	%	96 - 99	98.6
BOD_5 Weekly Average	mg/L	3 - 19	5.6
Dissolved Oxygen (DO)	mg/L	3.8 – 6.1	5.0
Average Total Suspended Solids (TSS) Daily Maximum:	lbs/day	21.06 – 184.68	33.77
	mg/L	Non Detect (ND) – 13.3	2.65
TSS Monthly Average	mg/L	2 - 8	2.91
TSS Percent Removal	%	97 - 99	98.8
TSS Weekly Average	mg/L	2 - 17	4.4
Fecal Coliform (FC) Bacteria Daily Maximum	FC/100 mL	ND - 165	2.09
FC Bacteria Monthly Geometric mean	FC/100 mL	0.5 - 3	0.83
Flow – Daily Maximum	mgd	0.96 – 1.92	1.33
Flow – Monthly Average	mgd	1.245 – 1.462	1.33
pH Monthly Maximum	SU	6.9 – 8.0	7.2
pH Monthly Minimum	SU	6.49 – 7.0	6.7
Temperature	^{0} C	9.0 – 17.0	13.3
Cadmium [c]	µg/L	ND – 0.07	NA
Antimony [c]	µg/L	ND – 0.67	0.50
Cyanide	µg/L	ND – 4.8	2.55
Total Dissolved Solids (TDS)	lbs/day	4917.50 - 5385.07	5092.82
	mg/L	442 - 479	463
Total Nitrate and Nitrate as Nitrogen (N)	mg/L	0.24 - 46	30.3
Copper [b, c]	µg/L	4.9 – 18.8	9.7
Lead [b, c]	µg/L	0.1 – 2	0.62

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. Results from both summer and winter seasons. 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.

Table 3: Eagle River Wastewater Treatment Facility Expanded Effluent Testing Data Summary

Pollutant	Units	Aug 2014	Dec 2014	June 2015	May 2016	Sept 2016	Feb 2017
Arsenic	µg/L	Not Tested	0.242 [a]	0.49	0.41 [a]	Not Tested	ND
Barium	µg/L	Not Tested	Not Tested	Not Tested	11	Not Tested	Not Tested
Calcium	mg/L	30.9	28.8	35	32	28	Not Tested
Chloroform	µg/L	Not Tested	ND	0.27 [a]	0.23 [a]	Not Tested	0.17 [a]
Chromium	µg/L	Not Tested	0.37 [a]	0.77	1 [a]	Not Tested	ND
Kjeldahl Nitrogen	mg/L	Not Tested	1	ND	ND	Not Tested	ND
Magnesium	mg/L	6.35	6.2	7	7.2	5.9	Not Tested
Mercury	µg/L	Not Tested	ND	0.037 [a]	0.0196 [a]	Not Tested	ND
Nickel	µg/L	Not Tested	1.37	2.8	4.3	Not Tested	1.6 [a]
Phosphorus	mg/L	Not Tested	3.5	3.5	3.3	Not Tested	3.4
Selenium	µg/L	Not Tested	0.689	0.61	0.49 [a]	Not Tested	ND
Silver	µg/L	ND	ND	0.099	0.097 [a]	Not Tested	0.042 [a]
Toluene	µg/L	Not Tested	ND	ND	ND	Not Tested	0.59 [a]
Total Phenolic Compounds	µg/L	Not Tested	ND	8.1 [a]	ND	Not Tested	14
Zinc	µg/L	Not Tested	73	81	83	Not Tested	**77**

Footnotes:

a. Estimated value.

2.4 Compliance History

DEC reviewed Discharge Monitoring Reports (DMRs) from July 1, 2014 to June 30, 2019 to determine the facility's compliance with effluent limits. No permit exceedances were found during the review of the ER WWTF DMRs. Non-compliance notifications received during the previous permit cycle are listed in Table 4. No enforcement actions brought against the permittee during the previous permit cycle and no citizen complaints were lodged against the facility. Three facility inspections were performed during the previous permit cycle on May 13, 2014, January 8, 2016 and January 11, 2018. All inspection reports indicated the facility was operating within the permit requirements and reported no concerns or problems.

Other than the non-compliance events reported, the ER WWTF routinely produces high quality secondary treatment effluent with BOD_5 and TSS removal rates usually greater than 95%.

Table 4: Eagle River Wastewater Treatment Facility Non-Compliance Notifications 2014 - 2018

Parameter/ Problem	Date	Non-Compliance Notification Description
Metals Reporting	Due October 15, 2018	Reported November 9, 2018
BOD5	January 28, 2018 – February 5, 2018	BOD result 243.4 mg/L outside acceptable limits. Weekly reporting not performed
FC	October 19, 2018	Monitoring/reporting violation
pH	December 8, 2016	Effluent pH reading 6.49-8 S.U.; clogged suction line to soda feed pumps
Sanitary Sewer Overflow	August 21, 2015	16421 Brooks Loop Rd, Eagle River; 525 gallons, caused by tallow
Spill Notification	October 13, 2015	Contractor spilled combined primary & secondary solids; 50-100 gallons

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 publicly owned WWTP, 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 APPENDICESAPPENDIX B - BASIS FOR EFFLUENT LIMITATIONS -1.1.1.1.1APPENDIX D.

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: http://dec.alaska.gov/water/wwdp/index.htm.

3.3 Influent and Effluent Limits and Monitoring Requirements

The permit contains a combination of both TBELs and WQBELs. The following summarizes the proposed effluent limits (see Fact Sheet APPENDICES APPENDIX B - BASIS FOR EFFLUENT LIMITATIONS – 1.1.1.1.1APPENDIX D for more details). The permit contains new or revised WQBELs for NO_3/NO_2, ammonia, FC bacteria, *E. coli* bacteria and copper and new monitoring requirements for NO_3/NO_2, TDS, DO, zinc, mercury and *E. coli* bacteria.

The permit requires monitoring of the effluent for FC bacteria, *E. coli* bacteria, pH, copper, lead, NO_3/NO_2 and ammonia to determine compliance with the permit WQBELs. In addition, the permit includes requirements to monitor the effluent for temperature, cyanide, mercury, zinc, DO, TDS, and WET in order to conduct a 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 (generally found in 18 AAC 70 and 40 CFR Part 136 [adopted by reference in 18 AAC 83.010]).

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).

Seasonal effluent limits have been applied for ammonia, copper and lead, due to the seasonal variability of the receiving water for flow, hardness, pH, and temperature. Water hardness is used to calculate WQC for certain metals, including lead and copper. Also, pH and temperature of the receiving water, as well as the presence of juvenile fish are used to calculate WQC for ammonia. (Toxics manual). Additional information about calculated WQC in the receiving water can be found in Fact Sheet Part 4.5. The previous permit included monthly monitoring provisions for ammonia and twice-yearly monitoring provisions for lead and copper in order to determine compliance with the provisions the TMDL finalized on Eagle River. Additional information about the Eagle River TMDL can be found in Fact Sheet Part 4.4. Monitoring requirements from the previous permit will be carried forward in the permit for ammonia, lead and copper, consistent with the sampling frequency requirements of the previous permit.

A Reasonable Potential Analysis (RPA) of the effluent and receiving water copper data obtained during the previous permit cycle demonstrates that copper has a reasonable potential to exceed the aquatic life freshwater standards at the boundary of the acute mixing zones for both the winter and summer seasons and is the driver for the acute mixing zone dilutions for both seasons. More information about the RPA analysis for copper can be found in Fact Sheet Part 4.4and APPENDICES APPENDIX B - BASIS FOR EFFLUENT LIMITATIONS – 1.1.1.1.1APPENDIX D.

Lead remains a pollutant of concern. A RPA of lead for both summer and winter seasons, using the receiving water monitoring data and results of effluent monitoring conducted during the previous permit cycle indicate that lead is present in the effluent, but does not have a reasonable potential to exceed either the acute or chronic WQS; therefore the lead effluent limits will remain unchanged from the previous permit and monitoring will continue at the same frequency.

Ammonia was the driver of the acute and chronic mixing zones during the previous permit cycle, but is not the driving parameter of either the acute or chronic mixing zone in the current permit. An RPA of receiving water and effluent ammonia data collected during the previous permit cycle reveals that concentrations of ammonia present in the effluent of the ER WWTF have been reduced. Data collected by AWWU from 2013 to 2015 was evaluated to determine whether there was reasonable potential to cause or contribute to an exceedance of the criteria. More information about the receiving water monitoring conducted by AWWU can be found at Fact Sheet Part 4.5. DEC derived ammonia criteria from the Toxics manual. Consistent with the *APDES Permits Reasonable Potential Analysis and Effluent Limits Development Guide*, the 85th percentile of the pH and temperature receiving water data collected by AWWU from Eagle River, the receiving waterbody, was used to calculate the ammonia criteria from tables contained in Appendices F and G of the Toxics manual. The toxicity of ammonia is dependent on pH and temperature; therefore the criteria are also pH and temperature-dependent. The summer 85th percentile receiving water pH was 7.4 SU and water temperature was 5.8 ^{o} C. The winter 85th percentile receiving water pH was 7.5 SU and temperature data was 0 ^{o} C. The RPA tool calculated an acute ammonia WQS numeric criterion of 16.3 mg/L and a chronic criterion of 4.9 mg/L for the summer season and an acute ammonia WQS numeric criterion of 12.3 mg/L and a chronic criterion of 9.1 mg/L for the winter season. The effluent data evaluated in DEC's ammonia RPA was also separated into summer and winter seasons and used in separate effluent limitation calculations, to maintain consistency with the characteristics of the receiving water, whose flow rates, pH, temperature and ambient concentrations of ammonia vary by season. For the summer season, 28 effluent data points were used in the RPA, with values ranging from 0.12 mg/L to 1.5 mg/L. For the winter season, 38 effluent data points were used in the analysis, with values ranging from 0.12 mg/L to 1.5 mg/L. More information about the ammonia RPA can be found in the Fact Sheet Appendix B -B.3.4.5

When evaluating the effluent to determine if WQBELs based on chemical-specific numeric criteria are needed, the Department projects the receiving waterbody concentration (RWC) 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 RWC. If the projected concentration of the receiving waterbody exceeds the numeric criterion for a limited parameter, then there is reasonable potential (RP) that the discharge may cause or contribute to an excursion above the applicable WQS, and a WQBEL must be developed. If the projected concentration of the receiving waterbody is lower than the numeric criterion for a limited parameter, then there is not RP that the discharge may cause or contribute to an excursion above the applicable WQS and it is expected that the effluent will meet WQS at the point of discharge. The effluent limits that would be applied in the latter case are the WQS for the limited parameter. For the ER WWTF, the result of the ammonia RPA for the summer season yielded a Maximum Projected Effluent Concentration (MEC) of 0.22 mg/L for the summer season and a MEC of 0.15 mg/L for the winter season. The MECs calculated for ammonia in the ER WWTF effluent would indicate an expected RWC for ammonia lower than the aquatic life acute or chronic criteria derived for either season, meaning that ammonia does not have a RP to exceed ammonia WQS during either the winter or summer seasons and that ammonia concentrations in the effluent are low enough to meet WQS at the point of discharge.

Therefore, WQBELs for ammonia in the summer and winter seasons have been revised in the current permit to meet WQS at the end of the pipe. Separate summer and winter ammonia WQS-WQBELs are necessary, because the characteristics of the receiving water, vary by season, as previously described. The WQS-WQBELs in this permit for ammonia are the acute and chronic Alaska WQC calculated per APPENDIX C and D of the Toxics manual. The acute ammonia WQC in summer is 16.3 mg/L, applied as the Daily Maximum effluent limit. The chronic WQC for summer is 4.9 mg/L, applied as the Monthly Average effluent limit. Likewise, for the winter the Monthly Average effluent limit (chronic) is 9.1 mg/L. The Daily Maximum winter effluent limit for ammonia is 11.5 mg/L, calculated from the existing TMDL. EPA's 1995 TMDL for Eagle River assigned a WLA of 240 lbs/day for ammonia during the winter season; a limit that is more protective than the limit calculated for the Daily Maximum winter effluent limit, based on a chronic WQ criterion of 12.3 mg/L, which would be 256 lbs/day. Therefore, DEC is retaining the more protective ammonia effluent limit of 240 lbs/day for the winter season in the permit, because the 1995 Eagle River TMDL is still in effect. The 240 lbs/day limit calculates to a concentration limit of 11.5 mg/L. See Fact Sheet Part 4.4 and APPENDIX B: B.3.4.5 for additional information. The previous permit required monthly monitoring of ammonia in both the summer and winter seasons and this monitoring frequency requirement will be carried forward in the present permit.

Quarterly monitoring of NO_3/NO_2 during the previous permit cycle resulted in sufficient data to conduct a RPA for NO_3/NO_2. A new WQBEL for NO_3/NO_2 and increased monitoring frequency is required in the permit, because an RPA of NO_3/NO_2 data demonstrated that NO_3/NO_2 has RP to exceed the Alaska WQS at the boundary of the chronic mixing zone during both the summer and winter seasons. Separate RPAs for NO_3/NO_2 were conducted by season for the present permit. For the summer season, 8 samples were used in the RPA and for the winter season, 14 samples were used in the analysis. The WQS-WQBELs in this permit for NO_3/NO_2 are the Human Health Alaska WQC from the DEC Toxics manual of 10 mg/L for both summer and winter seasons. More information about the RPA analysis for NO_3/NO_2 can be found in Fact Sheet Part 4.5 and APPENDICES APPENDIX B - BASIS FOR EFFLUENT LIMITATIONS – 64. Monitoring for NO_3/NO_2 will be conducted at the same time as monthly monitoring for ammonia.

Cyanide monitoring occurred fifteen times during the previous permit cycle. Cyanide was only quantified three times (ND – 4.8 µg/L). Due to the small data set, the MEC calculated for the cyanide results indicate that cyanide may be present in concentrations that do have a reasonable potential to exceed Alaska WQS. Therefore, monitoring requirements for cyanide will be carried forward at the same frequency as in the previous permit.

DO monitoring was not a requirement in the previous permit, but AWWU conducted monthly DO monitoring throughout the previous permitting cycle. A total of 46 DO samples were collected, within a range of 3.8 – 5.7 mg/L. According to 18 AAC 70.020(b)(3)(C), 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. Based on the results from the previous monitoring, it is probable that DO in the effluent would exceed Alaska WQS at the end of the pipe and DO should be included in the mixing zone. Monthly DO monitoring is a requirement of the permit.

TDS was sampled monthly between July, 2014 and October, 2014. No additional TDS monitoring was performed during the permit cycle. The results of the four monitoring samples were in a range of 442 - 475 mg/L. The most stringent Alaska WQS for TDS is 500 mg/L. The sample results from the 2014 monitoring indicate TDS may exceed Alaska WQS at the end of the pipe and that TDS should continue to be included in the mixing zone. TDS monitoring twice per year is a requirement of the permit.

Mercury and zinc were monitored in the expanded effluent testing (see Table 3) and the results indicate that these are new parameters of concern.

Zinc was reported four times in four expanded effluent monitoring events during the last permit cycle. Mercury was reported two out of four expanded effluent monitoring events. Consistent with the *APDES Permits Reasonable Potential Analysis and Effluent Limits Development Guide*, in situations where fewer than ten valid data points exist for a pollutant, the Department may include a requirement for the discharger to collect additional effluent data to produce a more robust data set. This decision is appropriate, considering that the levels of zinc were consistently high, exceeding the fresh water zinc acute and chronic aquatic life Alaska Water Quality Criteria (WQC) in all four samples collected (73 – 83 µg/L) and that the levels of mercury were also relatively high in two samples (0.0196 µg/L and 0.037 µg/L), even though mercury was not detected in two of the four samples. Data collected for zinc and mercury will be used to conduct a future reasonable RPA to determine if zinc or mercury discharges might cause or contribute to an exceedance of Alaska WQS in the receiving waterbody. The permit includes new monitoring for mercury and zinc.

A new WQBEL for FC is included in the permit. In the previous permit, FC was included in the mixing zone and the WQBELs were 100 FC/100 mL for the Monthly Average and 200 FC/100 mL for the Daily Maximum. During the previous permitting cycle, a total of 327 FC samples were collected. With the exception of one sample of 165 FC/100 mL, none of the samples exceeded the freshwater WQC of 40 FC/100 mL. The average reported maximum daily concentration over three years was 2.09 FC/100 mL. The most stringent Alaska WQS for FC is listed for the 18 AAC 70.020(b)(2)(i) Water Supply–drinking, culinary and food processing designated use: In a 30-day period, the geometric mean may not exceed 20 FC/100 mL and not more than 10% of the samples may exceed 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, the WQS-WQBEL is applied for the permit and FC has been removed as a parameter in the mixing zone. The Daily Maximum limit for FC is 40 FC/100 mL and the Monthly Average limit is 20 FC/100 mL, consistent with the Alaska WQS for FC bacteria. The previous permit required FC to be monitored once per week on a year-round basis and this monitoring frequency requirement for FC is carried forward in the present permit. More information about FC can be found in APPENDIX B – B.3.4.4

New monitoring requirements and effluent limits for *E. coli* bacteria have been added to the permit. *E. coli* are indicator organisms of harmful pathogens in fresh water and are a better indicator of acute gastrointestinal illness than FC bacteria. In 2018 Alaska adopted the *E. coli* bacteria criteria for fresh water recreation designated uses. 18 AAC 70.020(b)(2)(B)(i) Water Recreation–contact recreation state that: in a 30-day period, the geometric mean of samples may not exceed 126 *E. coli* cfu/100 mL. 18 AAC 70.990(16) gives the definition for "contact recreation" as activities in which there is direct and intimate contact with water. These activities (e. g., swimming, diving, and water-skiing) would only take place during the summer season. Since the regulation change to 18 AAC 70.020(b)(2)(B)(i) was adopted during the last permitting cycle, monitoring of *E. coli* was not previously required and is a new provision in this permit. The present permit includes an *E. coli* WQS-WQBEL of 126 *E. coli* cfu/100 mL as the monthly average. The WQC at 18 AAC 70.020(b)(2)(B)(i) has the further requirement that not more than 10% of the samples may exceed a statistical threshold value of 410 *E. coli* cfu/100 ml. Therefore, 410 *E. coli* cfu/100 mL is the Daily Maximum. The limit for *E. coli* as a WQS-WQBEL is being applied due to disinfection methods used at the ER WWTF consistently addressing FC levels and therefore, being able to address *E. coli* bacteria in the same manner. In the present permit, monitoring of *E. coli* bacteria in the ER WWTF effluent is required to be performed at the same time as FC bacteria monitoring, between May 1 – September 30, however with only a monthly monitoring frequency. More information about *E. coli* bacteria can be found in Fact Sheet APPENDIX B: B.3.4.6.

In the permit, monitoring for cadmium and antimony will not be required, except during expanded monitoring events. Cadmium was only detected above the minimum reporting threshold once in 19 monitoring events (result = 0.07 µg/L) at a level below WQS, so additional monitoring for cadmium is not required for the permit cycle. Antimony was monitored in 18 events, with quantifiable concentrations measured six times (0 – 0.67 µg/L). However, an RPA of antimony indicated that the antimony MEC remains far below the Human Health Criteria; the most stringent criteria for antimony. Cadmium and antimony are present in the ER WWTF effluent, but neither parameter has reasonable potential to exceed WQS, so quarterly monitoring for either parameter will not be required in the permit.

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

Table 5 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		625	938	1,251			
Total Suspended Solids (TSS)	mg/L	N/A	30	45	60	Influent and Effluent [b]	1/Week	24-hour Composite [c]
	lbs/day		625	938	1,251			
BOD_5 & TSS Minimum Percent (%) Removal	%	85				Influent and Effluent	1/Month	Calculated [d]
Fecal coliform Bacteria (FC)	FC/ 100 mL	N/A	20 [e]	N/A	40 [f]	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	N/A	N/A	N/A	Report	Effluent	1/Month	Grab
Total Dissolved Solids (TDS)	mg/L	N/A	N/A	N/A	Report	Effluent	2/Period [k]	24-hour Composite [c]
Cyanide, as free cyanide	µg/L	N/A	N/A	N/A	Report	Effluent	2/Period [k]	Grab
Mercury	µg/L	N/A	N/A	N/A	Report	Effluent	2/Period [k]	Grab
Copper [l]	mg/L	N/A	N/A	N/A	0.026	Effluent	2/Period [k]	24-hour Composite [c]
	lbs/day	N/A	N/A	N/A	0.55			
Lead [l]	mg/L	N/A	N/A	N/A	0.030	Effluent	2/Period [k]	24-hour Composite [c]
	lbs/day	N/A	N/A	N/A	0.63			
Zinc [l]	µg/L	N/A	N/A	N/A	Report	Effluent	2/Period [k]	24-hour Composite [c]
Esherichia coli (*E. coli*)	cfu/ 100 mL	N/A	126 [g]	N/A	410 [h]	Effluent	1/Month [i]	Grab
Total Nitrate/Nitrite, as N	mg/L	N/A	63.7	N/A	82.4	Effluent	1/Month [j]	24-hour Composite [c]
	lbs/day	N/A	1,328	N/A	1,719			
Total Ammonia, as N	mg/L	N/A	4.9	N/A	16.3	Effluent	1/Month	24-hour Composite [c]
	lbs/day	N/A	102	N/A	340			
Whole Effluent Toxicity (WET)	See Permit Section 1.4 for WET requirements					Effluent	1/Alternate Year	24-hour Composite [c]

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. 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.
e. If more than one FC bacteria 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.
f. Not more than one sample, or 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.
g. If more than one *E. coli* bacteria 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.
h. Not more than one sample, or if more than ten *E. Coli* bacteria samples are collected during the monthly reporting period, not more than 10% of the samples may exceed the statistical threshold value of 410 cfu/100 mL.
i. Monitoring required once per month only during the time period **May-September**. Monitoring should be conducted at the same time as FC monitoring.
j. Monitoring to be conducted at the same time as monitoring for ammonia.
k. Monitoring to be conducted a minimum of 60 days apart.
l. All metals shall be analyzed and reported as total recoverable metals.

Table 6: Outfall 001A: Effluent Limits and Monitoring Requirements (October 1 - May 31)

<table>
<tr><th rowspan="2">Parameter</th><th colspan="5">Effluent Limits</th><th colspan="3">Monitoring Requirements</th></tr>
<tr><th>Units [a]</th><th>Daily Minimum</th><th>Monthly Average</th><th>Weekly Average</th><th>Daily Maximum</th><th>Sample Location</th><th>Sample Frequency</th><th>Sample Type</th></tr>
<tr><td>Total Discharge Flow</td><td>mgd</td><td>N/A</td><td>Report</td><td>N/A</td><td>2.5</td><td>Effluent</td><td>Continuous</td><td>Recorded</td></tr>
<tr><td rowspan="2">Biochemical Oxygen Demand (BOD_5)</td><td>mg/L</td><td rowspan="2">N/A</td><td>30</td><td>45</td><td>60</td><td rowspan="2">Influent and Effluent [b]</td><td rowspan="2">1/Week</td><td rowspan="2">24-hour Composite [c]</td></tr>
<tr><td>lbs/day</td><td>625</td><td>938</td><td>1,251</td></tr>
<tr><td rowspan="2">Total Suspended Solids (TSS)</td><td>mg/L</td><td rowspan="2">N/A</td><td>30</td><td>45</td><td>60</td><td rowspan="2">Influent and Effluent [b]</td><td rowspan="2">1/Week</td><td rowspan="2">24-hour Composite [c]</td></tr>
<tr><td>lbs/day</td><td>625</td><td>938</td><td>1,251</td></tr>
<tr><td>BOD_5 & TSS Minimum Percent (%) Removal</td><td>%</td><td colspan="4">85</td><td>Influent and Effluent</td><td>1/Month</td><td>Calculated [d]</td></tr>
<tr><td>Fecal coliform Bacteria (FC)</td><td>FC/ 100 mL</td><td>N/A</td><td>20 [e]</td><td>N/A</td><td>40 [f]</td><td>Effluent</td><td>1/Week</td><td>Grab</td></tr>
<tr><td>pH</td><td>SU</td><td>6.5</td><td>N/A</td><td>N/A</td><td>8.5</td><td>Effluent</td><td>5/Week</td><td>Grab</td></tr>
<tr><td>Temperature</td><td>° C</td><td>N/A</td><td>N/A</td><td>N/A</td><td>Report</td><td>Effluent</td><td>5/Week</td><td>Grab</td></tr>
<tr><td>Dissolved Oxygen (DO)</td><td>mg/L</td><td>N/A</td><td>N/A</td><td>N/A</td><td>Report</td><td>Effluent</td><td>1/Month</td><td>Grab</td></tr>
<tr><td>Total Dissolved Solids (TDS)</td><td>mg/L</td><td>N/A</td><td>N/A</td><td>N/A</td><td>Report</td><td>Effluent</td><td>2/Period [k]</td><td>24-hour Composite [c]</td></tr>
<tr><td>Cyanide, as free cyanide</td><td>µg/L</td><td>N/A</td><td>N/A</td><td>N/A</td><td>Report</td><td>Effluent</td><td>2/Period [k]</td><td>Grab</td></tr>
<tr><td>Mercury</td><td>µg/L</td><td>N/A</td><td>N/A</td><td>N/A</td><td>Report</td><td>Effluent</td><td>2/Period [k]</td><td>Grab</td></tr>
<tr><td rowspan="2">Copper [l]</td><td>mg/L</td><td>N/A</td><td>N/A</td><td>N/A</td><td>0.025</td><td rowspan="2">Effluent</td><td rowspan="2">2/Period [k]</td><td rowspan="2">24-hour Composite [c]</td></tr>
<tr><td>lbs/day</td><td>N/A</td><td>N/A</td><td>N/A</td><td>0.52</td></tr>
<tr><td rowspan="2">Lead [l]</td><td>mg/L</td><td>N/A</td><td>N/A</td><td>N/A</td><td>0.018</td><td rowspan="2">Effluent</td><td rowspan="2">2/Period [k]</td><td rowspan="2">24-hour Composite [c]</td></tr>
<tr><td>lbs/day</td><td>N/A</td><td>N/A</td><td>N/A</td><td>0.37</td></tr>
<tr><td>Zinc [l]</td><td>µg/L</td><td>N/A</td><td>N/A</td><td>N/A</td><td>Report</td><td>Effluent</td><td>2/Period [k]</td><td>24-hour Composite [c]</td></tr>
<tr><td>Esherichia coli (E. coli)</td><td>cfu/ 100 mL</td><td>N/A</td><td>126 [g]</td><td>N/A</td><td>410 [h]</td><td>Effluent</td><td>1/Month [i]</td><td>Grab</td></tr>
<tr><td rowspan="2">Total Nitrate/Nitrite, as N</td><td>mg/L</td><td>N/A</td><td>44.9</td><td>N/A</td><td>66.4</td><td rowspan="2">Effluent</td><td rowspan="2">1/Month [j]</td><td rowspan="2">24-hour Composite [c]</td></tr>
<tr><td>lbs/day</td><td>N/A</td><td>936</td><td>N/A</td><td>1,385</td></tr>
<tr><td rowspan="2">Total Ammonia, as N</td><td>mg/L</td><td>N/A</td><td>9.1</td><td>N/A</td><td>11.5</td><td rowspan="2">Effluent</td><td rowspan="2">1/Month</td><td rowspan="2">24-hour Composite [c]</td></tr>
<tr><td>lbs/day</td><td>N/A</td><td>190</td><td>N/A</td><td>240</td></tr>
<tr><td>Whole Effluent Toxicity (WET)</td><td colspan="5">See Permit Section 1.4 for WET requirements</td><td>Effluent</td><td>1/Alternate Year</td><td>24-hour Composite [c]</td></tr>
</table>

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. 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.
e. If more than one FC bacteria 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.
f. Not more than one sample, or 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.
g. If more than one *E. coli* bacteria 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.
h. Not more than one sample, or if more than ten *E. Coli* bacteria samples are collected during the monthly reporting period, not more than 10% of the samples may exceed the statistical threshold value of 410 cfu/100 mL.
i. Monitoring required once per month only during the time period **May-September**. Monitoring should be conducted at the same time as FC monitoring.
j. Monitoring to be conducted at the same time as monitoring for ammonia.
k. Monitoring to be conducted a minimum of 120 days apart.
l. All metals shall be analyzed and reported as total recoverable metals.

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 on the test organisms *Ceriodaphnia dubia* (the water flea) and *Pimpehales promelas* (the fathead minnow). Specifically, the EPA freshwater chronic toxicity tests on the subject organisms were:

- 3-brood (6-8-day) survival & reproduction test with *Ceriodaphnia dubia;* and
- 7-day survival & growth test with *Pimephales promelas*.

The organisms were tested at the following effluent concentrations: 36.4%, 18.2%, 9.1%, 4.6%, 2.3%, and 0% for the summer season. For the winter season, the dilution series was: 45.0%, 22.5%, 11.2%, 5.6%, 2.8%, and 0%. The 0% was the control dilution, specific to the season the sample was gathered.

In the previous permit, the dilution was based on the in stream waste concentration (IWC), reflecting procedures outlined in EPA guidance as the inverse of the mixing zone dilution factors (USEPA 1996). A total of five chronic toxicity tests for both testing species were performed. Tests were conducted on 24-hour flow composited final effluent samples. The five tests were submitted in a timely manner to the Department during the previous five-year permitting period, with the respective DMRs as required by the permit. Results from the five *Ceriodaphnia* tests exhibited no chronic effects or toxic response for either survival or reproduction. For *Pimephales promelas*, four of the five tests exhibited no chronic effects or toxic response for either survival or growth. For the last test conducted in September 2018, *Pimephales promelas* exhibited a toxic response in the growth endpoint for the highest effluent concentration of 45%, but the TUc of 1.1 based on the Inhibition Concentration 25% (IC_{25}) and 2.7 based on the No-Observed-Effect Concentration (NOEC). The NOEC were below the permit trigger limits of 11.0 for the summer season sampling. Complete results of the WET testing permitting conducted during the previous permitting period are shown in Table 7.

Table 7: Eagle River Wastewater Treatment Facility Chronic WET Testing Results, 2014 - 2018

Date	***Ceriodaphnia dubia***				***Pimephales promelas***			
	Type	**TUc**	**IC_{25}**	**NOEC**	**Type**	**TUc**	**IC_{25}**	**NOEC**
2014 Annual (Summer)	Survival	<1.0	>100%	100%	Survival	<1.0	>100%	100%
	Reproduction	<1.0	>100%	100%	Growth	<1.0	>100%	100%
2015 Annual (Winter)	Survival	<1.0	>100%	100%	Survival	<1.0	>100%	100%
	Reproduction	<1.0	>100%	100%	Growth	<1.0	>100%	100%
2016 Annual (Summer)	Survival	<1.0	>100%	100%	Survival	<1.0	>100%	100%
	Reproduction	<1.0	>100%	100%	Growth	<1.0	>100%	100%
2017 Annual (Winter)	Survival	<1.0	>100%	100%	Survival	<1.0	>100%	100%
	Reproduction	<1.0	>100%	100%	Growth	<1.0	>100%	100%
2018 Annual (Summer)	Survival	<1.0	>100%	100%	Survival	<1.0	>100%	100%
	Reproduction	<1.0	>100%	100%	Growth	**1.1/2.7**	**89.7%**	**36.4%**

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 summer sampling events, chronic WET testing requires dilution of effluent in the following series: 54.8%, 27.4%, 13.7%, 6.8%, 3.4%, and a control (0%). For winter sampling events, the chronic WET testing effluent dilution series is: 78.4%, 39.2%, 19.6%, 9.8%, 4.9%, and a control. 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. This is a change from the previous APDES permit where the WET dilution series was based on the ratio of influent to effluent flow rates.

For this discharge, a mixing zone is authorized and the chronic WET permit triggers are any one test result greater than or equal to as critical effluent dilution of 13.7% (100/7.3 TUc = 13.7%) in the summer season or greater than or equal to a critical effluent dilution of 19.6% (100/5.1 TUc = 19.6 %) in the winter season. A TUc equals 100/NOEC (e.g., If NOEC = 100, then toxicity = 1 TUc) or TUc = $100/IC_{25}$.

The current permit also requires accelerated WET testing if toxicity is greater than 13.7 TUc in the summer season or 19.6 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 13.7 TUc or 19.6 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 Limits and Monitoring

Eagle River is protected for the following uses per 18 AAC 70.020(a)(1)(A) – (C): water supply for drinking, culinary, and food processing; agriculture, including irrigation and stock watering; aquaculture; industrial activities; water recreation, both contact and secondary recreation; and growth and propagation of fish, shellfish, other aquatic life, and wildlife. AWWU monitored Eagle River for calcium, magnesium, total water hardness, ammonia, temperature, and pH, in addition to monitoring for recoverable and dissolved concentrations of copper, lead and silver.

3.5.1 Receiving Waterbody Monitoring Requirements in Current Permit

The permit establishes a receiving waterbody monitoring requirement to determine ambient conditions for temperature, pH and water hardness in Eagle River. The WQC of certain metals, including copper, lead, and zinc, are water hardness-dependent. Receiving water monitoring for water hardness in the current permit cycle will allow continued accurate characterization of ambient conditions for water-hardness-dependent metals of concern in the next permit cycle. Ammonia also remains as a pollutant of concern, and is part of the 1995 TMDL. Ammonia WQC are dependent upon receiving waterbody temperature and pH. Monitoring temperature and pH in the present permit cycle will also allow accurate characterization for ammonia during the next permit cycle. The permit establishes a receiving waterbody monitoring station in Eagle River, at a location above the influence of the facility's discharge at Outfall 001A and also outside of the influence of the Glenn Highway stormwater flow. The monitoring station may be the same as the station used in the receiving water monitoring study conducted from February 2013 until July 2015, or a different monitoring station may be established. Monitoring must start within 180 days of the effective date of the permit and the location must be approved by the Department (see permit section 1.6).

3.5.2 Receiving Waterbody Monitoring, February 2013 – July 2015

Receiving water monitoring was performed upstream from the WWTP, at one location; 61.3103 North, -149.5768 West, starting in February 2013 and continuing monthly until July 2015. This location, at the confluence of Meadow Creek and Eagle River, avoided collection of water samples potentially contaminated with stormwater pollution from the Glenn Highway (Alaska State Highway #1) corridor and other impervious surfaces from the Eagle River community. The purpose of the receiving water monitoring was to assess the ambient water concentrations of ammonia, copper, and lead. The AWWU testing was intended to provide the data for a potential revision of the WLA for the ER WWTF in the Eagle River TMDL. More information about the Eagle River TMDL can be found in Fact Sheet 4.4.

AWWU collected this data and the made the monitoring results available to DEC. Data results for these parameters collected in this monitoring event are summarized in Table 8 Fact Sheet Part 4.5.

4.0 RECEIVING WATERBODY

4.1 Description of Receiving Waterbody and Low Flow Conditions

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.

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. More recent river flow data 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. More information about the permit condition to study flow rates in Eagle River during the permit cycle can be found in Fact Sheet Part Receiving Water Flow Study7.3.

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.

4.2 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.

4.3 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.

4.4 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.

In 1995, EPA described the development of effluent limits for ammonia, copper, and lead in the fact sheet to the NPDES permit as follows:

"In some cases, the maximum daily limit may appear to exceed the wasteload allocation value. However, this is due to the difference in time frames between the two values. The wasteload allocation is based on the same time frame as the criteria (for example, four days for a chronic wasteload allocation), whereas the maximum daily limit is based on a single day. It is possible to exceed the four-day average on any given day and still meet the average. The permit limits will ensure that both the wasteload allocations and criteria are met."

The permit limits for ammonia and copper have changed from the previous permit, but the new permit limits for these parameters are still protective of Alaska WQS. The permit limit for copper, based on receiving water and effluent monitoring during the previous permit cycle and a RPA conducted in accordance with the Department's *APDES Permits Reasonable Potential Analysis and Effluent Limits Development Guide*, is lower than the WLA assigned by the TMDL. The 1995 TMDL copper WLA for the ER WWTF was 2.5 lbs/day for the summer season for a chronic aquatic life criterion of 11 µg/L and 1.4 lbs per day for the winter season with a chronic aquatic life criterion of 12 µg/L. The present permit limits for copper is 0.55 lbs/day for the summer season, with a chronic aquatic life criterion of 6.6 µg/L. The present permit limit for the winter season for copper is 0.52 lbs/day with a chronic aquatic life criterion of 9.1 µg/L. More information on the calculation of receiving water WQC for metals can be found in Fact Sheet Part 4.5 and Table 8: Eagle River Receiving Water Monitoring Results, February 2013 - July 2015 .

Ammonia is expected to meet Alaska WQC at the end of the pipe and have WQS-WQBELs of 102 lbs/day for the Monthly Average and 340 lbs/day Daily Maximum for the summer season in the present permit. The summer WQS-WQBELs for ammonia are reduced from the previous permit's WQBELs, which were 410 lbs/day for the Daily Maximum and no Monthly Average limit. For the winter season, the ammonia WQS-WQBELs are 190 lbs/day for the Monthly Average and 240 lbs/day for the Daily Maximum compared to the previous permit's winter limits of 240 lbs/day for the Daily Maximum and no Monthly Average limit. The freshwater acute aquatic life Alaska WQC for ammonia in the winter season, using receiving water monitoring data collected during the previous permitting cycle, is 12.3 mg/L. Based on this value, the Daily Maximum limit would be 256 lbs/day. However, the 1995 TMDL assigned a WLA of 240 lbs/day for ammonia during the winter season; a limit that is more protective than the calculated limit. Therefore, DEC is retaining the more protective ammonia effluent limit of 240 lbs/day for the winter season in the permit. More information about DEC's decision to use 240 lbs/day as the Daily Maximum effluent limit in the present permit can be found in Fact Sheet APPENDIX B: B.3.4.5.

Effluent limits for lead are unchanged from the previous permit and are the same as the limits for lead in the 1995 TMDL; 0.63 lbs/day for the Daily Maximum effluent limit in the summer season and 0.37 lbs/day for the Daily Maximum in the winter season.

4.5 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 mixing zone dilution factors remained unchanged from the factors determined for the previous NPDES permit cycle, including providing for seasonal mixing zones for ammonia, DO, copper, FC bacteria, lead, temperature, TDS, and WET. Low flow conditions (1Q10 for acute mixing zone calculations and 7Q10 for chronic mixing zone calculations) were used. Ammonia was the parameter that required the most dilution in both the summer and winter seasons and the mixing zone dilution and lengths and widths of the seasonal mixing zones were driven by the dilution necessary to achieve the ammonia WQS at the boundary of the mixing zone.

For the present permit, acute and chronic aquatic life criteria were calculated for ammonia, lead, and copper, 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. Dissolved criteria were used in this case, because the high suspended sediment load from the glacial stream provided inaccurate results from direct measurements of total recoverable metal concentrations. The rationale for using dissolved metals criteria was explained in the 2005 (EPA) fact sheet:

“Total recoverable concentrations of all four metals (copper, lead, silver, and zinc) were found to be directly correlated to Eagle River’s suspended sediment concentrations and flow, with the highest concentrations occurring during the summer glacial melt period and the lowest concentrations occurring during the winter months. Dissolved concentrations of all four metals were found to be very low when compared to EPS water quality criteria. Total recoverable concentrations of copper and lead were found to be elevated with respect to the state of Alaska total recoverable criteria during the summer months as a result of the naturally high suspended sediment loads”. Further studies were requested, which were completed and summarized in a report submitted to EPA on December 20, 2003. “The study determined that if the State of Alaska continued to use total recoverable metals for water quality criteria, the criteria would need to be adjusted to account for the naturally high background conditions. In the interim, however, the State of Alaska has adopted the EPA recommended dissolved criteria for these metals.”

Conversion factors in Appendix B of the DEC Toxics manual were used to convert dissolved metals (copper and lead) criteria to total recoverable metals. DEC’s policy for calculating WQC for fresh water hardness-dependent metals is to use the 15th percentile of total water hardness from the monitoring data collected. 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 ammonia, copper, and lead. Ambient data and calculated WQC is summarized in Table 8.

Table 8: Eagle River Receiving Water Monitoring Results, February 2013 - July 2015

Parameter	Minimum Value	Maximum Value	Concentration Used in RPA Analysis	Units [a]	Calculated WQC for aquatic life
Total Ammonia as N [b]	ND	0.017	0.016 [d]	mg/L	16.3 [f], 4.9 [g]
Total Ammonia as N [c]	ND	0.11	0.0081 [d]	mg/L	12.3 [f], 9.1 [g]
Copper [b]	ND	0.61	0.58 [d]	µg/L	7.7 [h], 6.0 [i]
Copper [c]	ND	2.25	1.3 [d]	µg/L	13.7 [h], 9.1 [i]
Lead [b]	ND	0.015	0 [d]	µg/L	36.4 [j], 1.4 [k]
Lead [c]	ND	0.39	0.093 [d]	µg/L	92.2 [j], 3.6 [k]
Temperature [b]	4.9	13.2	5.8 [d]	°C	N/A
Temperature [c]	-0.1	9.6	6.1 [d]	°C	N/A
pH [b]	7.0	7.9	7.4 [d]	SU	N/A
pH [c]	7.5	8.2	8.0 [d]	SU	N/A
Hardness as $CaCO_3$ [b]	52	98	53 [e]	mg/L	N/A
Hardness as $CaCO_3$ [c]	87	140	110 [e]	mg/L	N/A

Footnotes:

a. Units: mg/L = milligrams per liter, µg/L = micrograms per liter, SU = standard units, °C = degrees Celsius,
b. Samples taken in the summer months (June 1– Sept 30)
c. Samples taken in the winter months (Oct 1- May 31).
d. 85th Percentile
e. 15th Percentile
f. Acute aquatic life criterion (freshwater, salmonids present): $Acute = \frac{0.275}{1+10^{7.204-pH}} + \frac{39.0}{1+10^{7.204-pH}}$
g. Chronic aquatic life criterion (freshwater, early stages fish life present): $Chronic = \left[\frac{0.0577}{1+10^{7.688-pH}} + \frac{2.487}{1+10^{pH-7.688}}\right] \cdot MIN\ (2.85, 1.45 \cdot\ 10^{0.028(25-T)}\ )$
h. Acute aquatic life criterion $Acute = \exp\{0.9422[\ln(hardness) - \ 1.700\}\ (0.960)$
i. Chronic aquatic life criterion $Chronic = \exp\{0.8545[\ln(hardness)] - \ 1.702\}\ (0.960)$
j. Acute aquatic life criterion $Acute = \exp\{1.273[\ln(hardness) - \ 1.460\}\ (1.46203 - [\ln hardness)(0.145712)]$
k. Chronic aquatic life criterion $Chronic = \exp\{1.273[\ln(hardness) - \ 4.705\}\ (1.46203 - [\ln hardness)(0.145712)]$

The calculated WQC for water hardness-dependent metals are lower 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 53 mg/L (proposed permit); lower than the summer water hardness value of 89 mg/L, estimated from the 1990s USGS data (previous permit). The 15th percentile of the receiving waterbody winter hardness data is 110 mg/L; higher than the estimated winter receiving waterbody hardness of 97 mg/L (previous permit) and the calculated WQC for winter water hardness-dependent metals are also higher than the winter WQC used in calculations for the previous APDES permit. The revised WQC for copper was the basis for revising the copper effluent limits for copper in the permit for both the winter and summer seasons. More information about calculations of the copper effluent limits are provided in Fact Sheet APPENDICESAPPENDIX B - BASIS FOR EFFLUENT LIMITATIONS - 1.1.1.1.1APPENDIX D.

DEC received AWWU's application for reissuance of the permit on December 21, 2018. As part of the application, AWWU prepared a data summary of the effluent data, compounded from the monitoring required by the previous permit as well as the results of the expanded effluent monitoring. AWWU 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 average daily design flow rate of 2.5 mgd and calculated Maximum Projected Effluent Concentrations (MECs) for ammonia, copper, FC, lead, and TDS. AWWU compiled an effluent data summary and subsequently performed a Reasonable Potential Analysis (RPA) following the DEC's recommended RPA procedures (DEC 2009 and Tetra Tech 2013). In the analysis, AWWU determined that copper was the driving parameter for the summer and winter mixing zone dimensions. AWWU requested re-authorization of the previously authorized mixing zone for ammonia, metals (copper, mercury, and zinc), cyanide, DO, FC bacteria, temperature, TDS, and WET, with copper as the parameter requiring the most dilution. A mixing zone for total residual chlorine (TRC) was not requested, as chlorine is not being utilized for disinfection purposes by the ER WWTF. AWWU proposed modifications for dilution factors, and reduced sizes of the mixing zone during both the summer and winter season.

In accordance with 18 AAC 70.240, DEC also modeled the acute and chronic mixing zones and calculated dilution factors using the CORMIX version 11.0 modeling program. DEC's models yielded different mixing zone sizes than those proposed by AWWU, 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, such as NO_3/NO_2, that demonstrated reasonable potential (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 daily design flow of 2.5 mgd. See Fact Sheet APPENDIX APPENDIX B - BASIS FOR EFFLUENT LIMITATIONS for details on the RPA. Differences between AWWU's and DEC's CORMIX models were primarily due to differences in the calculated metals water quality criteria determined by water hardness More information about calculated water quality criteria for metals can be found in Fact Sheet Part 4.5, and because AWWU did not originally determine that NO_3/NO_2 had RP to exceed AWQC. AWWU submitted an amended mixing zone analysis in June, 2019 including a RPA analysis for 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, 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 has a dilution factor of 7.3 for the summer season, and a dilution factor of 5.1 for the winter season. The chronic summer mixing zone has a length, parallel to the downstream course of Eagle River, of 169 feet and a width of 13 feet. The chronic winter mixing zone has a length of 790 feet and a width of 26 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 9 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. Figure 1 shows a map view of the summer chronic mixing zone for the current permit and Figure 2 shows a map view of the winter chronic mixing zone for the current permit. Mixing zones approved in the previous APDES permit are superimposed on the areal extent of the mixing zones for the current permit in both Figures 1 and 2.

Table 9: Mixing Zone Dilution Factors (DF) and Sizes for Current Permit

Mixing Zone		DF Current	Length (ft) Current	Width (ft) Current
Summer [a]	Acute	3.6	39	4.1
	Chronic	7.3	169	13
Winter [b]	Acute	1.9	55	9.4
	Chronic	5.1	790	26

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 with copper as the driving parameter. The only parameters, other than copper, that indicated there was RP to exceed Alaska WQS at the boundary of the acute mixing zone were zinc in the summer and winter season and TDS in the winter season. Both parameters had too few samples to complete an RPA, so no WQBELs were developed. Zinc and TDS, like copper, 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 3.6, with a length of 39 feet and a width of 4.1 feet. The winter season acute mixing zone has a dilution factor of 1.9, with a length of 55 feet and a width of 9.4 feet. (See Table 10). 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 62 seconds for the winter acute mixing zone and approximately 0.67 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 E 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:

4.5.1 Size

In accordance with 18 AAC 70.240, 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 four and a half years of DMRs from July 2014 through December 2018 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 is the only pollutant that requires dilution in the chronic mixing zone and therefore is the driving parameter. 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.

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 include in the chronic mixing zone include, TDS, WET, DO, temperature, copper, and lead.

For copper, the summer receiving water concentration was 0.582 µg/L and the winter receiving water concentration was 1.337 µg/L. Both ambient concentrations for copper were calculated from receiving water monitoring conducted by AWWU, 2013 – 2015. A further discussion of the ambient monitoring project and results is presented in Fact Sheet Part 4.5. More information about mixing zone dilutions and sizes are shown in Table 9: Mixing Zone Dilution Factors (DF) and Sizes for Current Permit and more information about copper and NO_3/NO_2 can be found in Fact Sheet APPENDIX B Part B.3.4.7and B.3.4.8.

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 decreased from the previous permit issuance, except for the winter chronic mixing zone length. The winter chronic mixing zone length is larger than that calculated for the previous permit, even though the dilution factor has been reduced. In the previous permit, the winter chronic mixing zone size was 397-feet long by 34-feet wide. In the proposed permit, the winter chronic mixing zone dimensions are 790-feet long by 26-feet wide. See Table 9: Mixing Zone Dilution Factors (DF) and Sizes for Current Permit.

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 Department did not have enough data for NO_3/NO_2 concentrations in the effluent prior to the 2014 APDES permit issuance to impose a WQBEL for NO_3/NO_2. With NO_3/NO_2 concentrations collected in the effluent as new information during the previous permit cycle, the DEC finds that it is has become necessary to require a longer chronic mixing zone for the winter season in order that the NO_3/NO_2 concentrations are able to meet AWQC at the edge of the chronic mixing zone.

The acute mixing zone, driven by copper, is sized according to the dilution required by copper to meet acute aquatic life WQ criteria for both the summer and winter seasons. Both acute mixing zones are based on five years of monthly copper effluent data submitted by the permittee and results from the February 2013 – July 2015 receiving water monitoring conducted by AWWU.

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 10: Summary of DEC CORMIX Model Inputs

Parameter Modeled	Maximum Expected Concentration	Ambient Concentration	Acute Aquatic Life Criterion	NO_2/NO_3 Human Health Drinking Water Criteria
Total Nitrate/Nitrite (NO_2/NO_3)	64.23 mg/L [a]	1.5 mg/L [a, b]	**N/A**	10 mg/L [a, b]
	45.39 mg/L [b]			
Copper (Total recoverable)	26.41µg/L [a]	0.582 µg/L [a]	7.7 µg/L [a]	**N/A**
	24.92 µg/L [b]	1.34 µg/L [b]	9.1 µg/L [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	15.1 ^{o}C [a]			
	12.2 ^{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	0 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	5.8 ^{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)

Figure 1: Eagle River Wastewater Treatment Facility Permit Summer Chronic Mixing Zone

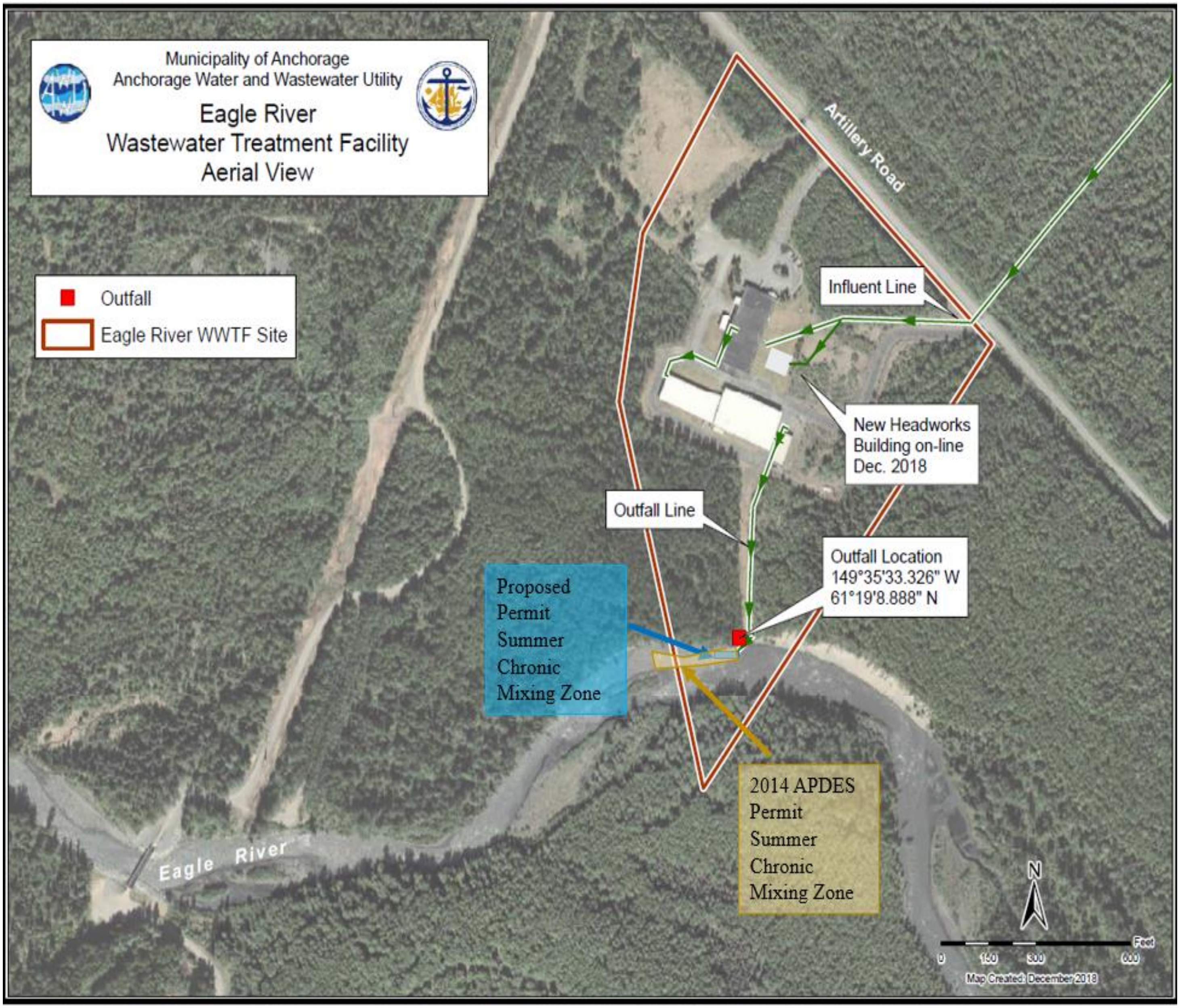
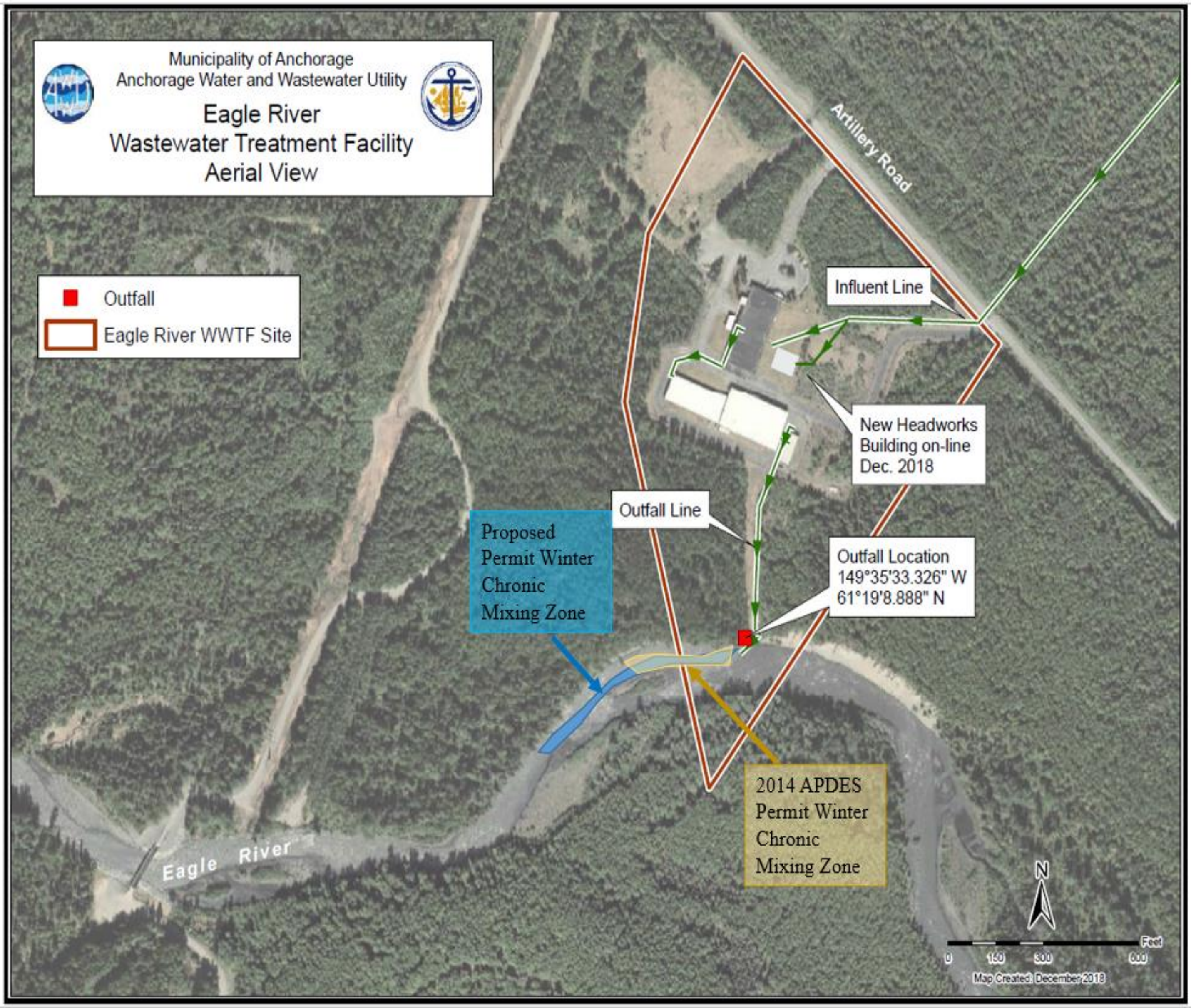


Figure 2: Eagle River Wastewater Treatment Facility Permit Winter Chronic Mixing Zone



4.5.2 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.

4.5.3 Existing Use

In accordance with 18 AAC 70.240, the mixing zone has been appropriately sized to fully protect the existing uses of Eagle River. Water quality criteria are developed to specifically protect the uses of the waterbody as a whole. Therefore, if the water quality criteria are met in the waterbody then the existing uses are protected. Given that water quality criteria will be met at, and beyond, the boundary of the chronic mixing zone, the designated and existing uses beyond the boundary of the chronic mixing zone will be maintained and fully protected under the terms of the permit as required in 18 AAC 70.240(c)(2).

The permit reissuance application does not propose any changes that would result in a lower quality effluent. Effluent monitoring and receiving water monitoring have indicated that the discharge neither partially nor completely eliminates an existing use of the waterbody outside of the mixing zone. The size of the mixing zone will significantly decrease from the previous permit issuance, in all instances except for the chronic mixing zone length in the winter season, are discussed in Fact Sheet Part 4.5.1. Mixing zone modeling indicates that the flushing in the winter 7Q10 and 1Q10 scenarios is adequate to ensure full protection of uses of the waterbody outside of the mixing zone. 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).

4.5.4 Human Consumption

In accordance with the conditions of the permit, and in accordance with 18 AAC 70.240(d) and 18 AAC 70.240(c)(4)(C), the pollutants discharged cannot produce objectionable color, taste, or odor in aquatic resources harvested for human consumption; nor can the discharge preclude or limit established processing activities or commercial, sport, personal use, or subsistence fish and shellfish harvesting.

There is no indication that the pollutants discharged have produced objectionable color, taste, or odor in aquatic resources harvested for human consumption. Additionally, the discharge has not precluded or limited established processing activities or commercial, sport, personal use, or subsistence fish and shellfish harvesting. Signs are required to be posted to inform the public that certain activities such as harvesting of aquatic life for raw consumption and primary contact recreation should not take place in the mixing zone.

The CORMIX modeling suggests that the maximum expected effluent concentrations of pollutants will be diluted rapidly and that the mixing zone will not preclude or limit established fishery activities per 18 AAC 70.240(c)(4)(C). DEC has determined that application data and available mixing zone modeling suggests that pollutants discharged will neither produce objectionable color, taste, or odor in harvested aquatic resources for human consumption, nor preclude or limit fish and shellfish harvesting per 18 AAC 70.240(d)(6) and 18 AAC 70.240(c)(4)(C).

4.5.5 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 (*Thymallus arcticus*), northern pike (*Esox lucius*), inconnu/sheefish (*Stenodus leucichthys*) and all other whitefish in Alaska belonging to genera *Prosopium* and *Coregonus*, Arctic char (*Salvelinus alpinus*), Dolly Varden (*S. malma*), brook trout (*S. fontinalis*), rainbow trout (*Oncorhynchus mykiss*), cutthroat trout (*O. clarkii*), burbot *Lota*, landlocked coho salmon (*O. kisutch*), Chinook salmon (*O. tshawytscha*), and sockeye salmon (*O. nerka*).

The ER WWTF mixing zones are not authorized in a known spawning area for anadromous fish or resident fish, spawning redds for chinook, coho, pink, chum and sockeye salmon. The Alaska Department of Fish and Game (ADF&G) stated in a correspondence to the Department on May 29, 2019 that fish are not known to spawn in the vicinity of the discharge location. Known spawning areas for chum, coho, chinook, and pink salmon in Eagle River are all located upstream from the ER WWTF.

4.5.6 Human Health

In accordance with 18 AAC 70.240(d), the mixing zone must be protective of human health and will not result in pollutants discharged at levels that will bioaccumulate, bioconcentrate, or persist above natural levels in sediments, water, or biota, or at levels that otherwise will create a public health hazard through encroachment on a water supply or contact recreation uses. An analysis of the effluent data that was included with AWWU's application for permit reissuance 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 zone.

Low-level concentrations of copper, nickel, mercury, and zinc have been detected in the ER WWTF effluent. These pollutants are identified as bioaccumulative by EPA (EPA 2000). DEC is requiring that AWWU monitor copper twice each year during the summer season and twice each year during the winter season; a monitoring frequency consistent with conditions required by the previous permit. AWWU will also monitor concentrations of lead, cyanide, mercury, and zinc, at the same frequency as copper. All aforementioned parameters will also be tested in the expanded effluent monitoring required during the next permit cycle. The effluent data will be used to make future determinations about reasonable potential, the need for WQBELS, and /or the need for specific mixing zone authorizations for these parameters. DEC has determined that the permit satisfied 18 AAC 70.240(d)(1), 18 AAC 70.240(k)(4), and 18 AAC 70.240(c)(4)(A), and that the level of treatment at the ER WWTF is protective of human health.

4.5.7 Aquatic Life and Wildlife

In accordance with 18 AAC 70.240(d)(5) and 18 AAC 70.240(c)(4)(D-G), pollutants for which the mixing zone will be authorized will not result in concentrations that result in undesirable or nuisance to aquatic life, cause permanent or irreparable displacement of indigenous organisms, or a reduction in fish or shellfish population levels. Nor will the discharge result in adverse effects on threatened or endangered species or anadromous fish, form a barrier to migration, or prevent zone of passage in the receiving water.

Known spawning areas for chum, coho, chinook, and pink salmon in Eagle River are all located upstream from the ER WWTF indicating that salmon pass through the discharge area on their way upstream to spawn and that smolt migrate downstream on their return to sea. Reasonable potential analysis results and CORMIX modeling conducted for this discharge suggest that pollutants will not be discharged at high levels, will require relatively small dilution factors, that high dilution occurs relatively rapidly and that pollutants will have a relatively short residence time in the mixing zones (See Fact Sheet 4.5.1). CORMIX modeling incorporated the most stringent WQC for the protection of the growth and propagation of fish shellfish, other aquatic life, and wildlife, and all WQC will be met at the boundary of the authorized mixing zone. Furthermore, recent WET testing results do not indicate that the effluent is toxic at critical concentration, and toxic effects are relatively rare even at 100%

effluent concentrations. More information about toxic effects and WET testing can be found in Fact Sheet Part 3.4

DEC determined that the mixing zones will not create a significant adverse effect to fish spawning or rearing, form a barrier to migratory species, fail to provide a zone of passage, result in undesirable or nuisance aquatic life, result in permanent or irreparable displacement of indigenous organism, or result in reduction in fish population levels and that 18 AAC 70.240(d)(5) and 18 AAC 70.240(c)(4)(D-G), are met.

4.5.8 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. Based on the review of applicable endangered species mapping and data bases and information received from the National Marine Fisheries Service (NMFS) and the United States Fish and Wildlife Service (USFWS) in communications with DEC in a telephone conversation on June 3, 2019 (NMFS) and an email communication on May 30, 2019 (USF&WS) (see Fact Sheet 8.1and 8.2), combined with consideration of the mixing zone size and critical conditions; DEC determined that the critical habitat and the threatened or endangered species occurring in the area are located over ten miles downstream of the boundary of the chronic mixing zone boundary. The subject discharge and associated mixing zone are not located in a proposed or designated critical habitat area.

No detrimental effects to fauna in the area have been documented with previously authorized mixing zones for the facility, nor does the mixing zone appear to pose an undesirable nuisance to aquatic life. The RPA and CORMIX modeling resulted in an overall decrease in the size of the mixing zone, excepting the winter chronic mixing zone, as discussed in Fact Sheet 4.5.1, further reducing the possibility for any threatened or endangered species potentially in the area to come into contact with the treated wastewater.

Due to the reduced size and short residence time of pollutants in the mixing zone, DEC has concluded that the mixing zones are sized to not cause an adverse effect on threatened or endangered species in the vicinity of the discharge. DEC will provide a copy of the permit and fact sheet to NMFS and USF&WS when it is publically 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.

Other permit monitoring requirements that changed since the previous permit are requirements to monitor the following parameters: NO_3/NO_2 (increased frequency of monitoring) and mercury, zinc, TDS, DO, *E. coli* bacteria (new monitoring requirements). The decision to remove the monitoring requirements for cadmium and antimony is supported by five years of monitoring for these parameters once every quarter which provided a robust data set that was used to make the determination that the levels of these parameters do not have a probable cause to exceed Alaska WQS at the end of the pipe.

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 chronic mixing zone in the winter season, albeit one with a lower dilution, was required in order to meet water quality standards at the boundaries of the mixing zone. See Fact Sheet Part 4.5.1and APPENDICES APPENDIX B - BASIS FOR EFFLUENT LIMITATIONS – 1.1.1.1.1APPENDIX D for more information on the size of the winter chronic mixing zone and information regarding new WQBELs for copper and NO_3/NO_2.

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).

A section of Eagle River adjacent to and upstream of the ER WWTF is listed in Category 4A on DEC's most recent Integrated Report (Alaska's 2014-16 Integrated Report)*;* therefore listed parameters have been identified where only the Tier 1 protection level applies. Accordingly, this antidegradation analysis conservatively assumes that the Tier 2 protection level applies to all other 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).*

The water quality criteria, upon which the permit effluent limits are based, serve the specific purpose of protecting the existing and designated uses of the receiving water. Per 18 AAC 70.020 and 18 AAC 70.050 all fresh waters are protected for all uses; therefore, the most stringent water quality criteria found in 18 AAC 70.020 and in the DEC Toxics 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.

Conventional pollutants of concern in domestic wastewater are BOD_5, TSS, and pH. Additional domestic wastewater pollutants are: temperature, DO, TDS, ammonia, FC bacteria, and WET. Other pollutants of concern in the ER WWTF effluent are cyanide, lead, copper, zinc, mercury, and NO_3/NO_2. The permit includes numeric effluent limits or continued monitoring addressing each of these pollutants of concern. The permit requires facilities to implement an Operation and Maintenance (O&M) Plan to minimize the production of waste and the discharge of pollutants to waters of the U.S., to ensure that domestic wastewater facilities provide for the protection or attainment of existing and designated uses.

Section 1.2.2 of the permit requires that the discharge shall not cause or contribute to a violation of the Alaska WQS at 18 AAC 70. As previously stated, the portion of Eagle River where the discharge is located is designated as a Category 4A impaired waterbody for ammonia, chlorine, copper, and lead with an associated TMDL, therefore Tier 1 antidegradation analysis is required for those parameters at that location. More information about the Eagle River TMDL can be found in Fact Sheet Part 4.4. With the exception of chlorine, effluent limits for parameters that require a Tier 1 antidegradation analysis, (ammonia, copper, and lead) are reduced, or the same as, previous permit issuances and the WLAs for these parameters in this permit are lower or the same as the WLAs and margin of safety put in place by the final 1995 TMDL or in the previous APDES permit. Consistency with the final 1995 TMDL, WLA, margin of safety, and effluent limits first established in previous NPDES permits ensures that existing uses and the level of water quality necessary to support them are maintained and protected and no further analysis is required for those parameters. Chlorine is not expected to be present in the discharge because the ER WWTF has not used chlorine in its secondary treatment methods since 2009 and no further degradation of Eagle River is expected. Therefore, the existing uses and the level of water quality necessary to support them are maintained and protected.

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)(7)(A –F) *if, after review of available evidence, the department finds that the proposed discharge will lower water quality in the receiving water, the department will not authorize a discharge unless the department finds that*

> ***18 AAC 70.016(c)(7)(A)*** *the reduction of water quality meets the applicable criteria of 18 AAC 70.020(b), 18 AAC 70.030, or 18 AAC 70.236(b), unless allowed under 18 AAC 70.200, 18 AAC 70.210, or 18 AAC 70.240;*

As previously stated, Section 1.2.2 of the permit requires that the discharge shall not cause or contribute to a violation of the WQS at 18 AAC 70. WQBELs are set equal to the most stringent water quality criteria available under 18 AAC 70.020(b) for any of the protected water use classes. Because of the nature of the permitted discharges, other pollutants are not expected to be present in the discharges at levels that would cause, have the reasonable potential to cause, or contribute to an exceedance of any Alaska WQS.

Fact Sheet Part 4.5: Mixing Zone Analysis of the permit requires that the discharge shall not cause a violation of the WQS except if excursions are authorized in accordance with provisions in 18 AAC 70.200 – 70.240 (i.e., mixing zone, variance, etc.).

As a result of the ER WWTF reasonable potential to exceed water quality criteria for copper and NO_3/NO_2, and available assimilative capacity in the receiving water, a mixing zone is authorized in the wastewater discharge permit in accordance with 18 AAC 70.240. More information about the ER WWTF mixing zone can be found in Fact Sheet Part 4.5. The resulting effluent end-of-pipe limits and monitoring requirements in the permit (See Table 5 and Table 6) protect water quality criteria, and therefore, will not violate the water quality criteria found at 18 AAC 70.020 beyond the boundary of the authorized mixing zone. A smaller acute mixing zone for both summer and winter seasons has been authorized in the permit, consistent with 18 AAC 70.240(d)(7), to ensure no lethality to passing organisms occurs. Also, the size of the summer chronic mixing zone is reduced from the previous permit. The length of the chronic winter mixing zone has increased from 397 feet in the previous permit to 790 feet in the permit. More information about the winter chronic mixing zone can be found in Fact Sheet Part 4.5.1and Part 5.0

The permit reissuance application does not propose any changes that would likely result in wastewater of lower quality to be discharged than has been discharged under the previously issued NPDES permits or the previous APDES permit for the ER WWTF. The Alaska WQS (and associated TMDL, WLAs, and margin of safety), upon which the permit effluent limits are based, serve the specific purposes of protecting the existing and designated uses.

Based on the results of the RPA, there are WET requirements imposed by the permit. The permittee must conduct WET tests one time per year to determine if the effluent is creating toxicity in the receiving water beyond the boundary of the authorized chronic mixing zone. If WET tests reveal that the discharge could have toxicity beyond the boundary of the chronic mixing zone, the permittee shall perform accelerated testing and identify the source of the toxicity. The permittee must notify DEC of the exceedance in writing within two weeks of receipt of test results. WET results from this permit issuance will be used when the permittee applies for reissuance of the permit to ensure the applicable criteria of 18 AAC 70.030 are met.

Site-specific criteria as allowed by 18 AAC 70.235 have not been established for Eagle River, as listed in 18 AAC 70.236(b), and are therefore not applicable. The permit does not authorize short term variance or zones of deposit under 18 AAC 70.200 or 18 AAC 70.210; therefore does not apply.

The Department has determined the reduction of water quality meets the applicable criteria of 18 AAC 70.020(b), 18 AAC 70.030, or 18 AAC 70.236(b), and that the finding is met.

18 AAC 70.016(c)(7)(B) *each requirement under (b)(5) of this section for a discharge to a Tier 1 water is met;*

See 18 AAC 70.016(b)(5) analysis and findings above.

18 AAC 70.016(c)(7)(C) *point source and state-regulated nonpoint source discharges to the receiving water will meet requirements under 18 AAC 70.015(a)(2)(D); to make this finding the department will (i) identify point sources and state-regulated nonpoint sources that discharge to, or otherwise impact, the receiving water;* and *(ii) consider whether there are outstanding noncompliance issues with point source permits or required state-regulated nonpoint source best management practices, consider whether receiving water quality has improved or degraded over time, and, if necessary and appropriate, take actions that will achieve the requirements of 18 AAC 70.015(a)(2)(D); and (iii) coordinate with other state or federal agencies as necessary to comply with (i) and (ii) of this subparagraph;*

The requirements under 18 AAC 70.015(a)(2)(D) state:

(D) all wastes and other substances discharged will be treated and controlled to achieve

(i) for new and existing point sources, the highest statutory and regulatory requirements; and

(ii) for nonpoint sources, all cost-effective and reasonable best management practices;

The highest statutory and regulatory requirements are defined at 18 AAC 70.015(d):

(d) For purposes of (a) of this section, the highest statutory and regulatory requirements are

(1) any federal technology-based effluent limitation identified in 40 C.F.R. 122.29 and 125.3, revised as of July 1, 2017 and adopted by reference;

(2) any minimum treatment standards identified in 18 AAC 72.050;

(3) any treatment requirements imposed under another state law that is more stringent than a requirement of this chapter; and

(4) any water quality-based effluent limitations established in accordance with 33 U.S.C. 1311(b)(1)(C) (Clean Water Act, sec. 301(b)(1)(C)).

The first part of the definition includes all federal technology-based effluent limit guidelines (ELGs) including "For POTWs, effluent limitations based upon…Secondary Treatment" at 40 CFR § 125.3(a)(1) defined at 40 CFR § 133.102, adopted by reference at 18 AAC 83.010(e). The ELGs set standards of performance for existing and new sources and are incorporated in the permit.

The second part of the definition references the minimum treatment standards for domestic wastewater discharges found at 18 AAC 72.050. The conditions of this permit require the permittee to meet or exceed the minimum treatment standards described in 18 AAC 72.050. Wastewater operations at the ER WWTF often exceed minimal percent removal and concentration based secondary treatment requirements for POTWs at 40 CFR § 133.102 and 18 AAC 72.050. The facility includes preliminary treatment, primary treatment, extended aeration activated sludge, secondary clarifiers, a sand filtration system, and UV disinfection, which achieves the highest statutory and regulatory requirements. The Department finds that this requirement is met.

The third part of the definition refers to treatment requirements imposed under another state law that are more stringent than 18 AAC 70. Other regulations beyond 18 AAC 70 that apply to this permitting action include 18 AAC 15 and 18 AAC 72. Neither the regulations in 18 AAC 15 and 18 AAC 72, nor another state law that the Department is aware of impose more stringent requirements than those found in 18 AAC 70.

The fourth part of the definition refers to WQBELS. WQBELs are designed to ensure that the WQS of a waterbody are met and may be more stringent than TBELs. Section 301(b)(1)(C) of the CWA requires the development of limits in permits necessary to meet WQS by July 1, 1977. WQBELs included in APDES permits are derived from EPA-approved 18 AAC 70 WQS. APDES regulation 18 AAC 83.435(a)(1) requires that permits include WQBELs that can "achieve water quality standard established under CWA §303, including state narrative criteria for water quality." The permit requires compliance with the 18 AAC 70 WQS, includes effluent limits for lead, copper, NO_3/NO_2, ammonia, bacteria and pH, and monitoring for other applicable WQS pollutants.

The Department reviewed available information on known point source discharges to receiving waters covered under the permit, and found no outstanding noncompliance issues. A state regulated nonpoint source discharging to Eagle River upstream of the ER WWTF is the MOA and State of Alaska Department of Transportation & Public Facilities (ADOT&PF) APDES permit AKS 05255-8. Receiving water monitoring conducted during the previous permitting cycle provided data for an analysis of the water quality of the receiving water. Results of this analysis indicate that the receiving water meets Alaska WQS. More information about the Eagle River receiving water quality monitoring project can be found in Fact Sheet 4.5

After review of the methods of treatment and control and the applicable statutory and regulatory requirements, including 18 AAC 70, 18 AAC 72, and 18 AAC 83, the Department finds that the discharge authorized under this general permit meets the highest applicable statutory and regulatory requirements; therefore, 18 AAC 70.016(c)(7)(C) finding is met.

18 AAC 70.016(c)(7)(D)(i-ii) *the alternatives analysis provided under (4)(C-F) of this subsection demonstrates that*

- *(i) a lowering of water quality under 18 AAC 70.015(a)(2)(A) is necessary; when one or more practicable alternatives that would prevent or lessen the degradation associated with the proposed discharge are identified, the department will select one of the alternatives for implementation; and*
- *(ii) the methods of pollution prevention, control, and treatment applied to all waste and other substances to be discharged are found by the department to be the most effective and practicable.*

AWWU submitted a revised antidegradation analysis in the required Antidegradation Form 2G that included an alternatives analysis to address (4)(C-F) of this subsection.

(i) According to AWWU's alternatives analysis, the revised application is for a new or expanded discharge, meaning a discharge that is regulated for the first time. AWWU found that the discharge requires a Tier 2 analysis as defined under 18 AAC 70.016(c)(2)(A) – (E). As part of the AWWU analysis, they made a statement that while no actual expansion of the discharge is included in this application, NO_3/NO_2 was determined to require a mixing zone and will be newly regulated parameter under the permit. AWWU's analysis of a range of practicable alternatives that have the potential to prevent or lessen the degradation associated with the proposed NO_3/NO_2 discharge, per 18 AAC 70.015(c)(4) is provided below:

a. Modification of the facility to retrofit the existing process for nitrification/denitrification for Biological Nutrient Removal (BNR) (alternating aerobic /anoxic zones). As alkalinity is consumed by nitrification, the process will require pH adjustment through the use of chemical additives. In addition, conditions required to achieve good BNR rates promote filamentous growth, which would require employing additional strategies to target their removal (such as the use of chlorination or chemical additives).
    i. There are a number of BNR process available, including the Modified Ludzach-Etinger (MLE) Process, Step Feed Process, Bardenpho Process, Modified Bardenpho Process, Sequencing Batch Reactor (SBR) Process, as well as others.
    ii. The exact process that would be the most appropriate for retrofitting the ER WWTF would need to be identified, as each particular system depends upon both influent and target effluent quality, existing treatment processes, such as plant configuration, and sludge handling procedures. Retrofitting an existing facility such as the ER WWTF, to include any of the above-mentioned or other BNR processes could range from $3,000,000 to in excess of $10,000,000 (EPA-823-R-07-002; June 2007). Also, as noted earlier, in order to achieve good BNR rates, additional chemicals would need to be added to control filamentous algal grown, possibly resulting in other impacts to the environment.

b. Utilizing a mixing zone as allowed by 18 AAC 70.240 would result in no additional costs to the facility while allowing only limited water quality degradation within a relatively small mixing zone. Permit limitations that restrict the effluent discharge will ensure that water quality criteria will not be exceeded at the boundary of, or beyond, the mixing zone. The discharge of has been allowed in the past (i.e., while to be newly regulated, discharges of this parameter are not demonstratively increasing). In addition, Eagle River has assimilative capacity and there has been no observed evidence of eutrophication in the receiving water in the vicinity of the outfall (e.g., such as low DO levels, fish kills, depletion of flora or fauna , or increased algal growth), indicating existing uses will be protected. Also, there are no known beneficial uses of the waterbody (e. g., drinking water use downstream of the outfall that would be impacted by the discharge and the area downstream of the outfall is not part of a DEC Drinking Water Protection Area.

c. AWWU did not identify a proposed practicable alternative that prevents or lessens water quality degradation while also considering accompanying cross-media environmental impacts.

The Department has determined that discharge under the limitations and requirements of the permit is identified as the only practicable alternative; therefore 18 AAC 70.016(c)(7)(D)(i) finding is met.

(ii) The methods of prevention, control, and treatment the Department finds to be most effective and reasonable are currently in use at the facility and include meeting federal (40 CFR 133) and state (18 AAC 72.050) requirements. The ER WWTF utilizes a variety of measures to prevent, control and treat the pollution that may be generated as a result of the facility's wastewater treatment operations, as described in Fact Sheet Part 2.2. The facility Operation and Maintenance Plan (OMP) establishes standard operational procedures and regular maintenance schedules for the prevention, control, and treatment of all wastes and other substances discharged from the facility. The OMP that prevents or minimizes the release of pollutants into Eagle River include minimum components such as preventative maintenance, spill prevention, water conservation, and public information and education. Section 2.6 of the permit requires that pollutants removed in the course of treatment such as screenings and grit be disposed of in accordance with Alaska Solid Waste Management Regulations at 18 AAC 60.

The Department has determined that the methods of pollution prevention, control, and treatment applied to all waste and other substances to be discharged are found by the department to be the most effective and practicable; therefore 18 AAC 70.016(c)(7)(D)(ii) finding is met.

18 AAC 70.016(c)(7*)(E) except if not required under (4)(F) of this subsection, the social or economic importance analysis provided under (4)(G) and (5) of this subsection demonstrates that a lowering of water quality accommodates important social or economic development under 18 AAC 70.015(a)(2)(A);*

The community of Eagle River has been discharging wastewater from the community of Eagle River to Eagle River under the NPDES Program since 1974 and under the APDES program since 2014. The facility currently serves an estimated population of 18,000. The WWTF treats and disposes of sewage, reducing the risk to public health, from approximately 6,709 residential and commercial connections, reducing the risk to public health, according to the AWWU's application form 2A. The community's entire sewer infrastructure has been constructed and expanded over the years to drain to the community's treatment plant that discharges to Eagle River. Accordingly, any change in this configuration would come at an immense cost to local taxpayers. Further, as previously mentioned, the Department has found that the facility routinely produces effluent quality far exceeding the secondary treatment requirement of 40 CFR Part 133, adopted by reference at 18 AAC 83.010. The facility's continued operation is important to the public health and the regional economy, as well as the overall economic and social development of the State of Alaska.

The Department has determined that the operation of the WWTF and the discharges authorized by the permit demonstrates that a lowering of water quality accommodates important social or economic development; therefore, 18 AAC 70.016(c)(7)(E) finding is met.

***18 AAC 70.016(c)(7)(*F)** *18 AAC 70.015 and this section have been applied consistent with 33 U.S.C. 1326 (Clean Water Act, sec. 316) with regard to potential thermal discharge impairments.*

Discharges authorized under the permit are not associated with a potential thermal discharge impairment; therefore, the finding is not applicable.

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. 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, if the 1995 Eagle River TMDL is revised or removed. 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://netdmr.zendesk.com/home.

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 National Marine Fisheries Service (NMFS) is responsible for administration of the Endangered Species Act (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 United States Fish & Wildlife Service (USFWS).

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. 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 and the NMFS on May 29 and June 3, 2019, respectively, and requested them to identify any threatened or endangered species under their jurisdiction in the vicinity of the ER WWTF outfall.

On May 30, 2019, DEC received an e-mail message from Mr. Drew Crane of the USFWS stating that, "There are no federally listed, proposed, or candidate species within your (the ER WWTF discharge location) project area."

Ms. Verena Gill, from the NMFS, contacted the DEC by telephone on June 3, 2019, to convey the information that the endangered Cook Inlet beluga whale occurs in waters of Knik Arm where the Eagle River empties into it, and NMFS has designated Knik Arm as a year-round critical habitat for this species. Further information on this can be found on the NMFS website: http://www.fakr.noaa.gov/protectedresources/whales/beluga.htm.

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

Essential fish habitat (EFH) includes the waters and substrate (sediments, etc.) necessary for fish from commercially-fished species to spawn, breed, feed, or grow to maturity. The Magnuson-Stevens Fishery Conservation and Management Act (January 21, 1999) requires federal agencies to consult with NOAA when a proposed discharge has the potential to adversely affect (reduce quality and/or quantity of) EFH.

As a state agency, DEC is not required to consult with NOAA on EFH; however, DEC voluntarily contacts agencies to notify them of the proposed permit issuance and to obtain listings of EFH in the area. NMFS has concluded that since Eagle River is a freshwater system, the ADF&G "*Catalog of Waters Important for the Spawning, Rearing or Migration of Anadromous Fishes*" and associated Atlas are the appropriate documents for determining EFH in freshwater in Alaska. Accordingly, EFH species for Eagle River are chinook, sockeye, coho, pink and chum salmon; however, per ADF&G, as of May 30, 2019, the Atlas indicates that the discharge and mixing zone location are not in areas of documented salmon spawning, but salmon do use the segment of the river as a migration corridor.

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 2010 Integrated Water Quality Monitoring and Assessment Report,” July 15, 2010.

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

Alaska Department of Environmental Conservation, “Interim Antidegradation Implementation Methods,” Policy and Procedure 05.03.103, July 14, 2010.

Alaska Department of Environmental Conservation. 18 AAC 70 Water quality standards, as amended through April 6, 2018.

Alaska Department of Environmental Conservation, “Alaska Water Quality Criteria Manual for Toxics and Other Deleterious Organic and Inorganic Substances,” as amended through December 12, 2008.

Alaska Department of Environmental Conservation, “Alaska Pollutant Discharge Elimination System permits reasonable potential analysis and effluent limits development guide.”

Alaska Department of Environmental Conservation. 18 AAC 80 Drinking Water, as amended through May 3, 2019.

Anchorage Water & Wastewater Utility, “Antidegradation Form 2G”, August 22, 2019.

Drew Crane (Drew.Crane@fws.gov), “Re: APDES Permit AK0022543 – Eagle River Wastewater Treatment Facility Discharge, Permit Reissuance-Endangered Species inquiry for the Eagle River vicinity,” May 30, 2019.

Jay Johnson (Jay.Johnson@alaska.gov), “Re: APDES Permit AK0022543 – Eagle River Wastewater Treatment Facility Discharge, Permit Reissuance - Confirmation of Eagle River Alaska DF&G Spawning Determination,” May 29, 2019.

Jeffrey Urbanus (UrbanusJD@muni.org), “Re: APDES Permit AK0022543 – Eagle River Wastewater Treatment Facility Discharge, Permit Reissuance-Impervious Area Draining to ER Sampling Location,” email message April 24, 2019.

Johnson, J. and P. Blanche. 2012. Catalog of waters important for spawning, rearing, or migration of anadromous fishes – Southcentral Region, Effective June 1, 2012. Alaska Department of Fish and Game, Special Publication No. 12-06, Anchorage.

John Plaskett (John.Plaskett@awwu.biz), “Re: Question about receiving water monitoring location used in 2014-19 permit cycle,” email message, April 25, 2019.

Kristi Bischofsberger, (BischofbergerKL@muni.org), Personal communication regarding Municipality of Anchorage (MOA)/State of Alaska Department of Transportation & Public Facilities (ADOT-PF)’s Municipal Separate Storm Sewer System (MS4) Permit outfall monitoring results. April 25, 2019.

USEPA, “Fact Sheet, Proposed reissuance of a National Pollutant Discharge Elimination System (NPDES) permit to discharge pollutants pursuant to the provisions of the Clean Water Act, Municipality of Anchorage, Eagle River Wastewater Treatment Plant,” USEPA Region 10, Seattle, Washington, April 1995.

USEPA, “Fact Sheet, Proposed reissuance of a National Pollutant Discharge Elimination System (NPDES) permit to discharge pollutants pursuant to the provisions of the Clean Water Act, Municipality of Anchorage, Eagle River Wastewater Treatment Plant,” USEPA Region 10, Seattle, Washington, September 2005

USEPA, “EPA Regions 8, 9 and 10 Toxicity Training Tool,” January 2010, pdf files located at: http://www.epa.gov/region8/water/wet/ToxTrainingTool10Jan2010.pdf

USEPA, “Total Maximum Daily Load Eagle River,” February 1995.

USEPA, “Technical Support Document for Water Quality-based Toxics Control,” EPA/505/2-90-001, USEPA Office of Water, Washington, DC, March 1991.

USEPA, “Water Quality Standards Handbook: Second Edition,” EPA-823-B-94-005a, USEPA, Washington, DC, August 1994.

USEPA, “Alaska DEC NPDES Permit Writer’s Course” Reference Manual. May, 2019.

Verena Gill (Verena.Gill@noaa.gov), “Re: APDES Permit AK0022543 – Eagle River Wastewater Treatment Facility Discharge, Permit Reissuance –T & ES Determination,” June 3, 2019.

APPENDIX A: FACILITY INFORMATION

Figure 3: Eagle River Wastewater Treatment Facility Vicinity Map

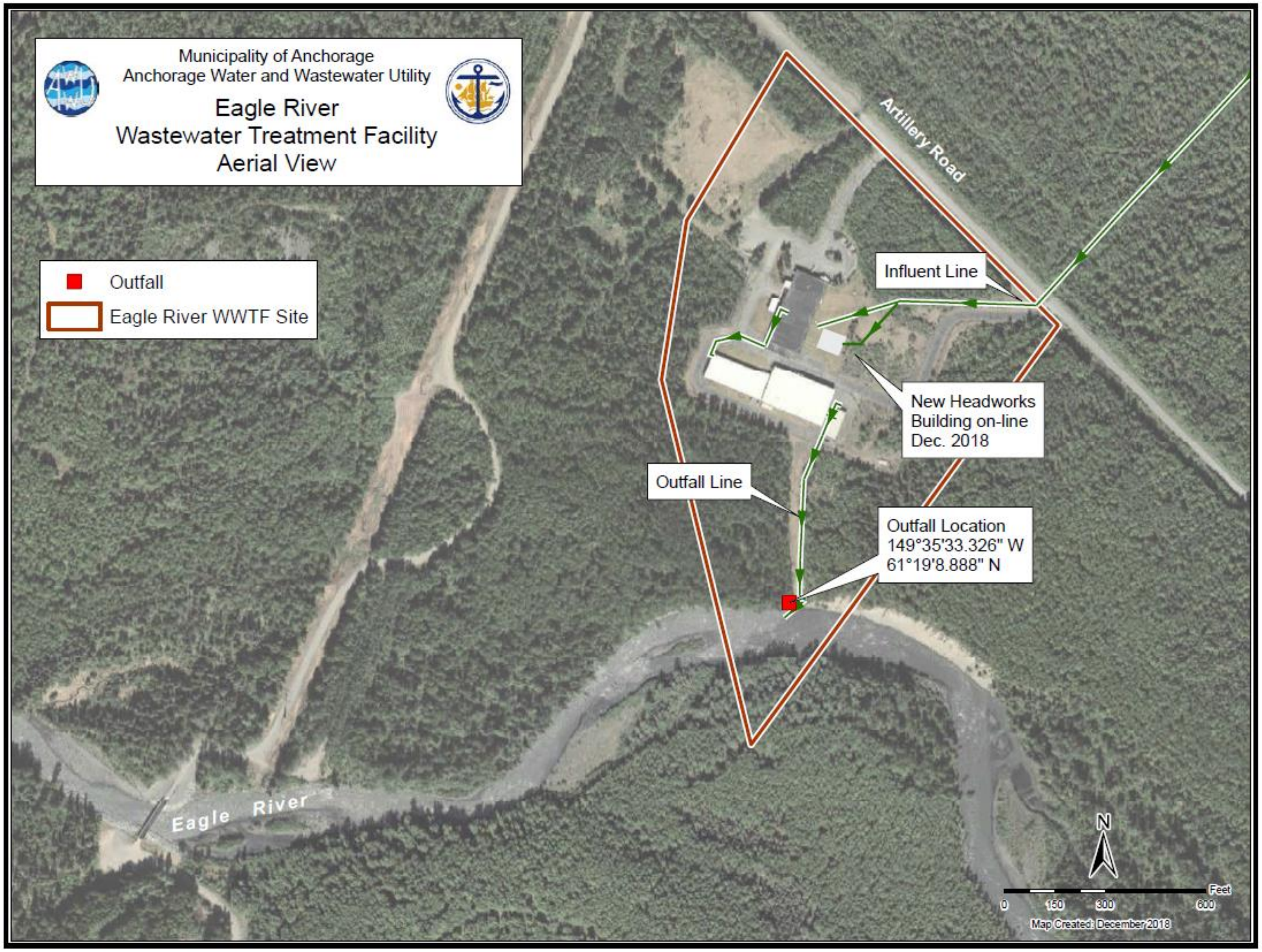
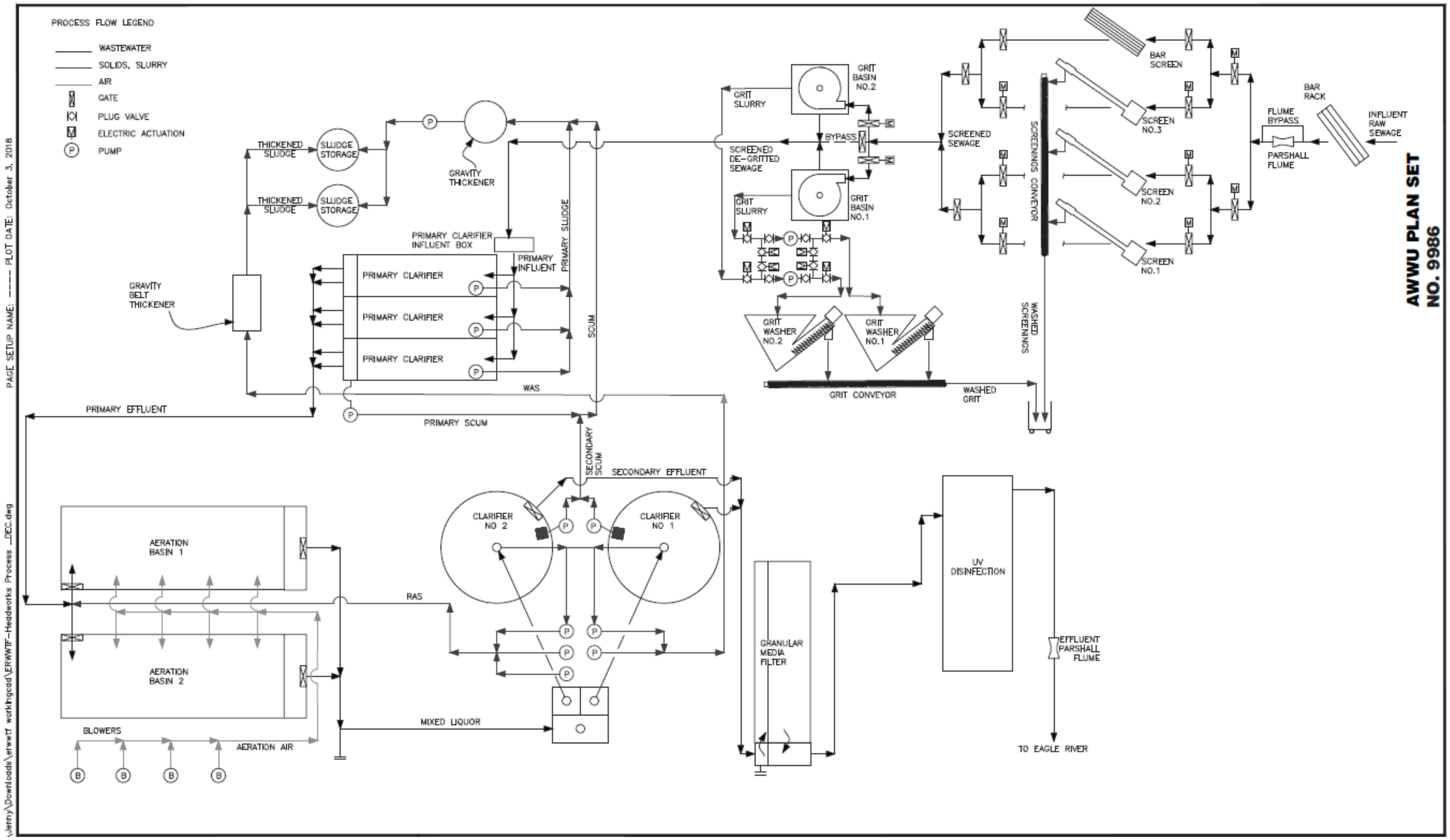


Figure 4: Wastewater Treatment Plant Process Flow Diagram



APPENDIX B - BASIS FOR EFFLUENT LIMITATIONS

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 (40 CFR) 133, adopted by reference in Alaska Administrative Code (AAC) 18 AAC 83.010(e). The Department 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 water quality standards (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 (BOD_5), 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 particular 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 criteria (WQC) for the waterbody. If a pollutant causes or contributes to an exceedance of a WQC, a WQBEL for the pollutant must be established in the permit.

B.1 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 B- 1: 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			

B.2 Mass-Based Limitations

Alaska Pollutant Discharge Elimination Systems (APDES) regulations at 18 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 POTW be calculated based on the design flow of the facility in million gallons per day (mgd). The design flow of the Eagle River Wastewater Treatment Facility (ER WWTF) is 2.5 mgd. The Department used the design flow to calculate loading limits in the permit for BOD_5, TSS, total nitrate/nitrite as nitrogen (NO_3/NO_2), copper, and lead. 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 (lbs/day) and are calculated as follows:

Mass based limit (lbs/day) = concentration limit (mg/L) × design flow (mgd) × 8.34

Where: 8.34 is a conversion factor with units (lbs x L) / (mg x gallon x 10^6)

B.3 Water Quality – Based Effluent Limitations

B.3.1 Statutory and Regulatory Basis

18 AAC 70.010 prohibits conduct that causes or contributes to a violation of the 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 CWA requires that the effluent limit for a particular pollutant be the more stringent of either TBELs or WQBELs. TBELs are established by the Environmental Protection Agency (EPA) for many industries in the form of Effluent Limitation Guidelines (ELGs), are based on available pollution control technology and are adopted by reference in 18 AAC 83. The Department adopts the subject ELGs by reference in 18 AAC 83.010.

B.3.2 Reasonable Potential Analysis

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.

According to 18 AAC 70.990(38), a mixing zone is an area in a waterbody surrounding, or downstream of, a discharge where the effluent plume is diluted by the receiving water within which specified water quality criteria may be exceeded. Water quality criteria and limits may be exceeded within a mixing zone. A mixing zone can be authorized only when adequate receiving waterbody flow exists, and the concentration of the pollutant of concern in the receiving waterbody is below the numeric criterion necessary to protect the designated uses of the waterbody.

Reasonable Potential Analysis (RPA) calculations were computed for the following parameters known to be present in the ER WWTF effluent: NO_3/NO_2, copper, lead, zinc, mercury, total dissolved solids (TDS), cyanide, ammonia, and nickel. Parameters were chosen for RPA through monitoring required by the previous permit, expanded effluent testing or other testing conducted by the permittee, the Anchorage Water and Wastewater Utility (AWWU). The RPA was conducted in accordance with the Department's *APDES Permits Reasonable Potential Analysis and Effluent Limits Development Guide*.

B.3.3 Procedure for Deriving Water Quality-Based Effluent Limits

The *Technical Support Document for Water Quality-Based Toxics Control* (TSD) (Environmental Protection Agency (EPA), 1991) and the AWQC recommend the flow conditions for use in calculating WQBELs using steady-state modeling. The TSD, APDES Guide, and the WQS state the WQBELs intended to protect aquatic life uses should be based on the lowest seven-day average flow rate expected to occur once every ten years (7Q10) for chronic criteria and the lowest one-day average flow rate expected to occur once every ten years (1Q10) for acute criteria. In marine settings, tidal velocities must be representative of critical conditions as well.

The first step in developing a WQBEL is to develop a WLA for the pollutant. A WLA is the concentration or loading of a pollutant that the permittee may discharge without causing or contributing to an exceedance of the WQC or a total maximum daily load (TMDL) in the receiving waterbody. If a mixing zone is authorized in the permit, the WQC apply at all points outside the mixing zone.

In cases where a mixing zone is not authorized, either because the receiving waterbody already exceeds the criterion, the receiving waterbody flow, or for some other reason one is not authorized, the criterion becomes the WLA. Establishing the criterion as the WLA ensures that the permittee will not cause or contribute to an exceedance of the criterion. 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.

B.3.4 Specific Water Quality-Based Effluent Limits

B.3.4.1 Total Dissolved Solids

The criteria for water supply (drinking, culinary, and food processing) is the most stringent standard for TDS. The standard states that for fresh waters "TDS from all sources may not exceed 500 mg/L". The Department used data from four samples of TDS in the analyses, using procedures identified in the Department's *APDES Permits Reasonable Potential Analysis and Effluent Limits Development Guide*., Section 3.3.2. AWWU collected all of the TDS samples between July and October of 2014; the TDS data had a range between 442 – 479 mg/L. The effluent may have reasonable potential to violate the TDS Alaska WQS numeric criteria. As in the previous permit, TDS is included within the authorized chronic mixing zone and included effluent monitoring in the current permit for a more robust data set during this permit cycle for analysis in future permit reissuances.

B.3.4.2 Dissolved Oxygen

Aerobic microorganisms require dissolved oxygen (DO) in order to metabolize organic wastes into inorganic byproducts and reproduce. Municipal wastewater exerts a demand on the oxygen resource of waterbodies via BOD_5. The WQ standards at 18 AAC 70.020(b)(3)(C) Growth and Propagation of Fish, Shellfish, Other Aquatic Life, and Wildlife are the most stringent and require that "DO must be greater than 7 mg/L in waters used by anadromous or resident fish. In no case may DO be less than 5 mg/L to a depth of 20 cm in the interstitial waters of gravel used by anadromous or resident fish for spawning. For waters not used by anadromous or resident fish, DO must be greater than or equal to 5 mg/L. In no case may DO be greater than 17 mg/L. The concentration of total dissolved gas may not exceed 110% of saturation at any point of sample collection."

DEC reviewed effluent data for the ER WWTF, from October, 2014 - September, 2018. There were 46 DO samples with concentrations ranging between 3.8 mg/L and 6.1 mg/L; averaging 5.0 mg/L. Since none of the 46 samples met the most stringent Alaska WQS for DO at the end of the pipe, the Department has determined that the ER WWTF has a reasonable potential (RP) to exceed the WQC. As in the previous permit, DO is included within the authorized chronic mixing zone. Therefore, the Department has authorized a mixing zone for DO for the ER WWTF and included effluent monitoring during this permit cycle.

B.3.4.3 Temperature

The WQS at 18 AAC 70.020(b)(10)(A)(i) Water Supply: drinking, culinary, and food processing and 18 AAC 70.020(b)(10)(C) Growth and Propagation of Fish, Shellfish, Other Aquatic Life, and Wildlife state that temperature may not exceed 13 degrees Celsius (^{o}C).

The Department reviewed 1,135 effluent temperature results for the ER WWTF from July, 2014 - December, 2018 and found that effluent monitoring results demonstrate that the ER WWTF's effluent temperature exceeded the WQS for temperature 241 times. The effluent temperature ranged from a minimum of 10° C to a maximum of 17° C with an average temperature of 14° C. The 85th percentile of the data was 16° C, therefore the effluent has reasonable potential to violate the temperature AWQC. DEC is including temperature within the chronic mixing zone. The permit requires the applicant to continue monitoring effluent temperature five times per week and report the daily maximum observed temperature each month on the discharge monitoring report.

B.3.4.4 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 review of the ER WWTF effluent monitoring data for FC bacteria from July, 2014 - September, 2018 indicated a range of results from "0" (non-detect) to 165 FC/100 mL. The instance of the FC bacteria result of 165 FC/100 mL occurred during the first month of the previous permitting period, July 2014, and the next highest result was a single sample with a level of 24 FC/100 mL two years later. In these four 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 327 total FC bacteria samples collected and none of the samples exceeded the WQC of 40 FC/100 mL. The average reported maximum daily concentration over three years was 2.09 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 required for this permit. 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.

B.3.4.5 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. Eagle River has known populations of all five species of pacific salmon (Chinook, chum, coho, pink, and sockeye) (Johnson and Blanche 2012). Chinook[1] and sockeye[2] salmon typically spend one to four years rearing in fresh water prior to migrating to the ocean. Therefore, DEC has established ammonia WQC when early life stages of salmon are present. Data collected by AWWU from 2013 to 2015 were evaluated to determine whether there was reasonable potential to cause or contribute to an exceedance of the criteria. More information about the receiving water monitoring conducted by AWWU can be found at Fact Sheet Part 4.5 DEC derived ammonia criteria from the *Alaska Water Quality Criteria Manual for Toxics and Other Deleterious Organic and Inorganic Substances* (Toxics manual), consistent with the Department's *RPA and Effluent Limitation Guidance*. The 85th percentile of the pH and temperature receiving water data collected by AWWU from Eagle River from February 2013 – July 2015 was used to extrapolate the ammonia criteria from tables contained in Appendices F and G of the Toxics manual.

[1] "Chinook Salmon (*Oncorhynchus tshawytscha*) Species Profile," < http://www.adfg.alaska.gov/index.cfm?adfg=chinook.main>, accessed on May 30, 2019.
[2] "Sockeye Salmon (*Oncorhynchus nerka*) Species Profile," < http://www.adfg.alaska.gov/index.cfm?adfg=sockeyesalmon.main>, accessed on May 30, 2019.

Receiving water pH and temperature data was separated into summer and winter seasons and used in separate effluent limitation calculations, as was done in the previous APDES permit and in the Eagle River TMDL. More information about the Eagle River TMDL can be found at Fact Sheet Part 4.4.

An acute ammonia WQS numeric criterion of 16.3 mg/L and a chronic criterion of 4.9 mg/L were used in the RPA for the summer season. An acute ammonia WQS numeric criterion of 12.3 mg/L and a chronic criterion of 9.1 mg/L were used in the RPA for the winter season. AWWU collected receiving water ammonia data, and per Department *RPA and Effluent Limit Development Guidance*, the 85th percentile of the receiving water concentration was used for the RPA and effluent limits calculation were used; 0.016 mg/L for the summer season and 0.93 mg/L for the winter season.

In the previous APDES permit, ammonia was the parameter that required the greatest dilution to meet acute and chronic WQ criteria at the boundary of the acute and chronic mixing zones and the permit conditions required AWWU to monitor ammonia in the effluent on a twice-yearly basis in order to collect enough data to determine whether there was reasonable potential for ammonia to exceed water quality criteria. AWWU sampled ammonia in the effluent on a monthly basis; collecting 65 total ammonia samples. A review of the ammonia effluent data from September, 2014 – December, 2018 indicated a range of results from a minimum of 0.12 mg/L to a maximum observed concentration of 2.3 mg/L; all values were below the ammonia aquatic life Alaska WQS. The RPA for ammonia 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. The 1995 Eagle River TMDL 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. This amount is greater than the 340 lbs/day mass-based Daily Maximum limit in the current permit for ammonia. 340 lbs/day is the acute summer WQC for ammonia in mass units, calculated from 16.3 mg/L concentration units. The 1995 TMDL winter ammonia WLA for the ER WWTF was 240 lbs/day. A calculation for the winter acute ammonia WQC of 12.3 mg/L yields a mass-based effluent limit of 256 lbs/day for the Daily Maximum effluent limit. This amount is greater than the 240 lbs/day ammonia WLA, imposed by the TMDL. The permit limit of 240 lbs/day has been retained from the previous permit for the Daily Maximum limit as it is lower in amount, and therefore more protective. 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 winter season was less stringent than the winter Daily Maximum limit in the previous permit; therefore, the previous limit for the winter Daily Maximum has been retained as the facility routinely demonstrated that it is able to meet the previous ammonia permit limits for the subject time periods. The winter ammonia Daily Maximum concentration limit has been revised lower than the freshwater acute aquatic life ammonia criterion in winter from 12.3 mg/L to 11.5 mg/L, to be consistent with the Daily Maximum limit in units of mass. Also, the monthly monitoring provision for ammonia will still be a requirement of this permit.

B.3.4.6 Esherichia 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

In January 2017, DEC adopted EPA's recommended recreational water quality criteria (RWCQ) and revised 18 AAC 70.020(b)(2)(B)(i) to adopt *E. coli* as the recommended contact recreation WQ criteria for fresh waters. The water quality criteria for *E. coli* bacteria is a monthly geometric mean of 126 colony forming units (CFU)/100 mL and a statistical threshold value of 410 CFU/100 mL. EPA approved DEC's revised bacteria water quality criteria on May 15, 2017. Effluent monitoring is required on a monthly basis from May through September, to be performed in conjunction with fecal coliform bacteria monitoring, when primary contact recreation in which full immersion and ingestion of water is more likely to occur.

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. 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.

B.3.4.7 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 (NO_3/NO_2) criterion for Drinking Water is 10 mg/L and is the same for the summer and winter seasons.

Monitoring requirements in the previous APDES permit included monitoring of NO_3/NO_2 two times per year, in addition to monitoring conducted during the expanded effluent testing, because NO_3/NO_2 was identified as a pollutant of concern during the permit development. The DEC review of 22 ER WWTF effluent monitoring results for NO_3/NO_2 from September, 2014 to August, 2018 indicated a range of values from 0.24 mg/L to 46 mg/L with an average value of 30.3 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.

The MEC for NO_3/NO_2 was calculated to be 64.23 mg/L for the summer season and 45.39 mg/L for the winter season. 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 is 7.3 and the dilution factor for the acute mixing zone for the winter season is 5.1 and therefore WQBELs were developed with 63.55 mg/L as the Human Health WLA and 82.42 mg/L as the Human Health Daily Maximum for the summer season. For the winter season, the Human Health WLA was 44.85 mg/L and 66.94 mg/L was calculated as the Human Health MDL.

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 C for details on RPA and APPENDIX D for details on permit limit derivation.

B.3.4.8 Copper

Seasonal variations in ambient water hardness require establishment of summer and winter AWQC for copper. DEC derived copper 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 copper criteria in the Department's RPA tool. Receiving water hardness data was separated into summer and winter seasons and used in separate effluent limitation calculations, as was done in the previous APDES permit and in the Eagle River TMDL. More information about the Eagle River TMDL can be found in Fact Sheet Part 4.4. Consistent with the DEC's RPA and Effluent Limitation Guidance, the 15th percentile of water hardness was used, with 53 mg/L being the summer water hardness value and 110 mg/L being the winter water hardness value. The most stringent state water quality for total recoverable copper to protect designated uses during the summer season requires that concentrations may not exceed 7.7 micrograms per liter (µg/L) for acute aquatic life and 6.0 µg/L for chronic aquatic life [18AAC 70.020(b)(11)(c)]. The most stringent state water quality for copper to protect designated uses during the winter season requires that concentrations may not exceed 13.7 µg/L for acute aquatic life and 9.1 µg/L for chronic aquatic life. More information about AWWU's 2013 – 2015 receiving water monitoring project can be found in Fact Sheet Part 4.5.

AWWU collected receiving water copper data, and per Department RPA and Effluent Limit Development Guidance, the 85th percentile of the receiving water concentration was used for the RPA and effluent limits calculation were used; 0.58 µg/L for the summer season and 1.34 µg/L for the winter season. Monitoring requirements in the previous APDES permit included monitoring of copper biennially, in addition to monitoring conducted during the expanded effluent testing, because copper was identified as a pollutant of concern during the permit development and was also included in the 1995 Eagle River TMDL. The DEC review of 21 ER WWTF effluent monitoring results for copper from September, 2014 to August, 2018 indicated a range of values ranged from 6.3 µg/L to 18.8 µg/L for the summer effluent monitoring results, with an average of 9.4 µg/L. The winter monitoring for copper ranged from 4.9 µg/L to 16.4 µg/L with an average value of 8.5 µg/L. The Department has authorized summer and winter mixing zones with dilution factors for meeting acute and chronic criteria. The reasonable potential analysis in Fact Sheet APPENDIX1.1.1.1.1APPENDIX C takes into account these dilution factors. Considering the AWQC provides protection from acute effects on aquatic life and based on a copper MEC of 26.4 µg/L for the summer season and 24.9 µg/L for the winter season, the RPA indicates that copper does have RP to violate AWQC at the boundary of the authorized mixing zone. Copper is the driving parameter for the acute mixing zones for both summer and winter seasons. The dilution factor for the acute mixing zone for the summer season is 3.6 and the dilution factor for the acute mixing zone for the winter season is 1.9. Therefore, the average monthly effluent limit (AML) of 14.9 µg/L and Daily Maximum of 26.2 µg/L for the summer conditions are in effect for this permit issuance for copper. The Monthly Average of 16.9 µg/L and Daily Maximum of 24.8 µg/L are in effect for this permit for winter conditions. 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. Both seasonal Daily Maximum effluent limit amounts in the current permit are lower than the seasonal copper WLAs, imposed by the TMDL, and therefore the current copper effluent limits are more protective than the TMDL limits. The 1995 copper TMDL WLAs were used as Daily Maximum effluent limits in the previous permit, so the current permit copper effluent limits are also more stringent than the limits used in the previous APDES permit. See Fact Sheet 1.1.1.1.1APPENDIX C for details on RPA and 1.1.1.1.1APPENDIX D for details on permit limit derivation.

B.3.4.9 Lead

Seasonal variations in ambient water hardness require establishment of summer and winter AWQC for lead. 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, as was done in the previous APDES permit and in the Eagle River TMDL. More information about the Eagle River TMDL can be found in Fact Sheet Part 4.4. Consistent with the DEC's RPA and Effluent Limitation Guidance, the 15^{th} percentile of water hardness was used, with 53 mg/L being the summer water hardness value and 110 mg/L being the winter water hardness value. The most stringent state water quality for lead to protect designated uses during the summer season requires that concentrations may not exceed 36.4 µg/L for acute aquatic life and 1.4 µg/L for chronic aquatic life [18AAC 70.020(b)(11)(c)]. The most stringent state water quality for lead to protect designated uses during the winter season requires that concentrations may not exceed 92.2 µg/L for acute aquatic life and 3.6 µg/L for chronic aquatic life.

AWWU collected receiving water lead data, and per Department RPA and Effluent Limit Development Guidance, the 85^{th} percentile of the receiving water concentration was used for the RPA and effluent limits calculation were used; below detection threshold for the summer season and 0.093 µg/L for the winter season. More information about AWWU's 2013 – 2015 receiving water monitoring project can be found in Fact Sheet Part 4.5. Effluent monitoring requirements in the previous APDES permit included monitoring of lead biennially, in addition to monitoring conducted during the expanded effluent testing, because lead was identified as a pollutant of concern during the permit development and was also included in the 1995 Eagle River TMDL. The DEC review of 19 ER WWTF effluent monitoring results for lead from September, 2014 to August, 2018 indicated a range of values ranged from "non-detect to 0.50 µg/L for the summer effluent monitoring results, with an average of 0.31 µg/L. The winter monitoring for lead ranged from non-detect to 0.83 µg/L with an average value of 0.26 µg/L. Considering that the WQC offers protection from acute effects on aquatic life and for protection from chronic effects on aquatic life, and based on a MEC of 2.8 µg/L for lead for the summer season and 1.2 µg/L for lead for the winter season, the RPA indicates that lead does not have RP to violate WQC at the boundary of the authorized mixing zone. Therefore, the Monthly Average of 34 µg/L and Daily Maximum of 50 µg/L for the summer conditions have been retained from the previous APDES permit issuance, set by the 1995 Eagle River TMDL. Likewise, the Monthly Average of 20 µg/L and Daily Maximum of 29 µg/L have been retained from the previous APDES permit for winter conditions. See Table B.2

B.3.4.10 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 1,143 pH effluent monitoring results of the ER WWTF from July 2014 – June 2019. During this time period, the average minimum pH value observed was 6.7. SU and the average maximum pH value was 7.3 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.

B.3.4.11 Floating, Suspended or Submerged Matter, including Oil and Grease

The WQS for floating, suspended or submerged matter, including oil and grease, are narrative. The most stringent standard, found at 18 AAC 70.020(b)(8)(A)(i), requires that fresh waters, "may not, alone or in combination with other substances or wastes, make the water unfit or unsafe for the use; cause a film, sheen, or discoloration on the receiving of the water or adjoining shorelines; cause leaching of toxic or deleterious substances; or cause a sludge, solid, or emulsion to be deposited beneath or upon the receiving of the water, within the water column, on the bottom, or upon adjoining shorelines."

B.4 Selection of Most Stringent Limitations

Table B-2 provides a summary and reference to those parameters that contain effluent limits at the point of discharge at the Eagle River WWTF.

Table B- 2: Summary of Effluent Limitations

Parameter	Fact Sheet Reference	Type of Effluent Limit
BOD_5	Fact Sheet Part 3.2 APPENDIX B- B.1	TBEL, implemented at end of pipe
TSS		
pH	Fact Sheet Part 3.4 APPENDIX B- Part B.3.4.10	WQBEL, implemented at end of pipe
FC Bacteria	APPENDIX B-Part B.3.4.4	WQBEL, implemented at end of pipe
E. coli	APPENDIX B – Part B.3.4.6B.3.4.6	WQBEL, implemented at end of pipe
Total Ammonia, as Nitrogen	Fact Sheet Part 3.2 APPENDIX B- Part B.3.4.5	WQBEL, implemented at end of pipe
Temperature	Fact Sheet Part 3.2 APPENDIX B – Part B.3.4.3	Dilution from mixing zone applied to meet WQS at boundary of mixing zone
TDS	Fact Sheet Part 3.2 APPENDIX B- Part B.3.4.1	Dilution from mixing zone applied to meet WQS at boundary of mixing zone
DO	Fact Sheet Part 3.2 APPENDIX B Part B.3.4.2	Dilution from mixing zone applied to meet WQS at boundary of mixing zone
Total Nitrate/Nitrite as Nitrogen	Fact Sheet Part 3.3 APPENDIX B- PartB.3.4.7	WQBEL, dilution from mixing zone applied to meet WQS at boundary of mixing zone
Copper	Fact Sheet Part 3.2 APPENDIX B Part B.3.4.8	WQBELs, dilution from mixing zone applied to meet WQS at boundary of mixing zone for summer and winter seasons
Lead	Fact Sheet Part 3.2 APPENDIX B Part B.3.4.9	WQBELs, dilution from TMDL limit applied to meet WQS at boundary of mixing zone for summer and winter seasons

APPENDIX C. REASONABLE POTENTIAL DETERMINATION

The 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 C-1 and Table C-2.

C.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:

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

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:

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

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:

$$C_d = \frac{C_e Q_e + C_u(Q_U \times MZ)}{Q_e + (Q_u \times MZ)}$$ (Equation C-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

$$C_d = C_e$$ (Equation C-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):

$$D = \frac{Q_e + Q_u}{Q_e}$$ (Equation C-5)

After the D simplification, this becomes:

$$C_d = \frac{(C_e - C_u)}{D} + C_u$$ (Equation C-6)

C.2 Maximum Projected Effluent 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. This can be entered as a User-Defined CV, which was the case for the calculation for the RPM in the summer season for copper and NO_3/NO_2.

In the example below, the Department used ProUCL to determine that the monitoring data of 14 samples submitted for NO_3/NO_2 in the winter season has a normal distribution. The CV calculated for this dataset was 0.2957. Therefore, the RPM equation in Section 2.4.2.1 of the *APDES Permits RPA and Effluent Limits Development Guide* is used to determine the RPM for NO_3/NO_2 in the winter season:

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

Where,

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

$\mu_n =$ mean calculated by ProUCL = 28.62

$\sigma =$ the standard deviation calculated by ProUCL = 8.46

$p_n =$ the z − statistic at the 95th percent confidence level of $(1 - 0.95)^{\frac{1}{n}} = 0.81$

$n =$ number of valid data samples = 14

RPM = 1.3 (rounded)

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

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

MOC = 33.8 milligrams per liter (mg/L)

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

MEC = (1.3) * (33.8) = 43.94 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 45.39 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) 10.11 > 10.0 mg/L **YES**, there is a RP to violate criterion

Comparison with fresh water WQS numeric criteria for Copper:

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 acute and chronic fresh water WQC. Copper does not have RP to violate the chronic copper criterion because the NO_3/NO_2 mixing zone provides sufficient dilution.

Acute (June 1 – September 30) 7.76 micrograms per liter (µg/L) > 7.7 µg/L (acute criterion)	**YES**, there is a reasonable potential to violate acute criterion
Chronic (June 1 – September 30) 4.12 µg/L < 6.0 µg/L (chronic criterion)	**NO**, there is not a reasonable potential to violate chronic criterion
Acute (October 1 – May 31) 13.75 µg/L > 13.7 µg/L (acute criterion)	**YES**, there is a reasonable potential to violate criterion
Chronic (October 1 –May 31) 5.96 µg/L < 9.1 µg/L (chronic criterion)	**NO**, there is not a reasonable potential to violate chronic criterion

Table C-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 and acute WQC for copper, water quality based effluent limits (WQBELs) are required.

See Fact Sheet APPENDIX D for the calculations.

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

Parameter	MOC	Number of Samples	Upstream Concentration (C_u)	CV	RPM	MEC	Water Quality Criteria	End of Pipe RP?	Maximum Projected Receiving Waterbody Concentration (C_e)[a]	Boundary of Mixing Zone RP?
Ammonia (mg/L)	2.32	28	0.016 [c]	0.4177	1.5	3.54	4.9 (chronic)	No	0.50 (chronic)	No
							16.3 (acute)	No	0.99 (acute)	No
Copper (µg/L)	12.00	8	0.582 [c]	0.4500 [d]	2.2	26.41	6.0 (chronic)	Yes	4.12 (chronic)	No
							7.7 (acute)	Yes	7.76 (acute)	Yes
Cyanide (µg/L)	4.80	5	0.780	0.6000	3.4	16.28	5.2 (chronic)	Yes	2.90 (chronic)	No
							22.0 (acute)	No	5.08 (acute)	No
Lead (µg/L)	0.50	7	0.000 [c]	1.095 [d]	5.6	2.79	1.4 (chronic)	Yes	0.38 (chronic)	No
							36.4 (acute)	No	0.77 (acute)	No
Mercury (µg/L)	0.04	1	0.002	0.6000	9.0	0.33 [b]	0.012 (chronic)	No [b]	0.05 (chronic)	No [b]
							2.4 (acute)	No	0.09 (acute)	No [b]
Nickel (µg/L)	2.80	1	4.573	0.6000	9.0	25.32 [b]	30.5 (chronic)	No	7.41 (chronic)	No [b]
							274.2 (acute)	No	10.34 (acute)	No [b]
Zinc (µg/L)	81.00	1	10.495	0.6000	9.0	732.41 [b]	70.0 (acute and chronic)	No [b]	109.39 (chronic)	No [b]
								No [b]	211.03 (acute)	No [b]
Total Nitrate/ Nitrite (mg/L)	46.00	8	1.5	1.833 [d]	1.4	64.23	10.0 (HHDW)	Yes	10.09	Yes
Total Dissolved Solids (mg/L) [b]	456	2	75	0.6000	5.5	2,524 [b]	500 (HHDW)	No [b]	410	No [b]

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. Upstream concentration from calculation of 85th percentile of receiving water monitoring data
d. User-defined CV from ProUCL

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

Parameter	MOC	Number of Samples	Upstream Conc. (C_u)	CV	RPM	MEC	Water Quality Criteria	End of Pipe RP?	Maximum Projected Receiving Waterbody Conc. (C_e)[a]	Boundary of Mixing Zone RP?
Ammonia (mg/L)	1.50	38	0.093 [c]	0.2519	1.2	1.87	9.1 (chronic)	No	0.44 (chronic)	No
							12.3 (acute)	No	1.03	No
Copper (µg/L)	16.40	13	1.337 [c]	0.2834	1.5	24.92	9.1 (chronic)	Yes	5.96 (chronic)	No
							13.7 (acute)	Yes	13.75 (acute)	Yes
Cyanide (µg/L)	1.90	10	0.780	0.6000	2.5	4.82	5.2 (chronic)	No	1.57 (chronic)	No
							22.0 (acute)	No	2.91 (acute)	No
Lead (µg/L)	0.83	12	0.093 [c]	0.4039	1.5	1.23	3.6 (chronic)	No	0.32 (chronic)	No
							92.2 (acute)	No	0.69 (acute)	No
Mercury (µg/L)	0.02	3	0.002	0.6000	4.4	363.22 [b]	0.012 (chronic)	No [b]	0.02 (chronic)	No [b]
							2.4 (acute)	No [b]	0.05 (acute)	No [b]
Nickel (µg/L)	4.30	3	8.481	0.6000	4.4	18.82 [b]	56.5 (chronic)	No [b]	10.51 (chronic)	No [b]
							508.6 (acute)	No [b]	13.92 (acute)	No [b]
Zinc (µg/L)	83.00	3	19.484	0.6000	4.4	363.22 [b]	129.9 (acute and chronic)	No [b]	86.88 (chronic)	No [b]
								No [b]	200.40 (acute)	No [b]
Nitrate + Nitrite (mg/L)	33.80	14	1.5	0.2957	1.3	45.39	10.0 (HHDW)	Yes	10.11	Yes
Total Dissolved Solids (mg/L) [b]	475	1	75	0.6000	9.0	4,294 [b]	500 (HHDW)	No [b]	902	No [b]

Footnotes:

a. Calculated using CORMIX acute dilution factor of 1.9 and chronic dilution factor of 5.1
b. Insufficient sample results for valid calculation
c. Upstream concentration from calculation of 85th percentile of receiving water monitoring data

C.3 Temperature Reasonable Potential Determination

DEC reviewed Discharge Monitoring Report (DMR) data from July 2014 –December 2018 and found that effluent temperature monitoring results demonstrate that the Eagle River Wastewater Treatment Facility (ER WWTF) at times produces effluent at a temperature that does not meet AWQS. The most stringent WQS at 18 AAC 70.020(b)(10)(A)(iii) for Water Supply: aquaculture is that temperature may not exceed 13 degrees Celsius (°C) for spawning areas, egg and fry incubation. The Alaska Department of Fish & Game (ADF&G) has determined that the section of Eagle River downstream and adjacent to the ER WWTF is a migration route for anadromous fish, however, no spawning or fry incubation occurs in the vicinity of the Outfall 001A discharge. The next most stringent WQS at 18 AAC 70.020(b)(10)(A)(i): Water Supply: drinking, culinary, and food processing and (iii) Water Supply: aquaculture – migration routes and rearing is temperature may not exceed 15 °C.

Effluent temperature data shows that the 13 °C value was exceeded 528 out of 1,135 times in the most recent five years of operation. The highest observed temperature value in the most recent five years of operation was 17 °C. Therefore, the effluent has RP to exceed the temperature AWQS. A mixing zone is appropriate for this parameter, and temperature is included in the chronic mixing zone. See Fact Sheet APPENDIX B: Part B.3.4.3 for additional information.

C.4 Dissolved Oxygen Reasonable Potential Determination

DEC reviewed 46 data points from Discharge Monitoring Report (DMR) data collected October 2014 – December 2018 and found that effluent dissolved oxygen (DO) monitoring results demonstrate that the ER WWTF produces effluent at a DO that does not meet WQS. The most stringent WQS at 18 AAC 70.020(b)(3)(C) for Growth and Propagation of Fish, Shellfish, Other Aquatic Life, and Wildlife. This criteria requires that DO must be greater than 7 mg/Lin waters used by anadromous or resident fish. In July 2017 the ER WWTF had an effluent minimum DO of 3.8 mg/L. The average effluent DO was 5.0 mg/L and the highest DO sample was 6.8 mg/L. The effluent has RP to violate the DO Alaska WQS at the end of the pipe. The permittee requested a mixing zone for DO, and the Department determined a mixing zone is appropriate for this parameter. Accordingly, DO is included in the chronic mixing zone. See Fact Sheet APPENDIX B: Part B.3.4.2 for additional information.

APPENDIX D. 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 chronic mixing zone. Copper required the most dilution to meet WQS numeric criteria at the boundary of the authorized acute mixing zone. Therefore, the Department developed WQBELs for NO_3/NO_2 and copper.

Examples of the NO_3/NO_2 and copper limit calculations are depicted below.

D.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 and copper. The first step in calculating WQBELs is the development of wasteload allocations (WLAs) for the pollutant.

D.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 AWQC. Acute and chronic aquatic life standards apply over different time frames and may have different mixing zones; therefore it is not possible to compare the WLAs directly to determine which standard results in the most stringent limits. The acute criteria are applied as a one-hour average and may have a smaller mixing zone, while the chronic criteria are applied as a four-day average and may have a larger mixing zone. To allow for comparison, long-term average (LTA) loads are calculated from both the acute and chronic WLAs. The most stringent LTA is used to calculate the permit limits.

D.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. As with the mixing-zone based WLA, the acute and chronic criteria must be converted to LTAs and compared to determine which one is more stringent. The more stringent LTA is then used to develop permit limits.

D.4 Permit Limit Derivation

Once the appropriate LTA has been calculated, 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)), sampling frequency, and the difference in time frames between the Monthly Average and Daily Maximum effluent limits.

The Daily Maximum effluent limit (Daily Maximum) is based on the CV of the data and the probability basis, while the Monthly Average 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 Monthly Average effluent limit (Monthly average) calculation and 99% for the Daily Maximum calculation.

The following is a summary of the steps to derive WQBELs from WQS numeric criteria for pollutants that have RP to exceed AWQC. 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 Daily Maximum and Monthly Average for copper and NO_3/NO_2 in the ER WWTF permit.

<u>Step 1- Determine the WLA</u>

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 copper for the acute WLA (WLA_a) for the summer season at the ER WWTF, based on the largest dilution factor modeled for acute criteria, D_a, the calculation is:

$D_a = 3.6$

$D_c = 7.3$

C_s = *0.58 µg/L* (85% of the ambient concentration of copper during the summer season)

WLA_a = *26.2 µg/L*

WQC_a = *7.7 µg/L*

WLA_c = *40.4 µg/L*

WQC_c = *6.0 µg/L*

For NO_3/NO_2 for the human health WLA (WLA_{hh}) for the winter 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:

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

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

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

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

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

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

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

For copper during the summer season:

$LTA_a\ \sigma = 0.43$

$LTA_a\ \sigma^2 = 0.18$

$LTA_a = 10.6\ \mu g/L$

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 copper, only the acute WQBELs have been developed in this permit, so the acute LTA ($LTA_a = 10.6\ \mu/L$) applies.

- 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 copper during the summer season:

MDL = 26.19 µg/L

AML = 14.88 µg/L

For NO_3/NO_2 during the winter 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} = 44.9 mg/L

MDL = 66.9 mg/L

APPENDIX E. 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. In order to authorize a mixing zone, all criteria must be met. The permit writer must document all conclusions in the permit Fact Sheet; however, if the permit writer determines that one criterion cannot be met, then a mixing zone is prohibited, and the permit writer need not include in the Fact Sheet the conclusions for when other criteria were met. More information about the Eagle River Wastewater Treatment Facility (ER WWTF) and the mixing zone analysis can be found in Fact Sheet Part 4.5.

Criteria	Description	Answer & Resources	Regulation
Size	Is the mixing zone as small as practicable? Permit writer conducts analysis and documents analysis in Fact Sheet at: Section 5.5.1 Mixing Zone Analysis	**Answer: Yes**, mixing zone as small as practicable. •Technical Support Document for Water Quality-Based Toxics Control •Fact Sheet, Section 5.5 •Fact Sheet, Section 5.5.1 •DEC's Reasonable Potential Analysis Guidance •Environmental Protection Agency's Permit Writers' Manual Fact Sheet, Part 4.5.1	18 AAC 70.240 (k)(3)
Technology	Were the most effective technological and economical methods used to disperse, treat, remove, and reduce pollutants?	**Answer: Yes** Fact Sheet, Part 4.5.2	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.	**Answer: Yes** Fact Sheet Part 4.1;	18 AAC 70.240(*l*)
Existing Use	Does the mixing zone… (1) partially or completely eliminate an existing use of the waterbody outside the mixing zone? **If yes, mixing zone prohibited.**	**Answer: No** Fact Sheet Part 4.5.3	18 AAC 70.240(c)(4)(C)
	(2) impair overall biological integrity of the waterbody? **If yes, mixing zone prohibited.**		18 AAC 70.240(c)(3)
	(3) provide for adequate flushing of the waterbody to ensure full protection of uses of the waterbody outside the proposed mixing zone? **If no, then mixing zone prohibited.**	**Answer: Yes** Fact Sheet Part 4.5.3	18 AAC 70.240(b)(3)

Criteria	Description	Answer & Resources	Regulation
	(4) cause an environmental effect or damage to the ecosystem that the department considers to be so adverse that a mixing zone is not appropriate? **If yes, then mixing zone prohibited.**	**Answer: No** Fact Sheet Part 4.5.3	18 AAC 70.240(b)(4)
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 reduced in size or prohibited.**	**Answer: No** Fact Sheet Part: 4.5.4	18 AAC 70.240(d)(6)
	(2) preclude or limit established processing activities of commercial, sport, personal use, or subsistence shellfish harvesting? **If yes, mixing zone may be reduced in size or prohibited.**		18 AAC 70.240(c)(4)(C)
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.**	**Answer: No** Fact Sheet Part: 4.5.5	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 prohibited.**	**Answer: No** Fact Sheet Part: 4.5.6	18 AAC 70.240(d)(1)
	(2) contain chemicals expected to cause carcinogenic, mutagenic, teratogenic, or otherwise harmful effects to human health? **If yes, mixing zone prohibited.**		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.**	**Answer: Yes** Fact Sheet Part 4.5.1	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 prohibited.**	**Answer: No** Fact Sheet Part: 4.5.6	18 AAC 70.240(k)(4)

Criteria	Description	Answer & Resources	Regulation
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.**	**Answer: No** Fact Sheet Part: 4.5.7	18 AAC 70.240(e),(f)
	(2) form a barrier to migratory species? **If yes, mixing zone prohibited.**		18 AAC 70.240(c)(4)(G)
	(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 prohibited.**		18 AAC 70.240(d)(5)
	(5) result in permanent or irreparable displacement of indigenous organisms? **If yes, mixing zone prohibited.**		18 AAC 70.240(c)(4)(E)
	(6) result in a reduction in fish or shellfish population levels? **If yes, mixing zone prohibited.**		18 AAC 70.240(c)(4)(D)
	(7) prevent lethality to passing organisms by reducing the size of the acute zone? **If yes, mixing zone prohibited.**	**Answer: No** Fact Sheet Part: 4.5 4.5.1	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 prohibited.**	**Answer: No** Fact Sheet Part: 4.5.7	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?	**Answer: No** Fact Sheet Section 4.5.8	Program Description, 6.4.1 #5 18 AAC 70.240(c)(4)(F),