ALASKA POLLUTANT DISCHARGE ELIMINATION SYSTEM

PERMIT FACT SHEET – FINAL

Permit Number: AK0023451

City of Fairbanks and Golden Heart Utilities, Inc. Wastewater Treatment Facility

DEPARTMENT OF ENVIRONMENTAL CONSERVATION

Wastewater Discharge Authorization Program

555 Cordova Street

Anchorage, AK 99501

Public Comment Period Start Date: November 23, 2015
Public Comment Period Expiration Date: January 11, 2016
Alaska Online Public Notice System

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

THE CITY OF FAIRBANKS AND GOLDEN HEART UTILITIES, INC.

For wastewater discharges from the

City of Fairbanks and Golden Heart Utilities, Inc. Wastewater Treatment Facility
4247 Peger Road
Fairbanks, AK, 99709

The Alaska Department of Environmental Conservation (the Department or DEC) has reissued an APDES individual permit to the City of Fairbanks and Golden Heart Utilities, Inc. (COF and GHU). 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 COF and GHU 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
- proposed monitoring requirements in the permit

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 15 days after receiving the Department's decision to the Director of the Division of Water at the following address:

Director 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://www.dec.state.ak.us/commish/InformalReviews.htm 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
410 Willoughby Street, Suite 303
Juneau AK, 99811-1800

Interested persons can review 18 AAC 15.200 for the procedures and substantive requirements regarding a request for an adjudicatory hearing. See http://www.dec.state.ak.us/commish/ReviewGuidance.htm 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://www.dec.state.ak.us/water/wwdp/index.htm.

Alaska Department of Environmental Conservation Division of Water Wastewater Discharge Authorization Program 410 Willoughby Avenue, Suite 310 Juneau, AK 99801 (907) 465-5180	Alaska Department of Environmental Conservation Division of Water Wastewater Discharge Authorization Program 610 University Avenue Fairbanks, AK 99709 (907) 451-2100
Alaska Department of Environmental Conservation Division of Water Wastewater Discharge Authorization Program 555 Cordova Street Anchorage, AK 99501 (907) 269-2685	

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APPENDICES

1.0 APPLICANT

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

Name of Facility:	City of Fairbanks and Golden Heart Utilities, Inc. Wastewater Treatment Facility
APDES Permit Number:	AK0023451
Facility Location:	4247 Peger Road, Fairbanks, AK 99709-5468
Mailing Address:	4247 Peger Road, Fairbanks, AK 99709-5468
Facility Contact:	Mr. Oran Paul, President (907) 479-3118

The map in Appendix A to the Fact Sheet shows the location of the treatment plant and the discharge location.

2.0 FACILITY INFORMATION

The City of Fairbanks (COF) owns and leases the Fairbanks Wastewater Treatment Facility (WWTF) to Golden Heart Utilities (GHU). As such, COF and GHU are co-permittees for the APDES wastewater discharge permit.

COF and GHU collects and treats domestic and industrial wastewater from the greater Fairbanks area, College, and Ft. Wainwright. Their WWTF, with a design flow rate of 8 million gallons per day (mgd) is designated a major facility because it has a design flow rate of 1.0 mgd or greater and because COF and GHU have an approved industrial pretreatment program (IPP). Under the IPP, COF and GHU regulate flow from six significant industrial users (SIU), one of which, Aurora Energy Limited Liability Company (LLC), a steam electric-generating plant, is also classified as a categorical industrial user (CIU). The other five SIUs include: the University of Alaska Fairbanks Power Plant, Fairbanks Memorial Hospital, Fort Wainwright, the Fairbanks North Star Borough Landfill and the Ruth Burnett Sport Fish Hatchery. See Section 9.1 for further details regarding the IPP.

COF and GHU wastewater collection system contains 165 miles of gravity sewer main and 93 lift stations. The treatment process, which is entirely contained inside of the plant, consists of an oxygen activated sludge secondary treatment system. Mechanical bar screens and aerated grit chambers provide preliminary treatment followed by aeration, clarification, and chlorine disinfection prior to discharge to the Tanana River. In 2009, the facility switched from a chlorine gas injection system to an on-site sodium hypochlorite generating system. Biosolids generated by the treatment process are aerobically digested, thickened, and dewatered. The biosolids are then mixed with wood chips and compressed air to produce compost. The compost is tested in accordance with the requirements of the Environmental Protection Agency (EPA) Standards for the Use or Disposal of Sewage Sludge, Title 40 Code of Federal Regulations (CFR) Part 503, and made available to the public for land application. Two 500 kilowatt generators provide backup power. A schematic of the WWTF can be found in Appendix A.

Table 1 summarizes monthly average plant performance from January 2010 through February 2015.

Table 1. Average Plant Performance

Parameter	Monthly Average January 2010-February 2015
Flow	5.5 mgd
5-day Biochemical Oxygen Demand (BOD_5)	21 milligrams per liter (mg/L)
BOD_5 percent (%) removal	90 %
Total suspended solids (TSS)	21 mg/L
TSS % removal	91 %
Fecal coliform (FC) bacteria	8 FC per 100 milliliters (mL)
Total ammonia, as nitrogen	20 mg/L
pH	6.7 - 7.1 standard units (s.u.)
Total residual chlorine (TRC)	0.5 mg/L

3.0 BACKGROUND

EPA initially issued a National Pollutant Discharge Elimination System (NPDES) wastewater discharge permit to COF on October 29, 1990. The permit, which expired on October 30, 1995 was transferred on January 21, 1998 to COF and GHU as co-permittees. The permit was subsequently reissued on July 25, 2000 and expired on July 25, 2005.

Under the Administrative Procedures Act and state regulations at 18 ACC 83.155(c), a federally issued NPDES permit may be administratively extended (i.e., continues in force and effect), provided that the permittee submits a timely and complete application for a new permit prior to the expiration of the current permit. A timely application for a new permit was submitted by COF and GHU on February 18, 2005; therefore, the 2000 permit issued by EPA is administratively extended until such time a new permit is reissued. In October 2008, DEC received approval to administer the NPDES Program in the State of Alaska for domestic wastewater discharges and therefore DEC is the permitting authority.

4.0 COMPLIANCE HISTORY

Discharge Monitoring Reports (DMRs) from September 2001 through February 2015, were reviewed to determine the facility's compliance with effluent limits. DMRs for 2000 and the first part of 2001 could not be located and are therefore not included in this summary.

EPA sent a Warning Letter to the Director of Operations for GHU on April 29, 2005 summarizing the violations that had occurred from August 2001 through October 2004. The letter also urged the facility to take corrective actions to eliminate the permit exceedances. The Director of Operations responded to the letter on June 10, 2005 and indicated that the violations that occurred in April, May and August of 2004 resulted from work being done on the aeration chambers. The EPA inspector conducted a site inspection of GHU on October 26, 2005 to evaluate the facility. EPA concluded in an inspection report from October 26, 2005 that the repairs to the aeration chambers had improved the operational efficiency of the plant. During the site visit, the EPA inspector also discussed the permit violations for BOD_5, TSS, and FC Bacteria that occurred in 2005.

In September 2008, EPA sent a Notice of Continuing Noncompliance to the GHU Director of Operations to notify the facility of violations EPA discovered after reviewing DMRs submitted by GHU and during an inspection of the facility. EPA reviewed DMRs from July 2003 to April 2007 and identified 465 violations of the Clean Water Act (CWA). A list of the permit violations included 8 average weekly limit (AWL) violations,

13 average monthly limit (AML) violations, and 19 maximum daily limit (MDL) violations. EPA multiplied the AWL violations by seven and the AML violations by 30 and added the result to the total number of MDL violations to arrive at the 465 total violations.

Appendix F of this fact sheet provides details on the nature of the reported permit effluent limit exceedances from January 2010 through February 2015.

In addition to citing permit violations, EPA identified a deficiency on the part of GHU on failing to include a proposed fish hatchery as a SIU in their wastewater discharge application dated February 18, 2005. EPA requested that GHU determine whether the fish hatchery is considered a SIU and revise their application accordingly. GHU responded to the Notice of Continuing Noncompliance on September 26, 2008 by submitting an update to the SIU portion of their application that included the fish hatchery.

DEC conducted routine inspections of the facility in April 2009, September 2012, and September 2014. The inspection reports did not identify any significant compliance issues. The sole deficiency identified in the September 2012 inspection report was that of the lack of an annual record of inspection for a backflow prevention device. COF and GHU subsequently corrected this deficiency by testing the device in February 2013, providing DEC with a copy of the test report, and putting the device on an annual test schedule.

An IPP Compliance Audit was conducted by EPA in 2004 and DEC in 2010 and 2015. In 2004, EPA indicated that overall COF and GHU was complying with many of the requirements of the Federal pretreatment regulations (40 CFR 403). In 2010 and in 2015, DEC identified areas in COF and GHU IPP that required improvements such as correcting inconsistencies in the sewer use ordinance and SIU permits. In April 2015, DEC sent a Compliance Letter to COF and GHU requesting that they correct the deficiencies found during the January 2015 audit and respond to DEC by July 31, 2015. COF and GHU responded to DEC on July 29, 2015 addressing each action item in the Compliance Letter.

On June 8, 2015, COF and GHU notified the Department of potential BOD_5, TSS, and FC Bacteria exceedances resulting from damaged aeration mixers and associated repair work. While repairs were made to the mixers, COF and GHU were initially able to meet BOD_5 and TSS effluent limits; however, violations began to occur in July and continued into October when repairs were complete. In the same month, COF and GHU notified the Department that upgrade work to the clarifiers caused a TSS maximum daily limit violation and may cause future BOD_5, TSS, and FC Bacteria exceedances. The project is expected to be completed by December 15, 2015.

5.0 EFFLUENT LIMITS AND MONITORING REQUIREMENTS

5.1 Basis for Permit Limits

The Clean Water Act (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 (WQS) of a waterbody are met and may be more stringent than TBELs. Both TBELs (40 CFR 133 adopted by reference in 18 AAC 83.010) and WQBELs are included in the permit. A detailed discussion of the basis for the effluent limits contained in the permit is provided in Appendix B.

5.2 Basis for Influent, Effluent, and Receiving Water Monitoring

In accordance with Alaska Statutes (AS) 46.03.101(d), the Department may specify in a permit the terms and conditions under which waste material may be disposed. Monitoring in permits is required to determine compliance with effluent limits. Monitoring may also be required to gather effluent and surface water data to determine if additional effluent limits are required and/or to monitor effluent impact on receiving waterbody quality. The permittee is responsible for conducting the monitoring and

for reporting results on DMRs or on the application for reissuance, as appropriate, to the Department. Fact Sheet Sections 5.3 through 5.8 summarize monitoring requirements DEC has determined necessary to implement in the permit.

5.3 Monitoring Requirements

The permit requires monitoring of the effluent for flow, BOD_5, TSS, FC Bacteria, ammonia, copper, pH, temperature, TRC, and whole effluent toxicity (WET) to determine compliance with the effluent limitations and/or for use in future reasonable potential analyses (RPA). The permit also requires monitoring of the influent for BOD_5 and TSS to calculate monthly removal rates for these parameters. COF and GHU's IPP also requires regular effluent monitoring for metals. See Section 2.1 of the permit for pretreatment monitoring requirements.

Monitoring frequencies are based on the nature and effect of a pollutant, as well as a determination of the minimum sampling necessary to adequately monitor the facility's performance. Permittees have the option of taking more frequent samples than are required under the permit. These samples must be included in calculations and used for averaging if they are conducted using the Department-approved test methods (generally found in 18 AAC 70 and 40 CFR Part136 [adopted by reference in 18 AAC 83.010]) and if the method detection limits (MDL) are less than the effluent limits.

The reissued permit requires COF and GHU to report influent and effluent monitoring results on a monthly basis. DMRs must be submitted on or before the 15th day of the month following sampling. An annual Pretreatment Report that summarizes the permittees' activities and monitoring results over the previous 12 months, is also required to be submitted no later than January 31st of each calendar year.

Table 2 contains influent and effluent monitoring requirements. Table 3 contains parameters that effluent limits or monitoring requirements have changed since the previous permit.

Table 2. Outfall 001: Effluent Limits and Monitoring Requirements

Effluent Limits						Monitoring Requirements		
Parameter	**Units**	**Average Monthly Limit**	**Average Weekly Limit**	**Maximum Daily Limit**	**Minimum Daily Limit**	**Sample Location**	**Sample Frequency**	**Sample Type**
Flow	mgd	not applicable (N/A)	N/A	8	N/A	effluent	continuous [a]	recording
BOD_5	mg/L	30	45	60	N/A	influent and effluent [c]	3/week	24-hour composite [d]
	pounds per day (lbs/day) [b]	2,000	3,000	4,000				calculated
TSS	mg/L	30	45	60	N/A	influent and effluent [c]	7/week	24-hour composite [d]
	lbs/day [b]	2,000	3,000	4,000				calculated
BOD_5 minimum % removal [e]: 85%			TSS minimum % removal [e]: 85%			influent and effluent	1/month	calculated
FC Bacteria [f, g]	FC/100 mL	20 [h]	N/A	40 [h]	N/A	effluent	3/week	grab
Total Ammonia, as Nitrogen	mg/L	N/A	N/A	report	N/A	effluent	1/quarter	24-hour composite [d]
TRC [i]	mg/L	0.26	N/A	0.34	N/A	effluent	continuous [a]	recording
	lbs/day [b]	17	N/A	23			daily	calculated
Copper, total recoverable	micrograms per liter (µg/L)	N/A	N/A	report	N/A	effluent	1/quarter	24-hour composite [d]
pH	s.u.	N/A	N/A	8.5	6.5	effluent	daily	grab
Temperature	degrees Celsius (˚C)	N/A	N/A	report	N/A	effluent	5/week	grab

Footnotes:

a. Continuous recording may be interrupted for infrequent shutdowns for maintenance, process changes, or similar activities.
b. lbs/day = concentration (mg/L) x flow (mgd) x 8.34 (conversion factor).
c. Influent and effluent samples must be taken over approximately the same time period. Limits apply to effluent. Report average monthly influent concentration.
d. See Appendix C of the permit for a definition.
e. Minimum % Removal = [(monthly average influent concentration in mg/L - monthly average effluent concentration in mg/L) / (monthly average influent concentration in mg/L)] x 100. The monthly average percent removal must be calculated using the arithmetic mean of the influent value and the arithmetic mean of the effluent value for that month.
f. All FC Bacteria average results 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 quantities. For example the geometric mean of 100, 200, and 300 is (100 x 200 x 300)1/3= 181.7.
g. FC Bacteria limits shall become effective as soon as possible but no later than five years after the effective date of the final permit, in accordance with the conditions of the Compliance Schedule in Section 1.3 of the permit.
h. 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.
i. TRC effluent limits shall become effective as soon as possible but no later than five years after the effective date of the final permit, in accordance with the conditions of the Compliance Schedule in Section 1.3 of the permit.

Table 3. Effluent and Monitoring Requirement Changes from Prior Permit

Parameter	Units	Average Monthly Limit		Average Weekly Limit		Maximum Daily Limit		Sample Frequency	
		2000 Permit	2015 Permit	2000 Permit	2015 Permit	2000 Permit	2015 Permit	2000 Permit	2015 Permit
FC Bacteria	FC/100 mL	200	20	400	N/A	800	40	3/week	no change
Total Ammonia, as Nitrogen	mg/L	N/A	N/A	N/A	N/A	report	report	monthly during the 5th year of the permit	quarterly
TRC	mg/L	0.83	0.26	N/A	N/A	1.0	0.34	continuous	no change
	lbs/day	56	17	N/A	N/A	67	23		
Copper, total recoverable	µg/L	N/A	N/A	N/A	N/A	N/A	report	N/A	quarterly
Temperature	˚C	N/A	N/A	N/A	N/A	N/A	report	N/A	5/week
WET	chronic toxic units (TUc)	N/A	N/A	N/A	N/A	50 (trigger)	29 (trigger)	annually	no change

5.4 Total Ammonia, as Nitrogen

Total ammonia is the sum of ionized (NH4+) and un-ionized ammonia (NH3). Temperature and pH affect which form, NH4+ or NH3, is present in fresh water. NH3 is more toxic to aquatic organisms than NH4+ and predominates at higher temperature and pH. NH3 is also more dependent on pH than temperature.

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 as nitrogen. Excess ammonia as nitrogen in the environment can lead to dissolved oxygen depletion, eutrophication, and toxicity to aquatic organisms. Alaska WQS at 18 AAC 70.220.020(11) states that the concentration of substances in water may not exceed the numeric criteria for aquatic life for fresh water shown in the Alaska Water Quality Criteria Manual. Because there is reasonable potential (RP) for ammonia to exceed water quality criteria (acute criterion 4.6 mg/L, chronic criterion 1.9 mg/L) at the end of the pipe, but not at the boundary of the authorized mixing zone, monthly monitoring of the effluent for the duration of the permit will be required. Monitoring in the permit is increased from monthly during the fifth year of the permit to quarterly for the duration of the permit to more closely monitor ammonia concentrations in the effluent and for use in the next RPA.

5.5 Copper

Alaska WQS at 18 AAC 70.020(11) states that the concentration of substances in water may not exceed the numeric criteria for drinking water and human health for consumption of drinking water and aquatic organisms shown in the Alaska Water Quality Criteria Manual. The acute aquatic life copper concentration (total recoverable) may not exceed 19.2 µg/L and the chronic aquatic life copper concentration (total recoverable) may not exceed 12.4 µg/L. Because there is RP for copper to exceed water quality criteria at the end of the pipe, but not at the boundary of the authorized mixing zone, this permit requires quarterly monitoring of the effluent for copper to more closely monitor the copper concentration in the effluent and for use in the next RPA.

5.6 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 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.

WET tests are laboratory tests that measure the 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. There are two different durations of toxicity test: 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. State regulation 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 for dilution factors between 100:1 and 1000:1 at the boundary of the mixing zone.

The previous permit required that COF and GHU conduct annual chronic toxicity tests on the test organisms Ceriodaphnia dubia (the water flea) and Pimpehales promelas (the fathead minnow). The organisms were tested at the following effluent concentrations: 6.0, 4.0, 2.0, 1.0, 0.5 and 0% (control), with 2.0% effluent corresponding to the instream waste concentration at the boundary of the mixing zone. Results from 2010 through 2014 did not indicate any toxicity at the highest effluent concentration of 6% effluent, or 16.7 TUc.

In order to provide ongoing assessment of the toxicity of COF and GHU's wastewater discharge, and ensure compliance with 18 AAC 83.335, effluent monitoring for WET is required in the permit. WET monitoring conducted as a requirement in this permit will also satisfy the WET monitoring requirements found in Application Form 2A, that must be completed when reapplying for coverage. The test dilution series as well as the TUc trigger has been adjusted in this permit from 6.0, 4.0, 2.0, 1.0, and 0.5% effluent to 13.6, 6.8, 3.4, 1.7, and 0.9% effluent and from 50 TUc to 29 TUc to reflect the new chronic mixing zone dilution factor.

In order to determine an effluent-specific acute-to-chronic, the permit will require a joint evaluation of acute and chronic toxicity. The acute toxicity for the fathead minnow, Pimephales promelas, shall be evaluated at 96 hours into the 7 day chronic test. Results shall be reported in terms of both no observed effect concentration (NOEC) and lethal concentration (LC) 50. See Appendix C of the permit for definitions of NOEC and LC50.

The permit also requires accelerated WET testing if toxicity is greater than 29 TUc in any test. Six bi-weekly WET tests (every two weeks) over a 12-week period is required. If the permittees demonstrates through an evaluation of the facility operations that the cause of the exceedance is known and

corrective actions have been implemented, only one accelerated test is required. If toxicity is greater than 29 TUc in any of the accelerated tests, the permittees must initiate a Toxicity Reduction Evaluation (TRE). A TRE is required so that the specific cause of the toxicity can be identified and mitigated (see Section 1.4.5 of the permit for further details).

5.7 Receiving Waterbody Monitoring Requirements

The permit establishes a downstream mixing zone monitoring requirement for TRC at 1,600 meters from the point of discharge for a period of one year. Monitoring may then be discontinued if results indicate that the discharge quality has not caused or contributed to an exceedance of TRC water quality criteria outside of the authorized mixing zone. Monitoring can be reinstated at the request of the Department and then again be eliminated after one year if the discharge has not caused or contributed to an exceedance of TRC water quality criteria.

The permit establishes two receiving waterbody monitoring stations in the Tanana River. The boundary of the mixing zone station (MXZ) must be established downstream of the facility's discharge, at the boundary of the mixing zone. The upstream station (UPS) representing ambient conditions, must be established in a location above the influence of the facility's discharge. Monitoring must start within 180 days of the effective date of the permit and the locations must be approved by the Department (see Section 1.6 of the permit).

Upstream monitoring is required for hardness, pH, and temperature. Hardness is required in order to calculate appropriate water quality criteria for hardness dependent metals, and pH and temperature are required to determine appropriate ammonia water quality criteria. This data will be used in the next RPA.

Upstream and downstream monitoring for FC Bacteria is required in order to evaluate FC Bacteria concentrations in the Tanana River upstream of the facility and to assess whether the discharge causes or contributes to an exceedance of FC Bacteria water quality criteria outside of the authorized mixing zone. As described in Permit Section 1.6.7, FC Bacteria receiving waterbody monitoring may be discontinued after two years if in a 30-day period, the receiving waterbody geometric mean does not exceed 20 FC/100 mL, and if not more than 10% of the samples exceed 40 FC/100 mL. Monitoring may also be discontinued when compliance has been achieved and maintained for a period of one year with the final FC Bacteria effluent limits in Permit Section 1.2. FC Bacteria receiving waterbody monitoring shall be resumed if the permittees change to an alternative method of disinfection and then again be discontinued after two years if data show compliance with the final FC Bacteria effluent limits.

Table 4 contains boundary of mixing zone monitoring requirements and Table 5 contains ambient receiving waterbody monitoring requirements.

Table 4. Station MXZ: Boundary of Chronic Mixing Zone Monitoring Requirements

Parameter	Units	Sampling Frequency	Sample Type
TRC	mg/L	2/year [a,b]	grab
FC Bacteria	FC/100 mL	monthly June 1- Sept 30 twice per winter (Oct 1-May 31) [c]	grab

Footnotes:

a. Twice per year consists of one sample taken in the summer months (June 1– Sept 30), and one in the winter (Oct 1- May 31).
b. Monitoring results must be submitted to DEC with the DMR for the month following sample collection.
c. Monitoring must occur in two different months.

Table 5. Station UPS: Upstream Station Monitoring Requirements

Parameter	Units	Sampling Frequency	Sample Type
pH [a]	s.u.	2/year [b,c]	grab
Temperature [a]	°C	2/year [b,c]	grab
Hardness as $CaCO_3$	mg/L	2/year [b,c]	grab
FC Bacteria	FC/100 mL	monthly June 1- Sept 30 twice per winter (Oct 1-May 31) [d]	grab

Footnotes:

a. pH and temperature samples should be taken concurrently.
b. Twice per year consists of one sample taken in the summer months (June 1– Sept 30), and one in the winter (Oct 1- May 31).
c. Monitoring results must be submitted to DEC with the DMR for the month following sample collection.
d. Monitoring must occur in two different months.

6.0 RECEIVING WATERBODY

6.1 Description of Receiving Waterbody

The Tanana River, the second largest tributary of the Yukon River, rises from the confluence of the Chisana and Nabesna Rivers on the north side of the Alaska Range. Predominately glacier fed, the Tanana flows in a northwesterly direction along the base of the Alaska Range for approximately 570 miles before joining the Yukon River near the community of Tanana. River flow peaks in July. Channel patterns upstream of Fairbanks consist of strong open braids, multiple channels, and unvegetated gravel bars, whereas channel patterns downstream of Fairbanks consist of narrower braids with one or more major channels and vegetated islands.

6.2 Outfall Location

COF and GHU discharges treated effluent at 64°47’54” North (N) latitude and 147°46’43” West (W) longitude, to the Tanana River.

6.3 Low Flow Conditions

The Technical Support Document for Water Quality-Based Toxics Control (TSD) (EPA, 1991) and the WQS recommend the flow conditions for use in calculating WQBELs using steady-state modeling. The TSD 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.

Flow information from United States Geological Survey (USGS) gage 15485500 for the Tanana River located at 64º47’34” N latitude and 147º50’20” W longitude, was used to determine the flow conditions for the receiving waterbody. Because much of the low flow occurs during the winter months when the Tanana River is frozen, it is difficult to accurately measure flows during these icy periods, and thus much of these data are estimated. Subsequently, minimal differences can occur in the 7Q10 and 1Q10 calculations. An evaluation of water data from October 2003 through September 2014 indicates that the 7Q10 and 1Q10 are both estimated at 4,700 cubic feet per second (ft^3/sec).

6.4 Water Quality Standards

Regulations in 18 AAC 70 require that the conditions in permits ensure compliance with the Alaska WQS. The State's WQS are composed of use classifications, numeric and/or narrative water quality criteria, and an antidegradation policy. The use classification system designates the beneficial 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 beneficial use classification of each waterbody. The antidegradation policy ensures that the beneficial uses and existing water quality are maintained.

Waterbodies in Alaska are designated for all uses unless the water has been reclassified under 18 AAC 70.230 as listed under 18 AAC 70.230(e). Some waterbodies in Alaska can also have site–specific water quality criterion per 18 AAC 70.235, such as those listed under 18 AAC 70.236(b). The Tanana River has not been reclassified pursuant to 18 AAC 70.230, nor does it have site-specific water quality criteria pursuant to 18 AAC 70.235. Therefore, existing uses and designated uses are the same and the Tanana River must be protected for all fresh water designated 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.

6.5 Water Quality Status of Receiving Water

Any part of a waterbody for which the water quality does not or is not expected to meet applicable WQS is defined as a "water quality limited segment" and placed on the state's impaired waterbody list. The Tanana River is not included on the *Alaska's Final 2010 Integrated Water Quality Monitoring and Assessment Report*, July 15, 2010.

6.6 Mixing Zone Analysis

Under 18 AAC 70.240, as amended through June 26, 2003, the Department may authorize a mixing zone in a permit. A chronic mixing zone is sized to protect the ecology of the waterbody as a whole, while an acute mixing zone is sized to prevent lethality to passing organisms. DEC modeled the acute and chronic mixing zones and calculated dilution factors using CORMIX modeling software. Inputs included the maximum expected effluent concentrations and the acute and chronic water quality criteria of parameters that demonstrated RP (See Appendix B for details on the RPA), as well as any site-specific discharge and ambient data.

Based on the maximum expected effluent concentrations and chronic water quality criteria, TRC required the most dilution of the parameters that demonstrated RP to exceed water quality criteria; therefore, TRC determined the chronic mixing zone size. Ammonia, copper, and WET also fit within the chronic mixing zone. Because the interim FC Bacteria effluent limits found in Permit Section 1.3, Table 3, exceed FC Bacteria water quality criteria, FC Bacteria is also included in the authorized mixing zone. FC Bacteria will not be authorized in the mixing zone upon achievement of compliance with the final FC Bacteria effluent limits found in Permit Section 1, Table 2. The chronic mixing zone for COF and GHU wastewater discharge has a dilution of 29.4:1 and is defined as the area extending downstream from the end of the outfall line a distance of 1,600 meters with a maximum width of 31 meters. The water quality criteria for ammonia, copper, FC Bacteria, TRC, and WET may be exceeded within the authorized chronic mixing zone.

There is a smaller, initial, acute mixing zone surrounding the outfall and contained within the larger chronic mixing zone. Based on the maximum expected effluent concentrations and acute water quality criteria, TRC required the most dilution of the parameters that demonstrated RP to exceed acute water quality criteria. Ammonia and copper, which also need an acute mixing zone to meet water quality criteria, fit into the TRC acute mixing zone. The acute mixing zone for this discharge has a dilution of

17.9:1 and is defined as the area extending downstream from the end of the outfall line a distance of 594 meters with a maximum width of 19 meters. 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 70.255, 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. The Department determined that the travel time of an organism drifting through the acute mixing zone to be approximately 15 minutes; therefore, there will be no lethality to organisms passing through the acute mixing zone.

Appendix E outlines regulatory 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 this analysis:

Size

In accordance with 18 AAC 70.255, 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, a mixing zone modeling software program, to model the chronic and acute mixing zones.

Because 18 AAC 70.245(b)(5) requires the Department to consider the characteristics of the effluent after treatment of the wastewater, DEC reviewed the last five years of effluent water quality data from January 2010 through February 2015. TRC required the most dilution for both the chronic and acute mixing zones (see above discussion). Therefore, TRC was modeled in CORMIX to determine the smallest practicable mixing zone sizes.

The maximum expected concentration for TRC and corresponding acute and chronic water quality criterion were entered into CORMIX. Other data required for the mixing zone modeling included receiving water characteristics at the outfall such as the depth of the receiving water at the outfall, Tanana River low flow rate, and the outfall discharge configuration. In 2000, DEC authorized a 1,600 meter x 40 meter mixing zone in its certification of the 2000 EPA-issued NPDES permit. As a point of reference, DEC used the mixing zone length in the previously authorized mixing zone as a maximum chronic mixing zone length in CORMIX.

CORMIX indicated that at 1,600 meter with a corresponding dilution of 29.4:1, the chronic water quality criterion for TRC cannot be met. The distance at which the chronic water quality criterion is encountered in CORMIX, 23,297 meters, is impracticable. Therefore, limits for TRC were developed that are more stringent than the limits in the current permit and that are protective of the water quality criteria. The permittees are required to comply with the new limits as soon as possible, but no later than five years after the effective date of the permit. See Section 9.6.

Because the permit contains new TRC effluent limits that must be met as soon as possible, but no later than five years after the effective date of the permit, the basic CORMIX inputs upon which this mixing zone is based, will likely change during the term of this permit, or upon its expiration. Accordingly, DEC will remodel the mixing zone at that time, and make any necessary modifications to it.

Table 6 summarizes basic CORMIX inputs that were used to model the chronic and acute mixing zones for TRC.

Table 6. Summary of CORMIX Inputs

Parameter Modeled	Maximum Expected Concentration	Ambient Concentration	Chronic Water Quality Criterion	Acute Water Quality Criterion
Total Residual Chlorine	1,226 µg/L	0 mg/L	11 µg/L	19 µg/L
Outfall and Receiving Waterbody Characteristics				
Discharge Geometry	buoyant surface discharge			
Discharge Location	right bank			
Diffuser Configuration	protruding 2 meters from bank			
Depth at Discharge	1 meter			
Ambient Low Flowrate	133 cubic m per sec			
Wind Velocity	2 knots			
Effluent Characteristics				
Flow Rate	8 mgd			
Temperature	14 º C			

Technology

In accordance with 18 AAC 70.240(a)(3), the most effective technological and economical methods should be used to disperse, treat, remove, and reduce pollutants. The wastewater operations at COF and GHU WWTF include an approved IPP that reduces pollutants prior to entering the WWTF. Treatment at the facility consists of an oxygen activated sludge secondary treatment process. Mechanical bar screens and aerated grit chambers provide preliminary treatment after which the wastewater is treated by aeration, secondary clarification and chlorine disinfection prior to discharge to the Tanana River.

Low Flow Design. In accordance with 18 AAC 70.255(f), DEC incorporated Tanana River low flow data from USGS flow gage 15485500 into the CORMIX mixing zone model. As indicated in Section 6.3, the 7Q10 and 1Q10 are both estimated at 4,700 ft^3/sec.

Existing Use

In accordance with 18 AAC 70.245, the mixing zone has been appropriately sized to fully protect the existing uses of the Tanana River. The waterbody's existing uses have been maintained and protected

under the terms of the previous permit, which included a very similar mixing zone authorization. The mixing zone authorization does not propose any modifications that would result in changes to existing uses.

Human Consumption

In accordance with the conditions of the permit, and in accordance with 18 AAC 70.250(b)(2) and (b)(3), 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.

Spawning Areas

In accordance with 18 AAC 70.255(h), the mixing zone may not be authorized in a known spawning area for anadromous fish or resident fish spawning redds for Arctic grayling, northern pike, rainbow trout, brook trout, cutthroat trout, whitefish, sheefish, Arctic char (Dolly Varden), burbot, and landlocked coho, king, and sockeye salmon. The Alaska Department of Fish and Game (ADF&G) interactive regulatory and interactive essential fish habitat (EFH) maps at http://www.adfg.alaska.gov/sf/SARR/AWC/index.cfm?ADFG=maps.maps do not show any spawning or rearing areas in the vicinity of COF and GHU wastewater discharge outfall. See Section 10.2 for more information on EFH.

Human Health

In accordance with 18 AAC 70.250 and 18 AAC 70.255, the mixing zone must be protective of human health. An analysis of the effluent data that was included with COF and GHU wastewater discharge application and the results of the RPA conducted on pollutants of concern indicate that the level of treatment at COF and GHU WWTF is protective of human health. The effluent data was then used in conjunction with applicable water quality criteria, which serve the purpose of protecting human and aquatic life, to size the mixing zone to ensure all water quality criteria are met in the waterbody at the boundary of the mixing zone.

Aquatic Life and Wildlife

In accordance with 18 AAC 70.250 and 18 AAC 70.255, the mixing zone authorized in the permit shall be protective of aquatic life and wildlife. CORMIX modeling conducted for this discharge to the Tanana River incorporated the most stringent water quality criterion in the model for protection of the growth and propagation of fish, shellfish, other aquatic life, and wildlife, and all water quality criteria will be met at the boundary of the authorized mixing zone.

Endangered Species

In accordance with 18 AAC 70.250(a)(2)(D), the authorized mixing zone will not cause an adverse effect on threatened or endangered species.

On April 30, 2015 DEC contacted the United States Fish and Wildlife Service (USFWS) and NMFS and requested them to identify any threatened or endangered species under their jurisdiction in the vicinity of COF and GHU's wastewater discharge outfall. USFWS and NMFS did not identify any threatened or endangered species. See Section 10.1 of the fact sheet for more information regarding endangered species.

7.0 ANTIBACKSLIDING

18 AAC 83.480 requires that "effluent limitations, standards, or conditions must be at least as stringent as the final effluent limitations, standards, or conditions in the previous permit."
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." The effluent limitations in this permit reissuance are consistent with 18 AAC 83.480. The permit effluent limitations, standards, and conditions in AK0023451 are as stringent as in the previously issued permit and are consistent with 18 AAC 83.480. Accordingly, no further backsliding analysis is required for this permit reissuance.

8.0 ANTIDEGRADATION

Section 303(d)(4) of the CWA states that, for waterbodies 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 Antidegradation Policy of the WQS (18 AAC 70.015) states that the existing water uses and the level of water quality necessary to protect existing uses must be maintained and protected. This section analyzes and provides rationale for the Department's decisions in the permit issuance with respect to the Antidegradation Policy.

The Department's approach to implementing the Antidegradation Policy, found in 18 AAC 70.015, is based on the requirements in 18 AAC 70 and the Department's *Policy and Procedure Guidance for Interim Antidegradation Implementation Methods*, dated July 14, 2010. Using these procedures and policy, the Department determines whether a waterbody, or portion of a waterbody, is classified as Tier 1, Tier 2, or Tier 3, where a higher numbered tier indicates a greater level of water quality protection. At this time, no Tier 3 waters have been designated in Alaska, and the Tanana River is not listed as impaired on DEC's most recent *Alaska's Final 2010 Integrated Water Quality Monitoring and Assessment Report;* therefore, a Tier 1 designation is not warranted. In addition, little other baseline receiving water data exists. Accordingly, this antidegradation analysis conservatively assumes that the discharge is to a Tier 2 waterbody.

The State's Antidegradation Policy in 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 (i.e. Tier 2 waters), that quality must be maintained and protected. The Department may allow a reduction of water quality only after finding that five specific requirements of the antidegradation policy at 18 AAC 70.015(a)(2)(A)-(E) are met. The Department's findings follow:

- ***18 AAC 70.015 (a)(2)(A). Allowing lower water quality is necessary to accommodate important economic or social development in the area where the water is located.***

Per finding four of the antidegradation analysis, the Department has determined that the methods of pollution prevention, control, and treatment are the most effective and reasonable and that the lowering water quality in the vicinity of the discharge is necessary,

COF and GHU collects and treats wastewater from the greater Fairbanks area, which according to the 2010 U.S. Census Bureau estimates serves a regional population of 97,581. They provide collection and treatment services to individual households and supporting businesses as well as to commercial septage haulers from local and outlying areas. Significant industrial contributors to the wastewater treatment facility include the University of Alaska Power Plant, Fort Wainwright, Fairbanks Memorial Hospital, Aurora Energy LLC, Ruth Burnett Sport Fish Hatchery, and the Fairbanks North Star Borough Municipal Solid Waste Landfill.

DEC determined that the permitted activities are necessary to accommodate important economic and social development and the anticipated minor lowering of water quality is necessary for these purposes and that the finding is met.

- ***18 AAC 70.015 (a)(2)(B). Except as allowed under this subsection, reducing water quality will not violate the applicable criteria of 18 AAC 70.020 or 18 AAC 70.235 or the whole effluent toxicity limit in 18 AAC 70.030.***

Section 1.2.1 of the permit requires that the discharge shall not cause a violation of the WQS at 18 AAC 70 except if excursions are authorized in accordance with provisions in 18 AAC 70.200 – 70.270 (e.g. variance, mixing zone, etc.). As a result of the facility's RP to exceed water quality criteria for ammonia, copper, TRC, and WET, and available assimilative capacity in the receiving water, a mixing zone is authorized in COF and GHU wastewater discharge permit in accordance with 18 AAC 70.240. The resulting effluent end-of pipe limitations and monitoring requirements in the permit (See Table 2) protect water quality criteria, and therefore, will not violate the water quality criteria found at 18 AAC 70.020.

There are no site-specific criteria associated with 18 AAC 70.235. The effluent limits for WET are protective of the limit in 18 AAC 70.030.

Alaska WQS at 18 AAC 70.030 requires that an effluent discharged to a waterbody may not impart chronic toxicity to aquatic organisms, expressed as 1.0 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.

The Department has authorized a chronic mixing zone for this permit with a dilution of 29.4, and subsequently assigned a chronic toxicity trigger based on the minimum effluent dilution achieved in the mixing zone of 29 TUc. If the WET trigger is met, COF and GHU's wastewater discharge will not violate the WET limit in 18 AAC 70.030.

DEC determined that the reduction in water quality will not violate the criteria of 18 AAC 70.020. 18 AAC 70.235, or 18 AAC 70.030 and that the finding is met.

- ***18 AAC 70.015(a)(2)(C). The resulting water quality will be adequate to fully protect existing uses of the water.***

The WQS serve the specific purpose of protecting the existing uses of the receiving waterbody. The Tanana River is protected for all designated uses (See Section 6.3 of this fact sheet); therefore, the most stringent water quality criteria found in 18 AAC 70.020 and in the Alaska Water Quality Criteria Manual for Toxic and Other Deleterious Organic and Inorganic Substances (2008) were selected for use in the RPA for COF and GHU wastewater discharge effluent. This will ensure that the resulting water quality at and beyond the boundary of the authorized mixing zone will fully protect all designated uses of the receiving waterbody.

DEC determined that COF and GHU's wastewater treatment operations will result in adequate water quality to fully protect existing uses of the water and that the finding is met.

- ***18 AAC 70.015(a)(2)(D). The methods of pollution prevention, control, and treatment found by the department to be most effective and reasonable will be applied to all wastes and other substances to be discharged.***

COF and GHU utilize a variety of measures to prevent, control and treat the pollution that may be generated as a result of their facility's wastewater treatment operations. The facility has an approved IPP that regulates discharge from SIUs as well as an Operation and Maintenance Plan (OMP) that 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 permit also requires accelerated WET testing if toxicity is greater than 29 TUc in any test. If toxicity is greater than 29 TUc in any of the accelerated tests, the permittees must initiate a TRE. The TRE is required so that the specific cause of the toxicity can be identified and mitigated (See Section 1.4.5 of the permit). Section 3.2 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.

DEC determined that the methods of pollution prevention, control, and treatment to be most effective and reasonable for applying to all wastes and substances discharged from COF and GHU WWTF, are the practices and requirements set out in the permit and that the finding is met.

- ***18 AAC 70.015(a)(2)(E). 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 applicable "highest statutory and regulatory treatment requirements" are defined in 18 AAC 70.990(30) (as amended June 26, 2003) and in the Implementation Methods. Accordingly, there are three parts to the definition, which are:

- (A) any federal technology-based effluent limitation guidelines (ELG) identified in 40 CFR § 125.3 and 40 CFR § 122.29, as amended through August 15, 1997, adopted by reference at 18 AAC 83.010(c)(9);
- (B) minimum treatment standards in 18 AAC 72.040; and
- (C) any treatment requirement imposed under another state law that is more stringent than a requirement of this chapter.

The first part of the definition includes all federal technology-based ELGs including "For publicly owned treatment works (POTW), 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), which are incorporated in the permit.

The second part of the definition 18 AAC 70.990(B) (2003) appears to be in error, as 18 AAC 72.040 describes discharges to sewers and not minimum treatment. The correct reference appears to be the minimum treatment standards found at 18 AAC 72.050, which refers to domestic wastewater discharges only. The permit includes stipulations that meet the intent of 18 AAC 70.990.

The third part includes any more stringent treatment required by state law, including 18 AAC 70 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.

After review of the applicable statutory and regulatory requirements, including 18 AAC 70, 18 AAC 72, and 18 AAC 83, the Department finds that COF and GHU's wastewater discharge meets the highest applicable statutory and regulatory requirements and that this finding is met.

9.0 SPECIAL CONDITIONS

9.1 Pretreatment Program Requirements

Section 301(b) of the CWA requires that industrial users who discharge to POTWs comply with pretreatment requirements established under CWA Section 307 (adopted by reference at 18 AAC 83.010(g)(2)). The objectives of the pretreatment program are: 1) to prevent the introduction of pollutants to the treatment system that will interfere with the plant's operation, that could pass untreated through the system and contribute to water quality problems, or that are otherwise incompatible with the treatment plant; and 2) to improve opportunities to reclaim and recycle municipal and industrial waste water and sludge.

The previous permit required the permittees to implement the pretreatment program in accordance with the COF IPP (approved January 31, 1985) with subsequent modifications. The pretreatment program includes requirements to enforce pretreatment standards promulgated under CWA Section 307, issue permits to SIUs that contain limits and other conditions, maintain records, carry out inspections, and obtain remedies for non-compliance by industrial users. As in the previous permit, the permit requires monitoring of influent, effluent, and sludge twice a year for metals and cyanide. In addition, the permit

requires that metals analyses be conducted using the most sensitive EPA-approved methods, unless a less sensitive method is approved by the Department's Pretreatment Coordinator. This provision ensures that the permittees will use the most sensitive EPA-approved analytical method currently available when influent or effluent concentrations for a particular pollutant are near or below the lowest MDL without imposing the financial burden of using these methods when a less sensitive method will provide quantifiable data. Finally, the permit requires the permittees to submit an annual report describing pretreatment program activities.

Table 7 summarizes the industrial processes of the six SIUs discharging into COF and GHU WWTF.

Table 7: Significant Industrial Users

Name	Flow Rate (gpd)	Summary of Industrial Processes
University of Alaska Fairbanks Power Plant	15,000 (includes process and non-process wastewater)	Water purification, coal-fired steam/electric power generation, and non-contact cooling tower waste. This facility has local limits.
Department of the Army, Fort Wainwright	300,600 (includes process and non-process wastewater)	Discharge from light vehicle and aircraft maintenance facilities, dental clinic, coal-fired steam electric power plant, water treatment plant, hospital, and food service establishments. All of the discharges flow to one main lift station prior to entering COF and GHU wastewater collection system. This facility has local limits.
Fairbanks Memorial Hospital	108,924 (includes process and non-process wastewater)	This facility contributes standard medical-type discharges that includes laundry, imaging/radiology, boiler room, and cafeteria. This facility has local limits.
Aurora Energy, LLC	22,300 process wastewater 100 non-process wastewater	Water purification and coal-fired steam electric power generation. This facility has local limits and categorical pretreatment standards for the steam electric power generating point source category.
Fairbanks North Star Borough, Municipal Solid Waste Landfill	0 process wastewater 200 non-process wastewater	Landfill leachate. The landfill is connected to COF and GHU wastewater collection system; however at this time the landfill recirculates its leachate. The SIU status is maintained as a contingency. This facility has local limits.

Name	Flow Rate (gpd)	Summary of Industrial Processes
Ruth Burnett Sport Fish Hatchery	17,320 process wastewater 160 non-process wastewater	Aquaculture and well filter backwash. This facility has local limits.

9.2 Tanana River Outfall Sampling Program

The State of Alaska Certification of Reasonable Assurance (certification) of the NPDES COF and GHU wastewater discharge permit required downstream monitoring for TRC and FC Bacteria at a series of stations and conditions to evaluate the extent of FC Bacteria in the discharge area. The certification included the provision that if the discharge did not cause an exceedance of water quality criteria at the edge of the mixing zone, TRC and FC Bacteria receiving waterbody monitoring could be discontinued after two years. An evaluation of the TRC and FC Bacteria monitoring results along with data collected prior to permit issuance suggests that a positive correlation exists between upstream and downstream FC Bacteria and TRC concentrations. This means that there is a degree of linear association between the samples taken at the upstream and downstream monitoring locations.

The results summarized in Table 8 illustrate that the average FC Bacteria concentrations at the upstream location were similar to or higher than FC Bacteria concentrations at the boundary of the mixing zone throughout the monitoring period suggesting that they are associated in some manner.

TRC was detected throughout the sampling area, and upstream sample results were similar to downstream results. The detection of TRC in the receiving area is most likely the result of positive interference with the DPD (diethyl-p-phenylene diamine) test. According to Hach Company, the manufacturer of the DPD test spectrophotometer used in the study, a positive interference will result in the TRC test when dissolved manganese is present in the sample. Manganese is associated with the silt content of the Tanana River (Northern Testing Laboratories, 2002). This information suggests that the positive interference with the DPD test associated with the silt content of the Tanana River could influence TRC monitoring results and could cause an apparent exceedance at the boundary of the mixing zone.

The Department determined on February 21, 2003 that the Tanana River Outfall Sampling Program was satisfactory, that the goals and objectives of the stipulations contained in the permit had been fulfilled, and therefore, in accordance with the permit, eliminated TRC and FC Bacteria receiving waterbody monitoring requirements.

DEC included the upstream monitoring data from the Tanana River Outfall Sampling Program while evaluating COF and GHU's FC Bacteria effluent monitoring data and mixing zone. Upstream FC Bacteria concentrations above water quality criteria do not allow for further dilution and preclude the authorization of a MZ; therefore FC Bacteria water quality criteria apply at the end of the pipe. Because COF and GHU will not be able to meet FC Bacteria water quality criteria upon the effective date of the permit, FC Bacteria is included in a Schedule of Compliance (See Permit Section 1.3 and Fact Sheet Section 9.6). In addition, because the interim FC Bacteria effluent limits exceed water quality criteria, FC Bacteria is included in the authorized mixing zone as described in Permit Section 1.5 until such time that the permittees achieve compliance with the final FC Bacteria effluent limits.

Because TRC is not a naturally occurring substance in the Tanana River and no other upstream sources for the introduction of the parameter are apparent, the upstream concentration of TRC was assumed to be zero for the RPA. The TRC RPA resulted in the development of TRC limits that are more stringent than the prior permit. COF and GHU will be implementing dechlorination within five years of the

effective date of the reissuance of the permit, which should lower or eliminate the concentration of TRC discharged from their WWTF. See Appendix C for details on the TRC RPA.

A summary of monitoring results from the Tanana River Outfall Sampling Program is presented in Table 8.

Table 8: Tanana River Outfall Sampling Data Summary

Date	TRC (mg/L)		FC Bacteria (FC/100 mL)	
	Upstream Average	Downstream Average	Upstream Average	Downstream Average
8/13/1999	0.18	0.19	149	89
3/15/2000	0.06	0.10	<2	1
5/18/2000	0.07	0.09	9	8
8/27/2000	0.06	0.11	26	27
10/01/2000	0.00	0.10	12	9
2/26/2001	0.09	0.08	<2	<2
4/20/2001	0.03	0.04	<2	2
5/30/2001	0.08	0.10	15	25
7/30/2001	1.07	1.22	113	120
9/07/2001	0.04	0.07	29	30
1/30/2002	0.01	0.05	<2	<2
3/21/2002	0.03	0.04	<2	<2
5/29/2002	0.02	0.03	31	27
7/29/2002	1.4	2.0	103	90
9/04/2002	0.1	0.3	18	33

9.3 Quality Assurance Project Plan

The permittees are required to develop procedures to ensure that the monitoring data submitted are accurate and to explain data anomalies if they occur. The permittees are required to update the QAPP within 180 days of the effective date of the final permit. Additionally, the permittees must submit a letter to the Department within 180 days of the effective date of the permit stating that the plan has been implemented within the required time frame. The QAPP shall consist of standard operating procedures the permittees must follow for collecting, handling, storing and shipping samples; laboratory analysis; and data reporting. The plan shall be retained on site and made available to the Department upon request.

9.4 Operation and Maintenance Plan

The permit requires the permittees 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 permittees are required to review and update the OMP that was required under the previous permit within 180 days of the effective date of the reissued permit. The plan shall be reviewed annually, be updated as necessary, be retained on site, and made available to the Department upon request.

9.5 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.

9.6 Schedules of Compliance

Schedules of compliance authorized under 18 AAC 83.560(b) require that if a permit establishes a schedule of compliance that exceeds one year, the schedule must set out interim requirements and dates for their achievement. If the time necessary to complete any interim requirement is more than one year, the schedule shall require reports on progress towards completion of the interim requirements. The permit contains a five-year schedule of compliance for TRC and FC Bacteria.

The more stringent TRC and FC Bacteria effluent limits may significantly impact the facility and utility rate payers. During the ten-day preliminary draft permit review period, the permittees requested that their permit be administratively extended for another three years, which would provide them time to complete an optimization study. They stated that the facility was aging, and that it would be necessary to assess the facility's current hypochlorite production before any process changes could be evaluated or implemented. DEC denied the permittee's request to extend the permit, but is allowing COF and GHU three years to complete an optimization study.

DEC incorporated the optimization study into the TRC and FC Bacteria Schedule of Compliance. A final optimization study report must be submitted three years after the effective date of the permit. The findings of the optimization study will provide COF and GHU critical information that may result in significant process changes and upgrades that could take considerable time to implement and complete. Therefore, a five-year compliance schedule provides a reasonable and appropriate timeframe to achieve compliance with the new TRC and FC Bacteria effluent limits described below. If it is determined that upgrades will be necessary, construction of facility upgrades must begin by four years after the effective date of the permit. By five years after the effective date of the permit, construction must be complete and compliance with the final TRC and FC Bacteria limits must be achieved.

Total Residual Chlorine

The TRC limits calculated for the permit are significantly lower than current treatment plant performance. While the final TRC effluent limits must be met as soon as possible, COF and GHU's wastewater treatment process does not include a dechlorination system. It is highly unlikely that without dechlorination, COF and GHU will be able to comply with the more stringent TRC limits upon the effective date of the permit; therefore DEC has delayed the implementation of the new TRC limits for five years to allow for the completion of a three year optimization study, and if necessary, the design, plan review, construction, and optimization of a dechlorination system. The permit requires COF and GHU to comply with the new TRC effluent limits (0.26 mg/L AML, 0.34 mg/L MDL) as soon as possible, although no later than five years after the effective date of the final permit. Reports on progress made toward achieving compliance with the final TRC effluent limits are due annually starting in the first year of the permit.

The Department determined that the limits of the prior permit are reasonable interim TRC effluent limits.

While the TRC schedule of compliance is in effect, the following interim effluent limits must be met:

Table 9: Total Residual Chlorine Interim Effluent Limits and Monitoring Requirements

Parameter	Average Monthly Limit	Maximum Daily Limit	Sample Frequency	Sample Type
TRC	0.83 mg/L	1.0 mg/L	continuous [a]	recording
	56 lbs/day	67 lbs/day	daily	calculated [b]

Footnotes:
a. Continuous recording may be interrupted for infrequent shutdowns for maintenance, process changes, or similar activities.
b. lbs/day = concentration (mg/L) x flow (mgd) x 8.34 (conversion factor).

Fecal Coliform Bacteria

An evaluation of ambient FC Bacteria monitoring data collected during the Tanana River Outfall Sampling Program show that ambient FC Bacteria concentrations upstream of COF and GHU wastewater discharge outfall have exceeded FC Bacteria water quality criteria (See Section 9.2). As a result, FC Bacteria can be reasonably expected to exceed water quality criteria. Therefore, in accordance with 18 AAC 83.435(b), the effluent discharged from COF and GHU WWTF must be limited to prevent the discharge from causing or contributing to an excursion of the most stringent FC Bacteria water quality criterion at 18 AAC 70.020 (b)(2)(A)(i). Because ambient FC Bacteria levels have exceeded water quality criteria and will not allow for further dilution, the Department is requiring that the water quality criteria be met as effluent limits at the end of the pipe.

The prior permit's limits required an AML of 200 FC/100 mL, an AWL of 400 FC/100 mL, and a MDL of 800 FC/100 mL. The reissued permit requires an AML of 20 FC/100 mL and a MDL of 40 FC/100 mL. Unless DEC approves the removal of FC Bacteria from the Schedule of Compliance as per Permit Section 1.3.1.12, compliance with the new FC Bacteria effluent limits must be met as soon as possible. In the event that FC Bacteria is removed from the Schedule of Compliance, the permittees must comply with the limits of the prior permit stated above as well as the receiving waterbody requirements described in Permit Section 1.6 and Fact Sheet Section 5.7.

The findings of the three-year optimization study may indicate that in order to meet the new FC Bacteria effluent limits, upgrades to the WWTF will be necessary. Facility upgrades will involve an engineered plan review process, procuring funding, seeking and awarding bids, construction, and optimization of the facility with the new upgrade. A five-year compliance schedule provides a reasonable and appropriate timeframe to achieve compliance with the new FC Bacteria effluent limits. Reports on progress made toward achieving compliance with the final FC Bacteria effluent limits are due annually starting in the first year of the permit.

DEC determined that the limits of the prior permit are reasonable interim FC Bacteria effluent limits. While the FC Bacteria schedule of compliance is in effect, the following interim effluent limits must be met:

Table 10: Fecal Coliform Interim Effluent Limits and Monitoring Requirements

Parameter	Average Monthly Limit	Average Weekly Limit	Maximum Daily Limit	Sample Frequency	Sample Type
FC Bacteria	200 FC/100 mL	400 FC/100 mL	800 FC/100 mL	3/week	Grab

10.0 OTHER CONSIDERATIONS

10.1 Endangered Species Act

Section 7 of the ESA requires a federal agency to consult with the USFWS and NMFS to determine whether their authorized actions may harm threatened and endangered species or their habitats. 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 USFWS.

As a state agency, DEC is not required to consult with USFWS or NMFS regarding permitting actions; however, DEC interacts voluntarily with these federal agencies to obtain listings of threatened and endangered species and critical habitat. DEC contacted USFWS and NMFS on April 30, 2015 and requested them to identify any threatened or endangered species under their jurisdiction in the vicinity of COF and GHU wastewater discharge outfall. NMFS responded on April 30, 2015 that there are no threatened and endangered species or critical habitat under their jurisdiction in the area of the outfall. USFWS responded on May 5, 2015 that there are no ESA-listed species or designated critical habitat in the area of the discharge.

An interactive endangered species map maintained by NMFS map may be accessed at http://alaskafisheries.noaa.gov/mapping/esa/. The USFWS has further information regarding ESA at http://www.fws.gov/alaska/fisheries/endangered/index.htm.

10.2 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 NMFS 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 NMFS regarding permitting actions; however, DEC interacts voluntarily with NMFS. On May 1, 2015 DEC requested NMFS to identify any EFH under their jurisdiction in the vicinity of COF and GHU wastewater discharge outfall. On May 4, 2015 NMFS responded that they defer to the Alaska Department of Fish and Game's (ADF&G) Anadromous Water Catalog for EFH listings. They also stated that EFH for the Fairbanks area would be for any Pacific salmon in the Chena or Tanana Rivers and that they do not anticipate that the discharge would have any adverse impacts on EFH in the project area.

DEC consulted ADF&G's Anadromous Water Catalog and Atlas at http://www.adfg.alaska.gov/sf/SARR/AWC/index.cfm?ADFG=maps.maps. The catalog and atlas identify waters that are important for spawning, rearing, or migration of anadromous fishes. While the ADF&G's catalog and atlas reveal a presence of chinook, chum, and coho salmon in the Tanana River near the WWTF outfall, they do not show this portion of the Tanana River as important for spawning or rearing.

10.3 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 permittees must consult both state and federal regulations to ensure proper management of the biosolids and compliance with applicable requirements.

10.3.1 State Requirements

The Department separates wastewater and biosolids permitting. The permittees should contact the Department's Solid Waste Program for information regarding state regulations for biosolids. The

permittees can access the Department's Solid Waste Program web page for more information and who to contact.

10.3.2 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 permittees should ensure that a biosolids permit application has been submitted to EPA. In addition, the permittees are 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:
EPA, 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'.

10.4 Permit Expiration

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

REFERENCES

ADEC (Alaska Department of Environmental Conservation). 2003. 18 AAC 70 Water Quality Standards, as amended through June 26, 2003.

ADEC. 2010. Alaska water quality criteria manual for toxics and other deleterious organic and inorganic substances, as amended through December 12, 2008.

ADEC. 2010. Interim antidegradation methods, Effective July 14, 2010.

ADEC. 2010. Alaska's final 2010 integrated water quality monitoring and assessment report, July 15, 2010.

ADEC. 2012. 18 AAC 70 Water quality standards, as amended through April 8, 2012.

ADEC. 2014. Alaska Pollutant Discharge Elimination System permits reasonable potential analysis and effluent limits development guide.

Denton, D.L., J.M. Miller, and R.A. Stuber. 2010. EPA Regions 8, 9, and 10 toxicity training tool. January 2010. San Francisco.

EPA (Environmental Protection Agency).1991. Technical support document for water quality-based toxics control. EPA/505/2-90-001.

EPA. 2002. Short-term methods for estimating the chronic toxicity of effluents and receiving waters to freshwater organisms. EPA/821/R-02-013.

NMFS (National Marine Fisheries Service). 2015. E-mail from Bridget Crokus, NMFS, dated April 30, 2015 regarding threatened and endangered species in the vicinity of the City of Fairbanks and Golden Heart Utilities, Inc. Wastewater Treatment Facility outfall.

NMFS. 2015. E-mail from Matthew Eagleton, NMFS, dated May 4, 2015 regarding essential fish habitat in the vicinity of the City of Fairbanks and Golden Heart Utilities, Inc. Wastewater Treatment Facility outfall.

NTL (Northern Testing Laboratories). 2000. Correspondence from Michael Pollen, NTL, dated May 31, 2000 regarding Wastewater Treatment Plant Outfall Study.

NTL. 2002. Correspondence from Michael Pollen, NTL, dated November 8, 2002 regarding Tanana river outfall sampling reports—final summary.

United States Fish and Wildlife Service. 2015. E-mail from Kaithryn Ott, USFWS, dated May 5, 2015 regarding threatened and endangered species in the vicinity of the City of Fairbanks and Golden Heart Utilities, Inc. Wastewater Treatment Facility outfall.

APPENDIX A. FACILITY INFORMATION

Figure 1. City of Fairbanks and Golden Heart Utilities, Inc. Wastewater Treatment Facility Location

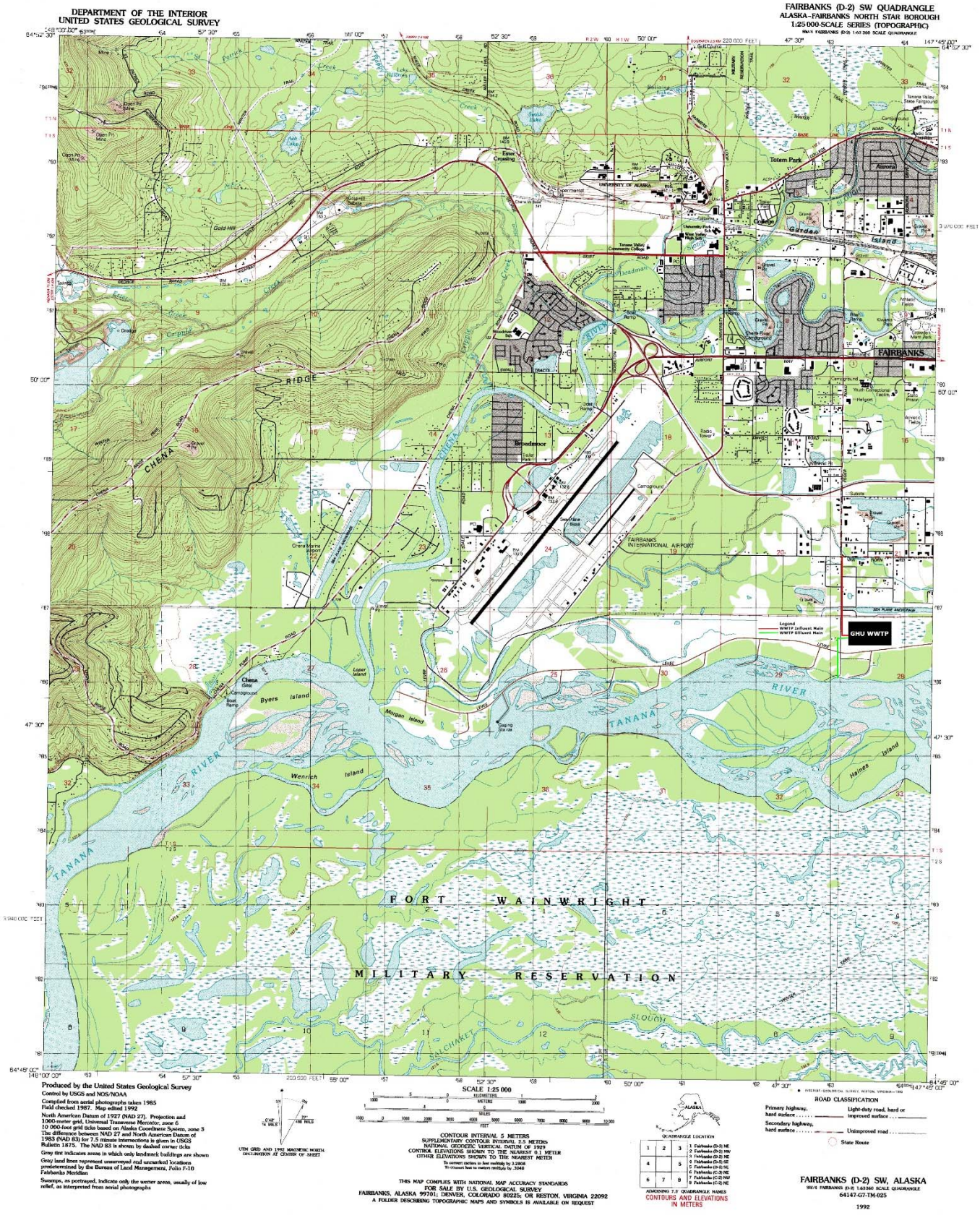
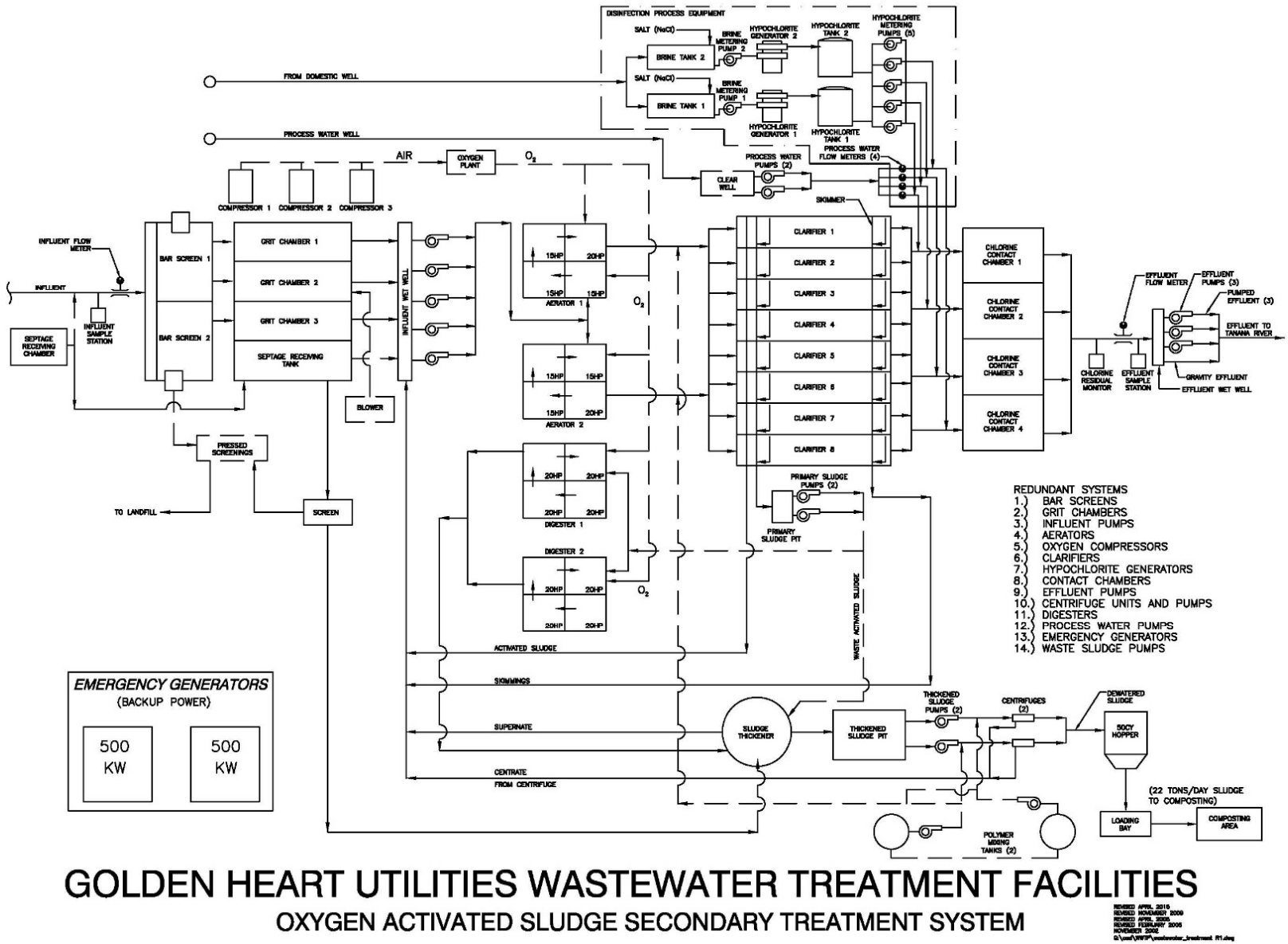


Figure 2. City of Fairbanks and Golden Heart Utilities, Inc. Wastewater Treatment Facility Process Flow Diagram



APPENDIX B.BASIS FOR EFFLUENT LIMITATIONS

B.1 Statutory and Regulatory Basis

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

The regulations require the permitting authority to make this evaluation using procedures that account for existing controls on point and nonpoint sources of pollution, the variability of the pollutant in the effluent, species sensitivity (for toxicity), and where appropriate, dilution in the receiving water body. The limits must be stringent enough to ensure that WQS are met and must be consistent with any available wasteload allocation (WLA).

The Clean Water Act (CWA) requires a Publicly Owned Treatment Works (POTWs) to meet effluent limits based on available wastewater treatment technology, specifically, secondary treatment effluent limits. The Alaska Department of Environmental Conservation (the Department or DEC) may find, by analyzing the effect of an effluent discharge on the receiving waterbody, that secondary treatment effluent limits are not sufficiently stringent to meet water quality 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 parameter 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, chlorine, ammonia, or metals, depending on the type of treatment system used and the quality of the influent to the POTW (e.g., industrial facilities, as well as residential areas discharge into the POTW). When technology-based effluent limits (TBELs) do not exist for a particular pollutant expected to be in the effluent, the Department must determine if the pollutant may cause or contribute to an exceedance of a water quality criterion for the waterbody. If a pollutant causes or contributes to an exceedance of a water quality criterion, a WQBEL for the pollutant must be established in the permit. Table B-1 summarizes the basis for effluent limits contained in the permit. Further details for each effluent limit follows in this section.

Table B-1. Basis for Effluent Limits

EFFLUENT PARAMETER	UNITS	EFFLUENT LIMITS					
		Average Monthly Limit	Average Weekly Limit	Maximum Daily Limit	Average Monthly Percent Removal	Minimum Daily Limit	Basis for Limit
Flow	million gallons per day (mgd)	---	---	8	---	---	18 AAC 72.255
pH	standard units (s.u.)	---	---	8.5	---	6.5	18 AAC 70.020(b)(18)(A)(i) 18 AAC 70.020(b)(18)(C)
BOD_5	milligrams per liter (mg/L)	30	45	60	85 % [b] (minimum)	---	18 AAC 83.010(e) 18 AAC 83.540
	pounds per day (lbs/day) [a]	2,000	3,000	4,000			
TSS	mg/L	30	45	60	85% [b] (minimum)	---	18 AAC 83.010(e) 18 AAC 83.540
	lbs/day [a]	2,000	3,000	4,000			
Fecal Coliform (FC) Bacteria [c, d]	FC/100 mL	20 [e]	---	40 [e]	---	---	18 AAC 70.020(b)(2)(A)(i)
Total Residual Chlorine (TRC) [f]	mg/L	0.2	---	0.3	---	---	18 AAC 83.435(6)(d) 18 AAC 83.540
	lbs/day [a]	13		20			

Footnotes:

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

b. 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.

c. All FC Bacteria average results 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 quantities. For example the geometric mean of 100, 200, and 300 is (100 x 200 x 300)1/3= 181.7.per liter)

d. FC Bacteria limits shall become effective as soon as possible but no later than five years after the effective date of the final permit, in accordance with the conditions of the Compliance Schedule in Section 1.3.

e. 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.

f. TRC effluent limits shall become effective as soon as possible but no later than five years after the effective date of the final permit, in accordance with the conditions of the Compliance Schedule in Section 1.3 of the permit.

B.2 Secondary Treatment Effluent Limitations

The CWA requires a POTW to meet requirements based on available wastewater treatment technology. Section 301 of the CWA established a required performance level, referred to as "secondary treatment," that all POTWs were required to meet by July 1, 1977. The Department has adopted the "secondary treatment" effluent limits, 18 AAC 83.010(e), which are found in Title 40 Code of Federal Regulations (CFR) §133.102. The technology-based effluent limits 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 133.102, the State of Alaska requires maximum daily limitations of 60 mg/L for BOD_5 and TSS in its definition of secondary treatment found in its waste disposal regulations (18 AAC 72.990); however, the waste disposal regulations do not specify the percent removal requirements that are required by 40 CFR 133, so the more stringent 40 CFR 133 requirements are applied. The secondary treatment effluent limits are listed in Table B-2.

Table B-2. Secondary Treatment Effluent Limits

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

B.3 Water Quality – Based Effluent Limits

WQBELs included in Alaska Pollutant Discharge Elimination System (APDES) permits are derived from WQS. APDES regulation18 AAC 83.435(a)(2) requires that permits include WQBELs that can achieve water quality standard established under CWA §303, including state narrative criteria for water quality. The WQS are composed of use classifications, numeric and/or narrative water quality criteria and an antidegradation policy (See Section 7.0, Antidegradation). The use classification system designates the beneficial 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 beneficial use classification of each waterbody. Existing uses are those uses actually attained in a waterbody on or after November 28, 1975, whether or not they are included in the WQS [40 CFR § 131.3(e)]. Designated uses are those uses specified in water quality standards for each waterbody or segment whether or not they are being attained [40 CFR § 131.3(f)].

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

Permit AK0023451 authorizes discharges of secondary treated domestic wastewater to fresh water. The designated uses for fresh water, that have not been reclassified are: 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.

B.4 Reasonable Potential Analysis

The Department used the process described in the Technical Support Document (TSD) for Water Quality-Based Toxics Control (Environmental Protection Agency, 1991) and DEC's guidance, APDES *Permits Reasonable Potential Analysis and Effluent Limits Development Guide* (June 30, 2014) to evaluate the City of Fairbanks and Golden Heart Utilities, Inc. Wastewater Treatment Facility (COF and GHU WWTF) effluent. Discharge monitoring reports (DMRs) from January 2010 through February 2015, Pretreatment Program monitoring data, and Form 2A Application to Discharge Effluent and Expanded Effluent Testing Data were reviewed to identify pollutants of concern (POC). POC are those pollutants that already have a TBEL or WQBEL for a particular pollutant, pollutants with a total maximum load waste load allocation or watershed analysis, pollutants identified as present in the effluent through monitoring, or those pollutants that are likely to be present in the effluent based on the nature of the operation. The monitoring of COF and GHU WWTF's effluent as reported in the above documents, revealed the presence of total residual chlorine, ammonia, and copper at levels above water quality criteria; therefore, these pollutants are POC and were selected for further reasonable potential analysis (RPA). DEC did not identify any other POC in the COF and GHU wastewater discharge for RPA.

When evaluating the effluent to determine if WQBELs based on chemical-specific numeric criteria are needed, the Department projects the receiving waterbody concentration downstream of where the effluent enters the receiving waterbody for each pollutant of concern. 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 reasonable potential (RP) that the discharge may cause or contribute to an excursion above the applicable water quality criterion. DEC assesses RP to exceed both acute and chronic criterion. Appendix C contains more details on the RPA conducted for this permit.

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

B.5 Procedure for Deriving Water Quality-Based Effluent Limits

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 water quality criteria or a total maximum daily load in the receiving waterbody.

In cases where a mixing zone is not authorized, either because the receiving waterbody already exceeds the criterion, the receiving waterbody flow is too low to provide dilution, 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.

B.6 Effluent Limits in COF and GHU WWTF, Inc. Permit

B.6.2 *Fecal Coliform Bacteria*

Alaska WQS at 18 AAC 70.020(a)(2)(A) states that the geometric mean may not exceed 20 FC/100 mL, and not more than 10% of the samples may exceed 40 FC/100 mL. In 2000, the Department issued a CWA Section 401 Certification for the NPDES COF and GHU WWTF discharge permit. The Certification included effluent limits for FC Bacteria. The Certification required that the effluent discharged from COF and GHU WWTF not exceed a monthly average limit (AML) of 200 FC/100 mL, an average weekly limit (AWL) of 400 FC/100 mL, and a MDL of 800 FC/100 mL.

The Department reviewed FC Bacteria monitoring results submitted on DMRs from January 2010 to February 2015. The FC Bacteria limits in the 2000 401 Certification were not exceeded; however the facility does not consistently comply with FC Bacteria water quality criteria. Therefore, it can be reasonably expected that COF and GHU WWTF will have RP to exceed water quality criteria. An evaluation of ambient FC Bacteria monitoring data collected during the Tanana Outfall Sampling Program indicated that ambient FC Bacteria concentrations upstream of the GHU outfall have exceeded FC Bacteria water quality criteria (See Section 9.2 of the fact sheet). Therefore, in accordance with 18 AAC 83.435(b), the effluent discharged from GHU must be limited to prevent the discharge from causing or contributing to an excursion of the most stringent FC Bacteria WQS at 18 AAC 70.020 (b)(2). Because ambient FC Bacteria levels have exceeded water quality criteria and will not allow for further dilution, the Department is requiring that the water quality criteria be met as effluent limits at the end of the pipe.

The reissued permit requires an AML of 20 FC/100 mL and a MDL of 40 FC/100 mL. The facility is unable to meet the new FC Bacteria limits upon the effective date of the permit; therefore the Department is allowing five years for COF and GHU WWTF to come into compliance with the new FC Bacteria effluent limits.

Unless FC Bacteria is removed from the Schedule of Compliance as per Permit Section 1.3.1.12, which states that FC Bacteria may be removed from the Schedule of Compliance after two years if receiving waterbody monitoring establishes that in a 30-day period, the geometric mean of the receiving waterbody does not exceed 20 FC/100 mL, and that not more than 10% of the samples exceed 40 FC/100 mL, the permit requires the facility to comply with the new FC Bacteria effluent limits as soon as possible, although no later than five years of the effective date of the permit. The Department determined that the limits of the prior permit (an AML of 200 FC/100 mL, an AWL of 400 FC/100 mL, and a MDL of 800 FC/100 mL) are reasonable interim FC Bacteria effluent limits (See Section 9.6 of the fact sheet for further details on the FC Bacteria Schedule of Compliance). The interim limits exceed FC Bacteria water quality criteria; therefore, until compliance with the final FC

Bacteria effluent limits is achieved, FC Bacteria is included in the authorized mixing zone as described in Permit Section 1.5.

While the FC Bacteria schedule of compliance is in effect, the following interim effluent limits must be met:

Table B-3. Fecal Coliform Bacteria Interim Effluent Limits and Monitoring Requirements

Parameter	Monitoring Requirements				
	Average Monthly Limit	Average Weekly Limit	Maximum Daily Limit	Sample Frequency	Sample Type
Fecal Coliform Bacteria	200 FC/100 mL	400 FC/100 mL	800 FC/100 mL	3/week	Grab

B.6.3 *pH*

Alaska WQS at 18 AAC 70.020(a)(6)(C)(i) (Growth and Propagation of Fish, Shellfish, Other Aquatic Life, and Wildlife) states that fresh water pH water quality criteria may not be less than 6.5 or greater than 8.5 s.u..

Between January 2010 and February 2015 COF and GHU WWTF reported an average minimum pH of 6.7 s.u. and an average daily maximum of 7.9 s.u.. There were only two excursions of pH water quality criteria during this time period (6.2 s.u. August 2014, 6.4 s.u. September 2014). Because COF and GHU WWTF has demonstrated that they can consistently meet water quality criteria for pH, pH water quality criteria will continue as the permit effluent limits at the point of discharge from the facility.

B.6.4 *Total Residual Chlorine*

The TRC effluent limits in the previous permit were 0.83 mg/L (AML) 1.0 mg/L (MDL). Since RP exists to exceed or to contribute to an exceedance of water quality criteria (See Appendix D of the fact sheet), WQBELs to protect aquatic life were developed for the reissued permit (AML 0.26 mg/L, MDL 0.34 mg/L). The permittees are required to comply with the developed WQBELs within five years of the final permit, as well as comply with interim effluent limits, which are the TRC effluent limits of the previous permit. See Section 1.3 of the permit and 9.6 of the fact sheet.

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. 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 and Effluent Limits Development Guide* (June 30, 2014) to determine the RP for any pollutant to exceed a water quality criterion.

To determine if there is RP for the discharge to cause or contribute to an exceedance of water quality criteria 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 water quality criteria, and a water quality-based effluent limit must be included in the permit.

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. If ambient data is not available, DEC uses 15% of the most stringent given pollutant's criteria as a worst case estimate. Total residual chlorine (TRC) is provided as an example.

This section discusses how the maximum projected receiving waterbody concentration is determined.

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 = 85th percentile measured receiving waterbody ambient concentration

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

Q_u = Receiving waterbody flow

Q_d = Receiving waterbody flow rate = Qe + Qu

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:

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

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

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

In other words, if a mixing zone is not authorized (either because the stream already exceeds water quality criteria or the Department does not allow one), 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 water quality criteria, the discharge cannot cause or contribute to a water quality violation for that pollutant. In this case, the mixing or dilution factor (% MZ) is equal to zero and the mass balance equation is simplified to $C_d = C_e$.

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

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

After the D simplification, this becomes:

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

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*." 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* 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.

DEC used ProUCL, a statistical software program, to determine that the monitoring data submitted for TRC follows a lognormal distribution. Therefore, the RPM equation in Section 2.4.2.2 of the *APDES Permits Reasonable Potential Analysis and Effluent Limits Development Guide* is used to determine the RPM for TRC.

$$RPM = \frac{\exp(Z_{99}\,\sigma_y - 0.5\,\sigma_y^2}{\exp(p_n\,\sigma_y - 0.5\,\sigma_y^2} \qquad \text{(Equation C-7)}$$

Where,

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

μ_n = mean calculated by ProUCL = 10.83

σ_y = the lognormal standard deviation calculated by ProUCL = 0.166

σ_y^2 = the lognormal variance calculated by ProUCL = 0.028

p_n = the z − statistic at the 95th percent confidence level of $(1 - 0.95)^{\frac{1}{n}} = 0.953$

n = number of valid data samples = 62

RPM = 1.1

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

$$\text{MEC} = (\text{RPM})(\text{MOC})$$

MOC = 1,110 micrograms per liter (µg/L)

In the case of TRC,

MEC = (1.1)(1,100) = 1,200 µg/L*

* The above MEC calculation is simplified. 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 1,226 µg/L.

Comparison with TRC water quality criteria

In order to determine if RP exists for this discharge to violate water quality criteria, the highest projected concentrations at the boundary of the mixing zone is compared with acute and chronic water quality criteria. For example:

Acute: 65 µg/L > 19 µg/L (acute criterion)

YES, there is RP to violate acute criterion

Chronic: 111 µg/L > 11 µg/L (chronic criterion)

YES, there is RP to violate chronic criterion

Since there is RP for the effluent to cause an exceedance of chronic water quality criteria for protection of aquatic life, a WQBEL for TRC is required. See Appendix D for that calculation.

Table C-1 summarizes the data, multipliers, and criteria used to determine RP to exceed water quality criteria at the end of the pipe and at the boundary of the chronic mixing zone.

Table C-1: Reasonable Potential Calculation and Determination

Parameter	MOC	Number of Samples	Upstream Concentration	CV	RPM	MEC	Water Quality Criteria	End of Pipe RP?	Maximum Projected Receiving Waterbody Concentration [a]	Boundary of Mixing Zone RP?
Total Ammonia as Nitrogen (milligrams per liter)	36.8	62	0.287	0.068	1.0	38.27	1.9 (chronic)	Yes	1.58 (chronic)	No
							4.6 (acute)	Yes	2.41 (acute)	No
Total Residual Chlorine (µg/L)	1,100	62	0	0.167	1.1	1225.95	11 (chronic)	Yes	41.70 (chronic)	Yes
							19 (acute)	Yes	68.49 (acute)	Yes
Copper, total recoverable (µg/L)	25.7	30	1.865	0.208	1.2	29.96	12.4 (chronic)	Yes	2.82 (chronic)	No
							19.2 (acute)	Yes	3.44 (acute)	No

Footnote:

a. Calculated using CORMIX acute dilution 17.9 and chronic dilution 29.4.

APPENDIX D. SELECTION OF EFFLUENT LIMITS

If the Alaska Department of Environmental Conservation (the Department or DEC) does not authorize a mixing zone, water quality criteria 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 criteria. If there are TBELs for an identified parameter in the mixing zone, TBELs apply at the end of the pipe, and water quality 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 water quality criteria at the end of pipe.

In the absence of water quality 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 City of Fairbanks and Golden Heart Utilities, Inc. Wastewater Treatment Facility (COF and GHU WWTF), total residual chlorine (TRC) demonstrated reasonable potential (RP) to exceed at the end of pipe and required the most dilution to meet water quality criteria at the boundary of the authorized mixing zone. Therefore, the Department developed WQBELs for TRC.

D.1 Effluent Limit Calculation

Once the Department determines that the effluent has a reasonable potential to exceed a water quality criterion, 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 and Effluent Limits Development Guide* (June 30, 2014) to calculate WQBELs for ammonia. The first step in calculating WQBELs is the development of a waste load allocation (WLA) for the pollutant.

D.1.1 Mixing Zone-based WLA

When the state authorizes a mixing zone for the discharge, the WLA is calculated using the available dilution, background concentrations and water quality criteria of the pollutant.

Since acute aquatic life and chronic aquatic life standards apply over different time frames and may have different mixing zones, it is not possible to compare the WLAs directly to determine which standard is the most stringent. 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.1.2 "End-of-Pipe" WLAs

In many cases, there is no dilution available, either because the receiving waterbody exceeds the criteria or because the state 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.1.3 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 AML and MDL.

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

The following is a summary of the steps to derive WQBELs from water quality criteria for pollutants that have reasonable potential to exceed water quality criteria. These steps are found in the Department's Reasonable Potential Analysis and Effluent Limitation Guidance and the guidance's accompanying Excel Reasonable Potential Analysis Tool. The guidance and tool were used to calculate the MDL and AML for TRC in COF and GHU WWTF permit.

Step 1- Determine the WLA

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

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

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

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

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

$Q_s = Critical\ Upstream\ Flow$

$Q_d = Critical\ Discharge\ Flow$

$C_s = Critical\ Upstream\ Concentration$

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

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

For TRC,

$D_a = 17.9$

$D_c = 29.4$

$C_s = 0$

$WLA_a = 342\ \mu g/L$

$WLA_c = 323\ \mu g/L$

$WQC_a = 19\ \mu g/L$

$WQC_c = 11\ \mu g/L$

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:

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

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

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

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

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

$CV = coefficient\ of variation$

For TRC:

$LTA_a = 234\ \mu g/L$

$LTA_c = 267\ \mu g/L$

Step 3 – Choosing the More 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. In the case of TRC, the LTA_a is more limiting.

Step 4 - Calculate the Permit Limits

The MDL and AML 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:

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

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

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

$CV = coefficient\ of variation$

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

For TRC:

$MDL = 340\ \mu g/L$

$AML = 246\ \mu g/L$

D.2 Mass-Based Limits

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

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

D.3 Flow

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

D.4 Effluent Limit Summary

Table D-1 provides a summary and reference to those parameters in COF and GHU WWTF that contain effluent limits at the point of discharge.

Table D-1. Summary of Effluent Limitations

Parameter	Fact Sheet Reference
BOD_5	Appendix B-Section B.2
TSS	Appendix B- Section B.2
Fecal Coliform Bacteria	Appendix B-Section B.6.2
pH	Appendix B- Section B.6.3
TRC	Appendix B- Section B.6.4

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 through 18 AAC 70.270 are satisfied, as well as provide justification to authorize a mixing zone in an 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. See Section 6.6 of the Fact Sheet for the City of Fairbanks and Golden Heart Utilities, Inc. Wastewater Treatment Facility mixing zone analysis.

Criteria	Description	Resources	Regulation
Size	Is the mixing zone as small as practicable? **Yes**	•Technical Support Document for Water Quality Based Toxics Control • DEC's RPA Guidance • EPA Permit Writers' Manual	18 AAC 70.240 (a)(2) 18 AAC 70.245 (b)(1) - (b)(7) 18 AAC 70.255(e) (3) 18 AAC 70.255 (d)
Technology	Were the most effective technological and economical methods used to disperse, treat, remove, and reduce pollutants? **Yes**		18 AAC 70.240 (a)(3)
Low Flow Design	**For river, streams, and other flowing fresh waters.**		18 AAC 70.255(f)

Criteria	Description	Resources	Regulation
	- Determine low flow calculations or documentation for the applicable parameters.		
Existing use	Does the mixing zone…		
	(1) partially or completely eliminate an existing use of the waterbody outside the mixing zone? **No** **If yes, mixing zone prohibited.**		18 AAC 70.245(a)(1)
	(2) impair overall biological integrity of the waterbody? **No** **If yes, mixing zone prohibited.**		18 AAC 70.245(a)(2)
	(3) provide for adequate flushing of the waterbody to ensure full protection of uses of the waterbody outside the proposed mixing zone? **Yes** **If no, then mixing zone prohibited.**		18 AAC 70.250(a)(3)
	(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? **No** **If yes, then mixing zone prohibited.**		18 AAC 70.250(a)(4)
Human consumption	Does the mixing zone…		
	(1) produce objectionable color, taste, or odor in aquatic resources harvested for human consumption? **No** **If yes, mixing zone may be reduced in size or prohibited.**		18 AAC 70.250(b)(2)

Criteria	Description	Resources	Regulation
	(2) preclude or limit established processing activities of commercial, sport, personal use, or subsistence shellfish harvesting? **No** **If yes, mixing zone may be reduced in size or prohibited.**		18 AAC 70.250(b)(3)
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? **No** **If yes, mixing zone prohibited.**		18 AAC 70.255 (h)
Human Health	Does the mixing zone…		
	(1) contain bioaccumulating, bioconcentrating, or persistent chemical above natural or significantly adverse levels? **No** **If yes, mixing zone prohibited.**		18 AAC 70.250 (a)(1)
	(2) contain chemicals expected to cause carcinogenic, mutagenic, teratogenic, or otherwise harmful effects to human health? **No** **If yes, mixing zone prohibited.**		
	(3) Create a public health hazard through encroachment on water supply or through contact recreation? **No** **If yes, mixing zone prohibited.**		18 AAC 70.250(a)(1)(C)

Criteria	Description	Resources	Regulation
	(4) meet human health and aquatic life quality criteria at the boundary of the mixing zone? **Yes** **If no, mixing zone prohibited.**		18 AAC 70.255 (b),(c)
	(5) occur in a location where the department determines that a public health hazard reasonably could be expected? **No** **If yes, mixing zone prohibited.**		18 AAC 70.255(e)(3)(B)
Aquatic Life	Does the mixing zone…		
	(1) create a significant adverse effect to anadromous, resident, or shellfish spawning or rearing? **No** **If yes, mixing zone prohibited.**		18 AAC 70.250(a)(2)(A-C)
	(2) form a barrier to migratory species? **No** **If yes, mixing zone prohibited.**		
	(3) fail to provide a zone of passage? **No** **If yes, mixing zone prohibited.**		
	(4) result in undesirable or nuisance aquatic life? **No** **If yes, mixing zone prohibited.**		18 AAC 70.250(b)(1)
	(5) result in permanent or irreparable displacement of indigenous organisms? **No** **If yes, mixing zone prohibited.**		18 AAC 70.255(g)(1)
	(6) result in a reduction in fish or shellfish population levels? **No** **If yes, mixing zone prohibited.**		18 AAC 70.255(g)(2)

Criteria	Description	Resources	Regulation
	(7) prevent lethality to passing organisms by reducing the size of the acute zone? **No** **If yes, mixing zone prohibited.**		18 AAC 70.255(b)(1)
	(8) cause a toxic effect in the water column, sediments, or biota outside the boundaries of the mixing zone? **No** **If yes, mixing zone prohibited.**		18 AAC 70.255(b)(2)
Endangered Species	Are there threatened or endangered species (T/E spp) at the location of the mixing zone?**No** If yes, are there likely to be adverse effects to T/E spp based on comments received from USFWS or NOAA. **Not applicable** If yes, will conservation measures be included in the permit to avoid adverse effects? **Not applicable** **If no, mixing zone prohibited.**		Program Description, 6.4.1 #5 18 AAC 70.250(a)(2)(D)

*Based on the 2003 Alaska Water Quality Standards 18 AAC 70.240 through 18 AAC 70.270.

APPENDIX F. CITY OF FAIRBANKS AND GOLDEN HEART UTILITIES, INC. WWTF EFFLUENT LIMIT VIOLATIONS 2001-2015

Monitoring Period	Parameter	Value Type	Reported Value(s)	Permit Limit
2001				
January-July	no reported effluent violations			
August	5-Day Biochemical Oxygen Demand (BOD_5)	minimum percent (%) removal	84%	85%
September - December	no reported effluent violations			
2002				
January - February	no reported effluent violations			
March	Fecal Coliform (FC) Bacteria	average monthly limit (AML)	218 FC/100 milliliters (mL)	200 FC/100 mL
		average weekly limit (AWL)	675 FC/100 mL	400 FC/100 mL
		maximum daily limit (MDL)	880 FC/100 mL	800 FC/100 mL
April	Total Suspended Solids (TSS)	AML	33 milligrams per liter (mg/L)	30 mg/L
		MDL	80 mg/L	60 mg/L
		minimum % removal	84 %	85%
	Flow	MDL	8.6 million gallons per day (mgd)	8 mgd
May	FC Bacteria	MDL	840 FC/100 mL 1,180 FC/100 mL	800 FC/100 mL
June	no reported effluent violations			
July	FC Bacteria	MDL	1,080 FC/100 mL	800 FC/100 mL
	TSS	AML	32 mg/L	30 mg/L
August	TSS	AML	37 mg/L	30 mg/L
		MDL	65 mg/L	60 mg/L

Monitoring Period	Parameter	Value Type	Reported Value(s)	Permit Limit
		minimum % removal	83 %	85%
September	FC Bacteria	MDL	3,700 FC/100 mL	800 FC/100 mL
October - December	no reported effluent violations			
2003				
January	TSS	AML	31 mg/L	30 mg/L
		MDL	73 mg/L	60 mg/L
		minimum % removal	84 %	85%
February-March	no reported effluent violations			
April	TSS	AML	33 mg/L	30 mg/L
		minimum % removal	84 %	85%
May - June	no reported effluent violations			
July	TSS	AML	31 mg/L	30 mg/L
	Flow	MDL	8.6 mgd	8 mgd
August	TSS	AML	32 mg/L	30 mg/L
September	no reported effluent violations			
October	BOD_5	MDL	66 mg/L	60 mg/L
November	no reported effluent violations			
December	TSS	MDL	80 mg/L	60 mg/L
2004				
January - March	no reported effluent violations			
April	BOD_5	AML	61 mg/L	30 mg/L
		AWL	46 mg/L	45 mg/L
		MDL	82 mg/L	60 mg/L

Monitoring Period	Parameter	Value Type	Reported Value(s)	Permit Limit
			5,137 pounds per day (lbs/day)	4,000 lbs/day
	TSS	AWL	52 mg/L	45 mg/L
		MDL	110 mg/L	60 mg/L
	FC Bacteria	MDL	1,000 FC/100 mL	800 FC/100 mL
May	BOD_5	AML	48 mg/L	30 mg/L
			2,317 lbs/day	2,000 lbs/day
		AWL	52 mg/L, 58 mg/L	45 mg/L
		MDL	61 mg/L, 65 mg/L	60 mg/L
		minimum % removal	82%	85%
	TSS	AML	42 mg/L	30 mg/L
		AWL	61 mg/L	45 mg/L
		MDL	66 mg/L, 81 mg/L, 82 mg/L, 94 mg/L	60 mg/L
		minimum % removal	84 %	85%
	FC Bacteria	MDL	15,800 FC/100 mL	800 FC/100 mL
	Total Residual Chlorine (TRC)	MDL	1.1 mg/L	1.0 mg/L
June - July	no reported effluent violations			
August	BOD_5	AML	35 mg/L	30 mg/L
		AWL	46 mg/L	45 mg/L
		MDL	62 mg/L	60 mg/L
September	no reported effluent violations			
October	BOD_5	AML	41 mg/L	30 mg/L
		AWL	59 mg/L	45 mg/L
		MDL	65 mg/L, 68 mg/L	60 mg/L
November - December	no reported effluent violations			

Monitoring Period	Parameter	Value Type	Reported Value(s)	Permit Limit
2005				
January	no reported effluent violations			
February	BOD_5	MDL	76 mg/L	60 mg/L
March	no reported effluent violations			
April	BOD_5	AML	32 mg/L	30 mg/L
	FC Bacteria	AWL	407	400 FC/100 mL
		MDL	1,720 FC/100 mL	800 FC/100 mL
May - July	no reported effluent violations			
August	TSS	MDL	69 mg/L	60 mg/L
September - November	no reported effluent violations			
December	TRC	MDL	1.1 mg/L	1.0 mg/L
2006				
January	TSS	MDL	114 mg/L	60 mg/L
			4,184 lbs/day	4,000 lbs/day
	TRC	MDL	1.5 mg/L	1.0 mg/L
February - December	no reported effluent violations			
2007				
January - March	no reported effluent violations			
April	BOD_5	AWL	49 mg/L	45 mg/L
		MDL	91 mg/L	60 mg/L
	TSS	AML	34 mg/L	30 mg/L
	FC Bacteria	MDL	2,000 FC/100 mL	800 FC/100 mL
May	BOD_5	MDL	63 mg/L	60 mg/L
June - December	no reported effluent violations			
2008				
January - July	no reported effluent violations			
August	FC Bacteria	MDL	1,240 FC/100 mL	800 FC/100 mL

Monitoring Period	Parameter	Value Type	Reported Value(s)	Permit Limit
September	no reported effluent violations			
October	FC Bacteria	MDL	21,700 FC/100 mL, 35,200 FC/100 mL	800 FC/100 mL
November - December	no reported effluent violations			
2009	no reported effluent violations			
2010	no reported effluent violations			
2011	no reported effluent violations			
2012				
January - March	no reported effluent violations			
April	BOD_5	AWL	58 mg/L	45 mg/L
		MDL	140 mg/L	60 mg/L
May - December	no reported effluent violations			
2013	no reported effluent violations			
2014				
January - March	no reported effluent violations			
April	TRC	MDL	1.1 mg/L	1.0 mg/L
May - June	no reported effluent violations			
July	Flow	MDL	9.1 mgd	8 mgd
August	pH	minimum	6.2 standard units (s.u.), 6.4 s.u., 6.2 s.u., 6.3 s.u.	6.5 s.u.
September	pH	minimum	6.4 s.u.	6.5 s.u.
October	no reported effluent violations			
November	BOD_5	AWL	47 mg/L	45 mg/L
		MDL	78 mg/L	60 mg/L
December	no reported effluent violations			
2015				
January-February	no reported effluent violations			