ALASKA POLLUTANT DISCHARGE ELIMINATION SYSTEM

PERMIT FACT SHEET – PROPOSED FINAL

AK0038661 – Hilcorp Alaska LLC., Endicott Operations

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

Technical Contact: Amy Wockenfuss
Alaska Department of Environmental Conservation
Division of Water
Wastewater Discharge Authorization Program
555 Cordova St., 3rd Floor
Anchorage, AK 99501-2617
(907) 269-8874
Amy.wockenfuss@alaska.gov

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

HILCORP ALASKA, LLC

For wastewater discharges from:

Endicott Operations
Duck Island, Stefansson Sound
Beaufort Sea

The Alaska Department of Environmental Conservation (Department or DEC) proposes to reissue APDES Individual Permit AK0038661 – Hilcorp Alaska, LLC, Endicott Operations (Permit). The Permit authorizes and sets conditions on the discharge of pollutants from this facility to waters of the United States. 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 Endicott Operations and the development of the Permit including:

- information on public comment, public hearing, and appeal procedures,
- a listing of effluent limitations and other conditions,
- technical material supporting the conditions in the permit, and
- 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 20 days after receiving the Department's decision to the Director of the Division of Water at the following address:

Director, Division of Water
Alaska Department of Environmental Conservation
555 Cordova Street, 3rd Floor
Anchorage AK, 99501

Interested persons can review 18 AAC 15.185 for the procedures and substantive requirements regarding a request for an informal DEC review. See http://dec.alaska.gov/commish/review-guidance/informal-reviews for information regarding informal reviews of DEC 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://dec.alaska.gov/commish/review-guidance/informal-reviews for information regarding appeals of DEC 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: https://dec.alaska.gov/water/wastewater/.

- 555 Cordova Street; **Anchorage**, AK 99501; 907-269-6285
- 610 University Avenue; **Fairbanks**, AK 99709; 907-451-2100
- P.O. Box 1800; **Juneau**, AK 99811-1800
  Location: 410 Willoughby Street, Suite 303; **Juneau**, AK; 907-465-5300
- 43335 Kalifornsky Beach Road; **Soldotna**, AK 99615; 907-262-5210
- 1700 E Bogard Road #B, Suite #103; **Wasilla**, AK 99654; 907-376-1850

TABLE OF CONTENTS

1.0 INTRODUCTION 1

1.1 Applicant. 1
1.2 Authority. 1
1.3 Permit History. 2

2.0 BACKGROUND 2

2.1 Facility Information 2
2.2 Effluent Characterization. 6
2.3 Compliance History 10

3.0 RECEIVING WATERBODY 10

3.1 Water Quality Standards. 10
3.2 Water Quality Status of Receiving Water. 11
3.3 Mixing Zone Analysis. 11

4.0 EFFLUENT LIMITS AND MONITORING REQUIREMENTS 15

4.1 Basis for Permit Effluent Limits. 15
4.2 Final TBELs and WQBELs Determinations 15
4.3 Effluent Limits and Monitoring Requirements. 16

5.0 ANTIBACKSLIDING. 24

6.0 ANTIDEGRADATION 25

6.1 Legal Basis. 25
6.2 Receiving Water Status and Tier Determination. 25

7.0 OTHER PERMIT CONDITIONS 26

7.1 Standard Conditions. 27
7.2 Quality Assurance Plan. 27
7.3 Best Management Practices Plan. 27

8.0 OTHER LEGAL REQUIREMENTS 29

8.1 Endangered Species Act. 29
8.2 Essential Fish Habitat. 29
8.3 Permit Expiration. 29

9.0 REFERENCES 30

LIST OF TABLES

Table 1: Outfall 002A Effluent Characterization (January 2011 – December 2014) 7
Table 2: Outfall 002B Effluent Characterization (November 1, 2018 through December 31, 2022) 8
Table 3: Outfall 001A – Flow-Weighted Effluent Characterization Estimates 9
Table 4: Outfall 001A – STP, POW, and WWTP Limits and Monitoring Requirements 16
Table 5: Outfall 002A – STP and POW Limits and Monitoring Requirements 17
Table 6: Outfall 002B – WWTP Limits and Monitoring Requirements 17
Table 7: Outfall 003A– Continuous Flush System Limits and Monitoring Requirements 17

LIST OF FIGURES

Figure 1: Vicinity Map Location of Endicott Operations A-1
Figure 2: Endicott Operations Facility – Stefansson Sound, North Slope, Alaska A-2
Figure 3: Endicott Operations – Outfall 001A Mixing Zones and Outfall 003A A-3
Figure 4: STP and RO Flow Diagram – Outfall 001A A-4
Figure 5: Seawater Process Flow Diagram – Outfalls 001A and 003A A-5
Figure 6: Potable Water System Diagram – Outfall 001A A-6
Figure 7: Wastewater Treatment Diagram – Outfall 001A A-7
Figure 8: Continuous Flush System Diagram – Outfall 003A A-8

APPENDICES

APPENDIX A. FIGURES
APPENDIX B. REASONABLE POTENTIAL ANALYSIS
APPENDIX C. EFFLUENT LIMITATIONS
APPENDIX D. MIXING ZONE ANALYSIS CHECKLIST
APPENDIX E. NONCOMPLIANCE NOTIFICATION FLOW CHART

1.0 INTRODUCTION. On May 4, 2023, the Alaska Department of Environmental Conservation (DEC or Department) received an Alaska Pollutant Discharge Elimination System (APDES) individual permit and mixing zone application from Hilcorp Alaska, LLC. (HAK or permittee) for reissuance of AK0038661- Endicott Operations (Permit). The permit and mixing zone applications include a request for the Department to reissue an APDES individual permit to continue the authorization of discharges to Stefansson Sound, Beaufort Sea, from the Endicott Operations (facility) located on Duck Island (Appendix A, Figure 1 and Figure 2).

1.1 Applicant. This fact sheet provides information on the APDES permit for the following entity:

Name of Facility: Endicott Operations
APDES Permit Number AK0038661
Facility Location: Stefansson Sound, Beaufort Sea
Mailing Address: Hilcorp Alaska, LLC, 3800 Centerpoint Drive, Suite 1400, Anchorage, Alaska 99503
Facility Contact: Ms. Jessica Fisher

The Permit authorizes the following discharges:

Outfall	Description	Latitude	Longitude
001A	Combined 002A and 002B	70.35530	-147.95344
002A	Seawater Treatment	70.35530	-147.95344
002B	Domestic Wastewater	70.35530	-147.95344
003A	Continuous Flush System	70.35634	-147.96600

See Appendix A, Figure 3 for the location of the outfalls.

1.2 Authority. The National Pollutant Discharge Elimination System (NPDES) regulates the discharge of wastewater to waters of the United States (WOTUS). Transfer of the NPDES Program to Alaska from the Environmental Protection Agency (EPA) occurred in four phases with oil and gas facilities transferring as part Phase IV on October 31, 2012. The State NPDES program is known as the APDES Program and is administered by DEC. Accordingly, DEC is the permitting authority for regulating the discharges associated with the Permit and is reissuing the Permit for the second time under the authority of the APDES Program.

Section 301(a) of the Clean Water Act (CWA) and Alaska Administrative Code (AAC) 18 AAC 83.015 provide that the discharge of pollutants to WOTUS is unlawful except in accordance with an APDES permit. The Permit is being developed per 18 AAC 83.115 and 18 AAC 83.120. A violation of a condition contained in the Permit constitutes a violation of the CWA and subjects the permittee of the facility with the permitted discharge to the penalties specified in Alaska Statute (AS) 46.03.760 and AS 46.03.761.

1.3 Permit History. The first NPDES permit for the facility was issued by the EPA in January 1986 to Standard Alaska Production Company. The permit was reissued to BP Exploration Alaska (BPXA) in November 1991 and subsequently in April 2000 and March 2009. In April 2014, BPXA submitted a timely and complete application for permit reissuance to DEC. BPXA later entered into an agreement to sell its interest in Endicott to HAK and the deal was closed in December 2014. The permit was reissued to HAK in November 2018 (2018 Permit). In May 2023, HAK submitted a timely completed application for permit reissuance to DEC, and the existing Permit was administratively extended prior to expiration on October 31, 2023.

2.0 BACKGROUND

2.1 Facility Information

2.1.1 Location and Function. Endicott is located approximately 27 miles northeast of Prudhoe Bay, Alaska near the Sagavanirktok River Delta in Stefansson Sound of the Beaufort Sea at the terminus of Endicott Road, an artificial island/causeway complex three (3) miles offshore on Duck Island. (Appendix A, Figure 1 and Figure 2). Endicott consists of two separate gravel islands: the main production island (MPI) and the satellite drilling island (SDI). Endicott includes a seawater treatment plant (STP) that was intended to provide waterflood to support enhanced oil recovery (EOR). Since 2006, the volume of produced water from oil production at Endicott has been adequate to provide for EOR without supplemental waterflood produced by the STP. Similarly, potable water is currently trucked to the facility rather than produced onsite in the potable water system (POW). Although there were proposals for the Endicott STP to provide treated seawater to the Liberty Drilling and Production Island (Liberty), DEC understands there are currently no plans to move forward with the Liberty Project. Furthermore, if Liberty is ultimately constructed it is more likely to have a separate STP. Still, if Liberty is constructed, it is likely that some of the construction workforce for Liberty will be housed at Endicott and possibly reinitiate the use of some of these systems and related discharges. Hence, HAK requests that the authorized discharge be retained in the reissued Permit so as not to limit alternatives.

Seawater is extracted from an intake basin located on the north side of the facility for treatment in an STP used for waterflood operations and treatment in a reverse osmosis (RO) system that produces potable water (Appendix A, Figure 4). Both the STP and POW require discharges of strainer/backwash water when operational. A large portion of the water extracted from the intake basin is returned without treatment or heat addition to prevent freeze-up or clogging of the intake basin. This recirculating line was formerly called the marine life return system but has since been renamed as the continuous flush system (CFS). Periodically, treated seawater from the POW is used to test the fire water distribution/suppression system and results in a discharge to the storm water system (Appendix A, Figure 4), a system which is regulated separately from this Permit. Lastly, camp domestic wastewater is treated in a wastewater treatment plant (WWTP) and commingled with effluent from the POW and STP and discharged out of Outfall 001A. The CFS has a separate outfall, 003A. The following section describes each of these facilities and outfalls in more detail.

2.1.2 **Outfall 001A - Combined Outfall for 002A and 002B.** Outfall 001A includes commingled effluent from multiple sources. The waste streams that commingle into Outfall 001A are considered "internal outfalls." The configuration of these systems that commingle into a single outfall complicates the evaluation of the combined effluent characteristics. While some of these sources have current discharges that enable updating effluent characteristics using recent data, other sources are not currently discharging. Therefore, for those placeholder discharges that are not discharging currently, DEC must use representative information and data from past permit terms when discharges did occur. To evaluate combined effluent characteristics in this circumstance, DEC must apply the principles of mass balance using new and old data. Accordingly, the mass balance approach requires an understanding of the origin of these various commingled waste streams. The following sections describe how multiple wastewater sources are commingled and discharged.

2.1.2.1 **Internal Outfall 002A - Strainer/Filter/Drinking Water RO Description.** The STP and POW wastewater streams are commingled under internal Outfall 002A. Outfall 002A is considered an internal outfall because it can commingle with other waste streams before being discharged to receiving water. The STP is designed to prepare seawater for waterflood injection at various points onsite to maintain formation pressures and allow EOR from production wells located on Duck Island and/or Liberty. The POW is designed to accommodate the needs of both the MPI and the SDI personnel as well as additional personnel anticipated to be associated with Liberty or other potential projects.

When significant volumes of seawater are required and oceanographic conditions dictate, the STP and POW share a pretreatment step where incoming seawater passes through a clarifying tank. Periodically, the incoming seawater is sediment-laden during breakup due to inputs from the Sagavanirktok River Delta and requires the addition of clarifying agents. Once the seawater passes this pretreatment step, it is treated separately in the STP and POW. STP effluent makes up the over-riding volume of discharge for internal Outfall 002A and, while being very similar in composition but negligible in comparative volume to STP effluent, POW effluent is included as a component of internal Outfall 002A for compliance only (See POW description below). In these situations, both the STP and POW discharges would contain these clarifying agents. The individual STP and POW systems are detailed separately in the following paragraphs.

STP Description: The STP draws in seawater from Stefansson Sound at the seawater intake basin to strain, heat, filter, and disinfect the seawater prior to deaeration and injection of biocides and corrosion inhibitors into filtered seawater to produce waterflood used in EOR and other industrial uses. The STP has a design capacity of 3.0 million gallons per day (mgd).

When the existing STP is operational, seawater sediment loads can vary greatly, particularly during spring break-up and summer months. Seawater is strained to remove detritus and reduce suspended solids and sediment prior to filtering using multimedia vessels and ultimately to prevent blocking the pore spaces in oil reservoir rock that could restrict the flow of oil into a producing well. The first-stage filter feed strainers are continuously backwashed, while the second-stage multimedia filters are backwashed as needed based on differential pressure, concentrations of suspended solids, and filtration rates. Disinfection occurs after straining but prior to multimedia filtration to prevent biofouling due to

bacterial growth in the system. Because chlorine is in filter backwash, sodium metabisulfite is used to reduce total residual chlorine (TRC) prior to commingling with other discharges (Appendix A, Figure 5).

Downstream of the strainers, incoming seawater is heated and a small portion flows back to the intake basin to prevent freezing when necessary. Chlorine injection is downstream of the freeze protection line before the multimedia filters, so the only potential pollutant is temperature. Because any additional chemicals needed to prepare the waterflood for injection are after the multimedia filters, these chemicals are not included in either the STP discharge or in this freeze-protection line (See Appendix A, Figure 4). Nonetheless, a discussion of these waterflood conditions chemicals is appropriate even if they are not in the discharge.

Oxygen is corrosive to carbon steel pipelines used for injection. During conditioning of waterflood, increased temperatures reduce viscosity and aid in stripping dissolved oxygen in the deaeration process. The waterflood is conditioned with oxygen scavengers, antifoaming agents, corrosion inhibitors, and biocides prior to injection into the petroleum formation. This protects piping from corrosion, prevents biological growth that could contribute to clogging formation pore spaces, and suppresses growth of sulfate-reducing bacteria responsible for producing poisonous hydrogen sulfide gas. Due to the piping layout and strategic locations for chemical injection, these waterflood chemicals cannot be present in the wastewater from the STP. However, HAK has requested that provisions allowing for drain-back of waterflood water be included in the Permit, as it may be necessary during maintenance or repairs.

DEC concurs that draining the waterflood pipeline should be considered as a contingent discharge in the Permit. However, this contingent discharge must not contain the waterflood conditioning chemicals discussed above to ensure the discharge would not cause, or contribute to, an excursion of water quality criteria. Without chemical additives, temperature is the only parameter of concern and limiting drain-back duration ensures the weekly average receiving water temperature will not increase more than 1 degree Celsius (°C), which is the governing marine water quality criterion. Hence, short-duration discharges (e.g., approximately 48 hours or less) of heated drain-back without chemical additions poses no reasonable potential to cause, or contribute to, an excursion of applicable water quality criteria. See Sections 4.3.12 and 7.3.2 for more information. Because the piping layout would need to be modified to create a discharge to the receiving water, DEC will require a plan review under 18 AAC 72.200 that includes reviewing the piping reconfiguration and procedures ensuring the drain-back is devoid of waterflood conditioning chemicals.

POW Description: Prior to being transferred to the POW, raw seawater may be treated in a clarifier, including clarifying agents as needed for high sediment loads during summer months. Otherwise, the seawater is pretreated through the STP strainers and transferred to the POW just upstream of the STP heaters. The seawater is heated using closed-loop heat exchangers and is injected with flocculants and coagulants prior to the flocculation tank and multimedia filters (Appendix A, Figure 6). The seawater may then be injected with antiscalant and foam inhibitor prior to the RO system to reduce fouling of the membranes and extend the operational life of the membranes until periodic cleaning becomes necessary. To restore fouled membranes, citric acid is cycled through to remove mineral deposits and the batch of

acidic cleaning fluid is neutralized in a tank prior to discharging. Backwash from both the flocculation tank and multimedia filters from the STP is commingled with reject water from the RO system to comprise internal Outfall 002A (See Section 2.1.2.3). The design discharge rate for the RO reject wastewater is 40,000 gallons per day (gpd) and is very small (0.04 mgd) when compared to the flow from the STP (3.0 mgd).

As a final conditioning step after the RO system, corrosion inhibitors, pH buffering agents, and calcium hypochlorite are added to make potable water and stored in a potable water tank for distribution to living quarters. A small amount of utility water is also used to maintain levels in the firewater tank after fire testing. None of the potable water conditioning chemicals are introduced into the wastewater stream from the POW and discharged. After treatment, the POW wastewater is mixed with the STP wastewater before being combined with internal Outfall 002B – Domestic Wastewater and discharged through Outfall 001A. Although the total flow from the STP represents 99 percent (%) of the total combined flow, the characteristics of the STP and the POW have been shown to be similar such that using data from one waste stream to represent the commingled is acceptable so long as derived limits are attainable until additional data are obtained.

2.1.2.2 **Outfall 002B – Domestic Wastewater Description.** The sewage treated in the WWTP is from the onsite MPI collection system and trucked from SDI living quarters, which is offsite. Other sources of raw domestic wastewater could similarly be received by truck at the facility, treated, and discharged so long as the rated capacity of the WWTP is not exceeded and the introduced sewage does not contain illicit pollutants. Although the current approved WWTP design flow in the Permit is 40,000 gpd to match the water demand, DEC understands that actual design capacity of the WWTP is 75,000 gpd. However, HAK does not currently anticipate a need to increase the authorized discharge based on current operations.

Incoming (influent) sewage is initially processed by rotary screens to remove solids. Sewage screenings are trucked to the North Slope Borough Solid Waste Landfill under the State of Alaska permit SW1A008-27 (Oxbow Landfill) along with waste activated sludge from biological treatment. The screened influent sewage flows sequentially into an equalization basin, an aeration/biological treatment tank, a clarifier/filtration tank, a chlorine contact tank, and a dechlorination chamber (See Appendix A, Figure 7). After the final treatment step, dechlorinated effluent from internal Outfall 002B is commingled with internal Outfall 002A effluent, then discharged through combined Outfall 001A.

2.1.2.3 **Combined Outfall 001A.** Outfall 001A includes a combination of discharges from Outfall 002A – STP/POW and Outfall 002B – Domestic Wastewater. Outfall 001A physically consists of a buried 12-inch diameter pipeline oriented in a northeast direction and extends approximately 150 meters (m) or 492 feet (ft) offshore in 4 m (13 ft) of water. Outfall 001A terminates with a 15.25 m (50 ft) long multiport diffuser, seven 3-inch ports equally spaced, angled at 45 degrees, 6 inches from the bottom and directed parallel to the shoreline and prevailing current in a southeasterly direction. Because of the multiple commingled effluents, Water Quality-based Effluent Limits (WQBELs) must be calculated using mass balance, whereas Technology-based Effluent Limits (TBELs) must be met prior to commingling.

2.1.3 Outfall 003A – Continuous Flush System Description. Outfall 003A - CFS is not operational unless the Endicott STP or POW operations restart to provide Endicott or Liberty with waterflood for EOR or if volumes of potable water for camp personnel or non-potable water for utilities increases. The system was originally intended to function as a marine life bypass but is more recently used to prevent marine kelp from accumulating in the intake basin and to provide freeze protection. This process stream is not injected with any chemicals but encounters incidental heating as the water passes through the STP. The CFS discharges through a 16-inch line that flares to a 20-inch port at the terminus (See Appendix A, Figure 3 and Figure 8).

2.2 Effluent Characterization. Effluent characterization is complex for this Permit due to the combination of commingling and intermittent or contingent discharges. For example, Outfall 003A is a distinct, stand-alone outfall but has not discharged for some time. Whereas internal Outfall 002A combines the STP and POW streams and then combines with internal Outfall 002B – Domestic Wastewater, resulting in overall discharge 001A. Note that Outfall 002A (POW and STP) did not discharge during the previous permit term but Outfall 002B did. Therefore, similar to the 2018 Permit, DEC uses some historical data collected and reported previously for Outfall 002A (January 2011 through December 2014). Data for the continuous flush system (003A) uses the most recent three years available (January 1, 2004 to November 30, 2006) when the STP was last operating. Although the STP was operational during that time and some data are available, the data does not represent daily temperature differences between the receiving water and the effluent necessary for consistency in statistical evaluation and likely underrepresents the maxima. The daily data provides a maximum temperature difference (ΔT) of 37.3 °C; whereas the previous data assumed a receiving water temperature to estimate the maximum ΔT as 23.9 °C. Therefore, DEC uses the most recent data from the POW from 2011 to 2014, which results in a conservative maximum. This duplicates the same data from the previous Permit given there is no new data to consider. Meanwhile, Outfall 002B effluent characterization data are from the previous permit term from November 1, 2018 through December 31, 2022. Effluent characterization in the following sections is based on data compiled from discharge monitoring reports (DMRs), information provided in the application, or subsequent data submitted by the permittee upon DEC request. Based on these data sources and constraints, the following sections provide characterization of the effluent quality.

2.2.1 Characterization of Internal Outfall 002A. Review of DMR data from January 1, 2011 through December 31, 2014 included the following parameters:

- flow reported in gpd,
- pH reported in standard units (SU),
- TRC reported in micrograms per liter (µg/L), and
- DT reported in °C.

For ΔT, the marine water quality criteria is based on the difference between the effluent and the ambient receiving water conditions, where the effluent must not have more than a 1°C increase over the ambient receiving water over a weekly duration. To provide a direct comparison with marine water quality

criteria and limits from the 2018 Permit for temperature, DEC uses ΔT as the parameter of concern, which is the effluent temperature minus the simultaneous receiving water ambient temperature. Because the receiving water temperature is measured continuously along with the effluent temperature, DT does not require monitoring at the boundary of the mixing zone, which is neither a practicable nor legal approach. Furthermore, only positive ΔT values were analyzed because zero and negative values do not result in lowering of water quality of the receiving water per application of 18 AAC 70 – Alaska Water Quality Standards (WQS) for temperature.

Although the 2018 Permit required monitoring for chronic whole effluent toxicity (WET) if biocide or other treatment chemicals were used upstream of the strainer, no chemicals were used during the term of the 2018 Permit, so no chronic WET data are available. Historically, chronic WET data indicated the discharge has been nontoxic. Table 1 compares available data to existing permit limits and applicable state water quality criteria.

Table 1: Outfall 002A Effluent Characterization (January 2011 – December 2014)

Parameter (Units)	Data Set	Current Limits		Marine Criteria		Observed Range (Low – High, Ave) [1]
		Maximum Daily Limit (MDL)	Average Monthly Limit (AML)	Acute	Chronic	
Flow (mgd)	48	3.04	Report	—	—	0.003– 0.034, 0.01
pH (SU)	42	—		6.5 ≤ pH ≤ 8.5		6.5 – 7.5, 6.9 [2]
ΔT (°C) [3]	48	Report		—	1 [4]	18.2-37.33, 25.5
TRC (µg/L)	48	Report		13	7.5	< 20 - < 100, 90.2 [5]

Notes:

1. Values that are at or exceed water quality criteria or existing limits are presented in bold.
2. Median of pH is used in lieu of average.
3. Δ T (°C) is effluent temperature minus ambient receiving water temperature. Only positive values were evaluated.
4. The marine water quality criteria is less than or equal to 1°C above ambient temperature such that any ΔT greater than 1°C, exceeds water quality criteria.
5. Only two detectable values were observed during the period of review: 20 and 30 □g/L. The average was determined per Section 4.3.7.

When compared to the STP data from the application for the 2009 Permit, the resulting maximum ΔT of 37.33 °C is greater than the maximum in the application (23.89 °C). This approach ensures limits are appropriately attainable until such time new data becomes available when the STP is operational. Note that the TRC data includes numerous reported values that are less than 100 µg/L (i.e., nondetectable). Therefore, DEC uses the maximum detected value of 30 µg/L in the mass-balance calculations used for the commingled waste streams. The chronic mixing zone is sized based on ΔT as the driving parameter and TRC similarly applies to the acute mixing zone. Both ΔT and TRC require limits as the driving parameters for the mixing zones in the comingled outfall (See Section 2.2.3).

2.2.2 Characterization of internal Outfall 002B. For Outfall 002B, data from the previous permit term (November 1, 2018 through February 29, 2024) is used to update the characteristics of this internal waste stream prior to commingling with 002A. The parameters include:

- flow reported in gpd,
- pH in SU,
- TRC in µg/L,
- temperature differential in °C,
- five-day biochemical oxygen demand (BOD5) in milligrams per liter (mg/L),
- total suspended solids (TSS) in mg/L,
- fecal coliform (FC) bacteria in FC bacteria per 100 milliliters (FC/100 ml), and
- enterococci (EC) bacteria in EC bacteria per 100 milliliters (EC/100 ml).

In the previous Permit, internal Outfall 002B included limits for BOD_5 and TSS in pounds per day (lb/d). During the previous permit term, the maximum possible daily discharge of BOD_5 and TSS was 2.25 lb/d and 1.5 lb/d, respectively. Given these parameters are primarily limited using units of measure for concentration, the additional limitation based on mass is not necessary and will be discontinued. See Section 4.2.3 for more information. Table 2 compares available data to existing permit limits and State water quality criteria as applicable.

Table 2: Outfall 002B Effluent Characterization (November 1, 2018 through December 31, 2022)

Parameter (Units)	Data Set	Current Limits		Marine Criteria		Observed Range (Low – High, Ave) [1]
		MDL	AML	Acute	Chronic	
Flow (mgd)	1047	0.04	—	—	—	0 – 0.013, 0.002
pH (SU)	1088	6.5 ≤ pH ≤ 8.5		6.5 ≤ pH ≤ 8.5		6.51 – 8.29, 7.07
TSS (mg/L)	48	60	30	—	—	< 1 – 14.0, 3.61
BOD_5 (mg/L)	48	60	30	—	—	< 2.0 – 21, 4.6
FC Bacteria (FC/100 ml)	47	400	200 [3]	40	14 [3]	< 1.0 – 5.2, 1.1[4]
EC Bacteria (EC/100 mL)	7	Report		130	35 [3]	< 1.0 – 12.2, 2.1[4]
ΔT (°C) [4]	1462	Report		—	1°C	*1.08 – 27.83, 12.53*
TRC (µg/L)	1103	Report		13	7.5	*< 20 – < 20, < 20* [5]

Notes:
1. Values that exceed water quality criteria are shown in italics. Values that exceed existing limits are presented in bold.
2. Median used in lieu of mean.
3. The geometric mean is used for the AML, chronic water quality criterion, and data average.
4. Δ T (°C) is effluent temperature minus ambient receiving water temperature as measured in the seawater intake bay. Only positive values were evaluated. The chronic criterion is in reference to increases above ambient temperatures.
5. No TRC results were detected above the reporting level of 20 µg/L of the monitoring equipment.

Similar to internal Outfall 002A, internal Outfall 002B results for TRC and ΔT are evaluated in the commingled outfall using mass-balance calculations to develop WQBELs at the point of discharge. The values derived from mass-balance calculations are applied to the mixing zone as well as the reasonable potential analysis (RPA). Note that the TBELs (BOD_5, TSS, and FC Bacteria) are applied prior to commingling with other waste streams.

2.2.3 Characterization of Outfall 001A (Internal Outfalls 002A and 002B Combined). Recent and concurrent data for each internal outfall is not available from the previous permit term given several waste streams have not been discharged. Therefore, historical data are used to supplement current data to characterize the combined discharge in Outfall 001A for the mixing zone analysis, RPA, and WQBEL derivation. Although some data exists for individual waste streams from internal Outfalls 002A and 002B, it does not include contribution from the STP because it has not been operated since 2006. Therefore, DEC must estimate concentrations and qualify decisions based on reasonable assumptions at this time. Currently, TRC and ΔT are the pollutants of concern for the mixing zone, RPA, and WQBEL development.

To estimate concentrations of these parameters in the combined discharge, DEC uses flow-weighted average concentrations based on mass balance. Because the mixing zone analysis requires an evaluation of critical effluent conditions, maximum reported concentrations or temperatures, and design flow rates are used for each internal outfall. For ΔT, DEC applies the maximum observed ΔT (MOΔT) recorded from the POW system to the combined flow of the STP and POW. For TRC, DEC also calculated the flow-weighted average using the maximum observed concentrations (MOCs) of available data. Although the TRC data are mostly below detection (< 20 µg/L), the overriding upper limit of detection established by policy is 100 µg/L. Hence, there is concern that the resulting limits may be unattainable is significantly lessened. Table 3 summarizes the flow-weighted averages generated using mass-balance as described above.

Table 3: Outfall 001A – Flow-Weighted Effluent Characterization Estimates

Outfall	Flow (mgd)	MOΔT (°C) [1]	MOC TRC (µg/L) [1]	ΔT Coefficient of Variation (CV)
Outfall 002A – STP & POW	3.04 [2]	37.33	30	0.1604
Outfall 002B – WWTP	0.04	27.83	< 20 [3]	0.3376
Outfall 001A – Flow-Weighted	3.08	37.2	29.9	0.1627 [4]

Notes:
1. Observed ΔT and TRC values on Outfall 002A from the POW are applied to the total flow of 3.04 mgd because the STP was not operational during data collection.
2. Flow in Outfall 002A includes 3.0 mgd from the STP and 0.04 mgd from the POW.
3. Given TRC was not detected, the equipment reporting level is used as the MOC.
4. The flow-weighted CV is to be used in the RPA for ΔT on Outfall 001A.

The lack of sufficient representative characterization data for the dominant STP discharge is problematic for evaluating mixing zones, conducting an RPA, and evaluating WQBELs. For example, DEC is establishing a TRC limit based on the MOCs where 99% of the total flow has not been adequately included in the overall characterization of the Outfall 001A discharge. However, DEC points out that ultimately the limit for TRC will be 100 µg/L to match the compliance level based on reporting levels allowed by 40 Code of Federal Regulations (CFR)136. In addition, DEC notes that all other STP operators on the North Slope are able to comply with this same TRC limit. Hence, DEC believes that these limits are attainable given the inclusion of dechlorination in the final treatment steps. For ΔT, DEC believes the observed values are adequately conservative for use in the mixing zone analysis, RPA, and WQBEL development. (See Section 4.1 and APPENDIX B for more information).

2.2.4 Characterization of Outfall 003A. Because the CFS was inoperative during the term of the 2018 Permit, current data are not available. However, the application for reissuance presented data that was used in the previous application to support the characterization. Temperature and flow data from June 2003 through May 2004 were summarized to provide maximum daily and average daily flows and monthly mean and maximum weekly ΔT between the ambient seawater and the effluent. For flow, the highest maximum daily flow was 4.966 mgd, which is less than the previous Permit limit of 5.0 mgd. For, ΔT, none of the monthly mean or maximum weekly measurements were greater than the marine water quality criterion (1°C). DEC accepts this characterization data and has determined that the discharge through the CFS meets applicable water quality criteria and concurs with the applicant that a mixing zone for Outfall 003A is not necessary.

2.3 Compliance History

2.3.1 Effluent Exceedances. A review of DMRs and reported violations in the EPA Integrated Compliance Information System (ICIS) from the effective date of the 2018 Permit to present was conducted to evaluate compliance. There were no effluent exceedances during this Permit period.

2.3.2 Non-Receipt Violations. During the review period of January 2021 through April 2021, there were twenty-four occurrences where DMRs were identified as being submitted late in ICIS. However, this was a result of incorrect temperature data being submitted for five months. When the DMRs were resubmitted, additional parameters were flagged as being late despite on time submittal of the original DMRs with correct data for parameters other than temperature. There were no unresolved non-reporting violations for this facility during the period of review.

2.3.3 Other Non-Compliances. Administrative deficiencies were identified in the Quality Assurance Project Plan (QAPP) during the period of April 2023 through August 2025. Additionally, there was a violation in ICIS for failure to notify the Department of the non-compliance in accordance with Standard Condition Section 3.2.2 for the initial submittal of incorrect temperature data despite the Permittee submitting corrected data. There were no unresolved other non-compliances for this facility during the period of review.

3.0 RECEIVING WATERBODY

3.1 Water Quality Standards. Section 301(b)(1)(C) of the CWA requires the development of limits in permits necessary to meet water quality standards by July 1, 1997. Per 18 AAC 83.435, conditions in permits must ensure compliance with Alaska WQS. The WQS are composed of waterbody 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 criteria per 18 AAC 70.235, such as those listed in 18 AAC 70.236(b). The

Department has determined that there has been no reclassification, nor has site-specific water quality criteria been established at the location of the discharge from the permitted facility into Stefansson Sound. Accordingly, the Department has determined that all marine use classes must be protected. These marine use classes include water supply; water recreation; growth and propagation of fish, shellfish, other aquatic life, and wildlife; and harvesting for consumption of raw mollusks or other raw aquatic life.

3.2 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. For an impaired waterbody, Section 303(d) of the CWA requires states to develop a Total Maximum Daily Load (TMDL) management plan for the waterbody. The TMDL documents the amount of a pollutant a waterbody can assimilate without violating WQS and allocates that load to known point sources and nonpoint sources.

Per *Alaska's Final 2024 Integrated Water Quality Monitoring and Assessment Report*, February 6, 2025, Stefansson Sound is a nearshore lagoon of the Beaufort Sea, which is currently classified as a Category 2 waterbody that attains water quality criteria for designated uses. Although listed on the CWA Section 303(d) list in 1996 for temperature and salinity, it was delisted in 1998 after the causeway to Endicott was breached to improve fish passage and water quality. Monitoring conducted after breaching the causeway demonstrated that there is no biological impact and that water quality is within state standards. Hence, Stefansson Sound is not an impaired waterbody nor is the subject waterbody listed as a CWA Section 303(d) waterbody requiring a TMDL. Accordingly, no TMDL has been developed for the subject waterbody.

3.3 Mixing Zone Analysis. Per 18 AAC 70.240, excluding 18 AAC 240(g)(1), (2), and (4) as amended through March 23, 2006, the Department may authorize a mixing zone in an APDES permit. HAK submitted a mixing zone application on May 4, 2023 requesting a 262 m long and 103 m wide chronic mixing zone for temperature, TRC, and pH and a 1.6 m long by 15 m wide acute mixing zone for TRC at Outfall 001A. These mixing zone dimensions are similar to those authorized in the 2018 Permit. The mixing zone was sized using the Cornell Mixing Zone Expert System modeling program (CORMIX) version 12.0, to model effluent temperatures and TRC concentrations in the receiving water during critical summer, winter, and breakup conditions. Three distinct seasons were previously evaluated during the development of the 2018 Permit to determine the critical conditions. Instead of evaluating seasonal receiving water temperatures, DEC has evaluated paired data sets of effluent and receiving water temperatures that account for seasonal differences in temperature (i.e., ΔT). Evaluating temperature as the difference between effluent temperature and ambient temperature as paired data sets eliminates the need for seasonal mixing zones when critical effluent and receiving water conditions are modeled concurrently.

Using CORMIX and a modified approach, DEC modeled mixing zones for ΔT and TRC to verify the accuracy of the mixing zone requested by the applicant. The modified approach accounted for a lack of recent and/or representative data for the combined Outfall 001A (See Section 2.2.3). Conservative flow-weighted average concentrations or temperatures were used that should ensure attainment of water

quality criteria at the boundary of the respective mixing zones for Outfall 001A. DEC modeled the mixing zones for Outfall 001A using probable maximum concentration of 100 µg/L for TRC for the acute mixing zone and the probable maximum ΔT of 37.2 °C based on the characterization in Section 2.2.3. Based on dilution requirements, ΔT is the driving parameter for the chronic mixing zone and TRC is the driving parameter for the acute mixing zone at Outfall 001A. For both mixing zones, the critical receiving water conditions are represented by springtime conditions of broken ice with stratification at the 10th percentile current of 0.05 meters per second (m/s).

APPENDIX D, Mixing Zone Analysis Checklist, outlines criteria per mixing zone regulations that must be considered when the Department reviews an application for mixing zones. These criteria include the size of the mixing zone, treatment technology, and existing uses of the waterbody, human consumption, spawning areas, human health, aquatic life, and endangered species. The following summarizes the Department's regulatory mixing zone analysis:

3.3.1 Size. The modified modeling approach for ΔT resulted in the authorization of a rectangular chronic mixing zone extending from the seafloor to the sea surface that is 262 m long perpendicular to the diffuser in the prevailing current direction (131 m in each direction) and 103 m wide centered on the diffuser. The authorized chronic dilution factor is 37. Using the same critical conditions for TRC resulted in the authorization of a rectangular acute mixing zone that is 1.6 m long (0.8 m on each side of the diffuser) and 15 m wide (same width of the diffuser) with an authorized dilution factor of 7.5 extending from the seafloor to the sea surface.

In accordance with 18 AAC 70.240(k), the Department determined that the sizes of the mixing zones for the wastewater discharge are appropriate and are as small as practicable. The sizes of the mixing zones are a small fraction (significantly less than 10%) of the area, and width, of Stefansson Sound. Using the 10^{th} percentile current velocity of 0.05 m/s, a drifting organism can traverse the acute mixing zone associated with Outfall 001A in approximately 16 seconds, well below the 15-minute duration used to evaluate lethality. Applicable water quality criteria representing the most stringent use classification are met at the boundary of the chronic mixing zone. Given the low concentrations of pollutants, rapid dispersion of the discharge plume, and the absence of sensitive aquatic resources within the vicinity, the mixing zones are determined to be protective of aquatic life and are small as practicable.

3.3.2 Technology. Per 18 AAC 70.240(c)(1), the Department is required to determine if "an effluent or substance will be treated to remove, reduce, and disperse pollutants, using methods found by the Department to be the most effective and technologically and economically feasible, consistent with the highest statutory regulatory treatment requirements" before authorizing a mixing zone. Applicable "highest statutory and regulatory requirements" are defined in 18 AAC 70.240(c)(1)(A), (B), and (C), which are:

- Any federal TBEL 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;
- Minimum treatment standards in 18 AAC 72.050; and

- Any treatment requirement imposed under another State law that is more stringent than the requirement of this chapter.

The first part of the definition includes all applicable federal technology-based effluent limit guidelines (ELGs) that may be adopted by reference at 18 AAC 83.010(g)(3) or TBELs developed using case-by-case best professional judgment (BPJ). The Permit includes TBELs developed using case-by-case BPJ for BOD_5, TSS, and FC bacteria citing 18 AAC 72 as the basis. The Department determined that the first part of the definition has been met.

The second part of the definition per 18 AAC 72.050 refers to the minimum treatment requirements for domestic wastewater. As discussed in the first part of the definition, TBELs have been developed to meet the secondary treatment standard of 18 AAC 72. Accordingly, the second part of the definition has been met.

The third part of the definition includes any treatment required by State law that is more stringent than 18 AAC 70. Other regulations beyond 18 AAC 70 that may apply to this permitting action include 18 AAC 83, 18 AAC 72, and 18 AAC 15. The Permit is consistent with 18 AAC 83 and neither the regulations in 18 AAC 15 nor another State legal requirement that the Department is aware of, impose more stringent treatment requirements than 18 AAC 70. Therefore, the third and final part of the definition has also been met.

3.3.3 Existing Use. Per 18 AAC 70.240(c)(2), the mixing zone has been appropriately sized to fully protect all existing uses of Stefansson Sound. Water quality criteria are developed to ensure protection of all existing uses. The chronic mixing zone has been appropriately sized to ensure water quality criteria will be met at, and beyond, the boundary of the mixing zone. Accordingly, the mixing zone results in the protection of the existing uses of the waterbody as a whole.

3.3.4 Human Consumption. Per 18 AAC 70.240(d)(6), 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 per 18 AAC 70.240(c)(4)(C). The mixing zone is not at a location where aquatic resources are harvested or that could result in precluding or limiting established processing activities or commercial, sport, personal use, or subsistence fish and shellfish harvesting. In addition, there is no indication that the pollutants discharged could produce objectionable color, taste, or odor in aquatic resources harvested for human consumption if such resources were to exist at the location of the mixing zone.

3.3.5 Spawning Areas. Per 18 AAC 70.240(e)(1) and (2), a mixing zone will not be authorized in lakes, streams, rivers, or other flowing freshwaters in spawning area of any of the five species of Pacific salmon found in the state or be allowed to adversely affect the present and future capability of an area to support spawning of these species. Per 18 AAC 70.240(f), a mixing zone will not be authorized in a spawning area for the following resident fish: Arctic Grayling; northern pike; lake trout; brook trout; sheefish; burbot; landlocked coho salmon, chinook salmon, or sockeye salmon; anadromous or resident rainbow trout, Arctic char, Dolly Varden, whitefish, or cutthroat trout. The Permit does not authorize the

discharge of effluent to open waters of a freshwater lake or river. Therefore, there are no associated discharges to anadromous fish spawning areas or the resident freshwater fish listed in the regulation.

3.3.6 Human Health. Per 18 AAC 70.240(d)(1), the mixing zones must not result in pollutants discharged at levels that will bioaccumulate, bioconcentrate, or persist above natural levels in sediments, water, or biota, or at levels that otherwise will create a public health hazard through encroachment on a water supply or contact recreation uses. The Department has reviewed available data provided by the applicant and has determined there are no bioaccumulating or bioconcentrating parameters associated with the discharge.

Per 18 AAC 70.240(d)(2), pollutants discharged must not present an unacceptable risk to human health from carcinogenic, mutagenic, teratogenic or other effects as determined using a risk assessment method approved by the Department and consistent with 18 AAC 70.025 which indicates the lifetime incremental cancer risk level is 1 in 100,000 for exposed individuals. There are no known cancer-causing pollutants being discharged at concentrations that present unacceptable risks.

Given the characteristics of the effluent discharged through Outfalls 001A and 003A (See section 2.2), there is no indication that the discharges include pollutants that could bioaccumulate, bioconcentrate, or persist above natural levels in sediments, the receiving water, or biota. Nor do the discharges contain pollutants known to cause cancer. The Department determined that the discharges are protective of human health.

3.3.7 Aquatic Life and Wildlife. Per 18 AAC 70.240(c)(3), the Department will approve a mixing zone if there is available evidence that reasonably demonstrates the overall biological integrity of the waterbody will not be impaired and per 18 AAC (c)(4)(A), (D), (E), and (G) the mixing zone will not result in acute or chronic toxic effect in the water column, sediments, or biota outside the boundaries of the mixing zone(s); a reduction in fish or shellfish population levels; permanent or irreparable displacement of indigenous organisms; or a barrier to migratory species or fish passage. In addition, the mixing zone must not result in undesirable or nuisance aquatic life per 18 AAC 70.240(d)(5).

Because all criteria are met at the respective acute and chronic mixing zone boundaries, toxic effects in the water column, sediments, or biota will not occur outside these boundaries; existing water quality criteria protect from these occurrences.

Based on the effluent characteristics and size of the acute mixing zone for TRC, there is no anticipation of lethality to drifting organisms (See section 3.3.1), nor do the effluent characteristics indicate that there will be undesirable nuisance aquatic life affects or displacement, or reduction of existing aquatic life outside of the mixing zones. The Department concludes that aquatic life and wildlife will be maintained and protected.

3.3.8 Endangered Species. Per 18 AAC 70.240(c)(4)(F), the mixing zones may not cause an adverse effect on threatened or endangered species. Based on the available information regarding threatened and endangered species in the vicinity of the discharge and the size of the mixing zones, authorized mixing zones are not likely to adversely affect threatened or endangered species. Based on the limited time that threatened or endangered species may migrate though this area, the discharge is not

likely to cause an adverse effect. Species with potential to be in the vicinity of Outfall 001A and 003A and are listed under the Endangered Species Act (ESA) are discussed in Section 8.1.

4.0 EFFLUENT LIMITS AND MONITORING REQUIREMENTS

4.1 Basis for Permit Effluent Limits. Per 18 AAC 83.015, the Department prohibits the discharge of pollutants to WOTUS unless the permittee has first obtained a permit issued by the APDES Program that meets the purposes of AS 46.03 and is in accordance with the CWA Section 402. Per these statutory and regulatory provisions, the Permit includes effluent limits that require the discharger to (1) meet standards reflecting levels of technological capability, (2) comply with 18 AAC 70 – WQS, and (3) comply with other State requirements that may be more stringent. In establishing permit limits, DEC first determines which, if any, ELGs must be incorporated into the Permit and whether other TBELs using case-by-case BPJ should be adopted. DEC then evaluates the effluent characteristics to determine if the discharge could result in, or contribute to, instream excursions above the water quality criteria in the receiving water beyond the boundary of the authorized mixing zones. If instream excursions could occur, WQBELs must be included in the Permit. The CWA requires that the limits for a particular pollutant be the more stringent of either TBELs or WQBELs.

4.2 Final TBELs and WQBELs Determinations

4.2.1 Outfall 001A – Combination of Internal Outfalls 002A and 002B Discharges. As discussed in APPENDIX B, the Department is utilizing a compliance point downstream of the intersection of internal Outfalls 002A and 002B for WQBELs. The Department made this modification to apply WQBELs in a manner that satisfies the waste load allocations derived from authorization of the mixing zones and applying established procedures for conducting an RPA and developing WQBELs. The result of establishing a compliance point after commingling internal outfalls is that WQBELs for TRC and temperature will now apply at this new point of compliance rather than at the internal outfalls. Chronic WET monitoring, if necessary, will also apply at this compliance point. Monitoring for TRC and temperature on the internal outfalls will still be required during the next term of the permit to collect information to support future DEC decisions.

TRC WQBELs: The calculated MDL is 97.5 µg/L and the AML is 48.6 µg/L. Because the facility uses laboratory equipment calibrated to 20 µg/L for TRC and the minimum compliance level for TRC is 100 µg/L, rules for reporting and averaging are necessary (See Section 4.3.7).

Temperature Differential (ΔT): The WQBEL derivation resulted in an MDL of 44°C for ΔT, however, the existing limit of 43°C is being retained. The permittee must continue to monitor the receiving water at the intake bay simultaneously with the effluent to demonstrate compliance with the temperature limit. Temperature monitoring is only applicable when there is a discharge occurring. Hence, the permittee is not required to monitor and report temperature differential if there is no discharge occurring.

4.2.2 Outfall 002A – STP and POW Discharges. As discussed in Section 4.2.1, the compliance point for WQBELs are located downstream at the combined Outfall 001A. Therefore, the only remaining applicable limit for Outfall 002A is the MDL for flow as a TBEL that is based on the combined design flows of the STP and POW for Outfall 002A, which is 3.04 mgd. The water quality parameters temperature and TRC will continue to be monitored on internal Outfall 002A to support the next application for reissuance.

4.2.3 Outfall 002B – Domestic WWTP Discharges. Similar to Outfall 002A, the compliance point for WQBELs is located at the combined Outfall 001A as discussed in Section 4.2.1. Whereas, TBEL compliance and water quality monitoring requirements are at internal Outfall 002B. The TBELs for internal Outfall 002B include flow established as the design flow of 40,000 gpd (0.04 mgd), pH, TSS, BOD_5, and FC Bacteria. Water quality parameters to be monitored at the internal outfall include EC bacteria, temperature, and TRC. Note that the previous mass-based limits for BOD_5 and TSS are discontinued per APPENDIX C.

4.2.4 Outfall 003A – Continuous Flush System Discharge. There are no pollutant parameters requiring limits on Outfall 003A. However, there is a TBEL limit for flow established at 5 mgd. In addition, the permittee must continue to monitor ΔT.

4.3 Effluent Limits and Monitoring Requirements. Per AS 46.03.110(d), the Department may specify in a permit the terms and conditions under which waste material may be disposed. Monitoring in a permit is required to determine compliance with effluent limits, to characterize the effluent or to assess impacts to the receiving water. The following sections provide the effluent limits and monitoring requirements for each outfall.

4.3.1 **Outfall 001A - Combined STP, POW, and Domestic WWTP Effluent.** The Permit requires the limitation and monitoring requirements as per Table 4. The combined effluent, regardless of what internal outfalls are contributing, shall be sampled after commingling prior to discharge.

Table 4: Outfall 001A – STP, POW, and WWTP Limits and Monitoring Requirements

Parameter	Effluent Limits			Monitoring Requirements	
	Units	MDL	AML	Frequency	Type
Flow [4.3.5]	mgd	3.08	Report	Continuous	Meter or Calculation
ΔT [4.3.6]	°C	43	---	Weekly	Meter or Grab
TRC [4.3.7]	µg/L	100	100	Weekly	Meter or Grab
Chronic WET [4.3.10]	TU_c	Report		Annual	Composite
Note: Superscript numbers in the table refer to Sections after Tables 5 through Table 8.					

The seasonal use of clarifying agents for pretreating seawater is allowed under the Permit. However, the permittee must establish specific best management practices (BMPs) to reduce chemical use and/or the toxicity associated with chemical use in the seawater and potable water treatment systems (See Section 7.3.2).

4.3.2 Outfall 002A - STP and POW Effluent. The Permit requires TBEL compliance and water quality monitoring at internal Outfall 002A per Table 5.

Table 5: Outfall 002A – STP and POW Limits and Monitoring Requirements

Parameter	Effluent Limits			Monitoring Requirements	
	Units	MDL	AML	Frequency	Type
Flow [4.3.5]	mgd	3.04	Report	Continuous	Meter or Calculation
ΔT [4.3.6]	°C	Report		Weekly	Meter or Grab
TRC [4.3.7]	µg/L	Report		Weekly	Meter or Grab
Note: Superscript numbers in the table refer to Sections after Tables 5 through Table 8.					

4.3.3 **Outfall 002B – Domestic Wastewater Effluent.** The Permit requires TBEL compliance and water quality monitoring at internal Outfall 002B per Table 6.

Table 6: Outfall 002B – WWTP Limits and Monitoring Requirements

Parameter	Effluent Limits			Monitoring Requirements	
	Units	MDL	AML	Frequency	Type
Flow [4.3.5]	mgd	0.04	Report	Continuous	Meter or Calculation
pH	SU	6.0 < pH < 9.0		Weekly	Meter or Grab
BOD_5	mg/L	60	30	Monthly	Grab
TSS	mg/L	60	30	Monthly	Grab
FC Bacteria[4.3.8]	FC/100 ml	400	200	Quarterly	Grab
EC Bacteria	EC/100 ml	Report		Annually	Grab
ΔT [4.3.6]	°C	Report		Weekly	Meter or Grab
TRC [4.3.7]	µg/L	Report		Weekly	Meter or Grab
Note: Superscript numbers in the table refer to Sections after Tables 5 through Table 8.					

4.3.4 Outfall 003A – Continuous Flush System. The Permit requires TBEL compliance and water quality monitoring at Outfall 003A per Table 7.

Table 7: Outfall 003A– Continuous Flush System Limits and Monitoring Requirements

Parameter	Effluent Limits			Monitoring Requirements	
	Units	MDL	AML	Frequency	Type
Flow [4.3.5]	mgd	5.0	Report	Continuous	Meter
ΔT [4.3.6]	°C	Report		Weekly	Meter or Grab
Note: Superscript numbers in the table refer to Sections after Tables 5 through Table 8.					

4.3.5 Flow Measurements and Calculations. Flow measurements or calculations are reported using available meters that provide accurate accounting of flows given the existing meter types, locations, and flow conditions. For example, when only the WWTP (002B) is discharging and not the POW or STP (002A), the internal meter from 002B may be used for reporting the flow on external outfall 001A. In addition, given there is no flow meter available for internal Outfall 002A, the flow for 002A may be calculated by subtracting the flow of internal Outfall 002B from the external outfall 001A. All procedures for measuring or calculating flows in varying discharge scenarios must be clearly described in the QAPP.

4.3.6 ΔT Conditions. Temperature differential is the effluent temperature minus the receiving water temperature as represented by the seawater intake reservoir. The permittee shall monitor the receiving water intake simultaneously with the effluent on a daily basis while discharging to demonstrate compliance with the temperature limit. The permittee must record the weekly maximum ΔT for the month on the DMR and submit the daily data with the next application for permit reissuance. In situations where only one internal outfall is discharging, the measurement of temperature on the internal Outfalls 002A or 002B, may be used for reporting temperature on external Outfall 001A. If the temperature data are recorded more frequently, all data shall be submitted with the next application for reissuance. All procedures for measuring and reporting temperature in varying discharge scenarios must be clearly described in the QAPP.

4.3.7 TRC Conditions. The permittee must monitor TRC daily and report the maximum weekly value for the month on the DMR. The application for reissuance must include the daily TRC monitoring data. For the purpose of reporting single sample results for TRC on DMRs, the minimum compliance level for TRC is 100 µg/L. If the facility currently uses TRC equipment calibrated to detect to 20 µg/L, the following rules for reporting and averaging apply. If equipment modifications result in different calibrations, the new detectable value may be used instead of the original equipment calibration value 20 µg/L.

If the facility equipment is calibrated to 20 µg/L (lowest achievable detection), then:

1. Report < 20 on the DMR when the equipment reads < 20:
2. Report < 100 on the DMR when the equipment reading is between 20 and 100;
3. Report on the DMR the actual value when the equipment reports ≥ 100.
4. For averaging, use 0 for < 20; use 20 for readings between 20 and 100; and use the actual value when ≥ 100.
5. Data submitted to DEC for the next permit application must represent the actual readings from the equipment and not DMR entries.

Similar to the discussion in Section 4.3.6, in situations where only one internal outfall is discharging, the measurement of TRC on the internal Outfalls 002A or 002B, may be used for reporting TRC on external Outfall 001A. The Permittee must be attentive to dichlorination (e.g., develop operating procedures) when there is a single internal outfall discharging to ensure compliance. All procedures for measuring and reporting TRC in varying discharge scenarios must be clearly described in the QAPP.

4.3.8 FC and EC Bacteria Averaging Conditions. The AML is expressed as a geometric mean.

4.3.9 Notifications

Chemical Use Notification: The permittee must notify DEC of the intent to inject additional treatment chemicals ahead of the STP or POW. The injection of treatment chemicals ahead of the STP or POW without prior notification to the Department is prohibited. This requirement does not pertain to the use of hypochlorite during routine operations, followed by de-chlorination prior to discharge. Nor does it pertain to chemicals injected into the finished waterflood downstream of the STP or POW (e.g.,

corrosion inhibitors, deaeration chemicals, or biocides) that are not routinely discharged. Drain-back of waterflood containing chemicals is prohibited.

Drain-Back Notification: The permittee must notify DEC of the intent to drain-back and discharge waterflood that contains only residual concentrations of chemicals. Discharge of waterflood drain-back is prohibited unless the permittee provides notification a minimum of 7-days prior to discharge and written approval is received from the Department within the 7-day time window. Approval will be based on demonstration/certification that the waterflood does not have residual chemical concentrations using conservative BMPs to cease chemical injection and purge the pipeline of chemical laden seawater. Notification shall include information on the anticipated volume, duration of discharge, and certification that the discharge will be free of chemical additives. Actual volume and duration shall be reported to the Department within 30 days following the completion of the discharge. The Department will determine the method of reporting when reporting is required.

For situations where halting chemical injection is not possible prior to drain-back, DEC recommends that the permittee consider developing a Regional Response Plan that can be implemented quickly. DEC also suggests that the Regional Response Plan includes instructions for establishing an Incident Command that has the appropriate authority over the situation.

Non-Compliance Notification (NCN): The Oil and Gas Section has updated the NCN for this Permit to be interactive and accompanied by a flowchart. The permittee must report certain violations of MDLs and AMLs, per Permit Appendix A, Standard Conditions, Section 3.4 – 24-Hour Reporting. For this permit, a 24-hour notice is not required for any MDL unless related to an upset condition or unanticipated bypass. Violations of all other effluent limitations not described in Section 3.4, including MDL exceedances not requiring 24-hour notice, are to be reported per Appendix A, Standard Conditions, Section 3.5 – Other Noncompliance Reporting. The Department has developed a flow chart to assist permittees with determining when 24-hour reporting is required (See APPENDIX E).

Redirecting Spill Notifications: The Oil and Gas Section has separated noncompliance notifications from spill reporting. Unless there is a sheen notification requirement in the Permit or a spill results in an effluent limit exceedance or violation of a permit condition, the Department is no longer requiring spill notifications to the Division of Water as spills only need to be reported to the DEC Spill Prevention and Response (SPAR) Program. To report a spill to SPAR, go to https://dec.alaska.gov/spar/ppr/spill-information/reporting/. While a spill to receiving water is a water quality concern under 18 AAC 70, there are no spill provisions in 18 AAC 83 that directly link it to the Permit. DEC SPAR is appropriate contact for spills, SPAR or an incident commander may coordinate with DEC WDAP on water quality issues during the response and closure processes.

4.3.10 Chronic WET Monitoring. If clarifying agents are used in the clarifying processes for the STP or POW treatment system and discharged, the permittee must conduct chronic WET testing per the following requirements.

If required by Permit, chronic WET testing must be conducted per the following requirements.

4.3.10.1 **Test Species and Methods.** When chronic WET monitoring is required by the Permit, the permittee must conduct chronic WET testing on one vertebrate and one invertebrate species. The permittee must conduct the WET testing to screen for the most sensitive invertebrate species below. Upon identification of the most sensitive test species, the permittee may submit a written request to eliminate the less sensitive species in subsequent WET analysis for DEC approval. DEC can also approve written requests to substitute the less sensitive species during periods when the more sensitive species is unavailable. The permittee shall not make any changes to the selection of test species or dilution series without prior written approval by DEC except as provided below.

Vertebrate (survival and growth): For survival and growth tests, the permittee must use the fish species *Atherinops affinis* (topsmelt). In the event that topsmelt is not available, *Menidia beryllina* (inland silverside) may be used as a substitute. The permittee shall document the use of substitute species in the DMR for the testing.

Invertebrate: For larval development tests, the permittee must use bivalve species *Crassostrea gigas* (Pacific Oyster) or *Mytilus spp*. (mussel) and *Americamysis bahia* (formally *Mysidopsis bahia*, mysid shrimp) for survival and growth. Due to seasonal variability, testing may be performed during reliable spawning periods (e.g., December through February for mussels and June through August for oysters).

4.3.10.2 **Monitoring Frequency.** The Permit specifies annual chronic WET testing of both vertebrate and invertebrate species.

4.3.10.3 **Procedures.** The permittee must conduct chronic WET testing using the following procedures.

Composite Sampling: Chronic WET samples must consist of eight equal volume grab samples over a specified period, not greater than 24 hours, that accounts for facility operations and schedules at the time of sample collection. The sampling methods used must be included in the QAPP. See Section 7.2 for QAPP requirements.

Methods and Endpoints: For the mysid shrimp and the alternate fish species (inland silverside) the presence of chronic toxicity must be estimated as specified in *Environmental Protection Agency* (*EPA) Short-Term Methods for Estimating the Chronic Toxicity of Effluents and Receiving Waters to Marine and Estuarine Organisms, Third Edition* (EPA-821-R-02-014) or the most recently updated version must be used.

For the bivalve species (Pacific Oyster and mussel) and the primary fish species (topsmelt) chronic toxicity must be estimated as specified in *Short-Term Methods for Estimating the Chronic Toxicity of Effluents and Receiving Water to West Coast Marine and Estuarine Organisms* (EPA/600/R-95/136).

The WET testing will determine the 25 % effect concentration (EC_{25}) endpoint estimate of the effluent concentration that would cause a 25 % reduction in normal embryo development for the bivalves or in survival for fish and/or mysid shrimp. The WET testing will also determine the inhibition concentration (IC_{25}) point estimate of the effluent concentration that would cause a 25 % reduction in the growth of the fish and/or mysid shrimp.

Reporting Results: Results must be reported on the DMR using TU_c, where $TU_c = 100/EC_{25}$ or $100/IC_{25}$. The reported EC_{25} or IC_{25} must be the lowest point estimate calculated for the applicable survival, growth or normal embryo development endpoints. If the endpoint is estimated to be above the highest dilution, the permittee must indicate this on the DMR by reporting a less than value for TUc based on the highest dilution.

The permittee must report the no observed effect concentrations (NOECs) in the full WET test report. DEC may compare this information with the IC_{25} during reissuance of this Permit.

Acute Toxicity Estimates: Although acute WET testing is not required, the permittee must provide an estimate of acute toxicity based on observations of mortality when appropriate (e.g., vertebrates). Acute toxicity estimates, if available, must be documented in the full report.

Dilution Series: A series of at least five dilutions and a control must be tested. The recommended initial dilution series is 6.25, 12.5, 25, 50, and 75 % (or maximum hypersaline dilution per test method) and a control dilution water control (0 % effluent). In subsequent tests, the dilution series should be modified to bracket toxicity endpoints observed during previous tests. DEC may provide written direction to modify the previous dilution series or the permittee may request written approval from DEC to modify the dilution series based on previous test results.

Hold Times: The logistics of shipping WET samples to the lower 48 can be challenging as poor weather delays or missed connections during shipping can result in violation of the standard 36-hour hold time. If extenuating circumstances occur, WET samples hold times can exceed 36 hours but must not exceed 72 hours. The permittee must document the conditions that resulted in the need for the holding time to exceed 36 hours and any potential effect the extended hold time could have on the test results and include in the test report.

Additional Quality Assurance Procedures: In addition to those quality assurance measures specified in the methodology, the following quality assurance procedures must be followed:

a. If organisms are not cultured by the testing laboratory, concurrent testing with reference toxicants must be conducted, unless the test organism supplier provides control chart data from at least the previous five months of reference toxicant testing. Where organisms are cultured by the testing laboratory, monthly reference toxicant testing is sufficient.
b. If either of the reference toxicant tests or the effluent tests does not meet all test acceptability criteria as specified in the test methods manual, then the permittee shall re-sample and re-test within the following month.
c. Control and dilution water must be receiving water, or salinity adjusted lab water. If the dilution water used is different from the culture water, a second control, using culture water must also be used.

4.3.10.4 **WET Reporting**

DMRs and Full Report Deliverables: The permittee shall submit chronic WET test results on next month's DMR following the month of sample collection. The permittee must also submit the full WET

Toxicity Report per Section 4.3.11.2 with the next application for reissuance or upon Department request.

Full Report Preparation: The report of results shall include all relevant information outlined in Section 10 of Report Preparation in the U.S. EPA Short-Term Methods for Estimating the Chronic Toxicity of Effluents and Receiving Waters to Marine and Estuarine Organisms, Third Edition (EPA-821-R-02-014) or the most recently updated version.

Additional Reporting Information: In addition to toxicity test results, the permittee shall report:

1. The date and time of sample collection and initiation of each test,
2. The contributing discharges and flow rates at the time of sample collection, and
3. A list of corrosion inhibitors, biocides, algaecides, clarifying agents, or other additives being used by facility that could potentially be in the STP or POW effluent during the period preceding sampling including the following three components:
   a. type of each chemical (product name) injected upstream of the STP or POW,
   b. estimated concentrations listed in item 1) that are injected upstream of the strainers and/or contained in STP or POW, and
   c. estimated volume of chemically treated strainer backwash.

Note: The inclusion of chemical information in the Full WET Report fulfills the previous requirement of submitting a chemical inventory annually. Failure to include this information may result in a permit violation.

4.3.11 Monitoring and Reporting Requirements

4.3.11.1 **Electronic Reporting Systems.** DEC has developed the Environmental Data Management System (EDMS) as the application portal and portal for submitting documents required for compliance, except for DMRs. Although DEC intends to eventually consolidate all reporting into EDMS, this is not currently possible. Therefore, permittees must use NetDMR to submit DMRs and EDMS for all other reporting needs. Once DEC makes EDMS fully functional and retires NetDMR, the Standard Conditions will be updated to reflect the new submittal process and put it out for a 30-day public notice before being formally adopted. Until that time, the Reporting Requirements stated in the Permit supersede any temporary inconsistencies in the transitional Standard Conditions. Permittees will be notified if this transition occurs during the Permit term.

4.3.11.2 **Discharge Monitoring Report Submittals.** The permittee must submit a DMR for each month by the 28th day of the following month. Until EDMS is established as the sole reporting portal, DMRs shall be submitted electronically through NetDMR per Phase I of the E-Reporting Rule (40 CFR 127). Authorized persons may access permit information by logging into the NetDMR Portal (https://cdxnodengn.epa.gov/oeca-netdmr-web/action/login). Any DMR data required by the Permit that cannot be reported in a NetDMR field (e.g., Full WET Reports, etc.), must be submitted with the next application for reissuance or upon Department request. Note that EDMS may be used to upload such items as “other reports”.

4.3.11.3 **Other Reports and e-Reporting Phase II Implementation.** The Department is integrating electronic reporting in EDMS for other reports required by the Permit per Phase II of the E-Reporting Rule (e.g., Certifications and Noncompliance Notifications). Once reports are established in EDMS, the Department does not intend to allow submittals by alternative means (e.g., hard copy, emails, etc.), except temporarily with written approval from the Department on a case-by-case basis depicting extenuating circumstances. DEC recommends using EDMS for all submittals, with the exception of DMRs, until further notice. If any questions or uncertainties arise, DEC advises permittees to contact the Department for assistance.

4.3.11.4 **Additional Information.** DEC has established an e-Reporting Information website at http://dec.alaska.gov/water/compliance/electronic-reporting-rule/ that contains general information about this new reporting format. Support for EDMS and training materials and webinars for NetDMR can be found at Electronic Reporting (alaska.gov).

4.3.12 Additional Effluent Monitoring. DEC may require additional monitoring of effluent or receiving water for facility or site-specific purposes, including, but not limited to data to support applications, demonstration of water quality protection, obtaining data to evaluate ambient water quality, evaluating causes of elevated concentrations of parameters in the effluent, and conducting chronic WET monitoring or toxicity identification and reduction evaluations. If additional monitoring is required, DEC will provide the permittee or applicant the request in writing.

The permittee also has the option of taking more frequent samples than required under the Permit. These additional samples must be used for averaging if they are conducted using the Department approved test methods (generally found in 18 AAC 70 and 40 CFR 136 [adopted by reference in 18 AAC 83.010]). The results of any additional monitoring must be included in the calculation and reporting of the averaged data on DMRs as required by the Permit and Standard Conditions Part 3.2 and 3.3 (Permit Appendix A).

Monitoring for effluent limitations must use methods with method detection limits that are less than the effluent limitations or are sufficiently sensitive. Monitoring effluent or receiving water for the purpose of comparing to water quality criteria must use methods that are less than the applicable criteria or are sufficiently sensitive. Per 40 CFR 122.21(a)(3), a method approved under 40 CFR 136 is sufficiently sensitive when:

1. The method minimum level (ML) is at or below the level of the applicable water quality criterion for the measured parameter, or
2. The method ML is above the applicable water quality criterion, but the amount of the pollutant or pollutant parameter in the discharge is high enough that the method detects and quantifies the level of the pollutant or pollutant parameter in the discharge (e.g., not applicable to effluent or receiving water monitored for characterization), or
3. The method has the lowest ML of the analytical methods approved under 40 CFR 136 for the measured pollutant or pollutant parameter (e.g., the receiving water concentration or the criteria for a given pollutant or pollutant parameter is at or near the method with the lowest ML).

5.0 ANTIBACKSLIDING. Per 18 AAC 83.480, "effluent limitations, standards, or conditions must be at least as stringent as the final effluent limitations, standards, or conditions in the previous permit." Per 18 AAC 83.480, a permit may not be reissued "to contain an effluent limitation that is less stringent than required by effluent guidelines in effect at the time the permit is renewed or reissued."

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

CWA Section 303(d)(4)(A) states that, for waterbodies where the water quality does not meet applicable WQS, effluent limitations may be revised under two conditions, the revised effluent limitation must ensure the attainment of the WQS (based on the waterbody TMDL or the waste load allocation) or the designated use which is not being attained is removed in accordance with the WQS regulations.

CWA Section 303(d)(4)(B) 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. Even if the requirements of CWA Section 303(d)(4) or 18 AAC 83.480(b) are satisfied, 18 AAC 83.480(c) prohibits relaxed limits that would result in violations of WQS or ELGs.

State regulation 18 AAC 83.480(b) only applies to effluent limitations established on the basis of CWA Section 402(a)(1)(B), and modification of such limitations based on effluent guidelines that were issued under CWA Section 304(b). Accordingly, 18 AAC 83.480(b) applies to the relaxation previously established limitations. To determine if backsliding is allowable under 18 AAC 83.480(b), the regulation provides five regulatory criteria (18 AAC 83.480[b][1-5]) that must be evaluated and satisfied.

The effluent limitations, standards, and conditions in the reissued Permit are at least as stringent as the 2018 Permit. Although the pH limit has expanded, there will be no violation of Water Quality Criteria (WQC) at the boundary of the mixing zone. There is significant buffer capacity in seawater. In addition, if the STP becomes operational again, this would result in even greater buffer capacity. Due to this, there is no reason to consider treatment for pH. Although the mass-based effluent limits for BOD_5 and TSS at Outfall 002B have been discontinued, the equivalent concentration-based limits are retained. Hence, given only concentration limits are necessary to control effluent quality, no backsliding has occurred.

DEC has also eliminated TBELs for TRC on Outfall 002B in lieu of establishing a more stringent WQBEL on the commingled outfall 001A. Hence, because TRC is controlled more stringently on the commingled discharge, there is no backsliding but rather relocating the compliance point and establishing more stringent WQBELs.

6.0 ANTIDEGRADATION

6.1 Legal Basis. Antidegradation is implicit in CWA Section 101(a) goals, explicitly referenced in CWA Section 303(d)(4)(B) and implemented through 40 CFR 131.12. 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 and implementation methods. Alaska's current antidegradation policy and implementation methods are presented in 18 AAC 70.015 *Antidegradation policy* (policy) and in 18 AAC 70.016 *Antidegradation implementation methods for discharges authorized under the federal Clean Water Act* (implementation methods). For these state regulations to apply under the CWA, they must be previously approved by EPA per CWA Section 303(c)(3). The policy and implementation methods have been amended through April 6, 2018; are consistent with the CWA and 40 CFR 131.12; and were approved by EPA on July 26, 2018.

The following subsections document the Department's conformance with the policy and implementation methods for reissuance of the Permit.

6.2 Receiving Water Status and Tier Determination. Per the Implementation Methods, the Department determines a Tier 1 or Tier 2 classification and protection level on a parameter-by-parameter basis. The Implementation Methods also describe a Tier 3 protection level applying to designated waters, although at this time no Tier 3 waters have been designated in Alaska.

Stefansson Sound is not included in *Alaska's Final 2024 Integrated Water Quality Monitoring and Assessment Report,* February 6, 2025. Therefore, no parameters have been identified where only the Tier 1 protection level applies. Accordingly, this antidegradation analysis conservatively assumes that the Tier 2 protection level applies to all parameters, consistent with 18 AAC 70.016(c)(1) and 18 AAC 70.015(a)(2), that states if the quality of water exceeds levels necessary to support propagation of fish, shellfish, wildlife, and recreation in and on the water, that quality must be maintained and protected, unless the Department authorizes a reduction in water quality.

Prior to authorizing a reduction of water quality, the Department must first analyze and confirm the findings under 18 AAC 70.015(a)(2)(A-D) are met. Because Tier 1 protection to all waters in the state, the analysis must be conducted with implementation procedures in 18 AAC 70.016(b)(5)(A-C) for Tier 1 protection, and under 18 AAC 70.016(c)(7)(A-F) for Tier 2 protection. These analyses and associated findings are summarized below.

6.2.1 Tier 1 Analysis of Existing Use Protection. The summary below presents the Department's analyses and findings for the Tier 1 analysis of existing use protections per 18 AAC 70.016(b)(5) finding that:

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

The Department has reviewed water quality data, environmental monitoring studies, and information on existing uses in the vicinity of Outfall 001A and 003A submitted by the applicant. The Department finds the information reviewed as sufficient to identify existing uses and water quality necessary for Tier 1 protection.

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

Per 18 AAC 70.020 and 18 AAC 70.050, marine waters are protected for all uses. Hence, if criteria are met, then the uses of the waterbody are being protected. When developing limitations and permit conditions, DEC applies the most stringent criteria based on all applicable uses of the receiving waterbody. Therefore, the most stringent water quality criteria found in 18 AAC 70.020 and in the *Alaska Water Quality Criteria Manual for Toxic and Other Deleterious Organic and Inorganic Substances* (DEC 2008) apply and are applied to ensure existing uses and the water quality necessary for protection of existing uses of the receiving waterbody are fully maintained and protected.

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

As discussed in (B), the Permit will require that the discharge shall not cause or contribute to a violation of WQS. As previously stated, the marine waters of Stefansson Sound covered under this Permit are not listed as impaired; therefore, no parameters were identified as already exceeding the applicable criteria in 18 AAC 70.020(b) or 18 AAC 70.030.

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

6.2.2 Tier 2 Analysis. Per 18 AAC 70.016(c)(2), an antidegradation analysis is only required for those waterbodies needing Tier 2 protection and which have any new or existing discharges that are being expanded based on permitted increases in loading, concentration, or other changes in effluent characteristics that could result in comparative lower water quality or pose new adverse environmental impacts. Per 18 AAC 70.016(c)(2)(A), the analysis will only be conducted for the portion of the discharge that represents a new discharge or an increase from the existing authorized discharge. Additionally, per 18 AAC 70.016(c)(3), DEC is not required to conduct an antidegradation analysis for a discharge that is not new or not expanding. The discharge is neither new nor expanded because the effluent limitations are either more stringent or the existing limitations are being retained. The elimination of mass-based limits while retaining the equivalent concentration-based limits for BOD_5 and TSS at Outfall 002B is not expanding the discharge because limiting only concentration does not increase the loadings to the receiving water. Therefore, the Tier 1 Antidegradation Analysis satisfies the requirements of 18 AAC 70.015 and 18 AAC 0.016.

7.0 OTHER PERMIT CONDITIONS

7.1 Standard Conditions. Appendix A of the Permit contains standard regulatory language that must be included in all APDES permits. These requirements are based on regulations and cannot be challenged in the context of an individual APDES permit action. However, the standard conditions also cover requirements based on regulations that may be in transition (e.g., Phase II eReporting) or conditions not based on regulation (e.g., DMR submittal deadlines). While DEC is transitioning to some new regulations, some of the Standard Conditions in Appendix A are being superseded by the Permit until such time revised Standard Conditions can be drafted, public noticed, and implemented holistically in the future.

7.2 Quality Assurance Plan. The permittee is required to develop procedures to ensure that the monitoring data submitted is accurate and to explain data anomalies if they occur. The permittee is required to update the QAPP within 90 days of the effective date of the final Permit. Additionally, the permittee must certify in writing that the plan has been implemented within the required time frame and retain the certification onsite with the QAPP and made available to DEC upon request. Hence, the date of the certification determines compliance with this requirement. The QAPP shall consist of standard operating procedures the permittee must follow for collecting, handling, storing and shipping samples; laboratory analysis; and data reporting. In addition, the QAPP must define the composite sampling techniques used to ensure chronic WET samples collected per Section 4.3.10. represent the combined effluent quality of Outfall 001A at the time of sample collection.

7.3 Best Management Practices Plan. A BMP Plan is a collection of pollution control methods and housekeeping measures which are intended to minimize or prevent the generation and the potential release of pollutants from a facility to WOTUS through normal operations and ancillary activities. Per CWA Section 402(a)(1), development and implementation of BMPs may be included as a condition in APDES permits. CWA 402(a)(1) authorizes DEC to include miscellaneous requirements that are deemed necessary to carry out the provision of the CWA in permits on a case-by-case basis. The BMP Plan must be developed and maintained to control, or abate, the discharge of pollutants in accordance with 18 AAC 83.475. A BMP Plan must include certain generic BMPs as well as specific BMPs for controlling pollutants (See Sections 7.3.1 and 7.3.2).

Within 90 days after the effective date of the Permit, the permittee must review, revise as necessary to be consistent with the reissued Permit, and certify in writing that these tasks have been completed within the required time frame prior to implementation. This initial and all subsequent certifications shall be retained onsite with the BMP Plan and made available to DEC upon request. Hence, the date of the certification determines compliance with this requirement. In subsequent years of the Permit, the permittee must establish a review committee to review and revise the BMP Plan at least annually to include any modifications deemed to be necessary or appropriate since the previous revision to meet the objectives and specific requirements in the Permit. By January 31st of each year thereafter, the permittee must certify that the BMP Plan review committee has reviewed and modified the BMP Plan, as appropriate.

7.3.1 Standard BMP Plan Components. The BMP Plan is to be consistent with the general guidance contained in Guidance Manual for Developing Best Management Practices (EPA 833-B-93-004, October 1993) or any subsequent revision. The BMP Plan must include, at a minimum, the following items:

- Statement of BMP policy. The BMP Plan must include a statement of management commitment to provide the necessary financial, staff, equipment, and training resources to develop and implement the BMP Plan on a continuing basis.
- Current copies of the Permit and all annual BMP Plan Certification Statements for the term of the Permit.
- Description, location, and sequence of activities, BMP control measures, any stabilization measures, final constructed site plans, drawings, and maps.
- A log of BMP modifications which documents maintenance and repairs of control measures, including date(s) of regular maintenance, date(s) of discovery of areas in need of repair/maintenance, and date(s) that the control measure(s) returned to full function.
- Description of any corrective action taken at the facility, including the event that caused the need for corrective action (include notice of non-compliance if reporting was required) and dates when problems were discovered, and modifications occurred.
- Structure, functions, and procedures of the BMP Committee. The BMP Plan must establish a BMP Committee chosen by the permittee responsible for developing, implementing, and maintaining the BMP Plan.
- An identification and assessment of risks associated with accidental pollutant releases.
- Standard Operating Procedures that include but are not limited to:
  - Good Housekeeping.
  - Security.
  - Materials compatibility.
  - Record keeping and reporting.
  - Operation and maintenance plans for wastewater treatment systems and BMP controls. Elements should include preventative maintenance and repair procedures that are developed in accordance with good engineering practices.
  - Use of local containment devices such as liners, dikes, and drip pans where chemicals are being unpackaged and where waste is being stored and transferred.
  - Apply chemical cleaning compounds and disinfectants in accordance with manufacturer instructions and suggested application rates.
  - Employee training on BMP requirements and records of employee training date(s), etc.
  - Inspections and regular evaluation of BMP controls including evaluation of planned facility modifications to ensure that BMP Plan is considered and adjusted accordingly.

7.3.2 Specific BMPs. In addition to the standard BMP components listed in Section 7.3.1, DEC requires that the BMP Plan include a specific BMP (e.g., a chemical-dosing matrix) to optimize the use of coagulants and other clarifying agents and to minimize the potential for chronic toxicity in Outfall 001A. See also Section 4.3.10.4 – WET Reporting.

When applicable, DEC also requires that specific BMPs be included in the BMP Plan for preventing treatment chemicals in waterflood that could be drained back to the seawater intake reservoirs, or other locations in marine water, to facilitate pipeline maintenance and repairs.

8.0 OTHER LEGAL REQUIREMENTS

8.1 Endangered Species Act. Per Section 7 of the ESA, federal agencies are required to consult with the National Oceanic and Atmospheric Administration (NOAA) National Marine Fishery Service (NMFS) and the U.S. Fish and Wildlife Service (FWS) if their actions could beneficially or adversely affect any threatened or endangered species. As a state agency, DEC is not required to consult with these federal agencies Section 7 regarding permitting actions. However, this does not absolve DEC from complying with Sections 9 and 10 of the ESA. DEC addresses this by requiring the permittee to be responsible for complying with the ESA for discharges under the Permit.

The Department voluntarily requested this information from these services on October 26, 2023 to inform permit development. NOAA responded and informed DEC that Endicott Operations discharges are within the range of endangered bowhead whales (*Balaena mysticetus*), threatened Arctic ringed seals (*Pusa hispida Arctic subspecies*), and threatened Beringia distinct population segment of bearded seals (*Erignathus barbatus*). The Department did not receive a response from FWS and therefore reviewed the FWS Information for Planning and Consultation (IPaC) for habitat ranges of FWS managed species. This database indicated that the following may occur in the vicinity of the Endicott Operations discharges: Spectacled Eider (*Somateria fischeri*) and Polar Bear (*Ursus maritimus*).

8.2 Essential Fish Habitat. Essential fish habitat (EFH) includes the waters and substrate (sediments, etc.) necessary for fish from commercially fished species to spawn, breed, feed, or grow to maturity. The Magnuson-Stevens Fishery Conservation and Management Act (January 21, 1999) requires federal agencies to consult with NOAA when a discharge has the potential to adversely affect (reduce quality and/or quantity of) EFH. Although DEC as a State agency is not required to consult with the NMFS regarding permitting activities, the Department voluntarily requested this information October 26, 2023 from these services to inform permit development. NMFS responded and informed DEC that NOAA's Essential Fish Habitat Mapper indicates that EFH for the Arctic Cod (*Arctogadus glacialis*) and Snow Crab (*Chionoecetes opilio*) occur in the area, but no areas in the vicinity of the discharges are a Habitat of Particular Concern.

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

9.0 REFERENCES

1. Alaska Department of Environmental Conservation, 2003. *Alaska Water Quality Criteria Manual for Toxics and Other Deleterious Organic and Inorganic Substances*, as amended through December 12, 2008.
2. Alaska Department of Environmental Conservation, 2010. *Alaska's Final 2022 Integrated Water Quality Monitoring and Assessment Report,* May 17, 2021
3. Alaska Department of Environmental Conservation, 2003, 2009, and 2012. Alaska Water Quality Standards.
4. Alaska Department of Environmental Conservation. Antidegradation Implementation Methods. Division of Water. April 6, 2018.
5. Alaska Department of Natural Resources – Division of Oil and Gas, 2024. *Active Oil and Gas Lease Inventory,* March 4, 2024.
6. The Alaska Oil and Gas Association (AOGA), 2020. *Economic Impact Report: The Role of the Oil and Gas Industry in Alaska's Economy,* January 2020.
7. Alaska Pollution Discharge Elimination System Discharge and Monitoring Report, 2011 – 2016.
8. National Oceanic and Atmospheric Administration, 2024. *Endangered Species and Critical Habitat Mapper. N.p.,n.d.* Web March 21, 2024. (https://alaskafisheries.noaa.gov/portal/apps/webappviewer/index.html?id=0c4a81f75310491d9010c17b6c081c81)
9. National Oceanic and Atmospheric Administration, 2024. *Essential Fish Habitat Mapper. N.p.,n.d.* Web March 21, 2024. (https://www.habitat.noaa.gov/apps/efhmapper/).
10. U.S. Fish and Wildlife Service, 2025 *IPaC. N.p.,n.d.* Web June 10, 2025. (https://ipac.ecosphere.fws.gov/)

APPENDIX A. FIGURES

Figure 1: Vicinity Map Location of Endicott Operations

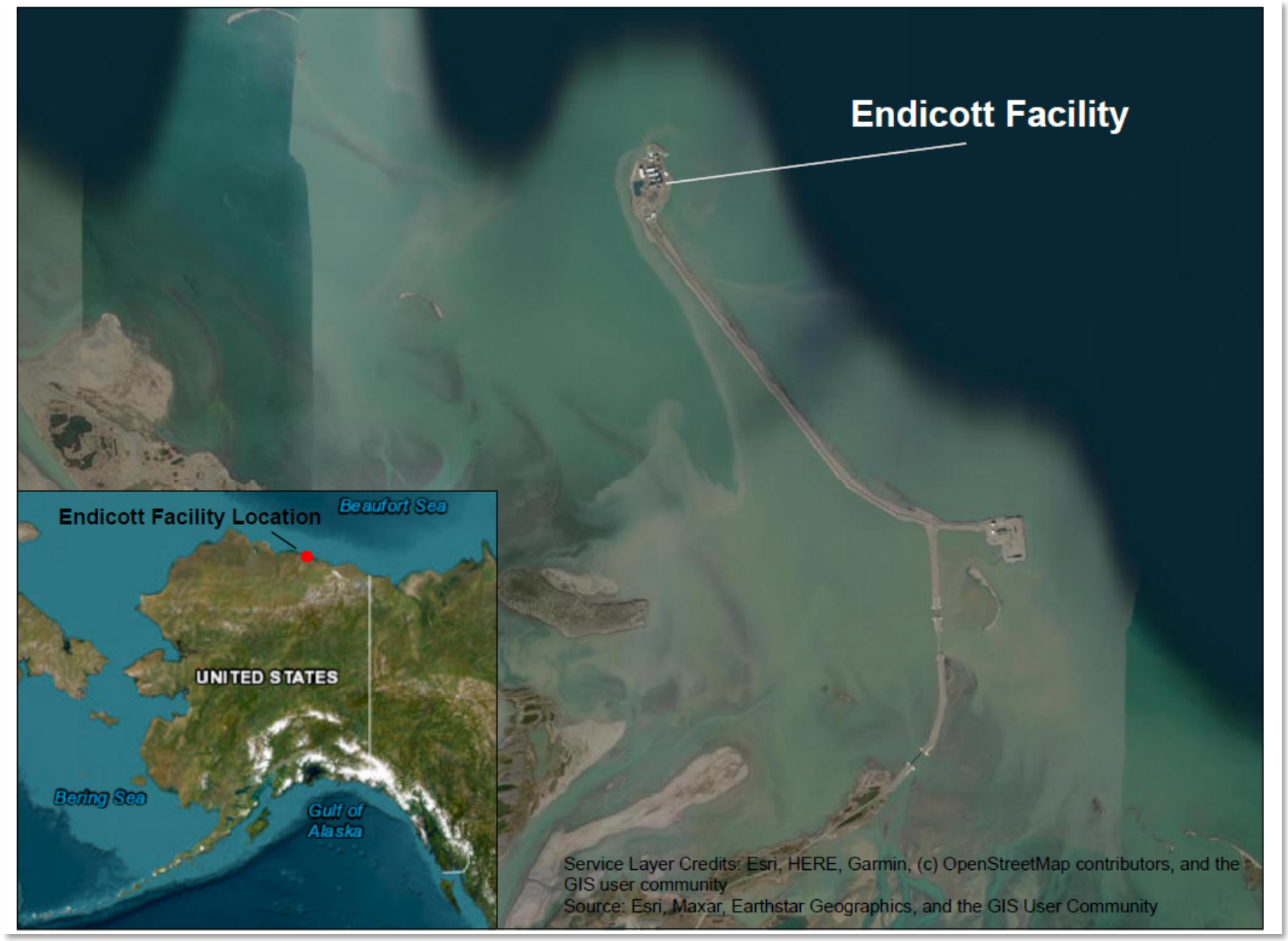


Figure 2: Endicott Operations Facility – Stefansson Sound, North Slope, Alaska

Figure 3: Endicott Operations – Outfall 001A Mixing Zones and Outfall 003A

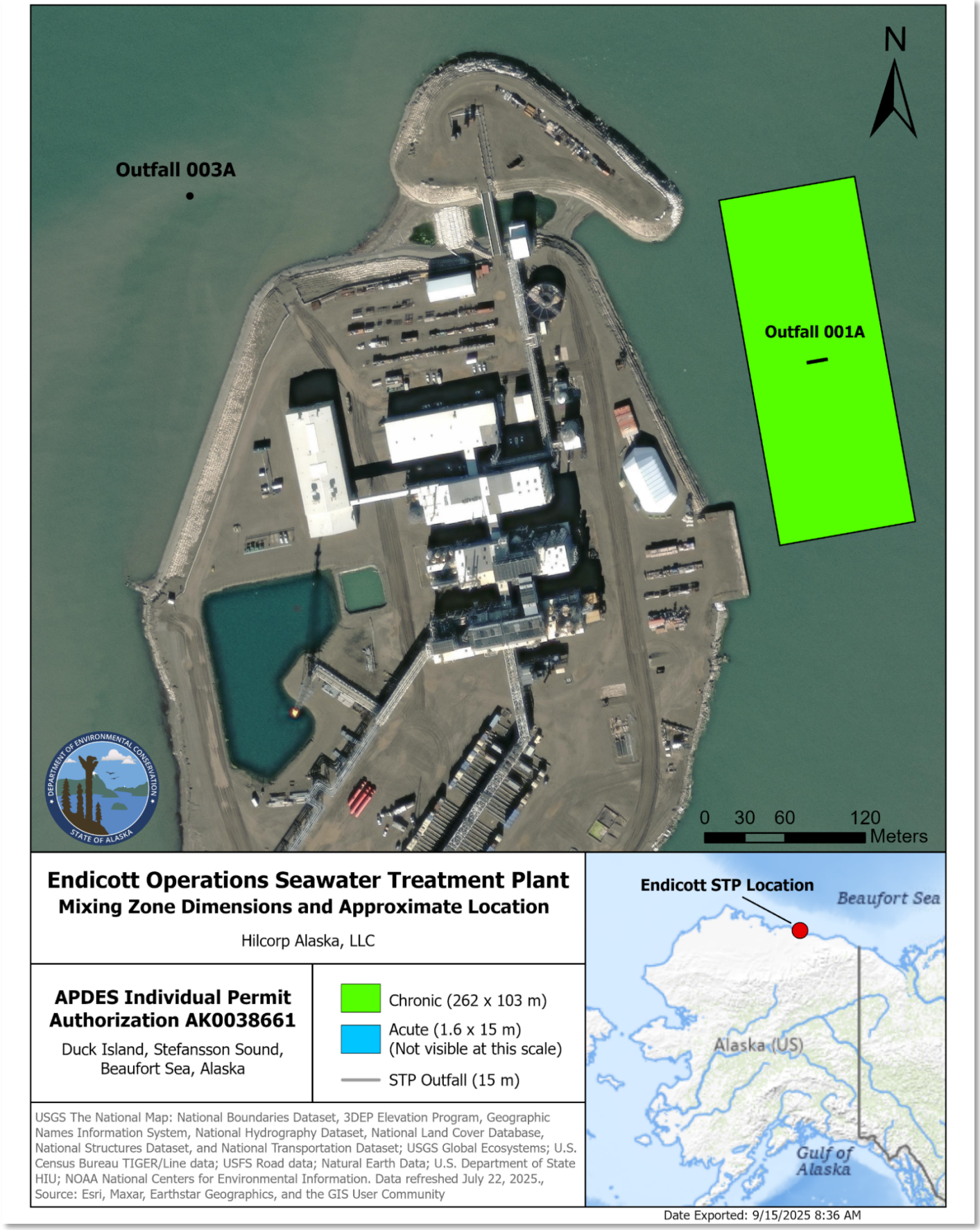


Figure 4: STP and RO Flow Diagram – Outfall 001A

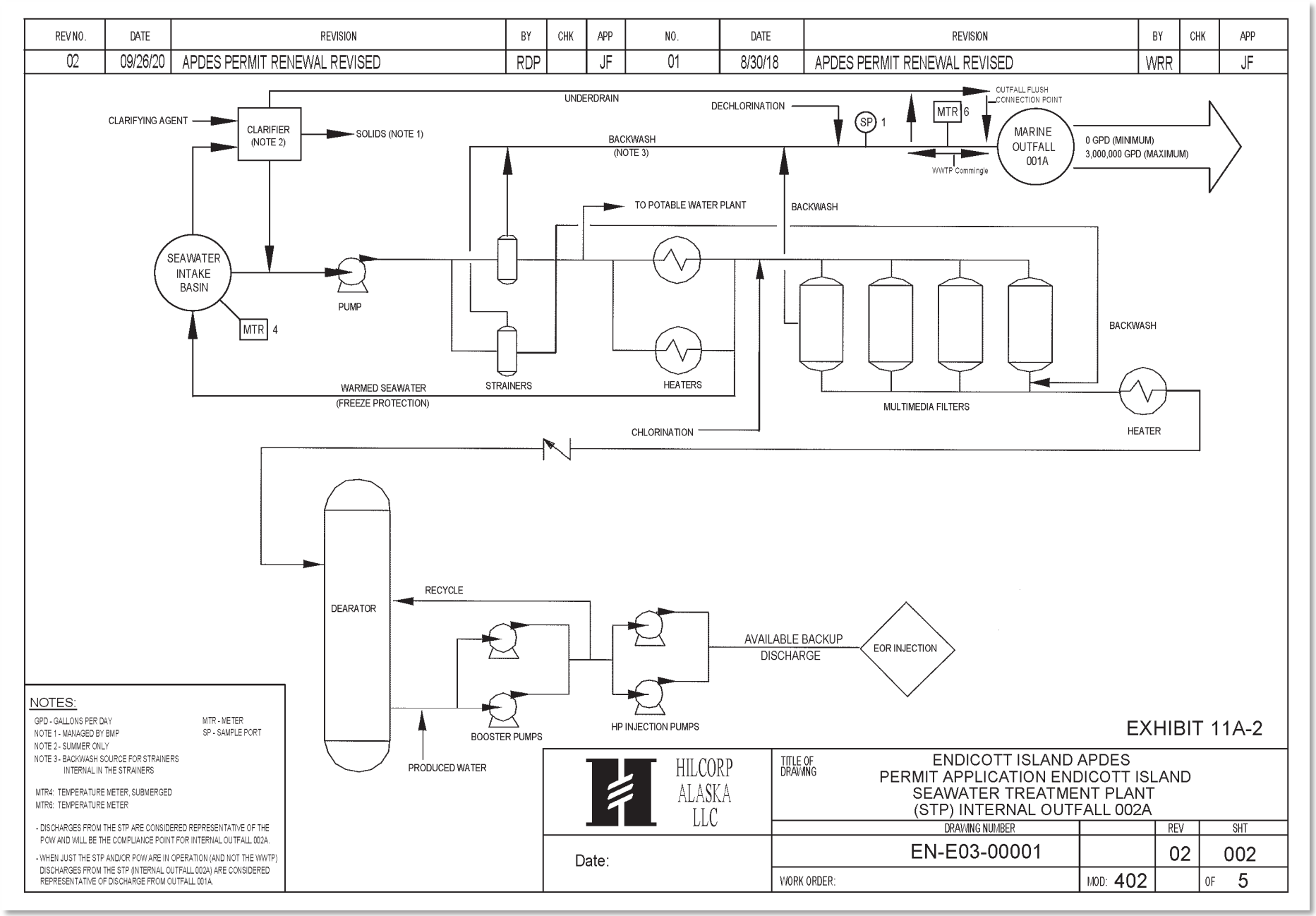


Figure 5: Seawater Process Flow Diagram – Outfalls 001A and 003A

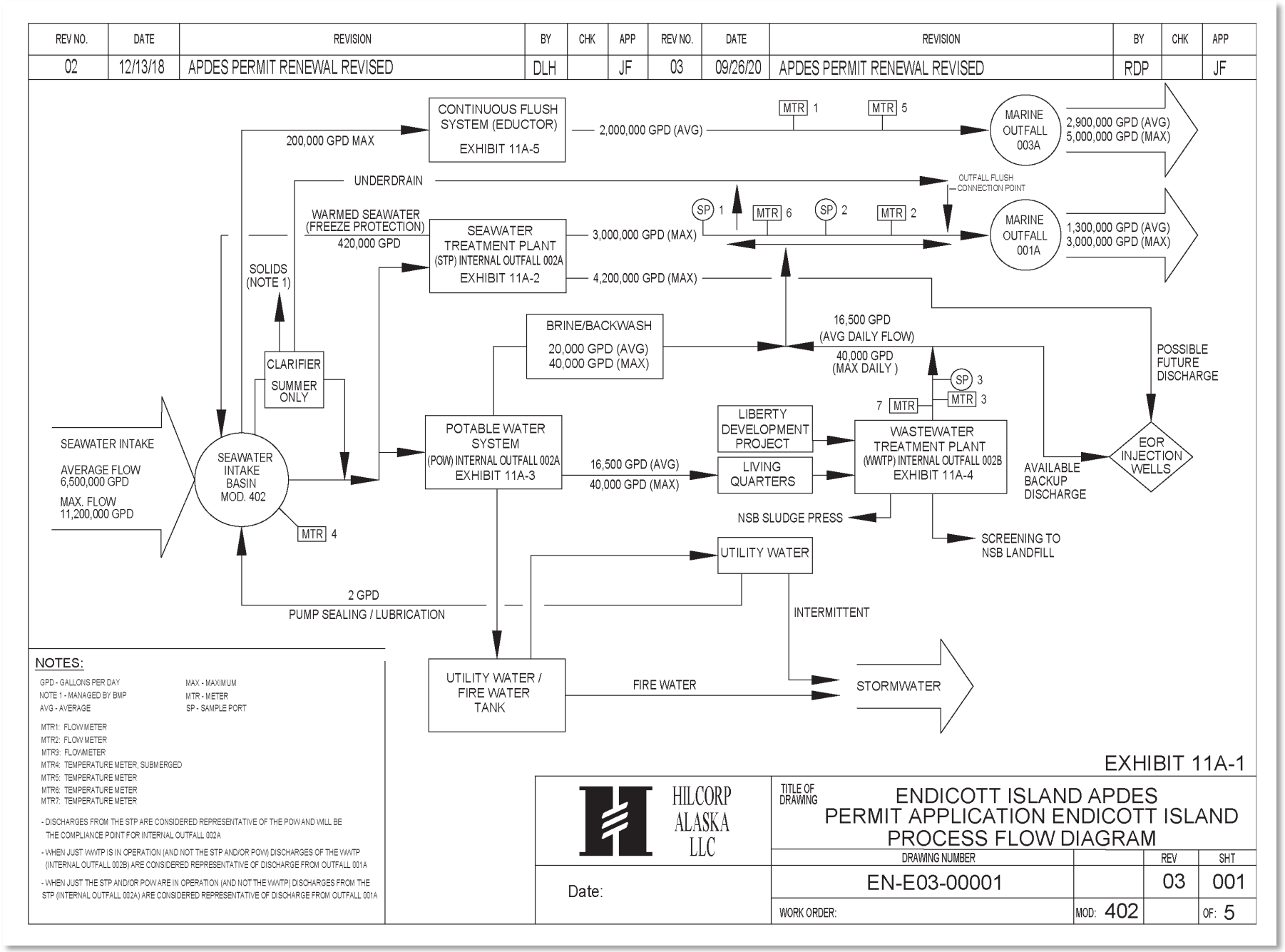


Figure 6: Potable Water System Diagram – Outfall 001A

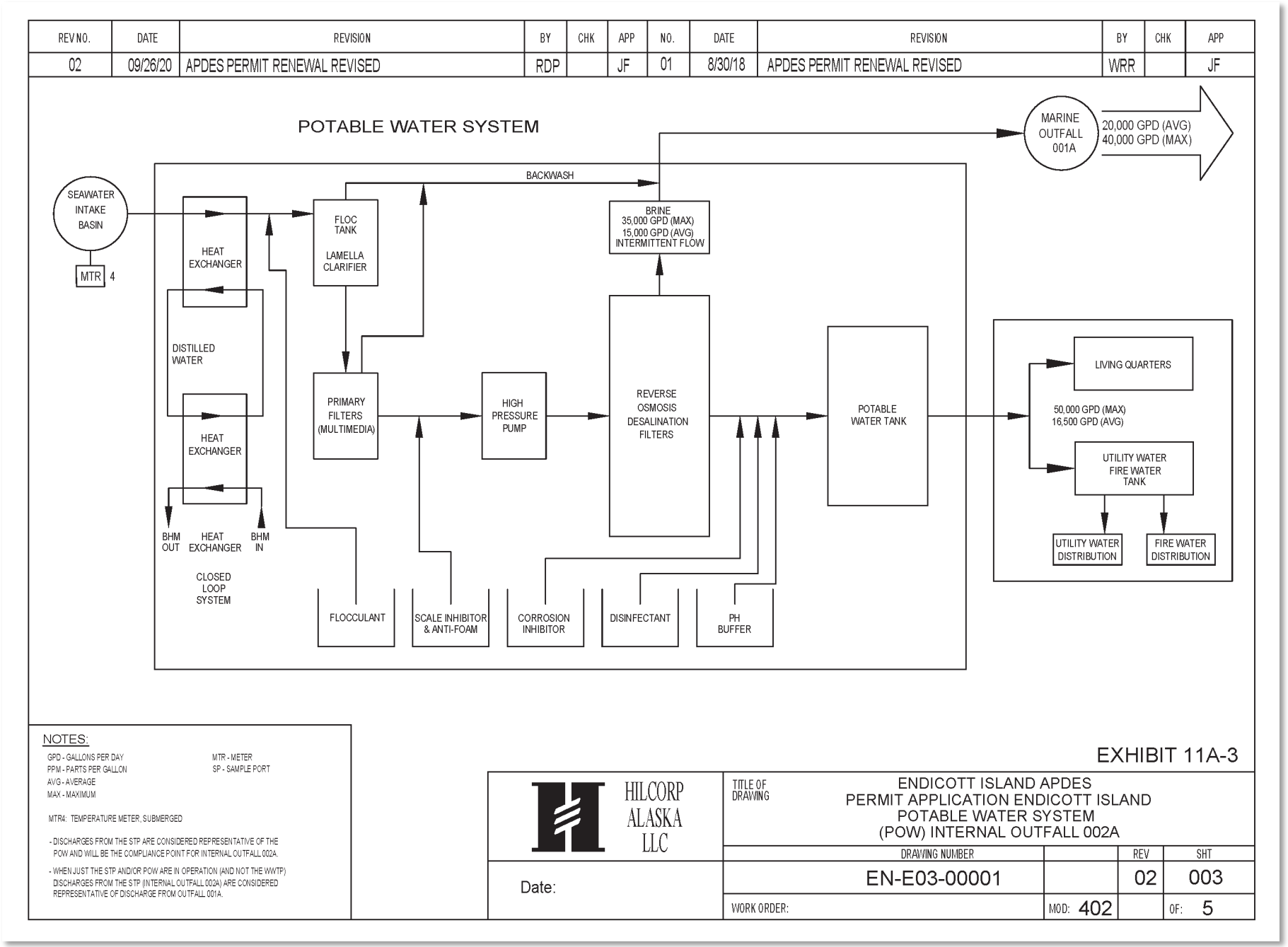
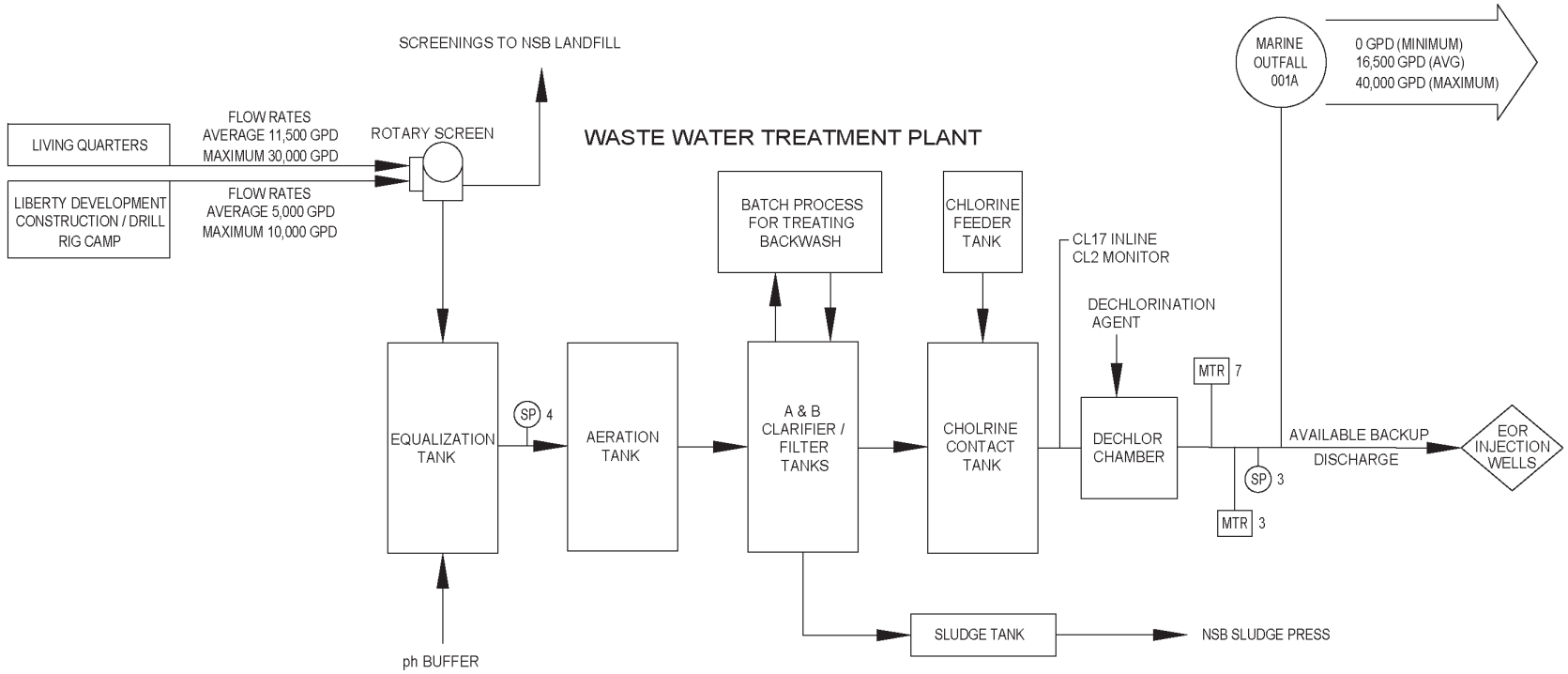


Figure 7: Wastewater Treatment Diagram – Outfall 001A

REV NO.	DATE	REVISION	BY	CHK	APP	REV NO.	DATE	REVISION	BY	CHK	APP
02	12/13/18	APDES PERMIT RENEWAL REVISED	DLH		JF	03	09/26/20	APDES PERMIT RENEWAL REVISED	RDP		JF



NOTES:

GPD - GALLON PER DAY
SP-SAMPLE PORT
MTR-METER
CL-CHLORINE

MTR3: FLOW METER
MTR7: TEMPERATURE METER

- IN APRIL 2020, HILCORP RECEIVED AUTHORIZATION TO INJECT FLUIDS FROM THE WWTP FOR ENHANCED OIL RECOVERY (EOR) AS CONTINGENCY TO WASTEWATER DISCHARGE.

- WHEN JUST THE WWTP IS IN OPERATION (AND NOT THE STP AND/OR POW) DISCHARGES OF THE WWTP (INTERNAL OUTFALL 002B) ARE CONSIDERED REPRESENTATIVE OF DISCHARGE FROM OUTFALL 001A

EXHIBIT 11A-4

HILCORP ALASKA LLC

Date:

TITLE OF DRAWING: ENDICOTT ISLAND APDES
PERMIT APPLICATION ENDICOTT ISLAND
WASTE WATER TREATMENT PLANT
(WWTP) INTERNAL OUTFALL 002B

DRAWING NUMBER		REV	SHT
EN-E03-00001		03	004
WORK ORDER:	MOD: 402		OF: 5

Figure 8: Continuous Flush System Diagram – Outfall 003A

REV NO.	DATE	REVISION	BY	CHK	APP	NO.	DATE	REVISION	BY	CHK	APP
02	09/26/20	APDES PERMIT RENEWAL REVISED	RDP		JF	01	8/30/18	APDES PERMIT RENEWAL REVISED	WRR		JF

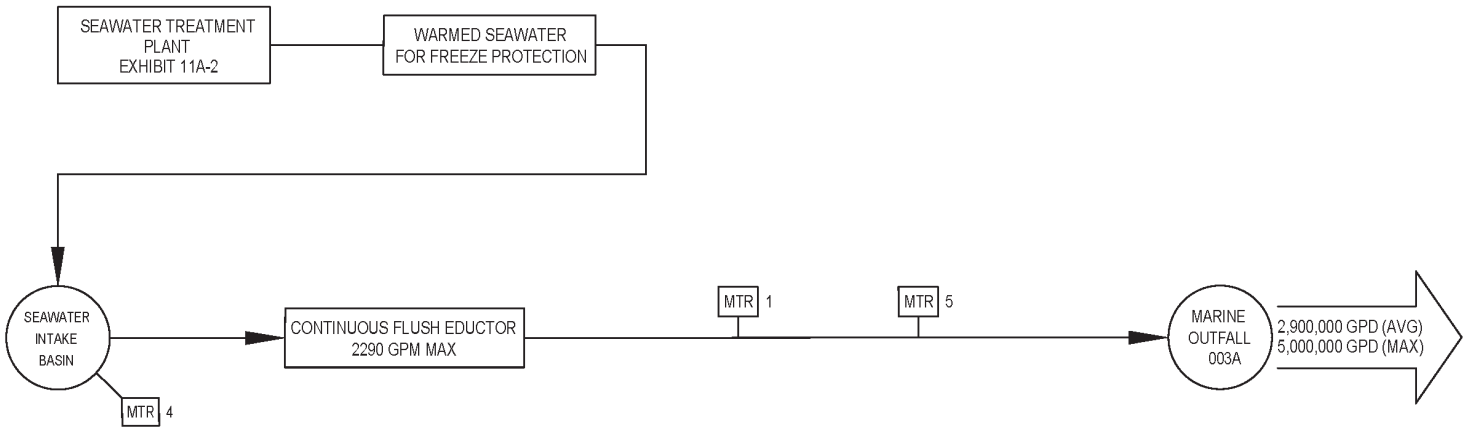


EXHIBIT 11A-5

NOTES:

GPD - GALLONS PER DAY
GPM - GALLONS PER MINUTE
MAX - MAXIUM
MTR - METER
SP - SAMPLE PORT

MTR1: FLOWMETER
MTR4: TEMPERATURE METER, SUBMERGED
MTR5: TEMPERATURE METER

HILCORP ALASKA LLC

Date:

TITLE OF DRAWING: ENDICOTT ISLAND APDES PERMIT APPLICATION ENDICOTT ISLAND CONTINUOUS FLUSH SYSTEM (CFS) OUTFALL 003A

DRAWING NUMBER		REV	SHT
EN-E03-00001		02	005
WORK ORDER:	MOD: 402		OF: 5

APPENDIX B. REASONABLE POTENTIAL ANALYSIS

The Alaska Department of Environmental Conservation (Department or DEC) determined if the permitted discharge has reasonable potential (RP) to cause or contribute to an excursion of water quality criteria (WQC). If the discharge violates the Alaska Water Quality Standards (WQS) in this manner, then a Water Quality-Based Effluent Limit (WQBEL) may be derived per the Environmental Protection Agency (EPA) *Technical Support Document for Water Quality-Based Toxics Control, 1991 (TSD)* and the *DEC Reasonable Potential Analysis and Effluent Limits Development Guide, June 30, 2014 (RPA/WQBEL Guidance).*

The Department determines RP by comparing the maximum projected receiving waterbody concentration at the acute or chronic mixing zone boundary to WQC for each parameter that is a Pollutant of Concern (POC). A POC is determined prior to conducting an RPA by characterizing the effluent based on raw data that demonstrates that the parameter does not meet either the acute or chronic criterion and requires significant dilution to meet it. Hence, a POC is not determined by using a reasonable potential multiplier (RPM) because a small sample size can elevate a parameter arbitrarily to be a POC. This practice eliminates the possibility that a monitored parameter has a small dataset because the past characterization has led to a reduced frequency of monitoring.

RP to cause, or contribute, to an excursion of WQC exists if the projected receiving waterbody concentration, or temperature, at the boundary of the respective mixing zone exceeds the applicable criteria for the POC. Such RP indicates a WQBEL must be included in the permit per 18 AAC 83.435. This Appendix discusses how the maximum projected receiving waterbody concentrations were determined for these discharges to marine waters and summarizes the calculations. To illustrate the unique procedures and calculations, both POCs temperature (ΔT) and total residual chlorine (TRC) for Outfall 001A are included below.

B.1 MASS BALANCE

Normally, for a discharge of a parameter at the maximum expected concentration (MEC) into a marine receiving environment with a known ambient water concentration (AWC), the projected receiving water concentration (RWC) is determined using a steady state model represented by the following mass balance equation:

$$(V_{MEC} + V_{AWC}) * RWC = V_{MEC} * MEC + V_{AWC} * AWC \qquad \text{(Equation B-1)}$$

where,

RWC = Receiving waterbody concentration downstream of the effluent discharge.

MEC = Maximum projected effluent concentration or maximum expected temperature difference (MEΔT)

AWC = Ambient waterbody concentration, taken as the 85th percentile of data or 15 percent of the chronic criteria if no ambient data are available.

V_{MEC} = Volume of the maximum expected effluent discharged into the control volume.

V_{AWC} = Volume of the ambient receiving water in the control volume.

Definition:

$$\text{Dilution Factor (DF), } DF = \frac{V_{MEC}+V_{AWC}}{V_{MEC}} \qquad \text{(Equation B-2)}$$

Upon separating variables in Equation B-1 and substituting Equation B-2 yields:

$$DF = \frac{(MEC - AWC)}{(RWC - AWC)} \qquad \text{(Equation B-3a)}$$

The preceding equation provides the dilution factor achieved at the boundary of the mixing zone if based on the MEC. To determine the dilution factor required to meet WQC at the boundary, the WQC is substituted for RWC in Equation B-3a. However, for temperature Equation B-3a is not directly applicable in the same manner because the marine WQC for temperature is in reference to the instantaneous ambient receiving water temperature; the increase above ambient cannot be more than 1°C (i.e., WQC = AWC +1). By making substitutions and using "ΔT" for maximum expected temperature minus the ambient water temperature (MET – AWT = MEΔT) instead of "C" for concentration, Equation B-3a can be rewritten to:

$$DF = \frac{(ME\Delta T)}{[(AWT + 1) - AWT]}$$

Simplifying…

$$DF = ME\Delta T \qquad \text{(Equation B-3b)}$$

Where:

$$ME\Delta T = \text{Maximum Effluent Temperature} - \text{Ambient Receiving Water Temperature}$$

Rearranging Equation B-3a to solve for RWC yields:

$$RWC = \frac{(MEC - AWC)}{DF} + AWC \qquad \text{(Equation B-4a)}$$

In the case of temperature, Equation B-4 simplifies to the following equation:

$$RWT = \frac{ME\Delta T}{DF} + 1 \qquad \text{(Equation B-4b)}$$

B.2 MAXIMUM PROJECTED EFFLUENT CONCENTRATION

To calculate the MEC (or MEΔT), the Department uses the *RPA/WQBEL Guidance* that uses modified procedures from the *TSD* Section 3.3. DEC uses a 95th confidence interval with a 99th percentile to determine an RPM. In addition, DEC evaluates the distribution of the data set using EPA's *ProUCL Statistical Software Program, Version 5.2 (ProUCL)* rather than assuming a lognormal distribution as described in the TSD for calculating and applying the coefficient of variation (CV) in derivation equations. The possible statistical distributions include lognormal, normal, gamma, or non-parametric.

The RPM is calculated differently depending on the type of distribution, CV of the data, and the number of data points. When fewer than 10 data points are available, the *RPA/WQBEL Guidance* assumes the CV

= 0.6, a conservative estimate that assumes a relatively high variability. The CV is defined as the ratio of the sample standard deviation of the data set to the sample mean.

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

$$CV = \frac{\hat{\sigma}_y}{\hat{\mu}_y} \qquad \text{(Equation B-5)}$$

Where: $\hat{\mu}_y = estimated\ mean = \frac{\Sigma[x_i]}{k}, 1 \le i \le k$

$\hat{\sigma}_y^2 = estimated\ variance = \Sigma\frac{[(x_i - \mu)^2]}{k-1}, 1 \le i \le k$

$\hat{\sigma}_y = estimated\ standard\ deviation = (\sigma^2)^{0.5}$

$k = number\ of\ samples$

For data sets with a Lognormal or Log-ROS distribution, the CV is transformed to a lognormal standard deviation per the following:

$$\sigma^2 = \ln(CV^2 + 1) \qquad \text{(Equation B-6a)}$$

$$\sigma = \sqrt{\sigma^2} \qquad \text{(Equation B-6b)}$$

The RPM is the ratio of the upper bound of the distribution at the 99th percentile to the percentile represented by the maximum observed concentration (MOC) or maximum observed temperature differential (MOΔT), at the 95% confidence level. The general equation (B-7) is followed by equations (B-8 and B-9) for data with a lognormal distribution is as follows:

$$RPM = \frac{C_{99}}{C_{pn}} \qquad \text{(Equation B-7)}$$

$$C_{99} = \exp\left[\left(Z_{99} * \hat{\sigma}_y\right) - \left(0.5 * \hat{\sigma}_y^2\right)\right] \qquad \text{(Equation B-8)}$$

$$C_{pn} = \exp\left[\left(Z_{p_n} * \hat{\sigma}_y\right) - \left(0.5 * \hat{\sigma}_y^2\right)\right] \qquad \text{(Equation B-9)}$$

In the case of data displaying Normal, Gamma, or Non-parametric (Kaplan-Meier) distributions, equations for C_{99} and C_{pn} become:

$$C_{99} = \hat{\mu}_n + Z_{99} * \hat{\sigma} \qquad \text{(Equation B-10)}$$

$$C_{p_n} = \hat{\mu}_n + Z_{pn} * \hat{\sigma} \qquad \text{(Equation B-11)}$$

In all Equations B-7, B-9, and B-11, the percentile represented by the MOC is:

$$p_n = (1 - confidence)^{1/n} \qquad \text{(Equation B-12)}$$

Where:

$$p_n = the\ percentile\ represented\ by\ the\ MOC\ (or\ MO\Delta T)$$

$$n = the\ number\ of\ samples$$
$$Confidence\ Level = 0.95\ for\ this\ analysis$$

In the event that a calculated RPM is less than one (1), the current Department policy is to default to a maximum value of one (1). The MEC is determined by multiplying the MOC by the RPM to derive the MEC:

$$MEC = (RPM) * (MOC) \qquad \text{(Equation B-13a)}$$

Or for Temperature Differential: $ME\Delta T = (RPM) * (MO\Delta T)$ (Equation B-13b)

If the RWC (acute or chronic) or RWT calculated by Equation B-4a or B-4b is found to exceed the respective criteria for the POC, then RP is confirmed and a WQBEL must be developed for that POC.

B.3 RPA CALCULATIONS FOR TOTAL RESIDUAL CHLORINE – OUTFALL 001A

The mixing zone analysis identified TRC as the driving parameter for the acute mixing zone in Outfall 001A where the Department authorizes an acute mixing zone with a DF of 7.5. Recall that Outfall 001A is a combination of internal Outfall 002A (STP and POW) and internal Outfall 002B (Domestic Wastewater). Therefore, to determine commingled concentration of TRC in outfall 001A, DEC used mass-balance (MB) to calculate a flow-weighted concentration (See Fact Sheet Table 3). Because there were less than 10 concentrations of TRC above detection (20 µg/L) in either data sets, a CV of 0.6 is used in the calculations. The following calculations demonstrate TRC has reasonable potential to cause, or contribute to, an excursion above WQC at the boundary of the acute mixing zone.

Number of effluent data (n) = 1151
MOC_{MB} = 30 µg/L
CV_{MB} = 0.6

to derive $\hat{\sigma}^2 and\ \hat{\sigma}$ via equations B-14a and B-14b below.

$$\sigma^2 = \ln(CV^2 + 1) \qquad \text{(Equation B-6a)}$$

$$\sigma = \sqrt{\sigma^2} \qquad \text{(Equation B-6b)}$$

$\hat{\sigma}^2 = 0.3075, and$
$\hat{\sigma} = 0.5545$

For a data set containing 1151 TRC samples:

$p_n = (1 - 0.95)^{1/1151}$
$p_n = 0.997$

Because the default CV of 0.6 was used for a small data set (< 10 detectable results) without a discernable distribution, the following equation applies based on an assumed lognormal distribution to calculate the RPM per the *RPA/WQBEL Guidance.*

$$RPM = \frac{\exp(Z_{99}\hat{\sigma}) - (0.5 * \hat{\sigma}^2)}{\exp(Z_{p_n}\hat{\sigma}) - (0.5 * \hat{\sigma}^2)}$$

$Z_{99} = 2.326\ for\ the\ 99\ percentile\ (Calculated\ with\ Excel\ Spreadsheet)$

$$Z_{99.7} = 2.755\ for\ the\ 99.8\ percentile\ (Calculated\ with\ Excel\ Spreadsheet)$$

Therefore referring to the RPM Equation (B-15) above:

$$RPM = \frac{\exp\left[(2.326 * 0.5545) - (0.5 * 0.3075)\right]}{\exp\left[(2.755 * 0.5545) - (0.5 * 0.3075)\right]}$$

$\boldsymbol{RPM = 0.788}$: $Therefore\ use\ the\ minimum\ RPM\ value = 1.0\ per\ the\ RPA/WQBELGuide.$

Using Equation B-13a for acute TRC,

$$MEC = \left(1.0 * 30\frac{\mu g}{L}\right) = 30\ \mu g/L\ (maximum\ projected\ effluent\ concentration)$$

However, recall that the compliance level for TRC is 100 µg/L and was used in the mixing zone, the applicable MEC is also 100 µg/L, and

$$AWC = 0.0\ \mu g/L$$

Then for $DF_{acute} = 7.5$

$$RWC_{acute} = \frac{100\ \mu g/L - 0\ \mu g/L}{7.5} + 0\frac{\mu g}{L} = 13.33\ \mu g/L$$

The RWC for TRC at the boundary of the acute mixing zone is above the acute water quality criteria of 13 µg/L. Therefore, TRC must have a WQBEL in the Permit.

B.4 RPA CALCULATIONS FOR TEMPERATURE DIFFERENTIAL (ΔT) OUTFALL 001A

The effluent characterization and mixing zone analysis identified ΔT as the driving parameter for the chronic mixing zone resulting in the Department authorizing a chronic mixing zone with DF of 37. Similar to TRC, the ΔT in Outfall 001A must be estimated using flow-weighted results from Fact Sheet Table 3. In addition, because there were data from both internal outfalls 002A and 002B used, a flow-weighted estimate of the CV is used.

The following calculations demonstrate that ΔT has reasonable potential to cause or contribute to an excursion above the temperature criteria at the boundary of the chronic mixing zone. Note that there is no acute temperature criterion and because the temperature differential is being evaluated, the applicable chronic criteria at the boundary of the chronic mixing zone is 1 degree Celsius (°C).

Number of effluent data (n) = 1510
$MO\Delta T_{MB}$ = 37.2°C
CV_{MB} = 0.1627

The CV_{MB} of 0.1627 was used to derive $\hat{\sigma}^2 and\ \hat{\sigma}$ via equations B-14a and B-14b below.

$$\sigma^2 = \ln\left(CV^2 + 1\right) \qquad \text{(Equation B-6a)}$$

$$\sigma = \sqrt{\sigma^2} \qquad \text{(Equation B-6b)}$$

$\hat{\sigma}^2 = 0.02613, and,$
$\hat{\sigma} = 0.1616$

For a data set containing 1510 ΔT samples:

$$p_n = (1 - 0.95)^{1/1510}$$

$$p_n = 0.998$$

Because the data has a lognormal distribution, the following equation applies to the RPM calculation per the *RPA/WQBEL Guidance.*

$$RPM = \frac{\exp\left(Z_{99}\hat{\sigma}\right) - (0.5 * \hat{\sigma}^2)}{\exp\left(Z_{p_n}\hat{\sigma}\right) - (0.5 * \hat{\sigma}^2)}$$

$Z_{99} = 2.326\ for\ the\ 99\ percentile\ (Calculated\ with\ Excel\ Spreadsheet)$

$Z_{99.8} = 2.881\ for\ the\ 99.8\ percentile\ (Calculated\ with\ Excel\ Spreadsheet)$

Therefore, referring to the RPM Equation (B-15) above:

$$RPM = \frac{\exp\left[(2.326 * 0.1616) - (0.5 * 0.0261)\right]}{\exp\left[(2.878 * 0.1616) - (0.5 * 0.0261)\right]}$$

$\boldsymbol{RPM = 0.915}$

$Therefore\ use\ the\ minimum\ RPM\ value = 1.0\ per\ the\ RPA/WQBELGuide.$

Using Equation B-13b for MEΔT,

$ME\Delta T = (1.0)(37.2\ °C) = 37.2\ °C\ (maximum\ projected\ effluent\ concentration)$

$For\ DF_{chronic} = 37$

$$RWC_{chronic} = \frac{37.2\ °C}{37.0} = 1.01\ °C$$

Because the RWC for ΔT at the boundary of the chronic mixing zone is above 1 °C, the Permit must have a WQBEL for ΔT.

APPENDIX C. EFFLUENT LIMITATIONS

The Alaska Department of Environmental Conservation (Department or DEC) prohibits the discharge of pollutants to waters of the United States (WOTUS) per Alaska Administrative Code (AAC) 18 AAC 83.015 unless first obtaining a permit issued by the Alaska Pollutant Discharge Elimination System (APDES) Program that meets the purposes of Alaska Statutes 46.03 and is in accordance with Clean Water Act (CWA) Section 402. Per these statutory and regulatory requirements, individual permit AK0038661 - Endicott Operations (Permit) includes effluent limitations that require the discharger to (1) meet standards reflecting levels of technological capability, (2) comply with 18 AAC 70 – Alaska Water Quality Standards (WQS), and (3) comply with other State requirements that may be more stringent.

The CWA requires that the limits for a particular parameter be the more stringent of either technology-based effluent limits (TBEL) or water quality-based effluent limits (WQBEL). TBELs are set via rule makings by the Environmental Protection Agency (EPA) in the form of Effluent Limitation Guidelines (ELGs) that correspond to the level of treatment that is achievable using available technology. In situations where ELGs have not been developed or have not considered specific discharges or pollutants, a regulatory agency can develop TBELs using best professional judgment (BPJ) on a case-by-case basis. A WQBEL is designed to ensure that WQS per 18 AAC 70 are maintained and the waterbody as a whole is protected. WQBELs may be more stringent than TBELs. In cases where both TBELs and WQBELs have been generated, the more stringent of the two limits will be selected as the final permit limit.

C.1 TECHNOLOGY BASED EFFLUENT LIMITS

C.1.1 TBELs based on ELGs

EPA has not established national ELGs for seawater treatment facilities for waterflood production. However, the Department is establishing TBELs developed using case-by-case BPJ as described in Section C.1.2.

C.1.2 TBELs based on Case-by-Case BPJ

Previous Permits issued by the Department included TBELs developed by the EPA for the 2009 permit using case-by-case BPJ on Outfall 002B (domestic wastewater). TBELs were established using case-by-case BPJ for fecal coliform (FC), total suspended solids (TSS), and 5-day biochemical oxygen demand (BOD_5). For fecal coliform bacteria, EPA imposed a maximum daily limit (MDL) of 400 fecal coliform counts per 100 milliliter (FC/100 ml) and an average monthly limit (AML) of 200 FC/100 ml based on past performance of the privately owned treatment system. The Permit also requires TSS and BOD_5 to have a MDL of 60 milligrams per liter (mg/L), and an AML of 30 mg/L. Per the 2009 Permit, the basis for these TBELs using case-by-case BPJ is 18 AAC 72 – Domestic Wastewater Disposal, specifically the requirement to achieve secondary treatment per 18 AAC 72.050 as defined by 18 AAC 72.990(79) and the definition of disinfect per 72.990(25). In addition to the MDL and AML for TSS and BOD_5, the definition of secondary treatment also included a weekly average of 45 mg/L for TSS and BOD_5 and a pH of no less than 6.0 standard units (SU) and no greater than 9.0 SU. The 45 mg/L limits were not applied to the 2009 or 2018 Permits as the MDL and AML are adequate to control these parameters in the discharge. DEC concurs with excluding the weekly limit.

For Outfall 002A (combined seawater treatment plant and potable water system), the EPA previously established a TBEL using case-by-case BPJ for total residual chlorine (TRC), which included an MDL of 250 micrograms per liter (µg/L) and an AML of 125 µg/L. This TBEL from the 2009 Permit was used in the 2018 Permit but is being discontinued in this reissuance. This determination was made based on the fact there is a dechlorination step in treatment prior to discharge and there have been no observed exceedances warranting these TBELs. Similar Seawater Treatment Plants (STPs) have dichlorination results that support this conclusion.

For Outfall 003A, DEC determined there are no TBELs required for the discharge of recirculating seawater after removal of detritus and debris.

C.2 WATER QUALITY BASED EFFLUENT LIMITS

C.2.1 Statutory and Regulatory Basis

Per 18 AAC 70.010, a person may not conduct an operation that causes, or contributes to, an excursion above the WQS. Per 18 AAC 83.435(a), an APDES permit must include conditions (e.g., WQBELs) in addition to, or more stringent than established TBELs as necessary to protect WQS. When evaluating if WQBELs are needed in addition to TBELs, the permitting authority conducts a reasonable potential analysis (RPA) based on pertinent pollutants of concern (POCs). Pertinent POCs are those that the Department considers as having the potential to exceed water quality criteria (WQC) at the point of discharge without a mixing zone or at the boundary of a mixing zone, if authorized. If a mixing zone is authorized, the Department may consider the dilution available in the receiving water in the analysis. Per 18 AAC 83.435(c), DEC must also use procedures that account for effluent variability (e.g., maximum expected effluent concentrations [MEC] and coefficient of variation), existing controls on point sources (e.g., treatment systems), and nonpoint sources of pollution (e.g., ambient receiving water concentrations). Often, it is necessary for DEC to consider the history of the permit limitations to avoid situations where a pollutant has demonstrated no reasonable potential in past issuance and there has been a frequency reduction granted. DEC does not apply a reasonable potential multiplier (RPM) to such data as it creates a limit where one is not warranted. The Department developed and implemented a *Reasonable Potential Analysis and Effluent Limits Development Guide, June 30, 2014* (RPA/WQBEL Guidance) and associated spreadsheet tool that were used in development of the WQBELs in the Permit.

C.2.2 Reasonable Potential Analysis

The *RPA/WQBEL Guidance* uses statistical methods to estimate MECs or, in the case of temperature in the Permit, maximum expected temperature difference between effluent and the ambient receiving water (MEΔT). Using a mass balance approach, the RPA projects the concentration, or temperature, at the boundary of a mixing zone if authorized. However, the RPA becomes complicated when multiple internal outfalls combine into a single discharge point. This complexity increases when there is no effluent data of the combined discharge to adequately characterize POCs. Such complications occurred in the RPA for Outfall 001A. In order to evaluate mixing zones and conduct an RPA, DEC developed a flow-weighted concentration for TRC and a flow-weighted temperature that estimates the characteristics of the combined flow in Outfall 001A. This approach allowed for evaluating and authorizing mixing zones and conducting an RPA.

Because DEC has authorized acute and chronic mixing zones, the mass balance procedure evaluates if the effluent may cause or contribute to an excursion above WQC at the boundary of either the acute or the chronic mixing zone. Based on the RPA summarized in Appendix B, the Department has determined there is a reasonable potential for the discharge to cause or contribute to an excursion above the chronic marine temperature criterion at the boundary of the chronic mixing zone and for TRC to exceed, or contribute to an exceedance of, the acute marine criterion at the boundary of the acute mixing zone for Outfall 001A. Accordingly, WQBELs for temperature (ΔT), and TRC are established per 18 AAC 83.435 to be consistent with the calculated available waste load allocation (WLA) and stringent enough to ensure compliance with WQS. No other parameters were determined to have reasonable potential.

C.2.3 Wasteload Allocations

In the context of this section, a WLA is the concentration of a pollutant that can be discharged to the receiving water and comply with the acute (a) or chronic (c) water quality criteria ($WQC_{a,c}$), accounting for ambient concentrations and authorized acute or chronic dilution factors ($DF_{a,c}$) in the mixing zones, if applicable. The Department has authorized a chronic dilution factor of 37 based on temperature and an acute dilution factor of 7.5 based on TRC. Specifically, the compliance level of 100 µg/L was used for TRC given there has been no observed concentrations higher for some time. Furthermore, no ambient concentrations of TRC are assumed due to the natural chlorine demand in marine waters. The WLA for TRC is calculated by rearranging Equation B-3a in Appendix B and substituting WQC for receiving water concentration and WLA for the maximum expected concentration. The resulting mass balance equation is:

$$WLA = DF_{a,c} \times WQC_{a,c}$$

Per the derivation of Equation B-3b in Appendix B, ΔT is the limited parameter and internally accounts for ambient temperatures of the receiving water. This requires the chronic WQC for temperature to be 1 degree Celsius (°C) and the WLA equation for temperature simplifies to:

$$WLA_{\Delta T} = DF_c \times 1$$

For TRC with an authorized acute dilution factor of 7.5, the appropriate WLA_a is 97.5 µg/L (7.5 x 13.0 µg/L). For ΔT, the WLA_c is 37 °C (37 x 1 °C).

C.2.4 WQBELs for Outfall 001A

C.2.4.1 Temperature Difference (ΔT) Outfall 001A

The RPA revealed that ΔT at Outfall 001A has reasonable potential to cause or contribute to an excursion above the chronic water quality criterion for temperature at the boundary of the chronic mixing zone requiring development of WQBELs. The MDL and AML are based on an MEΔT derived from mass balance (See Section 4.3) of the internal Outfalls 002A and 002B equaling 37.2 °C, a flow-weighted coefficient of variation (CV) of 0.1627, and an assumed four samples per month. The CV of 0.1627 was calculated using the flow-weighted CV of Outfalls 002A and 002B, following the same method used to calculate the flow-weighted values in Table 3. Because there are no acute criteria for temperature, there is also no acute long term average (LTA_a), so the LTA_c is the most limiting and is used in the derivation. Consistent with the 2018 Permit, DEC is establishing an MDL but not an AML as the MDL is adequate to control temperature in the discharge. The following steps were conducted for calculation of the MDL per

Part 5.4 (Permit Limit Derivation) of the EPA Technical Support Document and the DEC *RPA/WQBEL Guidance.*

Determine $\boldsymbol{LTA_s}$: the LTAs are calculated as follows:

$$LTA_{chronic} = WLA * [\exp((0.5\hat{\sigma}_4^2) - Z_{99}\hat{\sigma}_4)], where\ \sigma_4^2 = \ln(CV^2/4 + 1)$$

$$WLA = 37\ °C, CV = 0.1627\ ,\ Z_{99} = 2.326, \sigma_4 = 0.0812\ and\ \sigma_4^2 = 0.0066$$

$$\boldsymbol{LTA_{chronic}} = 31\ °C$$

Calculate the $\boldsymbol{MDL}$:

$$MDL = LTA_{chronic}\ [\exp(Z_{99}\sigma - 0.5\sigma^2)], where\ \sigma^2 = \ln(CV^2 + 1)]$$

$$CV = 0.1627\ ,\ Z_{99} = 2.326, \sigma = 0.1616, and\ \sigma^2 = 0.0261$$

$$\boldsymbol{MDL = 44.18\ °C}$$

$$\boldsymbol{Round\ down\ to\ 44\ °C}$$

The existing WQBEL for ΔT of **<u>43 °C</u>** is retained in the reissued Permit.

C.2.4.2 Total Residual Chlorine (TRC) Outfall 001A

The RPA revealed that only TRC has reasonable potential to cause or contribute to an excursion above the water quality criteria at the boundary of the acute mixing zone requiring development of WQBELs. The TRC MDL and AML are based the flow-weighted MEC equaling 30 µg/L but defaults to the compliance level of 100 µg/L, a default CV of 0.6 and an assumed four samples per month. The CV of 0.6 applies because there are only two observed TRC concentrations that were above the equipment detection limit of 20 µg/L. Note that because the mixing zone is sized based on 100 µg/L with a dilution factor of 7.5, the derivation of the limits must ensure the same WLA is applied even if the maximum observed TRC concentration are lower than the compliance level. The following steps were conducted for calculation of the MDL and AML per Section 5.4 (Permit Limit Derivation) of the EPA Technical Support Document and DEC's *RPA/WQBEL Guidance.*

Determine $\boldsymbol{LTA_s}$: the LTAs are calculated as follows:

$$LTA_a = WLA * [\exp(0.5\sigma^2 - Z_{99}\sigma)], where\ \sigma^2 = \ln(CV^2 + 1)$$

$$WLA_a = 97.5\frac{\mu g}{L}, CV = 0.6, Z_{99} = 2.326, \sigma = 0.5545\ and\ \sigma^2 = 0.3075$$

$$\boldsymbol{LTA_{acute}} = 31.31\ \mu g/L$$

$$LTA_{chronic} = WLA * [\exp(0.5\sigma_4^2 - Z_{99}\sigma_4)], where\ \sigma_4^2 = \ln(CV^2/4 + 1)$$

$$WLA_c = 277.5\ \frac{\mu g}{L}, CV = 0.6, Z_{99} = 2.326, \sigma_4 = 0.2936\ and\ \sigma_4^2 = 0.0862$$

$$\boldsymbol{LTA_{chronic}} = 146.36\ \mu g/L$$

Determine the most limiting (lowest)LTA

$$\boldsymbol{LTA_{acute}}\ is\ the\ most\ limiting = 31.31\ \mu g/L$$

Calculate the MDL and AML

$$\boldsymbol{MDL = LTA_a}[exp(Z_{99}\sigma - 0.5\sigma^2)], where\ \sigma^2 = ln(CV^2 + 1)$$

$$CV = 0.6, Z_{99} = 2.326, \sigma = 0.5545, and\ \sigma^2 = 0.3075$$

$$\boldsymbol{MDL = 97.5\ \mu g/L}$$

$$AML = LTA_{acute}\ [\exp(Z_{95}\sigma_4 - 0.5\sigma_4^2)], where\ \sigma_4^2 = \ln\left(\frac{CV^2}{4} + 1\right)$$

$$CV = 0.6, Z_{95} = 1.645, \sigma_4 = 0.2936, and\ \sigma_4^2 = 0.0862$$

$$\boldsymbol{AML = 48.6\ \mu g/L}$$

Applying the TRC Compliance Level: As stated previously, the maximum limit(s) for TRC is based on the compliance level of 100 µg/L. Hence, both the MDL and AML for TRC is 100 µg/L. The compliance level accounts for the highest reporting limit for TRC allowed for various methods available in 40 CFR 136 that could legally be used.

C.2.5 Other Numeric or Narrative Water Quality-Based Effluent Limits and Monitoring

In addition to the parameters evaluated in the RPA, the limited monitoring parameters in the existing Permit were reviewed to confirm they are appropriate for inclusion, should be modified, or removed from the reissued Permit as summarized below.

C.2.5.1 pH. The water quality criteria (WQC) for pH is no less than 6.5 SU and not greater than 8.5 SU. The pH WQC cannot be applied the same way that it was in the previous Permit. Internal Outfall 002B has a TBEL for pH developed using case-by-case BPJ per Section C.1.2 applied at the compliance point prior to commingling with Outfall 002A. DEC is applying the TBEL limit on Outfall 002B. However, there are no WQBEL limits on the combined Outfall 001A. This is due to the effluent being a possible mixture of seawater with domestic wastewater with significant buffer capacity. In addition, even if only Outfall 002B is discharged, the receiving water also has significant buffer capacity such that upon mixing in the mixing, pH will rapidly be buffered such that there is no possible excursion of pH at the boundary of either mixing zone.

C.2.5.2 Narrative Requirements. Residues include floating solids, debris, sludge, deposits, foam, or other objectionable conditions. Per 18 AAC 70.020(b)(20)(A)(ii), a discharge "may not, alone or in combination with other substances, cause a film, sheen, or discoloration on the surface of the water or adjoining shorelines; cause leaching of toxic or deleterious substances; or cause a sludge, solid, or emulsion to be deposited beneath or upon the surface of the water, within the water column, on the bottom, or upon adjoining shorelines." This narrative requirement is recognized as a goal for water quality protection as a whole but cannot be a point of compliance given recent court cases.

C.3 DETERMINATIN OF MOST STRINGENT EFFLUENT LIMITS AND COMPLIANCE POINTS

The 2018 Permit included three WQBELs: Two for ΔT and TRC at Outfall 001A and one for pH on Outfall 002B. The application of the more stringent water quality criteria over the TBEL developed using case-by-case BPJ on the internal Outfall 002B in the 2009 permit is appropriate because the criteria is

applied at the point of compliance without considering authorized dilution in a WLA. However, due to the requirement for WQBELs to satisfy WLAs when associated with an authorized mixing zone, it is inappropriate to establish the point of compliance for ΔT only on Outfall 001A. This is due to the mixing zone and the associated WLA being based on the combined flows of Outfall 002A and 002B and meeting the temperature criterion at the boundary of the authorized chronic mixing zone. Accordingly, the WQBEL for Outfall 001A is 43 °C and the point of compliance is the commingled discharge of Outfalls 002A and 002B downstream of their point of combining. In a similar manner, a WQBELs for TRC is also applied for Outfall 001A downstream of the point of combining flows from Outfall 002A and 002B. Because of insufficient characterization data, TRC concentration estimates were developed using flow-weighted averages based on mass-balance of the previous TRC TBELs and WQBELs. The MDL is 247 µg/L and the AML is 123 µg/L. These limits are more stringent than the TBELs established in the 2009 permit using case-by-case BPJ and WQBELs in the 2018 permit. Monitoring for TRC on Outfalls 002A and 002B is required in order to evaluate TRC more thoroughly during the next reissuance.

There are no other WQBELs to compare to TBELs. Therefore, the TBELs on Outfall 002A include only flow. For Outfall 002B, the TBELs include flow, secondary treatment standards of TSS and BOD_5, and FC bacteria as the most stringent limits.

APPENDIX D. MIXING ZONE ANALYSIS CHECKLIST

Mixing Zone Authorization Checklist

based on Alaska Water Quality Standards (2003)

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 presented in the Alaska Administrative Code (AAC) at 18 AAC 70.240 are satisfied, as well as provide justification to authorize a mixing zone in an Alaska Pollution Discharge Elimination System 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.

Criteria	Description	Resources	Regulation	Mixing Zone Approved Y/N
Size	Is the mixing zone as small as practicable? - Applicant collects and submits water quality ambient data for the discharge and receiving waterbody (e.g. flow and flushing rates)	Yes •Technical Support Document for Water Quality Based Toxics Control •Water Quality Standards Handbook • DEC's RPA Guidance • EPA Permit Writers' Manual Fact Sheet Section 3.3.1	18 AAC 70.240 (k)	Y

Criteria	Description	Resources	Regulation	Mixing Zone Approved Y/N
Technology	Were the most effective technological and economical methods used to disperse, treat, remove, and reduce pollutants? **If yes**, describe methods used in Fact Sheet at Section 3.3.2. Mixing Zone Analysis. Attach additional documents if necessary.	Yes Fact Sheet Section 3.3.2	18 AAC 70.240 (c)(1)	Y
Low Flow Design	**For river, streams, and other flowing fresh waters.** - Determine low flow calculations or documentation for the applicable parameters. Justify in Fact Sheet	N/A – Marine Discharge	18 AAC 70.240(1)	
Existing use	Does the mixing zone…			
	(1) partially or completely eliminate an existing use of the waterbody outside the mixing zone? **If yes, mixing zone prohibited.**	No Fact Sheet Section 3.3.3	18 AAC 70.240(c)(2)	Y
	(2) impair overall biological integrity of the waterbody? **If yes, mixing zone prohibited.**	No Fact Sheet Section 3.3.3	18 AAC 70.240(c)(3)	Y
	(3) provide for adequate flushing of the waterbody to ensure full protection of uses of the waterbody outside the mixing zone? **If no, then mixing zone prohibited.**	Yes Fact Sheet Section 3.3.3	18 AAC 70.240(b)(1)	Y

Criteria	Description	Resources	Regulation	Mixing Zone Approved Y/N
	(4) cause an environmental effect or damage to the ecosystem that the Department considers to be so adverse that a mixing zone is not appropriate? **If yes, then mixing zone prohibited.**	No Fact Sheet Section 3.3.3	18 AAC 70.240(m)	Y
Human consumption	Does the mixing zone…			
	(1) produce objectionable color, taste, or odor in aquatic resources harvested for human consumption? **If yes, mixing zone may be reduced in size or prohibited.**	No Fact Sheet Section 3.3.4	18 AAC 70.240(d)(6)	Y
	(2) preclude or limit established processing activities of commercial, sport, personal use, or subsistence shellfish harvesting? **If yes, mixing zone may be reduced in size or prohibited.**	No Fact Sheet Section 3.3.4	18 AAC 70.240(c)(4)(C)	Y
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 Fact Sheet Section 3.3.5	18 AAC 70.240(e) and (f)	Y

Criteria	Description	Resources	Regulation	Mixing Zone Approved Y/N
	If yes, mixing zone prohibited.			
Human Health	Does the mixing zone…			
	(1) contain bioaccumulating, bioconcentrating, or persistent chemical above natural or significantly adverse levels? **If yes, mixing zone prohibited.**	No Fact Sheet Section 3.3.6	18 AAC 70.240(d)(1)	Y
	(2) contain chemicals expected to cause carcinogenic, mutagenic, tetragenic, or otherwise harmful effects to human health? **If yes, mixing zone prohibited.**	No Fact Sheet Section 3.3.6	18 AAC 70.240(d)(2)	Y
	(3) Create a public health hazard through encroachment on water supply or through contact recreation? **If yes, mixing zone prohibited.**	No Fact Sheet Section 3.3.6	18 AAC 70.240(c)(4)(C)	Y
	(4) meet human health and aquatic life quality criteria at the boundary of the mixing zone? **If no, mixing zone prohibited.**	Yes Fact Sheet Section 3.3.6	18 AAC 70.240(c)(4)(B)	Y

Criteria	Description	Resources	Regulation	Mixing Zone Approved Y/N
	(5) occur in a location where the Department determines that a public health hazard reasonably could be expected? **If yes, mixing zone prohibited.**	No Fact Sheet Section 3.3.6	18 AAC 70.240(c)(4)(B)	Y
Aquatic Life	Does the mixing zone…			
	(1) create a significant adverse effect to anadromous, resident, or shellfish spawning or rearing? **If yes, mixing zone prohibited.**	No Fact Sheet Section 3.3.7	18 AAC 70.240(e) and (f)	Y
	(2) form a barrier to migratory species? **If yes, mixing zone prohibited.**	No Fact Sheet Section 3.3.7	18 AAC 70.240(c)(4)(G	Y
	(3) fail to provide a zone of passage? **If yes, mixing zone prohibited.**	No Fact Sheet Section 3.3.7		Y
	(4) result in undesirable or nuisance aquatic life? **If yes, mixing zone prohibited.**	No Fact Sheet Section 3.3.7	18 AAC 70.240(d)(5)	Y
	(5) result in permanent or irreparable displacement of indigenous organisms? **If yes, mixing zone prohibited.**	No Fact Sheet Section 3.3.7	18 AAC 70.240(c)(4)(E)	Y
	(6) result in a reduction in fish or shellfish population levels? **If yes, mixing zone prohibited.**	No Fact Sheet Section 3.3.7	18 AAC 70.240(c)(4)(D)	Y

Criteria	Description	Resources	Regulation	Mixing Zone Approved Y/N
	(7) prevent lethality to passing organisms by reducing the size of the acute zone? **If yes, mixing zone prohibited.**	No Fact Sheet Section 3.3.7	18 AAC 70.240(d)(7)	Y
	(8) cause a toxic effect in the water column, sediments, or biota outside the boundaries of the mixing zone? **If yes, mixing zone prohibited.**	No Fact Sheet Section 3.3.7	18 AAC 70.240(c)(4)(A)	Y
Endangered Species	Are there threatened or endangered (T/E species) at the location of the mixing zone?If yes, are there likely to be adverse effects to T/E species based on comments received from United States Fish & Wildlife Service or National Oceanic & Atmospheric Administration. If yes, will conservation measures be included in the permit to avoid adverse effects? **If yes, explain conservation measures in Fact Sheet. If no, mixing zone prohibited.**	Fact Sheet Section 3.3.8 and Section 8.0	Program Description, 6.4.1 #5 18 AAC 70.240(c)(4)(F)	Y

APPENDIX E. NONCOMPLIANCE NOTIFICATION FLOW CHART

E.1: Noncompliance Notification Flow Chart