ALASKA POLLUTANT DISCHARGE ELIMINATION SYSTEM
PERMIT FACT SHEET – PRELIMINARY DRAFT
Individual Permit: **AK0029840 – Hilcorp Alaska, LLC, Prudhoe Bay Seawater Treatment Plant**

DEPARTMENT OF ENVIRONMENTAL CONSERVATION
Wastewater Discharge Authorization Program
555 Cordova Street; Anchorage, AK 9950

Public Comment Period Start Date: **TBD**
Public Comment Period Expiration Date: **TBD**

Alaska Online Public Notice System

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Division of Water; Wastewater Discharge Authorization Program
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Proposed issuance of an Alaska Pollutant Discharge Elimination System (APDES) permit to:

HILCORP ALASKA, LLC.

For wastewater discharges from:

Prudhoe Bay Seawater Treatment Plant
Stefansson Sound, Beaufort Sea

The Alaska Department of Environmental Conservation (Department or DEC) proposes to reissue APDES individual Permit AK0029840 – Hilcorp Alaska, LLC., Prudhoe Bay Seawater Treatment Plant (Permit). The Permit authorizes and sets conditions on the discharge of pollutants from this facility to waters of the United States. In order to ensure protection of water quality and human health, the Permit places limits on the types and amounts of pollutants that can be discharged from the facility and outlines best management practices to which the facility must adhere.

This fact sheet explains the nature of potential discharges from the Prudhoe Bay Seawater Treatment Plant and the development of the Permit including:

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

Public Comment

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

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

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

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

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

The proposed Final Permit will be made publicly available for a five-day applicant review. The applicant may waive this review period. After the close of the proposed Final Permit review period, the Department will make a final decision regarding permit issuance. A Final Permit will become effective 30 days after the Department's decision, in accordance with the state's appeals process at 18 AAC 15.185 – 18 AAC 15.340.

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

Informal Review and Adjudicatory Hearing

A person authorized under a provision of 18 AAC 15 may request an informal review of a contested decision by the Division Director in accordance with 18 AAC 15.185 and/or an adjudicatory hearing in accordance with 18 AAC 15.195 – 18 AAC 15.340. See DEC's "Appeal a DEC Decision" web page https://dec.alaska.gov/commish/review-guidance/ for access to the required forms and guidance on the appeal process. Please provide a courtesy copy of the adjudicatory hearing request in an electronic format to the parties required to be served under 18 AAC 15.200. Requests must be submitted no later than the deadline specified in 18 AAC 15.

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

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1.0 INTRODUCTION. On August 30, 2022, 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 AK0029840 – HAK, Prudhoe Bay Seawater Treatment Plant (Permit). Information contained in this Fact Sheet is based on information in both applications. The permit and mixing zone applications include a request for the Department to develop an APDES individual permit to continue the authorization of discharges to Stefansson Sound, Beaufort Sea, from the HAK Prudhoe Bay Seawater Treatment Plant (STP or facility), located on the North Slope on the shore of Stefansson Sound, Beaufort Sea (See A.1).

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

Name of Facility:	Prudhoe Bay STP
APDES Permit Number:	AK0029840
Facility Location:	Stefansson Sound, Beaufort Sea, Alaska
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	Receiving Water	Latitude	Longitude
001	Strainer Backwash	Stefansson Sound	70.416512	-148.528981

See Appendix A, Figure A-1, Figure A-2, and Figure A-3 for the location of the facilities and discharges.

1.2 Authority. The National Pollutant Discharge Elimination System (NPDES) Program regulates the discharge of wastewater to the waters of the United States (WOTUS). For WOTUS under jurisdiction of the State of Alaska, the NPDES Program is administered by DEC as the APDES Program. This is the second reissuance of the Permit under authority of the APDES Program.

Clean Water Act (CWA) Section 301(a) 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 discharges from the facility was issued by the Environmental Protection Agency (EPA) to Atlantic Richfield Company (ARCO) in December 1980 and became effective in January 1981. The Permit was subsequently reissued to ARCO in October 1986, December 1992, and March 2000; the Permit was transferred to British Petroleum Exploration Alaska (BPXA) in July 2000. The Permit was subsequently reissued to BPXA in November 2004, March 2011, and January 2018 (existing Permit). HAK acquired BPXA's North Slope oil production facilities, including the STP, in 2020. In August 2022, HAK submitted a timely completed application for permit reissuance to DEC, and the existing Permit was administratively extended prior to expiration on December 31, 2022.

Earlier permits through the 2004 timeframe included discharges from a marine life return system (MLRS) and treated domestic effluent wastewater. Previously issued permits covered discharges from a multi-media filtration system that underwent periodic backwashing that included the use of biocides (sodium hypochlorite and glutaraldehyde compounds). By the issuance of the 2018 permit, the multi-media filtration system had been decommissioned and treated domestic wastewater was rerouted to the Seawater Injection Plant (SIP) for disposal. In the event the SIP cannot be used, treated domestic wastewater would be trucked to the Prudhoe Bay Operations Center-Wastewater Treatment Plant for disposal under general permit authorization AKG570006. Meanwhile, the MLRS was decommissioned after studies showed there would be no negative impacts to biological organisms if discontinued. As a result of eliminating these previous discharges, the existing Permit now only covers Outfall 001 - Strainer Backwash System as the only discharge.

2.0 BACKGROUND

2.1 Facility Information. The STP is located at the terminus of the West Dock Causeway on the mainland shoreline at the western end of Stefansson Sound in the Beaufort Sea, immediately west of Prudhoe Bay, Alaska (*Appendix A,* Figure A-2). The STP strains, heats, bio-treats, and de-aerates seawater drawn from Stefansson Sound for unit-wide waterflood activities and other industrial uses. Waterflood is injected into producing formations to maintain pressures and allow for enhanced oil recovery from production wells. Accordingly, treated waterflood is piped from the STP to the SIP and other infrastructure. The facility also provides water for the HAK Grind and Inject Class I Underground Injection Control Facility and treated water for fire control. The facility has a firewater distribution system that serves onsite process areas and the living quarters. The firewater is untreated and unheated seawater, distributed by pumps that require weekly testing. During weekly tests, the fire control test water is pumped to the inlet reservoir feeding the STP. If used to respond to a fire alarm or for fire suppression, the firewater from the STP process area would flow through floor drains and be pumped to a sump tank for ultimate disposal through underground injection. An STP Process Flow Diagram is presented in *Appendix A,* Figure A-4.

Seawater destined for use as waterflood is strained to remove particulate suspended solids, detritus, and other naturally occurring material to protect downstream treatment systems and to prevent blocking the pore spaces in oil reservoir rock that could restrict the flow of oil into a producing well. The strained waterflood is then heated to enhance treatment performance and ultimate injection into the SIP. Heating reduces viscosity and aids in stripping dissolved oxygen during the de-aeration process. Oxygen is a corrosive agent to carbon steel that makes up the pipelines used at the SIP. Levels of oxygen in raw

seawater can be as high as 15 milligrams per liter (mg/L) in winter months and the de-aeration process reduces oxygen levels down to 20 micrograms per liter (µg/L) to protect piping from corrosion. In addition, waterflood is treated with sodium hypochlorite and glutaraldehyde biocides to prevent biological growth that could clog formation pore spaces, as well as hinder sulfate-reducing bacteria that can produce hydrogen sulfide. The de-aerated waterflood with biocides and corrosion inhibitors is never discharged.

Strainer backwash is discharged to the receiving water of Stefansson Sound as one continuous discharge through Outfall 001 and is the only effluent to be routinely discharged from the STP under current and projected operations. The discharge is monitored daily for total residual chlorine (TRC) via grab samples collected and analyzed by STP personnel using laboratory equipment calibrated to detect down to 10 µg/L. Similarly, effluent temperature is continuously monitored along with the ambient receiving water at the intake reservoirs to provide paired data sets for reporting temperature differential. Although temperature is measured continuously, flow is at times not discontinuous. The startup after a period of no flow typically represents the greatest effluent temperature as the water within the facility equilibrates with the ambient temperature of the facility itself.

Treatment chemicals are typically not used upstream of the strainer backwash discharged to Outfall 001 and downstream chemically treated waterflood could only enter the waste stream as a result of drain-back for maintenance or repair activities. Although not typically used, HAK requested in their application the provisional use of clarifying agents should it become necessary in the future to modify treatment to meet new waterflood specifications. In 2011, a sodium hypochlorite injection port was relocated to mitigate the possibility of sodium hypochlorite leaking back into the intake reservoir (*Appendix A,* Figure A-4). However, small amounts of sodium hypochlorite can show up in the strainer backwash during warm startup. Warm startup is accomplished by routing a side stream of strained seawater through a heat exchanger and back to the inlet reservoirs to maintain ice free conditions. Sodium hypochlorite that is injected ahead of the heat exchanger to prevent biofouling becomes mixed with seawater in the inlet reservoirs, and results in low concentrations of TRC being discharged with the strainer backwash along with an incidental thermal load. Hence, TRC also may be prevalent in the effluent after a period of no effluent flow. Regardless, temperature, TRC, and chronic whole effluent toxicity (WET) from potential use of unidentified treatment chemicals are the primary parameters in the strainer backwash effluent.

The offshore discharge for Outfall 001 is through a buried line oriented in a due north direction that terminates 340 meters (m) offshore of the end of the West Dock Causeway in 4.0 – 4.5 m of water with a 64 m (210 foot [ft]) multi-port diffuser. The diffuser consists of 22 ports spaced 10 ft (3.05 m) apart with 4 inch (11.43 centimeter) diameter nozzles and 1 ft (0.305 m) risers that are oriented 20 degrees from horizontal in the vertical direction. Alternating nozzles are oriented horizontally into and away from the prevailing current along the diffuser.

During maintenance and repairs to the STP or SIP, it may be necessary to drain-back the SIP piping or conduct hydrostatic testing on pipeline repairs. However, if chemical use cannot be ceased prior to drain-back, discharge of the drain-back is prohibited. Only untreated seawater can be used for hydrostatic testing because treated drain-back water contains biocides, oxygen scavengers, or corrosion inhibitors that are not limited by the Permit. HAK previously considered discharging drain-back water to the intake reservoirs of the STP to mix with intake seawater and cycled through the STP, essentially

diluting the drain-back as it becomes part of the backwash through Outfall 001. However, HAK has determined that drain-back cannot be adequately controlled to prevent flooding in the intake reservoirs.

DEC concurs that draining the waterflood pipeline should be considered as a contingent discharge to the Beaufort Sea in the Permit. However, this contingent discharge must not contain the waterflood conditioning chemicals discussed above and be limited in duration (e.g., approximately 48 hours or less) to ensure the discharge would not cause, or contribute to, and 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 of heated drain-back poses no reasonable potential to cause, or contribute to, an excursion of applicable water quality criteria. See Sections 4.2.5 and 7.3.3 for more information.

2.2 Strainer Backwash System Effluent Characterization. Review of discharge monitoring report (DMR) data from January 2018 through May 2022 included the following parameters: flow reported in million gallons per day (mgd), pH in standard units (SU), TRC in µg/L, temperature in °C, and chronic WET in chronic toxicity units (TU_c). For temperature, the marine water quality criterion is based on the difference between the effluent and the ambient receiving water conditions represented by the intake reservoir, where the resulting discharge may not cause the weekly ambient receiving water temperature to increase more than 1°C. To provide a direct comparison with marine water quality criteria and limits from the existing Permit for temperature, DEC uses delta temperature (ΔT) as the parameter of concern, which is the effluent temperature minus the simultaneous receiving water ambient temperature. Only positive ΔT values were analyzed because zero and negative values do not result in lowering the water quality of the receiving water per 18 AAC 70.020(b)(22). Table 1 compares available data to existing maximum daily limits (MDLs), average monthly limits (AMLs), and applicable water quality criteria per 18 AAC 70 – Alaska Water Quality Standards (WQS).

(Table 1: Outfall 001 Effluent Characterization (January 2018 - May 2022)
is located on the following page.)

Table 1: Outfall 001 Effluent Characterization (January 2018 - May 2022)

Parameter (Units)	Data Set	Existing Limits		Marine Criteria		Observed Range (Low – High, Avg) [1]
		MDL	AML	Acute	Chronic	
Flow (mgd)	1612	12.4	---	---	---	0.0 – 7.2, 4.7
ΔT (°C) [2]	1602	20.0	---	---	1 [3]	0.1 – *18.8*, *1.05*
pH (SU)	214	6.0 < pH < 9.0		6.5 ≤ pH ≤ 8.5		***5.92*** - 8.2, 7.3 [4]
TRC (µg/L) [5]	1019	60.0 (100)	41.0 (100)	13	7.5	< 10.0 – *100* [6], 10.3
WET (TU_C)	0 [7]	Report		N/A	1.0	N/A

Notes:

1. Values that exceed water quality criteria are shown in italics. Values that exceed existing limits are presented in bold.
2. Δ T (°C) is effluent temperature minus ambient receiving water temperature. Only positive values were evaluated.
3. The marine water quality criterion for temperature requires no more than a 1°C increase above weekly ambient temperature such that any ΔT greater than 1°C, exceeds the water quality criterion.
4. Median used in lieu of mean.
5. Despite the calculated limits for the MDL and AML are 60 and 41 µg/L, respectively, the compliance level is 100 µg/L. Although the applicant claimed several detectable TRC results may not be valid, DEC used this data based on the possibility of being representative of warm start up conditions (See Section 2.1).
6. Although the value of 100 µg/L exceeded both the MDL and AML, it does not result in a limit violation because the compliance level for TRC is set to 100 µg/L (See Section 2.3)
7. Chronic WET monitoring is contingent on chemical use. Given no chemicals were used during the permit term, no WET tests were performed (See Section 2.3).

Based on the effluent characterization, ΔT and TRC are the driving parameters for the chronic and acute mixing zones, respectively, and require reasonable potential analysis (RPA) and water quality-based effluent limits (See Appendix B and Appendix C). Chronic WET and pH are included in the mixing zones but are not the driving parameters (See Section 3.3).

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 January 2018 through May 2022 listed the following three limit exceedances for Outfall 001:

- December 2019 - TRC (100 µg/L);
- October 2020 - pH (5.92 SU); and
- January 2020 – TRC (100 µg/L).

Although ICIS showed violations for TRC in December 2019 and January 2020, these were errors based on how the limits were established in ICIS; DEC set up the calculated limits in ICIS rather than the compliance level. Although the MDL and AML in the Permit are 60 and 41 µg/L, respectively, the compliance level referenced in the Permit is 100 µg/L. Hence, these are false positive violations based on how DEC set up the limits in ICIS. DEC is correcting this by also presenting the limits as the compliance level to prevent false positive violations in the next permit term. The pH exceedance in October 2020 occurred during an offline period simultaneous with high TSS in the intake water. Hence, the reported value occurred during an upset condition and once routine operations were established the

next day, HAK came back into compliance with pH. Note that per 40 CFR 401.17, a pH excursion less than 60 minutes for an individual occurrence and less than 7 hours and 26 minutes over a calendar month does not constitute a violation when monitoring is continuous and the pH limitation is a technology based effluent limitation (TBEL). More information is needed to correctly assess if there was an actual excursion of pH criteria to determine if a violation occurred.

2.3.2 Non-Receipt Violations. There were numerous DMR non-receipt violations for chronic WET listed in ICIS. However, these non-receipt violations are invalid because chronic WET monitoring under the Permit is conditional based on the use of chemicals. Monitoring was not required because no chemicals were used to trigger chronic WET monitoring and the permittee entered the correct "no discharge indicator code" (NODI Code) on the DMRs. However, ICIS still erroneously flagged violations. DEC will evaluate this issue for the reissued permit.

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, APDES permits must include conditions to 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 criterion 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.

Stefansson Sound is not included in the most recently EPA-approved *Alaska's Final 2024 Integrated Water Quality Monitoring and Assessment Report,* February 6, 2025 as 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 water body. Stefansson Sound is a subset of the Beaufort Sea which is classified as a Category 2 waterbody on the aforementioned report.

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 mixing zone(s) in an APDES permit. HAK submitted a mixing zone application on August 30, 2022, requesting that the existing 40 m by 104 m chronic mixing zone for temperature and the 10 m by 74 m acute mixing zone for TRC associated with Outfall 001 be reauthorized based on what was authorized in the existing Permit.

DEC has evaluated paired data sets that account for seasonal temperature differences (i.e., ΔT), using the Cornell Mixing Zone Expert System model program (CORMIX) version 12.0.

In summary, the Department used CORMIX to determine the sizes of the acute and chronic mixing zones based upon the following:

- The critical ambient conditions are represented by under ice, unstratified conditions and the 10th percentile current of 0.03 meters per second (m/s);
- Temperature was the pollutant of concern (POC) requiring the most dilution for chronic conditions. Evaluating temperature as the difference between the effluent temperature (ΔT) and that of the ambient receiving water at the time of discharge was found to be a better comparison of the data to the numeric limit of no increase above 1°C above the ambient temperature;
- Using the same critical receiving water conditions, the Department evaluated an acute mixing zone for TRC;
- The mixing zones were modeled using the maximum expected concentrations of 100 µg/L for TRC and 16.8°C for ΔT, applicable water quality criteria, and critical receiving water conditions; and
- Based on the above, the driving dilution factors are 16.75 (chronic) based on DT and 7.5 (acute) for TRC.

Low outfall velocity combined with low under-ice current conditions causes unstable mixing in the near field region. Due to this, CORMIX may overestimate the acute mixing zone dimensions. Although the dimensions may be an overestimate of where the required dilution is met, the Department has determined this conservative approach ensures dilution is met within the mixing zone. The result of the mixing zone analysis is the authorization of a rectangular chronic mixing zone extending from the seafloor to the top of the unfrozen water column that is 192 m long in a direction perpendicular to the diffuser by 170 m wide centered on the 64 m diffuser. The authorized chronic dilution factor is 16.75, which approximately matches the maximum ΔT from the paired temperature data set. The Department is also authorizing a rectangular acute mixing zone extending from the seafloor to the top of the unfrozen water column that is 40 m long by 79 m wide centered on the diffuser and an acute dilution factor of 7.5 with TRC as the driving parameter.

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. Per 18 AAC 70.240(k), the Department determined that the size of the mixing zones for the wastewater discharge is appropriate and are as small as practicable. The size of the mixing zones are a small fraction of the area, or width of Stefansson Sound. Using the 10th percentile current velocity of

0.03 m/s, a drifting organism can traverse the acute mixing zone in approximately 11 minutes, which is below the 15-minute duration typically used to evaluate lethality. Applicable water quality criteria protecting human health and aquatic life are met at the boundary of the chronic mixing zone. Given the low concentrations of pollutants, dispersion of the discharge plume, and the absence of sensitive aquatic resources within the vicinity, toxic effects in the water column, sediment, or biota outside the chronic mixing zone will not occur.

3.3.2 Technology. 18 AAC 70.240(c)(1) requires the Department 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 described in 18 AAC 70.240(c)(1)(A), (B), and (C) as follows:

1. 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;
2. Minimum treatment standards in 18 AAC 72.050; and
3. 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). There are no ELGs that apply to the Permit. However, similar to the existing Permit, the Permit includes a TBEL developed using case-by-case BPJ for pH. The Department determines 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. The application of 18 AAC 72.050 is not pertinent to the Permit as the discharge does not include domestic wastewater sources. 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 the existing uses of Stefansson Sound. Water quality criteria are developed to ensure protection of all existing uses. Hence, if the water quality criteria are being met, then the uses are being protected. 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 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 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: spawning redds, Arctic grayling, northern pike, rainbow trout, brook trout, cutthroat trout, whitefish, sheefish, Arctic char (Dolly Varden), burbot, and landlocked coho, king, and sockeye salmon. The 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 Outfall 001 (see section 2.2), there is no indication that the discharge includes pollutants that could bioaccumulate, bioconcentrate, or persist above natural levels in the sediment, receiving water, or biota. The Department has determined the discharge is 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 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. 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 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 001 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 Alaska Statute 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, water quality-based effluent limits (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.

The Permit includes numeric WQBELs and Best Management Practices (BMPs) for temperature, TRC, and a TBEL using case-by-case BPJ for pH for strainer backwash from Outfall 001. The following sections provide a summary of derived limits (see Appendix C – Basis For Effluent Limitations for additional details).

4.1.1 Technology Based Effluent Limits. As discussed in Appendix C – Basis For Effluent Limitations, TBELs are either established using case-by-case BPJ or set via EPA rule makings in the form of ELGs that correspond to the level of treatment achievable in selected industries using available treatment technology. There are no ELGs applicable to the discharge authorized under the Permit due to the absence of national ELGs for seawater treatment facilities. The existing Permit established a TBEL through BPJ for pH. DEC has evaluated effluent characteristics and available treatment technologies and has concluded that the TBEL limit of greater than 6.0 and less than 9.0 ($6.0 < pH < 9.0$) is appropriate. Because the TBEL for pH exceeds water quality criteria, it has been included in the authorized chronic mixing zone for Outfall 001.

4.1.2 Water Quality Based Effluent Limits.

4.1.2.1 Strainer Backwash (Outfall 001). The Department has determined, based on available data, that there is reasonable potential for the discharge of strainer backwash to exceed numeric water quality criteria for temperature, pH, and TRC at the point of discharge. As discussed in Section 2.2, only

temperature and TRC are evaluated in the RPA for limit derivation purposes as the driving parameters for the chronic and/or acute mixing zones, respectively (See Appendix C).

4.1.2.2 **Reasonable Potential Procedure for Strainer Backwash (Outfall 001).** Temperature and TRC are the driving parameters for the chronic mixing zone and acute mixing zones, respectively. In Appendix C, the Department determined there is reasonable potential for TRC and ΔT to cause, or contribute to, an excursion of water quality criteria for temperature and TRC. In Appendix C, the Department developed the following WQBELs for ΔT and TRC.

4.1.2.3 **WQBELs for Strainer Backwash (Outfall 001).** The following summarizes the derivation of WQBELs (see Appendix C for calculations).

TRC WQBELs: The calculated MDL is 97.5 µg/L and the AML is 58 µg/L. However, both of these limits are below what is quantifiable using the least sensitive, but appropriate, EPA-approved methods in 40 CFR 136. Therefore, DEC establishes the minimum level (ML) for TRC of 100 µg/L as the compliance level for these WQBELs. Consequently, the MDL and AML are set to 100 µg/L to avoid complications with compliance (See Section 2.3.1). Note that because the compliance level remains unchanged from the existing Permit, there is no backsliding even though the calculated WQBELs based on the data are higher. Furthermore, because the facility uses laboratory equipment calibrated to 10 µg/L for TRC, rules for reporting and averaging are necessary (See Section 4.2.3).

Temperature Differential (ΔT): The WQBEL derivation resulted in an MDL of 29° C for ΔT. However, the existing limit of 20°C for ΔT is being retained from the 2018 Permit given at no time did the facility discharge greater than 17°C during the term of the existing Permit. Note too that the maximum observed temperature during the permit term (16.8 ° C) occurred upon initiation of discharge after a no flow condition when the seawater held in facility piping can become equilibrated to facility room air temperature, representing the maximum possible effluent temperature. For example, the 20° C MDL would be equivalent to facility air temperature of 68° F. 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 limits are only applicable when there is a discharge occurring even though the initiation of discharge may include temperatures equilibrated during a shutdown. Should the initial discharge be above the limit, the permittee can demonstrate that the maximum temperature quicky subsides such that a violation of WQS in the receiving water can be dismissed given the criterion is based on a weekly average ambient temperature increase.

pH: The WQBEL based in WQS is more stringent than the BPJ TBEL, requiring pH to be no less than 6.5 and no greater than 8.5 SU ($6.5 \leq pH \leq 8.5$) at all times. However, the Department is using BPJ to impose less stringent pH limits as an end of pipe TBEL ($6.0 < pH < 9.0$) to help ensure the facility maintains compliance. Applying the dilution in the chronic mixing zone to pH ensures the water quality criteria for pH will be met within the mixing zone when the TBEL is applied at the end of pipe. The pH is expected to meet water quality criteria in close proximity to the outfall due to the high buffering capacity of marine waters.

4.2 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 Outfall 001.

The Permit requires the following limitations and monitoring requirements per Table 2

Table 2: Effluent Limits and Monitoring Requirements for Strainer Backwash (Outfall 001)

Parameter (Units)	Effluent Limits		Monitoring Requirements	
	MDL	AML	Frequency	Type
Flow (mgd)	12.4	Report	Continuous	Meter
pH (SU) [4.2.1]	6.0 < pH < 9.0		1/Week	Meter or Grab
ΔT (°C) [4.2.2]	20	N/A	1/Week	Meter or Grab
TRC (µg/L) [4.2.3]	100.0	100.0	1/Week	Meter or Grab
Chronic WET (TU_c) [4.2.3, 4.2.4, and 4.2.6]	Report		Annual	Grab
Note: Table notes refer to the Sections below this table.				

4.2.1 pH Conditions. The pH shall be maintained at values greater than 6.0 and less than 9.0. The permittee must report the monthly maximum and monthly minimum on the DMR.

4.2.2 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. In addition to submitting monthly DMRs, the permittee must record the weekly maximum ΔT for the month on the DMR and submit the daily data with the next application for reissuance. If the temperature data is recorded more frequently, all data shall be submitted with the next application for reissuance.

4.2.3 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. Although the MDL and AML calculated from data are 97.5 and 58 µg/L, respectively, the TRC compliance level for the MDL and AML are set at 100 µg/L. Because the facility currently uses laboratory equipment calibrated to detect down to 10 µg/L, the following rules for reporting and averaging apply. If equipment modifications result in different calibrations, the new detectable value must be used instead of 10 µg/L.

If the facility equipment is calibrated to 10 µg/L (lowest achievable detection), then:

1. Report < 10 on the DMR when the equipment reads < 10:
2. Report < 100 on the DMR when the equipment reading is between 10 and 100;
3. Report on the DMR the actual value when the equipment reports ≥ 100.
4. For averaging, use 0 for < 10; use 20 for readings between 10 and 100; and use the actual value when ≥ 100.

Data submitted to DEC for the next permit application must represent the actual readings from the equipment and not DMR entries.

4.2.4 Chronic WET Monitoring Conditions. Chronic WET monitoring per Section 4.2.6 is required if chemical additives (e.g., biocides or clarifying agents) are used upstream of the strainer such that chemicals are in the discharge. However, this requirement does not pertain to use of hypochlorite during periods of warm startup.

4.2.5 Notifications.

Chemical Use Notification: The permittee must notify DEC of the intent to inject additional treatment chemicals ahead of the strainers. The injection of treatment chemicals ahead of the strainers without prior notification to the Department is prohibited. However, this requirement does not pertain to hypochlorite injected into side-streams returned to the intake bay during periods of warm startup. Nor does this notification pertain to chemicals injected into the finished waterflood downstream of the strainer (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 specific violations of MDLs and AMLs, per 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 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 – Noncompliance Notification Flow Chart).

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.

4.2.6 Chronic WET Monitoring. If chemical additives are used upstream of the strainer and discharged, the permittee must conduct chronic WET monitoring per the following requirements.

4.2.6.1 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).

4.2.6.2 Monitoring Frequency. The Permit specifies annual chronic WET testing of both vertebrate and invertebrate species. If the Permittee plans to use chemical additives in the clarifying process, the Permittee must also plan to collect chronic WET samples immediately once effective dosing rates are established for chemical injection.

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

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 percent (%) 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 TU_C 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). DEC may provide written direction to modify the dilution series based on the chemical use notification or the permittee may request written approval from DEC to modify the dilution series based on previous test results to bracket toxicity endpoints in subsequent tests.

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 do 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.

4.2.6.4 WET Reporting. The following details WET reporting requirements.

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 4.2.7.2 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:

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

Note: The use of any clarifying agent triggers chronic WET monitoring per Section 4.2.6 to provide characterization data based on whichever chemical is used. In addition, the permittee must develop and implement a chemical-dosing matrix to optimize the use of coagulants and other clarifying agents as a BMP specific to outfall 001 (See Section 7.3). 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.

4.2.7 Monitoring and Reporting Requirements.

4.2.7.1 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.

4.2.7.2 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”.

4.2.7.3 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.

4.2.7.4 Additional Information on EDMS Upgrades

DEC intends to make EDMS the sole reporting portal at some indefinity time in the future. DEC will keep permittees apprise as this transition nears. 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).

4.2.7.5 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 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 existing 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 Section 402(o), and CWA Section 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 (if applicable).

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 case-by-case TBELs developed using BPJ. 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.

Data from Outfall 001 collected during the previous Permit term was evaluated by the Department using the *Reasonable Potential Analysis and Effluent Limits Development Guide, June 30, 2014 (RPA/WQBEL Guidance)*, and resulted in a WQBEL for ΔT and TRC that could be construed as less stringent than limits for temperature in the existing 2018 Permit.

Although the MDL for TRC appears to have increased from 61 to 97.5 µg/L and the AML from 41 to 58 µg/L, the 100 µg/L compliance level in both the existing and reissued permit remains unchanged. Accordingly, there is no backsliding for the TRC limits.

Although the MDL calculated using new data for ΔT is less stringent than in the previous Permit, the existing limit is being retained based on concurrence from the permittee that the more stringent limit is attainable; the maximum observed ΔT during the previous permit term was 16.8°C; whereas, the retained limit is 20°C. Therefore, all of the effluent limitations, standards, and conditions are at least as stringent as the 2018 Permit and no backsliding has occurred in the reissued Permit.

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 APDES Permit AK0029840.

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).

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. 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 finding are summarized below.

6.3 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 reviewed water quality data, environmental monitoring studies, and information on existing uses in the vicinity of Discharge 001 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. The criteria are developed to protect these 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).

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.

6.4 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 existing effluent limitations are being retained. Adjusting the TRC limit to reflect the compliance level is for clarity only and does not change how the TRC limit was implemented from the 2018 Permit (See Section 5.0). Therefore, the Tier 1 Antidegradation Analysis satisfies the requirements of 18 AAC 70.015 and 0.016.

7.0 OTHER PERMIT CONDITIONS.

7.1 Standard Conditions. Appendix A of the Permit contains standard regulatory language that is to be included in APDES permits. Most of these requirements are based on the 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 Project Plan. The permittee is required to develop procedures to ensure that the monitoring data submitted are accurate and to explain data anomalies if they occur. The permittee is required to update the Quality Assurance Project Plan (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.

7.3 Best Management Practices Plan. A BMP Plan is a collection of controls and housekeeping measures which are intended to minimize or prevent the generation and the potential release of pollutants from a facility to the 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 Section 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 may include certain generic BMPs as well as specific BMPs for controlling pollutants (See Sections 7.3.2 and 7.3.3. For this Permit, DEC requires specific BMPs for situations where the permittee needs to drain-back waterflood from SIP pipeline for maintenance and repairs or hydrostatic testing of facility pipelines.

7.3.1 Implementation and Maintenance of the BMP Plan. The permittee must develop a BMP Plan that achieves the broad objectives outlined in Section 7.3. The BMP Plan shall be located at the permitted facility and made available for Department review upon request. Electronic copies are appropriate so long as they are available during inspections. A qualified person must amend the BMP Plan whenever there is a change in the facility or in the operation of the facility that materially increases the generation of pollutants, their release, or potential release to receiving waters. Changes to the BMP Plan shall be consistent with the objectives and specific requirements as described in the Permit. Facility and environmental managers must review all changes to the BMP Plan. The BMP Plan must include the standard components per Section 7.3.2 and specific requirements in Section 7.3.3, to the extend they are applicable.

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 these tasks have been completed within the required time frame prior to implementing. Hence, the date of the certification determines compliance

with this requirement. This initial and all subsequent certifications shall be retained onsite with the BMP Plan and made available to DEC upon request. At a minimum, the BMP Plan must be reviewed annually by the permittee and a BMP Committee to result in certification that the annual review has been completed by January 31st of each year of operation under the Permit. The certification must be dated and signed by each BMP Committee member.

7.3.2 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 should 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 current permit term.
- 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 wastes are 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.

7.3.3 Specific BMP Requirements. In addition to the generic BMPs listed in Section 7.3.2, DEC requires that specific BMPs be included in the BMP Plan for preventing treatment chemicals in waterflood that could be drained back and discharged to marine waters to facilitate pipeline maintenance and repairs. In addition, the BMP need to address the timing and duration of the drain-back water to ensure there is no excursion of the weekly temperature criterion per Sections 2.1 and 4.1.2.3. Successful implementation of this specific BMP will prevent reasonable potential for temperature and chronic WET negating the need for monitoring of temperature and chronic WET during drain back to marine receiving water.

8.0 OTHER LEGAL REQUIREMENTS.

8.1 Endangered Species Act (ESA). 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 information from NFMS and FWS to inform permit development. The Department communicated with NOAA who informed the Department of the availability of websites to review. The Department reviewed the Alaska Protected Resources Division Species Distribution Mapper for habitat ranges of NOAA managed species. 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. Based on these maps, the following threatened or endangered species may occur in Stefansson Sound, Prudhoe Bay, Alaska at the vicinity of the discharge: Bearded Seal (*Erignathus barbatus)*, Ringed Seal (*Phoca hispida*), Bowhead Whale (*Balaena mysticetus*), Spectacled Eider (*Somateria fischeri*), and Polar Bear (*Ursus maritimus*).

8.2 Essential Fish Habitat. Essential fish habitat (EFH) includes 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) require federal agencies to consult with NOAA Fisheries when a proposed 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 information September 29, 2022 to inform permit development. The Department did not receive a response. Therefore, used the NMFS interactive map to identify EFH in the vicinity of the discharge for Arctic Cod (Arctogadus glacialis), Saffron Cod (Eleginus gracilis), and Arctic Snow Crab (Chionoecetes opilio).

No other North Pacific marine fish species were listed on the NMFS interactive website as having EFH in the general area of the discharges.

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's Final 2024 Integrated Water Quality Monitoring and Assessment Report,* February 6, 2025.
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, *Annual Report*, 2014.
6. Alaska Oil and Gas Association. *Economic Impact Report – The Role of the Oil and Gas Industry in Alaska's Economy*, May 2014.
7. Alaska Pollution Discharge Elimination System Discharge and Monitoring Report, 2013 – 2015.
8. Barnes, P.W. et al. *Ecosystems and Environments*, Academic Press, Inc. 1984.
9. Environmental Protection Agency. *Prudhoe Bay Seawater Treatment Plant 1994, 1995, 1996 Environmental Monitoring Program*, Kinnetic Laboratories Inc. January 1995, 1996, and 1997.
10. National Oceanic and Atmospheric Administration, 2025 *EFH Mapper. N.p.,n.d.* Web June 2, 2025.
11. National Oceanic and Atmospheric Administration, 2025 *MMPA Mapper. N.p.,n.d.* Web June 2, 2025.
12. U.S. Fish and Wildlife Service, 2025 *IPaC. N.p.,n.d.* Web June 2, 2025.

Appendix A – FIGURES

Figure A-1: Vicinity Map Location of Prudhoe Bay Seawater Treatment Plant

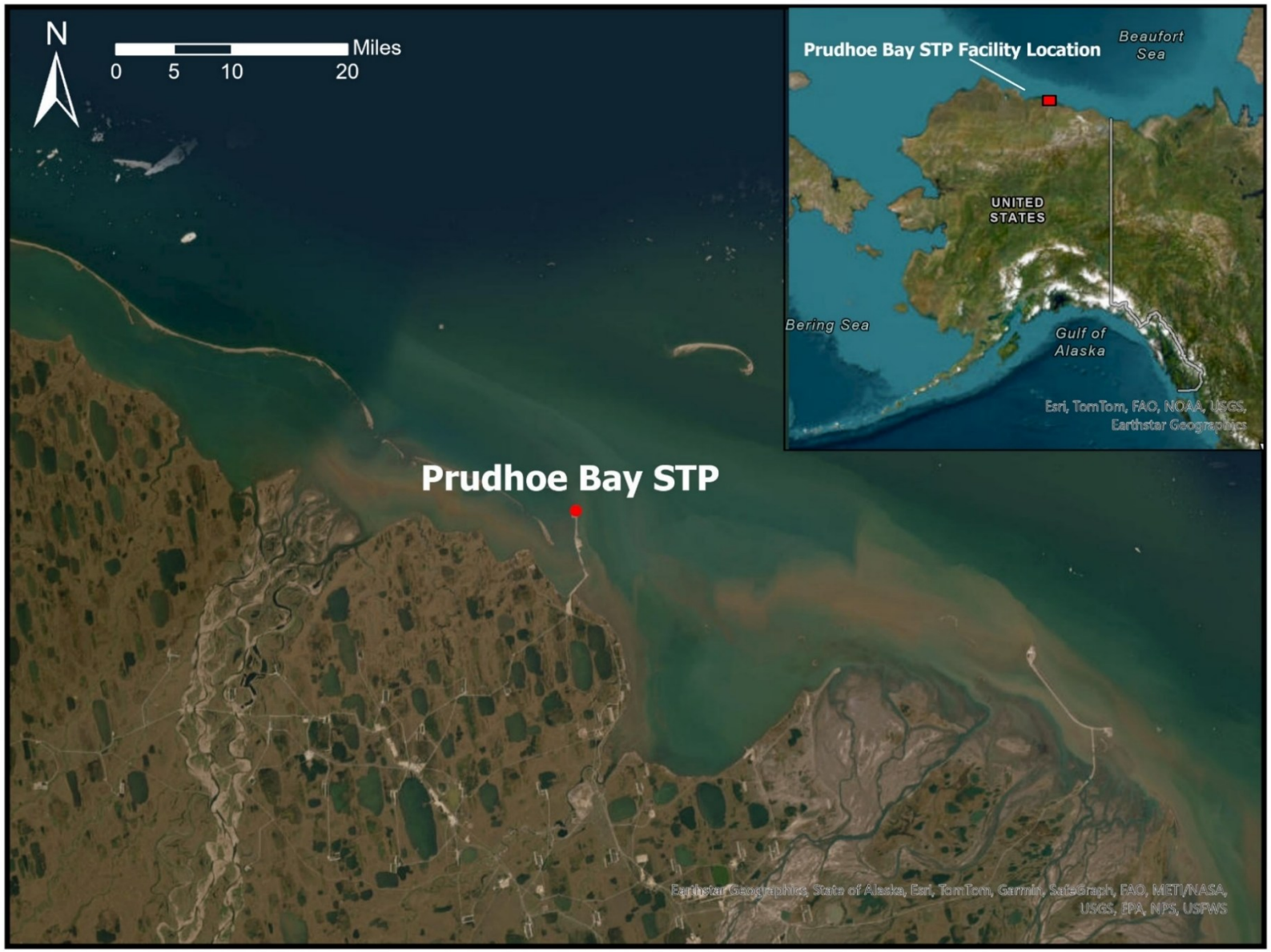


Figure A-2: HAK -Prudhoe Bay Seawater Treatment Plant Stefansson Sound Outfall 001

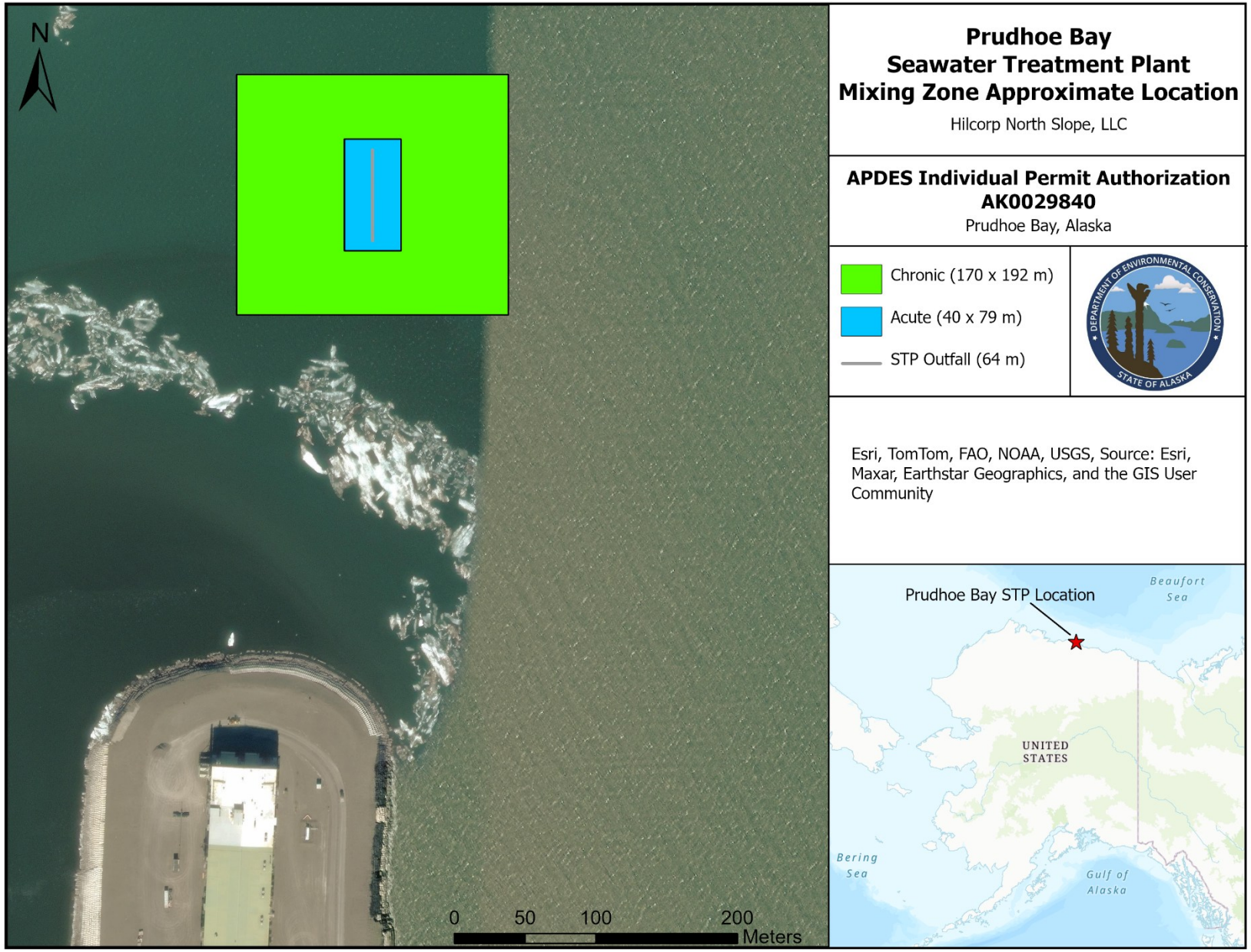
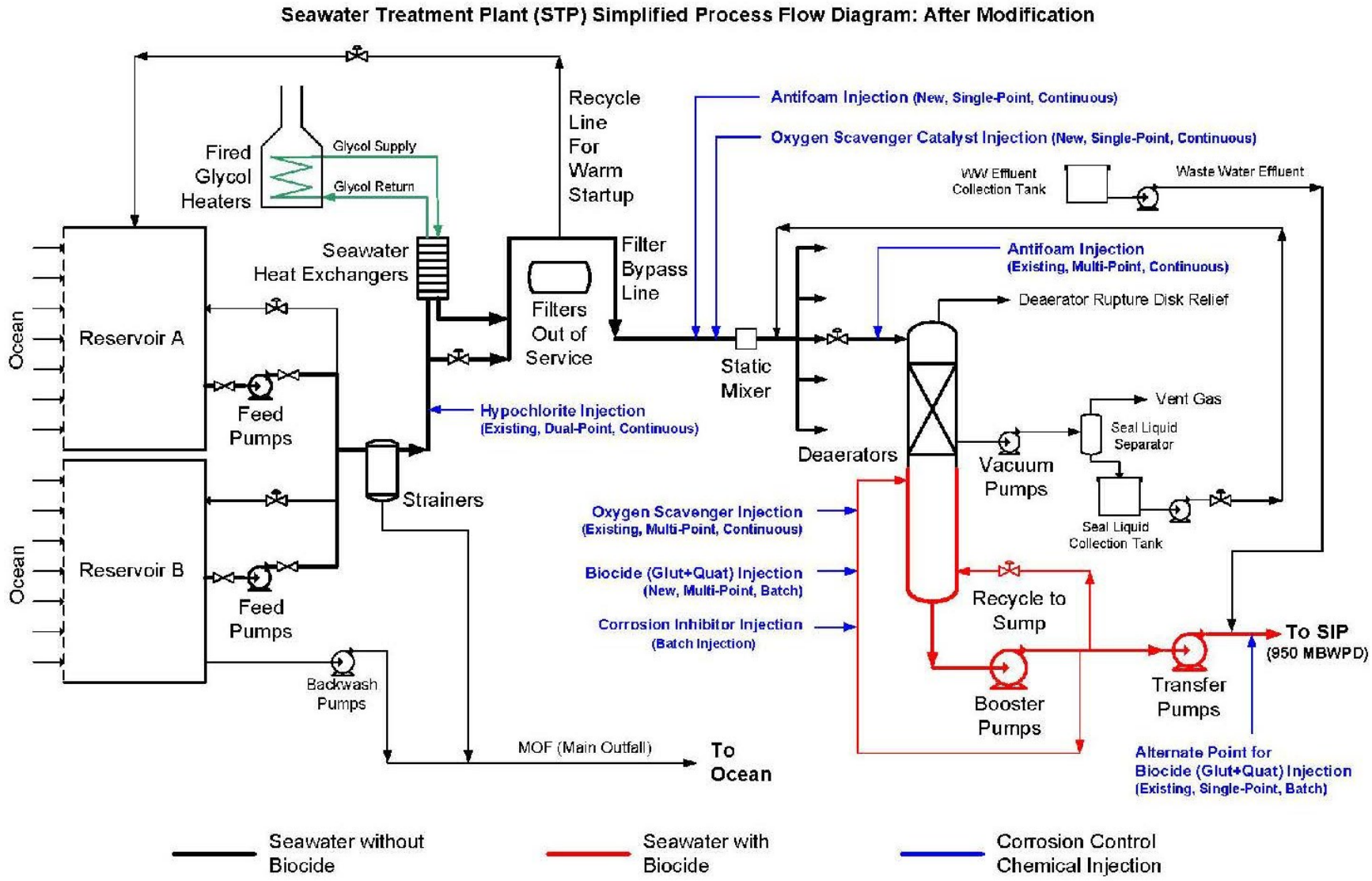


Figure A-3: Prudhoe Bay Seawater Treatment Plant

Figure A-4: Seawater Treatment Plant (STP) Simplified Process Flow Diagram: After Modification



Appendix B – REASONABLE POTENTIAL DETERMINATION.

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. If the discharge violates the Alaska 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 water quality criteria for each parameter that is a Pollutant of Concern (POC). A POC is determined by 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 water quality criteria 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 this discharge to marine waters and summarizes the calculations. To illustrate the unique procedures and calculations, both POCs (total residual chlorine (TRC) and temperature (ΔT) 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 ΔT [MEΔT])
AWC = Ambient waterbody concentration, taken as the 85th percentile of data or 15 percent of the chronic criteria if no ambient data is 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:

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

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

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

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 water quality criteria at the boundary, the water quality criteria (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 water quality criteria 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…

$$DF = ME\Delta T \quad \text{Equation B-3b}$$

where,

$ME\Delta T$ = Maximum Effluent Temperature – Ambient Receiving Water Temperature

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

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

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

$$RWC = \frac{ME\Delta T}{DF} + 1 \quad \text{Equation B-4b}$$

B.2 MAXIMUM PROJECTED EFFLUENT CONCENTRATION

To calculate the MEC (or MEΔT), the Department uses the *RPA/WQBEL Guide* 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 Guide* 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: $\hat{\mu}_y = estimated\ mean = \frac{\sum[x_i]}{k}, 1 \le i \le k$

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

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

$k = number\ of\ samples$

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-9) is followed by equations (B-10 and B-11) for data with a lognormal distribution is as follows:

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

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

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

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

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

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

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

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

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:

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

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

The mixing zone analysis identified TRC as the driving parameter for the acute mixing zone. The Department authorizes an acute mixing zone with a DF of 7.5 and a chronic mixing zone with a DF of 16.75. The following calculations demonstrate TRC has reasonable potential to exceed, or contribute to an exceedance, at the boundary of the acute mixing zone.

Number of effluent data (n) = 1,019
MOC = 100 µg/L
The data was found to have a Normal distribution with:
$\hat{\mu_n}$ = 10.27, and
$\hat{\sigma}$ = 4.099
CV = 0.3991

For a data set containing 1,019 TRC samples:

$$p_n = p_{1019} = (1 - 0.95)^{1/1019}$$
$$= 0.9971$$

The following equation applies to the RPM calculation for normal distributions per the *RPA/WQBEL Guide*.

$$RPM = \frac{\widehat{\mu_n} + z_{99}\,\hat{\sigma}}{\widehat{\mu_n} + z_{Pn}\,\hat{\sigma}}$$

Were:

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

$Z_{99.7}$= 2.755 for the 99.71 percentile (Calculated with Excel Spreadsheet);

Therefore,

$$RPM = \frac{10.27 + (2.326\ x\ 4.099)}{10.27 + (2.755\ x\ 4.099)} = 0.981$$

RPM = 0.918: *Therefore use the minimum RPM value = 1.0 per the RPA/WQBEL Guide.*

Using Equation B-13a for acute and chronic TRC,

MEC = (1.0)(100 µg/L) = 100 µg/L (maximum projected effluent concentration),

AWC = 0.0

For DF_{acute} = 7.5:

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

For $DF_{chronic}$ = 16.75:

$$\mathrm{RWC_{chronic}} = \frac{100\ \mathrm{ug/L_e} - 0\ \mathrm{ug/L}}{16.75} + 0\ \mathrm{ug/L} = 5.97\ \mu\mathrm{g/L}$$

The RWC for TRC at the boundary of 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)

The mixing zone analysis identified ΔT as the driving parameter for the chronic mixing zone resulting in the Department authorizing a chronic mixing zone with a DF of 16.75. The following calculations demonstrate that ΔT has reasonable potential to exceed, or contribute to an exceedance, of temperature criteria at the boundary of the chronic mixing zone. Note that there is no acute temperature criteria 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) = 1,602
MOΔT = 16.8°C
The data was found to have a Lognormal distribution with:
$\hat{\mu_n}$ = 1.050, and
$\hat{\sigma}$ = 2.020
CV = 1.93

For a data set containing 1,602 ΔT samples:

$$p_n = p_{1602} = (1 - 0.95)^{1/1602}$$

$$= 0.9981$$

Because the data was found to have a Lognormal distribution, the following equation applies to the RPM calculation per the *RPA/WQBEL Guide*.

$$RPM = \frac{\exp(z_{99}\,\hat{\sigma}_y - 0.5\hat{\sigma}_y^2)}{\exp(z_{Pn}\,\hat{\sigma}_y - 0.5\hat{\sigma}_y^2)}$$

Where:

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

Zp_n = 2.900 for the 99.81th percentile (Calculated with Excel Spreadsheet)

Therefore,

$$RPM = \frac{\exp((2.326\ x\ \ 0.852) - (0.5\ x\ 0.7259))}{\exp((2.88 \text{ x } 0.852) - (0.5\ x\ 0.7259))} = 0.624$$

RPM = 0.624: *Therefore use the minimum RPM value = 1.0 per the RPA/WQBEL Guide.*

Using Equation B-13b for MEΔT,

MEΔT = (1.0)(16.8°C) = 16.8°C (maximum projected effluent concentration),

For $DF_{chronic}$ = 16.75:

$$RWC_{chronic} = \frac{16.8\ °C}{16.75} = 1.003°C$$

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

Appendix C – BASIS FOR 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 (AS) 46.03 and is in accordance with Clean Water Act (CWA) Section 402. Per these statutory and regulatory requirements, individual permit AK0029840 – Hilcorp Alaska, LLC , Prudhoe Bay Seawater Treatment Plant (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

The EPA has not established national ELGs for seawater treatment facilities for waterflood production. However, the Department is retaining the TBELpreviously developed using case-by-case BPJ for pH. The Permit requires pH to be maintained at values greater than 6.0 and less than 9.0 standard units (SU) ($6.0 < pH < 9.0$).

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, a violation of 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 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.2.1.1 Reasonable Potential Analysis

The RPA procedures use 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. 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 water quality criteria at the boundary of either the acute or the chronic mixing zone. Based on the RPA summarized in Appendix C, 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 total residual chlorine (TRC) at the boundary of the acute mixing zone. Accordingly, WQBELs for ΔT and TRC are established per 18 AAC 83.435 to be consistent with the calculated available wasteload allocation (WLA) and stringent enough to ensure compliance with WQS. No other parameters were determined to have reasonable potential.

C.2.1.2 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. No ambient concentrations of TRC are assumed due to the natural chlorine demand in marine waters. The WLA 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:

$$WLA_{TRC} = DF_{a,c} \times WQC_{a,c}$$

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°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 micrograms per liter (µg/L; 7.5 x 13.0 µg/L). For ΔT, the WLA_c is 16.75 degrees Celsius (°C).

C.2.1.3 Total Residual Chlorine

The RPA revealed that only TRC has reasonable potential to cause, or contribute to, an excursion above the acute water quality criteria at the boundary of the acute mixing zone requiring development of WQBELs. The TRC maximum daily limit (MDL) and average monthly limit (AML) are based on maximum expected effluent concentration equaling the compliance level of 100 µg/L, a coefficient of variation (CV) of -0.447 and an assumed four samples per month. The calculated MDL is 69 µg/L and AML is 39 µg/L, and therefore both the MDL and AML are equal to the compliance level of 100 µg/L. 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 Long Term Averages (LTAs): The LTAs are calculated as follows:

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

  WLA = 97.5 µg/L, CV = -0.3991, $Z_{99} = 2.326$, $\sigma = 0.3844$ and $\sigma^2 = 0.1478$

  LTA_{acute} = 42.93 µg/L

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

  WLA = 125.6 µg/l, CV = -0.3991, $Z_{99} = 2.326$, $\sigma_4 = 0.1976$ and $\sigma_4^2 = 0.0390$

  $LTA_{chronic}$ = 80.90 µg/L

- **Determine the most limiting (lowest) LTA**

  LTA_{acute} is most limiting = 42.93 µg/L

- **Calculate the MDL and AML**

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

  CV = -0.3991, $Z_{99} = 2.326$, $\sigma = 0.3844$ and $\sigma^2 = 0.1478$

  MDL = 97.5 µg/L

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

  CV = -0.3991, $Z_{99} = 2.326$, $\sigma_4 = 0.1976$ and $\sigma_4^2 = 0.0390$

  AML = 58.27 µg/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.2.1.4 Temperature Difference (ΔT)

The RPA revealed that ΔT has reasonable potential to cause, or contribute to, an excursion of water quality criteria at the boundary of the chronic mixing zone requiring development of WQBELs. The MDL and AML are based on maximum expected effluent concentration equaling 16.8 °C, a calculated CV of 1.93, and an assumed four samples per month. Because there is no acute criteria for temperature, there is also no LTA_a so LTA_c is the most limiting and is used in the derivation. Consistent with the existing Permit, DEC is establishing an MDL but not an AML. The resulting MDL is 29°C. The following steps were conducted for calculation of the MDL per Section 5.4 (Permit Limit Derivation) of the EPA Technical Support Document and the DEC *RPA/WQBEL Guidance.*

- **Determine LTAs:** The LTAs are calculated as follows:

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

  $WLA = 16.75°C$, $CV = 1.93$, $Z_{99} = 2.326$, $\sigma_4 = 0.8113$ and $\sigma_4^2 = 0.6582$

  $LTA_{chronic} = 3.527$ °C

- **Calculate the MDL**

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

  $CV = 1.93$, $Z_{99} = 2.326$, $\sigma = 1.246$, and $\sigma^2 = 1.553$

  MDL = 29.45 °C

  Applying the existing limit: **MDL = 20** °C

As stated previously, the maximum limit for ΔT of 20 °C is being retained and therefore all of the effluent limitations, standards, and conditions are at least as stringent as the 2018 Permit.

C.3 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.3.1 pH The water quality criteria for pH is no less than 6.5 SU and not greater than 8.5 SU. Outfall 001 has a TBEL developed using case-by-case BPJ per Section TECHNOLOGY BASED EFFLUENT LIMITSDEC is retaining the TBEL limit on Outfall 001. The water quality criteria for pH can be

exceeded within the mixing zone but not beyond the end of pipe TBEL for pH (6.0 < pH < 9.0). The receiving water also has significant buffer capacity such that upon mixing in the mixing zone, pH will rapidly be buffered such that there is no possible excursion of pH at the boundary of either mixing zone.

C.3.2 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.

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
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 Mixing Zone Analysis. Attach additional documents if necessary.	Yes Fact Sheet Section 3.3.2	18 AAC 70.240 (c)(1)	Y

Criteria	Description	Resources	Regulation	Mixing Zone Approved Y/N
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 proposed mixing zone? **If no, then mixing zone prohibited.**	Yes Fact Sheet Section 3.3.3	18 AAC 70.240(b)(1)	Y
	(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
	Does the mixing zone…			

Criteria	Description	Resources	Regulation	Mixing Zone Approved Y/N
Human consumption	(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? **If yes, mixing zone prohibited.**	No Fact Sheet Section 3.3.5	18 AAC 70.240(e) and (f)	Y
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

Criteria	Description	Resources	Regulation	Mixing Zone Approved Y/N
	(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
	(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

Criteria	Description	Resources	Regulation	Mixing Zone Approved Y/N
	(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
	(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

Criteria	Description	Resources	Regulation	Mixing Zone Approved Y/N
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 Sections 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

Figure E-1: Noncompliance Notification Flow Chart