ALASKA POLLUTANT DISCHARGE ELIMINATION SYSTEM

PERMIT FACT SHEET – FINAL

Permit Number: AK0053708

Niblack Project Wastewater Treatment Facility

DEPARTMENT OF ENVIRONMENTAL CONSERVATION

Wastewater Discharge Authorization Program

555 Cordova Street

Anchorage, AK 99501

Public Comment Period Start Date: March 19, 2015
Public Comment Period Expiration Date: April 17, 2015
Alaska Online Public Notice System

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

NIBLACK PROJECT, LLC C/O HEATHERDALE RESOURCES LTD.

For wastewater discharges from

Niblack Project Wastewater Treatment Facility
Niblack Anchorage
Prince of Wales Island

The Alaska Department of Environmental Conservation (the Department or DEC) has issued an APDES individual permit (permit) to Niblack Project LLC. 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 discharges from the Niblack Project Wastewater Treatment Facility and the development of the permit including:

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

Appeals Process

The Department has both an informal review process and a formal administrative appeal process for final APDES permit decisions. An informal review request must be delivered within 15 days after receiving the Department's decision to the Director of the Division of Water at the following address:

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

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

See http://www.dec.state.ak.us/commish/InformalReviews.htm for information regarding informal reviews of Department decisions.

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

Commissioner
Alaska Department of Environmental Conservation
410 Willoughby Street, Suite 303
Juneau AK, 99811-1800.

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

Documents are Available

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

Alaska Department of Environmental Conservation Wastewater Discharge Authorization Program 610 University Avenue Fairbanks, AK 99709 (907) 451-2136	Alaska Department of Environmental Conservation Wastewater Discharge Authorization Program 555 Cordova Street Anchorage, AK 99501 (907) 269-6285	Alaska Department of Environmental Conservation Wastewater Discharge Authorization Program 410 Willoughby Avenue, Suite 310 Juneau, AK 99801 (907) 465-5180

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1.0 APPLICANT

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

Name of Facility:	Niblack Project Wastewater Treatment Facility
APDES Permit Number:	AK0053708
Facility Location:	Moira Sound, Prince of Wales Island
Mailing Address:	1040 W. Georgia Street, 15th Floor, Vancouver, BC V6E 4H8 Canada
Facility Contact:	Mr. Patrick Smith

Figures in Appendix A of this Fact Sheet show the location of the Niblack Project and the discharge location.

2.0 FACILITY INFORMATION

2.1 Background

Heatherdale Resources Ltd, are 100% owners of Niblack Project LLC, an Alaskan company which owns the Niblack Project (Niblack), and operates a wastewater treatment facility at the project site located in Niblack Anchorage, in Moira Sound, on Prince of Wales Island.

The Niblack adit is currently comprised of approximately 2500 feet, expandable to 6000 feet, of underground drift development (adit) to provide access for continued exploration drilling on the Lookout and Mammoth massive sulfide mineral zones. Metals in the massive sulfide mineralization include copper, zinc, gold, and silver. Non-acid generating (NAG) rock is disposed of on the hill slope adjacent to the portal. The estimated quantity of NAG rock is 46,600 cubic yards. According to the Plan of Operations, potentially acid generating (PAG) rock will temporarily be stored on site in a 25,000 square-feet, lined, temporary pad. The estimated quantity of PAG rock is 14,300 cubic yards. Wastewater is generated from both the adit and the run-off from the PAG pile.

Effluent from the wastewater treatment ponds was originally discharged into a gravity feed land application treatment system. When temperatures fall below freezing the water in the lines froze and prevented the water from discharging into the land application treatment system. Due to problems with the freezing, including ice blockage, overflows, and human safety problems, the effluent will now be diverted to an outfall and discharged into the marine waters of the Niblack Anchorage. Construction of the outfall line is expected to be completed in 2015. Accordingly, this is the first APDES permit issued to the facility.

2.2 Process Description

Groundwater from the adit is discharged into a two-pond treatment system with each pond measuring 76 feet x 76 feet x 8 feet deep. Runoff water from the PAG/ML rock pile is discharged into a separate treatment pond. Both of these treatment pond systems then flow into the discharge pipe and through the outfall into Niblack Anchorage.

The system is designed to treat a maximum flow rate of 300 gallons-per-minute (GPM) of water. Based on measured average flows, approximately 97 percent (291 GPM) of this flow is groundwater from the adit and direct precipitation into the settling ponds; the remaining 3

percent (9 GPM) of the flow is from run-off from the PAG pile. A maximum of 300 GPM of effluent will be treated and discharged from an outfall located at Latitude 55.0665 and Longitude -132.1447.

3.0 EFFLUENT LIMITS AND MONITORING REQUIREMENTS

3.1 Basis for Permit Effluent Limits

The Clean Water Act (CWA) requires that the limits for a particular pollutant be the more stringent of either technology-based effluent limits (TBELs) or water quality-based effluent limits (WQBELs). TBELs are set according to the level of treatment that is achievable using available technology. WQBELs are set as the permit limit if they are more stringent than TBELs to ensure that the receiving water quality is protected.

The Environmental Protection Agency (EPA) promulgated effluent limitation guidelines (ELGs) for the ore mining and dressing point source category at 40 CFR Part 440, which include TBELs for this point source category. Subpart J is applicable to Copper, Lead, Zinc, Gold, Silver, and Molybdenum Ores Subcategories.

The ELGs applicable to a new source, which is a source that has commenced construction after the ELGs were established on December 3, 1982, are applicable to discharges from active mines. Since Niblack is an inactive exploration project, these ELGs are not directly applicable; however the Department exercised its best professional judgment (BPJ) in establishing TBELs based on the previous referenced active mine ELGs. Table 1 identifies the parameters and TBEL's required as a minimum for this permit found in 40 CFR Part 440.

Table 1: Technology-Based Effluent Limits for Mine Drainage [40 CFR § 440.104(a)]

Parameter	Units	Maximum for any 1 day	Average of daily values for 30 consecutive days	Range
Copper	Milligrams per Liter (mg/L)	0.30	0.15	---
Zinc	mg/L	1.5	0.75	---
Lead	mg/L	0.6	0.3	---
Mercury	mg/L	0.002	0.001	---
Cadmium	mg/L	0.10	0.05	---
pH	Standard Units (SU)	---	---	6.0 – 9.0 ---
Total Suspended Solids (TSS)	mg/L	30.0	20.0	---

Currently, the project is in temporary closure status. As a result, all wastewater generated onsite is comprised of groundwater infiltration and runoff water from the PAG pond. Under current temporary closure conditions, effluent limits applicable to mine drainage are imposed. A flow limit is included in the APDES permit based on the hydraulic design limitations of the treatment ponds.

3.2 Basis for Effluent and Receiving Water Monitoring

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

3.3 Effluent Limits and Monitoring Requirements

The permit contains effluent limits that are both TBELs and WQBELs, and a flow limit based on the treatment system design. The following summarizes the effluent limits (see Appendix B for more details regarding the legal and technical basis surrounding the selection of effluent limits).

Table 2: Outfall 001 - Effluent Limits and Monitoring Requirements

Parameter	Daily Maximum	30-Day Average	Units	Sample Frequency	Sample Type
Total Discharge Flow	300 [a]	Report	Gallons Per Minute (GPM)	Continuous	Recorded
Copper	160	60	Micrograms per Liter (µg/L)	1/Quarter	Grab
TSS	30	20	mg/L	1/Quarter	Grab
pH	6.0-9.0	6.0-9.0	SU	1/Quarter	Grab
Cadmium	100	50	µg/L	1/Quarter	Grab
Lead	600	243	µg/L	1/Quarter	Grab
Mercury [c]	2	1	µg/L	1/Quarter	Grab
Zinc	1500	750	µg/L	1/Quarter	Grab
Whole Effluent Toxicity	Report	N/A	Toxic Units, Chronic (TU_c)	2/Permit Cycle[b]	Grab

a) The wastewater discharge volume shall not exceed the maximum design flow rate approved.
b) Twice per permit cycle means one sample taken in year two of the permit during the summer months (May1-September 30) and one taken in year four of the permit during the winter months (October 1-April 30).
c) Mercury shall be measured as total.
d) All other metals shall be measured as total recoverable.

3.4 Effluent Monitoring

The permit requires monitoring of the effluent to determine compliance with TBELs and water quality based effluent limits (WQBELs). Effluent samples will be collected from the effluent stream after the flows from both the portal treatment settling pond and the PAG treatment pond facilities are combined, and before discharge into receiving waters.

Whole effluent toxicity (WET) tests are required to measure the aggregate toxic effect of the effluent.

The data produced by this monitoring will be used to evaluate the effluent for pollutants of concern and to conduct future reasonable potential analysis as needed, which will determine if the discharge of these pollutants might cause an exceedance of the water quality criteria in the receiving water body. Table three presents historical maximum reported values of pollutants of concern in the treated effluent monitoring data provided by the permittee.

Table 3: Historical (2007-2013) Treated Effluent Monitoring Data

Parameter	Maximum Reported Value, in µg/L
Arsenic	3.4
Cadmium	0.95
Chromium (Total)	37.5
Copper	63.5
Lead	6.3
Mercury	0.05
Nickel	5.9
Selenium	1.1
Silver	1.12
Zinc	145

The permittee shall also consult and review APDES Application Form 2C. Form 2C contains specific effluent monitoring requirements due to be submitted in the application for permit reissuance (180 days prior to the permit expiration date). A copy of Form 2C can be found at http://dec.alaska.gov/water/wwdp/index.htm.

Monitoring frequencies are based on the nature and effect of the pollutant, as well as a determination of the minimum sampling necessary to adequately monitor the facility's performance. The permittee has the option of taking more frequent samples than required under the permit. These additional samples can be used for averaging if they are conducted using Department – approved test methods (generally found in 18 AAC 70 and 40 CFR § 136 [adopted by reference in 18 AAC 83.010]), and if the Method Detection Limits (MDLs) are less than the effluent limits.

3.5 Whole Effluent Toxicity Monitoring

18 AAC 83.435 requires that a permit contain limitations on WET when a discharge has reasonable potential to cause or contribute to exceedances of water quality standards (WQS). The permit does not establish WET limits because no effluent monitoring data for WET is currently available for a determination of reasonable potential to cause or contribute to an exceedance of the chronic WET numeric water quality criterion of 1.0 chronic toxic unit (TU_c), found in 18 AAC 70.030. The permit requires WET testing twice per permit cycle, once in the summer months and once during the winter months and as detailed in Table 2.

WET tests are laboratory tests that measure total toxic effect of an effluent on living organisms. The tests use small vertebrate and invertebrate species and/or plants to measure the aggregate toxicity of an effluent. Chronic toxicity tests measure reductions in survival, growth, and reproduction over a 7-day or 48 hour exposure. Chronic toxicity monitoring shall be conducted by the permittee according to the methods and species approved by the EPA in *Short Term Methods for Estimating the Chronic Toxicity of Effluents and Receiving Waters to West Coast Marine and Estuarine Organisms*, 1995, EPA 600-R-95-136.

4.0 RECEIVING WATER

As previously discussed at the end of Section 2.2, the permittee discharges treated effluent into the marine waters of Niblack Anchorage. Niblack Anchorage is located within Moira Sound off the Prince of Wales Island. Note, a mixing zone has been authorized as part of the permitting action (see Section 4.3 below).

4.1 Water Quality Standards

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

Water bodies in Alaska are designated for all uses unless the water has been reclassified under 18 AAC 70.230 as listed under 18 AAC 70.230(e). Some water bodies in Alaska can also have site–specific water quality criterion per 18 AAC 70.235, such as those listed under 18 AAC 70.236(b). The receiving water for the discharge, Niblack Anchorage, has not been reclassified, nor have site-specific water quality criteria been established. Therefore, Niblack Anchorage, must be protected for all marine water designated use classes listed in 18 AAC 70.020(a)(2).

4.2 Water Quality Status of Receiving Water

Any part of a water body 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 water body list. Niblack Anchorage is not included on *Alaska's Final 2010 Integrated Water Quality Monitoring and Assessment Report*, July 15, 2010.

4.3 Mixing Zone Analysis

Under 18 AAC 70.240, as amended through June 26, 2003, the Department may authorize a mixing zone in a permit. The Department authorizes a mixing zone for the following parameters: copper, lead, mercury, nickel, zinc and pH, with a dilution factor of 47.9 in Niblack Anchorage surrounding Outfall 001. This dilution factor was determined by calculating the maximum expected effluent concentration from seven years of effluent water quality data. Then, using the maximum expected effluent concentrations, the receiving water concentrations, applicable water quality criteria, and other relevant site-specific discharge and ambient data, mixing zones were modeled and dilution factors calculated using Department and EPA-approved CORMIX modeling software.

The chronic mixing zone is a parallelogram box shape extending from the ocean floor to the water surface. It has a maximum length of 9.03 meters centered along the 4.27 meter long diffuser, and has a total width of 11.82 meters. These results were modeled using the multiport diffuser option in CORMIX.

Under 18 AAC 70.255(d), there is a smaller, initial, acute, mixing zone surrounding Outfall 001 contained within the larger chronic mixing zone. At and beyond the boundary of the acute

mixing zone, all chronic aquatic life WQS apply. Based on the maximum expected effluent concentrations and acute WQS, copper required the most dilution with an acute dilution factor equal to 29.6, so copper determined the acute mixing zone size. The other parameters need an acute mixing zone to meet the respective water quality criteria fit into the acute mixing zone sized for copper. The acute mixing zone is a parallelogram box shape extending from the ocean floor to the water surface. It has a maximum length of 8.73 meters centered along the 4.27 meter long diffuser, and has a total width of 4.72 meters. These results were modeled using the multiport diffuser option in CORMIX. To comply with 18 AAC 70.240 and 18 AAC 255(b), as amended June 26, 2003, and to be consistent with EPA's *Technical Support Document for Water Quality-based Toxics Control* regarding the maximum size of an acute mixing zone (which are generally referenced in 18 AAC 70.255(d)), a drifting organism may not be within an acute mixing zone for longer than 15 minutes. At both the 10th, 0.0217 meters/second (m/s), and 90th, 0.195 m/s, percentile receiving water current velocity a drifting organism passes through the acute mixing zone in less than four minutes. The Department confirmed that there will be no lethality to organisms passing through the mixing zone.

Appendix C - Mixing Zone Analysis Checklist outlines regulatory criteria that must be considered when the Department analyzes a permittee's request for a mixing zone. These criteria include the size of the mixing zone, treatment technology, designated and existing uses of the water body, human consumption, spawning areas, human health, aquatic life, and endangered species. All criteria must be met in order to authorize a mixing zone. A summary of this analysis follows.

Ambient Data – To determine the width and length of the mixing zone under critical receiving water conditions, calculations using the 10th and the 90th percentile current velocity were completed. The water body was modeled as stratified with surface and bottom densities of 1,028.5 and 1,036.7 kilograms per cubic (kg/m^3), respectively. These densities were derived from temperature and salinity profiles collected from Niblack Anchorage in May 2007.

Baseline water quality data was collected to determine the assimilative capacity of the receiving water. Water samples from Niblack Anchorage were collected on May 14, 2007 and October 2, 2007 from three different depths in the water column. These samples were tested for salinity, pH, and a suite of chemicals and dissolved metals. The October samples were non-detect for copper, the parameter that determines the size of the acute and chronic mixing zones. The average copper concentration measured in May was 0.39 µg/L, and this is the value that was used for the background copper concentration in the reasonable potential analysis and the mixing zone modeling.

Effluent Data – The mixing zone plume was modeled using the maximum permitted flow limit equal to 300 gallons per minute and an effluent temperature of 9º C.

The effluent parameter requiring the greatest dilution to meet WQS at Outfall 001 is copper, with a maximum expected effluent concentration of 160.18 micrograms per liter (µg/L); therefore, copper determined the chronic mixing zone size. All other parameters needing a chronic mixing zone to meet their respective water quality criteria in the water body fit within the chronic mixing zone sized for copper. Consequently, this parameter determined the smallest practicable mixing zone.

Discharge Data – Depth of water at the diffuser equals 4.27 meters.

Size – For practical reasons, both the acute and chronic mixing zones are included in an approved mixing zone size of 9.03 meters centered along the 4.27 meter long diffuser by a total width of 11.82 meters. CORMIX model simulations based on critical receiving water and effluent conditions along with the Department's knowledge of the water body's existing uses were used to determine the appropriate size of the mixing zone. This evaluation is consistent with the provisions of 18 AAC 70.245 and the small as practicable provision found 18 AAC 70.240(a)(2).

Technology – In accordance with 18 AAC 70.240(a)(3), the most effective technologically and economically feasible methods are used to disperse, treat, remove, and reduce pollutants. Settling ponds are used to treat wastewater influent and produce an effluent of a higher quality. Additionally, state-of-the-art diffusers will be installed to help disperse the high quality effluent upon mixing with the receiving water.

Existing Use – In accordance with 18 AAC 70.245, the mixing zone has been appropriately sized to fully protect the existing uses of the water body as a whole.

Human Consumption – In accordance with 18 AAC 70.250(b)(2) and (b)(3), there is no indication that the pollutants discharged have produced objectionable color, taste, or odor in aquatic resources harvested for human consumption. Additionally, the discharge will not preclude or limit established processing activities or commercial, sport, personal use, or subsistence fish and shellfish harvesting.

Human Health – According to 18 AAC 70.250 and 18 AAC 70.255, the mixing zone authorized in the permit must protect human health. An analysis of the effluent testing data that was included with the wastewater discharge application and the results of the reasonable potential analysis conducted on pollutants of concern indicate that the level of treatment at Niblack is protective of human health.

Aquatic Life and Wildlife – According to 18 AAC 70.250 and 18 AAC 70.255, the mixing zone authorized in the permit must protect aquatic life and wildlife. Reasonable potential analysis suggests that pollutants are projected to be discharged at low concentrations and will have a relatively short residence time in the mixing zone. In addition, WET testing is required by the permit and information obtained from this testing will provide further information if any negative impacts are associated with the mixing zone.

Endangered Species – Under 18 AAC 70.250(a)(2)(D), the authorized mixing zone must not cause an adverse effect on threatened or endangered species. The United States Fish and Wildlife Service (USFWS) indicated that the Humpback Whale may occur within Niblack Anchorage, but analysis showed that there will be no lethality to organisms passing through the mixing zone.

4.4 Ocean Discharge Criteria

Section 403(a) of the CWA, Ocean Discharge Criteria, prohibits the issuance of a permit under Section 402 of the CWA for a discharge into the territorial sea, the water of the contiguous zone, or the oceans except in compliance with Section 403. Permits for discharges seaward of the baseline of the territorial seas must comply with the requirements of Section 403, which include development of an Ocean Discharge Criteria Evaluation (ODCE).

An interactive map depicting Alaska's baseline plus additional boundary lines is available at http://www.charts.noaa.gov/OnLineViewer/AlaskaViewerTable.shtml. The map is provided for

information purposes only. The U.S. Baseline committee makes the official determinations on baseline.

A review of the baseline line maps revealed that the baseline extends across the mouth of Moira Sound. The Niblack Outfall 001 is positioned landward of the baseline of the territorial sea; therefore, an ODCE under Section 403 of the CWA is not required to be completed for this permit issuance.

5.0 ANTIBACKSLIDING

18 AAC 83.480 requires that "effluent limitations, standards, or conditions must be at least as stringent as the final effluent limitations, standards, or conditions in the previous permit."

18 AAC 83.480(c) also states that a permit may not be reissued "to contain an effluent limitation that is less stringent than required by effluent guidelines in effect at the time the permit is renewed or reissued." This is the first APDES permit for this facility; therefore, antibacksliding provisions are not applicable.

6.0 ANTIDEGRADATION

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

The Department's approach to implementing the Antidegradation Policy, found in 18 AAC 70.015, is based on the requirements in 18 AAC 70 and the Department's Policy and Procedure Guidance for Interim Antidegradation Implementation Methods, dated July 14, 2010. Using these requirements and policies, the Department determines whether a water body, or portion of a water body, is classified as Tier 1, Tier 2, or Tier 3, where a higher numbered tier indicates a greater level of water quality protection. At this time, no Tier 3 waters have been designated in Alaska. Accordingly, this antidegradation analysis conservatively assumes that the discharge is to a Tier 2 water, which is the next highest level of protection and is more rigorous than a Tier 1 analysis.

The State's Antidegradation Policy in 18 AAC 70.015(a)(2) states that if the quality of water exceeds levels necessary to support propagation of fish, shellfish, and wildlife and recreation in and on the water (i.e. Tier 2 waters), that quality must be maintained and protected. The Department may allow a reduction of water quality only after finding that five specific requirements of the antidegradation policy at 18 AAC 70.015(a)(2)(A)-(E) are met. The Department's findings follow:

1. **18 AAC 70.015 (a)(2)(A).** Allowing lower water quality is necessary to accommodate important economic or social development in the area where the water is located.

   Niblack Exploration Project's contributions to the socioeconomics of Southeast Alaska are important and highly significant. Issuance of the permit will allow for a reliable long-term wastewater discharge option for the project site that is not susceptible to cold weather failure. Previously, the facility discharged treated effluent to a land application system. This land application system was prone to continual freezing problems and potential overflows, causing

operational and human safety issues. A marine discharge will allow the facility to discharge year-round without the potential freezing problems. This will allow Niblack to continue to maintain current levels of operations safely while focusing on future surface exploration activities and development studies. The project owner, Niblack Project LLC, has been committed to ensuring economic benefits from the Niblack Project are optimized for local residents, businesses and communities. This commitment has seen about $37 million invested in the Southeast Alaska project since 2009. During mine operations, Niblack has the potential to provide 200 full-time jobs, with about two-thirds of workers at the mine site and one-third at the mill. During the mill construction phase, an estimated workforce of 200 would be needed. It is believed that the economic benefits from production at Niblack will be comparable to those generated at other mines in Southeast Alaska. In addition, by allowing the marine discharge the project site will remain in a stable condition and the site will be maintained in a manner that will allow mining to commence as the project progresses.

As described in the following sections, the limits in the permit will meet WQS, provide for water quality adequate to protect existing uses, and treat and control discharges by the most effective and reasonable means and to the highest statutory and regulatory requirements. Allowing the discharge is important economically and socially for the Prince of Wales Island.

It would be a financial hardship to implement other source control and treatment measures. There are no other feasible wastewater disposal options that avoid a direct discharge to surface water. The Department concludes that the authorization of the discharge accommodates important economic and social development in the Prince of Wales Island area and that the finding is met.

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

   Except within the mixing zone, the permit prohibits violation of the water quality criteria in 18 AAC 70.020. Reduction of water quality in the mixing zone is specifically authorized according to 18 AAC 70.240 through 18 AAC 70.270 (as amended June 26, 2003) and as allowed in 18 AAC 70.015(a)(2). The mixing zone has been sized to ensure that all applicable water quality criteria are met at all points outside the boundary of the mixing zone; therefore, reduction of water quality in the mixing zone is allowed under the antidegradation policy at 18 AAC 70.015(a)(2), and outside the mixing zone all applicable water quality criteria are protected.

   Discharges authorized under this permit will not violate applicable water quality criteria, as allowed under 18 AAC 70.235. Under this regulation, the Department may establish a site-specific water quality criteria that modifies a water quality criterion set for a water body. Since there are no site-specific criteria established for any receiving waters applicable to this permit, further evaluation is not required.

   Whole effluent toxicity testing is required twice per permit cycle. If WET tests reveal that the discharge has toxicity, the permittee is required to submit these results to DEC within 14 days of receipt of test results. WET results from this permit issuance will be used when the permittee applies for reissuance of the permit to ensure the applicable criteria of 18 AAC 70.030 are met.

The Department finds that the reduced water quality will not violate applicable water quality criteria and that the finding is met.

3. **18 AAC 70.015(a)(2)(C).** The resulting water quality will be adequate to fully protect existing uses of the water.

   Analysis of effluent monitoring data from the existing land application system from the past seven years shows that discharges will protect existing water body uses. In addition, the effluent limits required by the permit will ensure that all uses are fully protected. A mixing zone is authorized, in accordance with 18 AAC 70.245; the mixing zone has been appropriately sized to fully protect the existing uses of Niblack Anchorage.

   The Department concludes that the resulting water quality will be adequate to fully protect existing uses and that the finding is met.

4. **18 AAC 70.015(a)(2)(D).** The methods of pollution prevention, control, and treatment found by the Department to be most effective and reasonable will be applied to all wastes and other substances to be discharged.

   The Department finds the most effective and reasonable methods of prevention, control, and treatment are the practices and requirements set out in the APDES permit. Wastewater treatment consists of settling ponds that are used to treat groundwater infiltration and run-off water. This type of treatment and associated discharge is similar in nature to other like facilities and their discharges. The design, construction and operation of the treatment system has been reviewed and approved by the Department.

   Previously, the facility discharged treated effluent to a land application system. This land application system was prone to continual freezing problems and potential overflows, causing operation and human safety issues. A marine discharge will allow the facility to discharge year-round without the potential freezing problems.

   The facility does have some chemical mixing tanks that are available for water treatment. Use of the chemical mixing tanks would require continuous, on-site supervision and the continuous expenditure of resources, such as fuel and materials. Since Niblack is a remote site that is in a period of temporary closure, with minimal staffing, use of the mixing tanks is not an economically feasible treatment option.

   The Department finds the most effective methods of prevention, control, and treatment are the practices and requirements set out in the permit and concludes that this finding is met.

5. **18 AAC 70.015(a)(2)(E).** All wastes and other substances discharged will be treated and controlled to achieve (i) for new and existing point sources, the highest statutory and regulatory requirements; and (ii) for nonpoint sources, all cost-effective and reasonable best management practices.

   Applicable "highest statutory and regulatory treatment requirements" are defined in 18 AAC 70.990(30) (as amended June 26. 2003) and in the July 14, 2010 DEC guidance titled "*Policy and Procedure Guidance for Interim Antidegradation Implementation Methods.*" Accordingly, there are three parts to the definition, which are:

   > (A) Any federal technology-based effluent limitation identified in 40 CFR §125.3 and 40 CFR §122.29, as amended through August 15, 1997, adopted by reference;

(B) Minimum treatment standards in 18 AAC 72.040; and

(C) Any treatment requirements imposed under another state law that is more stringent than a requirement of this chapter.

The first part of the definition includes all federal technology-based ELGs, which would include those that apply to Niblack. EPA promulgated ELGs for the ore mining and dressing point source category at 40 CFR Part 440, which include for this point source category. Subpart J is applicable to Copper, Lead, Zinc, Gold, Silver, and Molybdenum Ores Subcategories. The ELGs applicable to a new source, which is a source that has commenced construction after the ELGs were established on December 3, 1982, are applicable to discharges from active mines. Since Niblack is an inactive exploration project, these ELGs are not directly applicable, therefore the Department exercised its best professional judgment (BPJ) in establishing TBELs based on the active mine ELGs. Therefore, the Department concludes that this requirement is met.

The second part of the definition 18 AAC 70.990(B) (2003) appears to be in error, as 18 AAC 72.040 describes discharges to sewers and not minimum treatment. The correct reference appears to be the minimum treatment standards found at 18 AAC 72.050, which refers to domestic wastewater discharges only. The Niblack treatment facility does not treat or discharge domestic wastewater; therefore further analysis under this regulation is not required.

The third part of the definition includes any more stringent treatment required by state law, including 18 AAC 70 and 18 AAC 72. The correct operation of equipment, visual monitoring, and implementing BMPs, as well as other permit requirements, will control the discharge and satisfy all applicable federal and state requirements. The Department concludes that all wastes and other substances discharged will be treated and controlled to achieve the highest statutory and regulatory requirements and finds that this finding is met.

7.0 OTHER PERMIT CONDITIONS

7.1 Quality Assurance Project Plan

The permittee is required to develop procedures to ensure that the monitoring data submitted are accurate and to explain data anomalies if they occur. The permittee is required to develop or update and implement the Quality Assurance Project Plan (QAPP) within 120 days of the effective date of the final permit. Additionally, the permittee must submit a letter to the Department within 120 days of the effective date of the permit stating that the plan has been implemented within the required time frame. The QAPP shall consist of standard operating procedures the permittee must follow for collecting, handling, storing and shipping samples; laboratory analysis; and data reporting. The plan shall be retained onsite and made available to the Department upon request.

7.2 Best Management Practices Plan

In accordance with AS 46.03.110 (d), the Department may specify in a permit the terms and conditions under which waste material may be disposed. This permit requires the permittee to develop a Best Management Practices (BMP) Plan in order to prevent or minimize the potential for the release of pollutants to waters and lands of the State of Alaska through plant site runoff, spillage or leaks, or erosion. The permit contains certain BMP conditions that must be included

in the BMP plan. The permit requires the permittee to develop or update and implement a BMP plan within 180 days of the effective date of the final permit. The plan must be kept onsite and made available to the Department upon request.

7.3 Standard Conditions

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

8.0 OTHER LEGAL REQUIREMENTS

8.1 Endangered Species Act

The Endangered Species Act (ESA) requires federal agencies to consult with the National Oceanic and Atmospheric Administration (NOAA) National Marine Fisheries Service (NMFS) and the U.S. Fish and Wildlife Service (USFWS) if their actions could beneficially or adversely affect any threatened or endangered species.

As a state agency, DEC is not required to consult with these federal agencies regarding permitting actions; however, DEC voluntarily contacted the agencies to notify them of the issuance of this permit and to obtain listings of threatened and endangered species near the discharge. The following are responses from USFWS and the NOAA NMFS ESA/Marine Mammal Protection Act (MMPA) species map:

- USFWS was contacted and responded in a consultation letter dated June 12, 2014. The letter indicated that the Short-Tailed albatross (*Phoebastria (=diomedea) albatrus*) are found in the project area.
- MMPA species map showed the Humpback Whale (*Megaptera novaeangliae*) are found in the project area.

The antidegradation analysis, found in section 6.0, determined that the existing water uses and the level of water quality necessary to protect existing uses will be maintained and protected. In addition, based the mixing zone analysis found in section 4.3, the Department confirmed that there will be no lethality to organisms passing through the mixing zone.

8.2 Essential Fish Habitat

Essential fish habitat (EFH) includes the waters and substrate (sediments, etc.) necessary for fish from commercially-fished species to spawn, breed, feed, or grow to maturity. The Magnuson-Stevens Fishery Conservation and Management Act (January 21, 1999) requires federal agencies to consult with NOAA when a discharge has the potential to adversely affect (reduce quality and/or quantity of) EFH. As a state agency, DEC is not required to consult with federal agencies regarding permitting action; however, DEC consulted with NOAA’s EFH online mapper and found no mapped EFH for Niblack Anchorage.

8.3 Permit Expiration

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

9.0 REFERENCES

1. Alaska Department of Environmental Conservation, 2003. Alaska Water Quality Criteria Manual for Toxics and Other Deleterious Organic and Inorganic Substances, as amended through December 12, 2008.

2. Alaska Department of Environmental Conservation, 2010. Alaska's Final 2010 Integrated Water Quality Monitoring and Assessment Report, July 15, 2010.

3. Alaska Department of Environmental Conservation, 2013. Interim Antidegradation Implementation Methods. Retrieved from http://www.dec.state.ak.us/water/wqsar/Antidegradation/docs/P&P-Interim_Antidegradation_Implemenation_Methods.pdf

4. U.S. Environmental Protection Agency. 1991. Technical Support Document for Water Quality-based Toxics Control. Office of Water Enforcement and Permits, Office of Water Regulations and Standards. Washington DC, March 1991. EPA/505/2-90-001.

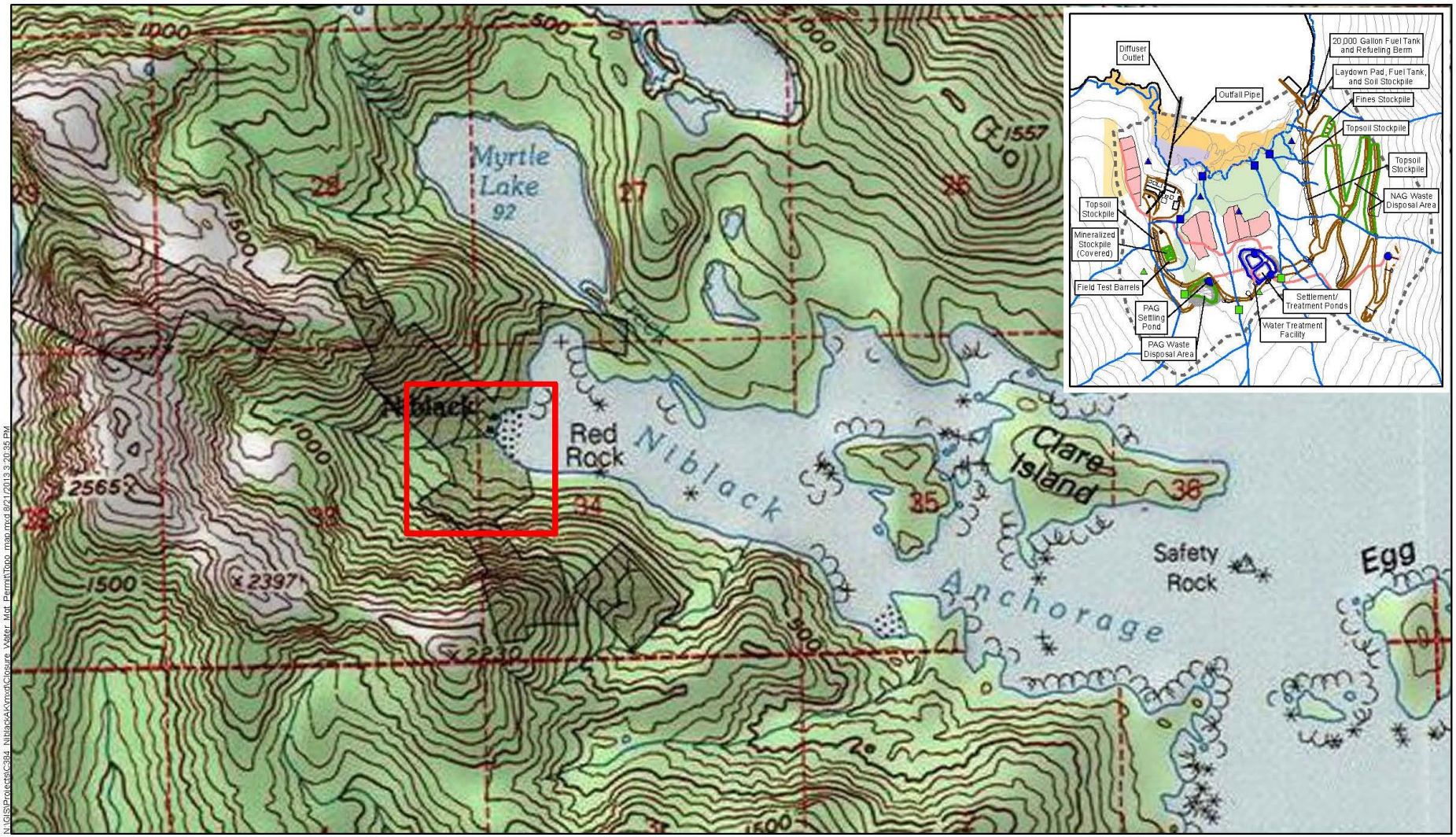
5. NMFS, Office of Habitat Conservation, 2013. Essential Fish Habitat Mapper v3.0. Retrieved from http://www.habitat.noaa.gov/protection/efh/habitatmapper.html.

6. DEC 2003, Water Quality Standards, as amended June 26, 2003, Alaska Department of Environmental Conservation 18 AAC 70. . . .

7. National Marine Fisheries Service (NMFS), Alaska Region, Protected Resources Division, 2013.

APPENDIX A. FACILITY INFORMATION

Figure 1: Niblack Exploration Project Facility Map



NIBLACK PROJECT LLC integral consulting inc.

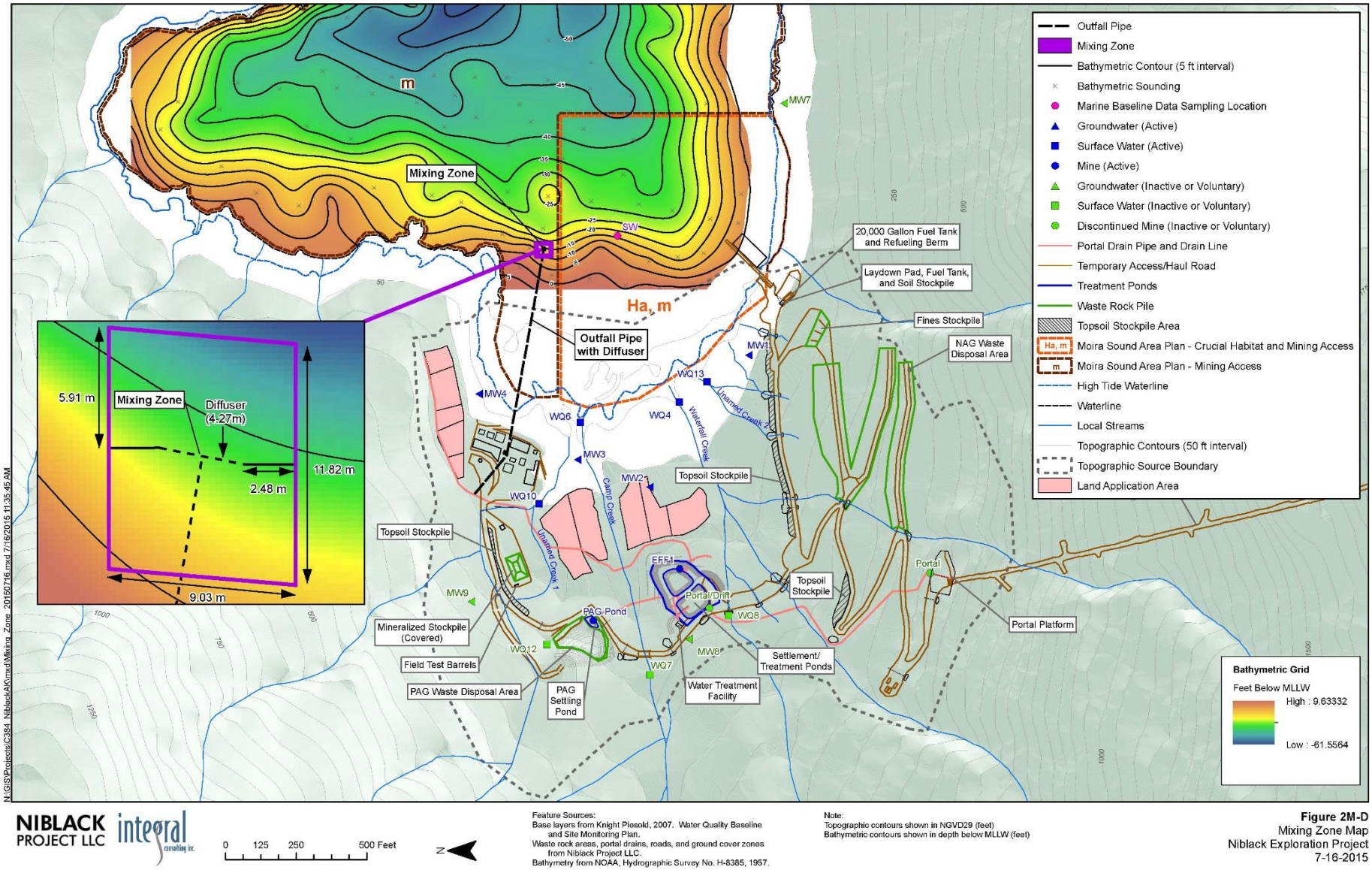
0 375 750 1,500
Feet
1:18,000

N

Feature Sources:
Base layers from Knight Piesold, 2007. Water Quality Baseline and Site Monitoring Plan.
Land Application Area from Turner, 2009. Personal communication.
Waste rock areas, portal drains, roads, and ground cover zones from Niblack Project LLC.
USGS Topographic Map Craig, AK (1:63,600)

N:\GIS\Projects\C384_Niblack\AK\mxd\Closure_Water_Mgt_Permit\Topo_map.mxd 8/21/2013 3:20:35 PM

Figure 2: Niblack Exploration Project Facility Mixing Zone Diagram



NIBLACK PROJECT LLC integral consulting inc.

0 125 250 500 Feet

N

Feature Sources:
Base layers from Knight Piesold, 2007. Water Quality Baseline and Site Monitoring Plan.
Waste rock areas, portal drains, roads, and ground cover zones from Niblack Project LLC.
Bathymetry from NOAA, Hydrographic Survey No. H-8385, 1957.

Note:
Topographic contours shown in NGVD29 (feet)
Bathymetric contours shown in depth below MLLW (feet)

Figure 2M-D
Mixing Zone Map
Niblack Exploration Project
7-16-2015

APPENDIX B. BASIS FOR EFFLUENT LIMITATIONS

This section discusses the basis for and the development of effluent limits in the permit. This section includes: an overall discussion of the statutory and regulatory basis for development of effluent limitations (Section I); discussions of the development of Technology Based Effluent Limits (TBELs) (Section II) and water quality-based effluent limits (Section III); and a summary of the effluent limits developed for this permit (Section IV).

I. Statutory and Regulatory Basis for Limits

Sections 101, 301(b), 304, 308, 401, 402, and 405 of the Clean Water Act (CWA) provide the legal basis for the effluent limitations and other conditions in the permit. The Department evaluates the discharges with respect to these sections of the CWA and the relevant Alaska Pollutant Discharge Elimination System (APDES) regulations to determine which conditions to include in the permit.

In general, the Department first determines if any federally-promulgated TBELs from an effluent limitation guideline have been developed that must be considered as the base or floor for permit limits. The Department then evaluates the effluent quality expected to result from these controls to see if the discharge could result in any exceedances of the Water Quality Standards (WQS) in the receiving water. If reasonable potential exists that exceedances could occur, the Department must include WQBELs in the permit. The permit limits reflect whichever requirements (technology-based or water quality-based) are more stringent. For Outfall 001, a mixing zone was requested. In authorizing a mixing zone for Outfall 001, the Department considered "the characteristics of the effluent, including volume, flow rate, dispersion, and quality after treatment," as required by 18 AAC 70.245(b)(5). Water quality-based and technology-based analyses were performed to determine the most stringent limits. In conducting the water quality-based analysis CORMIX modeling was used to determine dilution available to meet all WQS at and beyond the mixing zone's boundary.

II. Outfall 001 - Technology-Based Evaluation

Section 301(b) of the CWA requires industrial dischargers to meet promulgated TBELs established by EPA. TBELs are enforceable through their incorporation into an APDES permit. For dischargers in industrial categories for which EPA has not yet promulgated TBELs, and for types of discharges not covered by applicable TBELs, best professional judgment can be used to establish case-by-case TBELs established by permit writers. The 1972 amendments to the CWA established a two-step approach for imposing technology-based controls. In the first phase, industrial dischargers were required to meet a level of pollutant control based on the best practicable control technology currently available (BPT). The second level of pollutant control was based on the best available technology economically achievable (BAT). In 1977, enactment of Section 301(b)(2)(E) of the CWA allowed the application of best conventional pollutant control technology (BCT) to supplement BPT standards for conventional pollutants with cost effectiveness constraints on incremental technology requirements that exceed BPT. The BPT/BAT/BCT system of standards does not apply to a new source, which is defined by EPA as a source, the construction of which is commenced after the publication of proposed regulations prescribing a standard of performance, which will be applicable to the source. Direct dischargers that are new sources must meet New Source Performance Standards (NSPS), which are based on the best available demonstrated control technology.

At 40 CFR Part 440, EPA has established TBELs for the Ore Mining and Dressing Point Source Category. Subpart J of these guidelines, titled *Copper, Lead, Zinc, Gold, Silver, and Molybdenum Ores Subcategory*, became effective on December 3, 1982. ELGs are applicable to mines that produce copper,

gold, zinc, and silver bearing ores from open-pit or underground operations and to mills that use the froth-flotation process, alone or in conjunction with other processes, for the beneficiation of copper, gold, zinc, and silver. The ELGs applicable to a new source, which is a source that has commenced construction after the ELGs were established on December 3, 1982, are applicable to discharges from active mines. Since Niblack is an inactive exploration project, these ELGs are not directly applicable. The Department exercised its BPJ in establishing case-by-case TBELs based on the active mine ELGs. Table B-1 identifies the parameters and TBEL's required for the permit.

Table B-1: Outfall 001 - Technology Based Effluent Limits

Parameter	Daily Maximum	30-Day Average
Cadmium, µg/L	100	50
Copper, µg/L	300	150
Lead, µg/L	600	300
Mercury, µg/L	2	1
Zinc, µg/L	1,500	750
TSS, mg/L	30	20
pH, s.u.	within the range 6.0 - 9.0	

The CWA requires facilities to meet effluent limits based on available wastewater treatment technology and TBELs. The Department may find, by analyzing the effect of an effluent discharge on the receiving water body, that TBELs are not sufficiently stringent to meet WQS. In such cases, the Department is required to develop more stringent WQBELs, which are designed to ensure that the numeric WQS of the receiving water body are met.

III. Water Quality-Based Evaluation

In addition to the TBELs discussed above, the Department evaluated the Niblack discharges to determine compliance with Section 301(b)(1)(C) of the CWA. This section requires permit limits necessary to meet WQS by July 1, 1977.

Under 18 AAC 83.435, the Department must implement section 301(b)(1)(C) of the CWA. It requires that APDES permits include limits for all pollutants or parameters which "are or may be discharged at a level which will cause, have the reasonable potential to cause, or contribute to an excursion above any state water quality standard, including state narrative criteria for water quality." The limits must be stringent enough to ensure that WQS are met and must be consistent with any available wasteload allocation (WLA).

To determine if WQBELs are needed and develop those limits when necessary, the Department follows guidance in the *Technical Support Document for Water Quality-based Toxics Control* (TSD, EPA 1991) and the Department's *Reasonable Potential Analysis and Effluent Limits Development Guide*. The water quality-based analysis consists of the following three step sequence:

1. Identify the applicable water quality criteria;
2. Determine if there is "reasonable potential" for the discharge to exceed a water quality criterion in the receiving water;
3. If there is "reasonable potential" or where a parameter has a technology-based limit develop effluent limits.

The following sections provide a detailed discussion of each step.

A. Water Quality Criteria

The first step in determining if water quality-based limits are needed is to identify the applicable water quality criteria. Alaska's WQS are found at 18 AAC 70. The applicable criteria are determined based on the beneficial uses of the receiving water.

The beneficial uses for Niblack Anchorage, the receiving waters of Outfall 001 and the regulatory citation of the water quality criteria applicable to the uses are as follows:

1. aquaculture water supply - 18 AAC 70.020(b)(2)(A)(i)
2. seafood processing - 18 AAC 70.020(b)(2)(A)(ii)
3. industrial uses - 18 AAC 70.020(b)(2)(A)(iii)
4. contact recreation - 18 AAC 70.020(b)(2)(B)(i)
5. secondary recreation - 18 AAC 70.020(b)(2)(B)(ii)
6. growth and propagation of fish, shellfish, other aquatic life and wildlife - 18 AAC 70.020(b)(2)(C)
7. harvesting for consumption of raw mollusks or other raw aquatic life - 18 AAC 70.020(b)(2)(D)

For a given pollutant, different uses may have different criteria. To protect all beneficial uses, the reasonable potential analysis and permit limits are based on the most stringent water quality criteria for protecting those uses. For Niblack Anchorage, the most stringent applicable WQS are summarized in Table B-2.

Table B-2: Most Stringent of the Water Quality Criteria Applicable to Niblack Exploration Project Discharges into Niblack Anchorage (Outfalls 001)

Parameter (µg/L unless otherwise noted)	**Acute Aquatic Life Criterion**	**Chronic Aquatic Life Criterion**	**Human Health Criterion [c]**
Arsenic (TR)[a, b]	69	36	na
Cadmium (TR) [a, b]	40	8.8	na
Copper (TR) [a, b]	5.8	3.7	na
Lead (TR) [a, b]	220	8.5	na
Mercury (TR)[a, b]	2.1	1.1	0.051
Nickel (TR)[a, b]	75	8.3	4600
Selenium (TR)[a, b]	290	71	11,000
Silver (TR)[a, b]	2.3	na	na
Zinc (TR) [a, b]	95	86	69,000
pH (s.u.)	within the range of 6.5 - 8.5		

Notes:

a. TR = total recoverable

b. Standards for metals have been converted from dissolved to total recoverable by dividing the dissolved criterion by the conversion factor identified in regulation.

c. Human health criterion for consumption of aquatic organisms

B. Reasonable Potential Analysis

1. Outfall 001

The Department compared the maximum projected receiving water concentration to the criteria for that pollutant to determine if there is "reasonable potential" to cause or contribute to an exceedance of water quality criteria for each pollutant present in the discharge. If the projected receiving water concentration exceeds the criterion, there is "reasonable potential", and a limit must be included in the permit. The Department used the *Alaska Pollutant Discharge Elimination System (APDES) Permits Reasonable Potential Analysis and Effluent Limits Development Guide* to conduct the reasonable potential analysis.

This section discusses equations used in the guide document. The maximum projected receiving water concentration was determined using the following mass balance equation, for discharge to the mixing zone in marine waters:

$$C_d = C_u + ((C_e - C_u)/D)$$

where, C_d = maximum projected receiving water concentration at the boundary of the mixing zone

C_e = maximum expected effluent concentration

C_u = background concentration of pollutant

D = dilution in mixing zone

Where no mixing zone is allowed: $C_d = C_e$

After C_d is determined, it is compared to the applicable water quality criterion. If it is greater than the criterion, a water quality-based effluent limit is developed for that parameter. The following discusses each of the factors used in the mass balance equation to calculate C_d.

<u>C_e (maximum expected effluent concentration</u>): Per the *TSD*, the maximum expected effluent concentration in the mass balance equation was represented by the 99th percentile of the effluent data. The 99th percentile was calculated using the statistical approach recommended in the *TSD*, i.e., by multiplying the maximum reported effluent concentration by a reasonable potential multiplier (RPM):

C_e = (maximum measured effluent concentration) x RPM

The RPM accounts for uncertainty in the effluent data. The RPM depends upon the amount of effluent data and variability of the data as measured by the coefficient of variation (CV) of the data. When there are not enough data to reliably determine a CV, the *TSD* recommends using 0.6 as a default value. Once the CV of the data was determined, the RPM was determined using the statistical methodology discussed in section 3.3 of the *TSD*. See Table B-3 for a summary of the maximum reported effluent concentrations, CVs, and RPMs used in the reasonable potential analysis.

<u>C_u (background concentration of pollutant)</u>: The ambient concentration in the mass balance equation is based on a reasonable worst-case estimate of the background pollutant concentration. Where sufficient data exists, the 85th percentile of the ambient data is generally used as an estimate of worst-case. The C_u used for each parameter is provided in Table B-3.

<u>D (dilution):</u> A mixing zone is defined as a limited area or volume of water where the discharge plume is progressively diluted by the receiving water. WQS may be exceeded in the mixing zone as

long as acutely toxic effects are prevented from occurring and the applicable existing designated uses of the water body are not impaired as a result of the mixing zone. A mixing zone is authorized at the discretion of the Department based on the WQS regulations.

The WQS allow for the use of mixing zones. Under 18 AAC 70.250, it provides general conditions for mixing zones, and in 18 AAC 70.255, it provides quality and size specifications for mixing zones. The standards allow water quality within a mixing zone to exceed chronic water quality criteria so long as chronic water quality criteria are met at the boundary of the mixing zone. Acute water quality criteria may be exceeded within a zone of initial dilution inside the chronic mixing zone.

The Department authorized a mixing zone for Outfall 001 representing 1 part effluent to 46.9 parts receiving water for a dilution factor of 47.9.

Table B-3: Reasonable Potential Determination for Outfall 001

Parameter [a] (µg/L unless otherwise noted)	Effluent Data					Background Receiving Water Conc. (C_u) [g]	Max Projected Receiving Water Conc. (C_d)	Reasonable Potential [h] (yes or no)
	Max Observed Effluent Conc. [b]	Coefficient of Variation (CV) [c]	Number of Samples [d]	Reasonable Potential Multiplier (RPM) [e]	Max Expected Effluent Conc. (MEC) [f]			
Arsenic	3.4	0.5370	31	1.3	4.46	5.400	5.38	no
Cadmium	0.95	1.2948	31	1.5	1.40	1.320	1.32	no
Chromium	37.5	1.5487	27	1.6	58.68	0	1.23	no
Copper	63.5	1.1669	31	2.5	160.18	0.390	3.73	no
Lead	6.3	1.1200	31	1.4	9.13	1.275	1.44	no
Mercury	0.05	0.6	31	1.7	0.09	0.008	0.01	no
Nickel	5.9	0.8792	30	1.4	8.35	1.245	1.39	no
Selenium	1.1	0.2448	31	1.2	1.3	10.650	10.45	no
Silver	1.12	1.3349	30	1.5	1.67	0.345	0.37	no
Zinc	145.0	1.2107	32	1.5	210.56	12.900	17.03	no

Notes:

a. Parameters where there are applicable water quality criteria and effluent monitoring data available.

b. The maximum observed effluent concentrations are based on effluent samples collected from 2007 through 2013.

c. The CV is calculated as the standard deviation of the data divided by the mean. If the effluent-specific variability cannot be determined, a default CV of 0.6 was used.

d. The number of samples is used to develop the RPM.

e. The RPM is based on the CV and the number of data points.

f. For each parameter, the MEC equals the maximum observed effluent concentration times the RPM producing a number based on treatment plant performance for determining if there is a reasonable potential to exceed WQS in the receiving water outside the mixing zone.

g. The receiving water concentrations are based on samples collected from Niblack Anchorage station SW on May 14 and October 2, 2007 (see *Niblack Underground Exploration Project Annual Report, April 2008*).

h. Reasonable potential is evaluated at the mixing boundary, and it exists if C_d exceeds the most stringent applicable water quality criterion in Table B-2.

C. Water Quality–Based Effluent Limit Calculation

Once the Department determines that the effluent has a reasonable potential to exceed WQS at the end-of-pipe (comparing the MEC in Table B-3 to the WQS in Table B-2) or a parameter has a technology-based limit that exceeds WQS, a water quality-based effluent limit for the pollutant is developed. The first step in calculating a permit limit is development of a WLA for the pollutant.

Mixing Zone Based WLA

When the Department authorizes a mixing zone for the discharge, the WLA is calculated using the available dilution, background concentrations of the pollutant, and the WQS.

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

End-of-Pipe WLAs

In many cases, there is no dilution available, either because the receiving waterbody exceeds the criteria or because the Department does not authorize a mixing zone for a particular pollutant. When there is no dilution available, the criterion becomes the WLA. Establishing the criterion as the WLA ensures that the permittee's discharge does not contribute to an exceedance of the criterion. As with the mixing-zone based WLA, the acute and chronic criteria must be converted to LTAs and compared to determine which one is more stringent. The more stringent LTA is then used to develop permit limits.

Permit Limit Derivation

Once the appropriate LTA has been calculated, the Department applies the statistical approach described in Chapter 5 of the *TSD* and the Department's *Reasonable Potential Analysis and Effluent Limits Development Guide* to calculate maximum daily and average monthly permit limits. This approach takes into account effluent variability [using the Coefficient Variation (CV)], sampling frequency, and the difference in time frames between the average monthly and maximum daily limits.

The maximum daily limit is based on the CV of the data and the probability basis, while the average monthly limit is dependent on these two variables and the monitoring frequency. As recommended in the *TSD* and the Department's *Reasonable Potential Analysis and Effluent Limits Development Guide*, the Department used a probability basis of 95 percent for average monthly limit calculation and 99 percent for the maximum daily limit calculation.

The following is a summary of the steps to derive water quality-based effluent limits. Copper is used as an example.

Step 1- Determine the WLA

The acute and chronic aquatic life criteria are converted to acute and chronic WLAs (WLA_{acute} or $WLA_{chronic}$) using the following equation:

1. $$Q_d C_d = Q_e C_e + Q_u C_u$$

   Q_d = total flow = $Q_u + Q_e$
   C_d = most stringent WQS that cannot be exceeded outside the mixing zone

Q_e = effluent flow
C_e = concentration of pollutant in effluent = WLA_{acute} or $WLA_{chronic}$
Q_u = background flow
C_u = background concentration of pollutant

Rearranging the above equation to determine the effluent concentration (C_e) or WLA results in the following:

2. $$C_e = WLA = \frac{Q_d C_d - Q_u C_u}{Q_e} = \frac{C_d(Q_u + Q_e) - Q_u C_u}{Q_e}$$

With a 46.9: 1 chronic dilution ratio and C_u equal to 0.39, this equation becomes:

3. $$C_e = WLA = \frac{C_d(46.9 + 1) - (46.9 * 0.39)}{1}$$

4. WLA = (C_d * 47.9) – 18.29

For example, the copper chronic WLA, the calculation is:

C_e = $WLA_{chronic}$ = (3.735 * 47.9) – 18.29 = 160.6 µg/L

For copper, the acute WLA with an acute dilution ratio equal to 28.64:1, the calculation is:

C_e = WLA_{acute} = (5.80 * (28.64 + 1)) – (28.64 * 0.39) = 160.7 µg/L

<u>Step 2 - Determine the Long-Term Average (LTA)</u>

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

where,

$$\sigma^2 = \ln(CV^2 + 1)$$

$$\sigma^2 = \ln(1.1669^2 + 1)$$

$$\sigma^2 = 0.859$$

$$z = 2.326 \; for \; 99^{th} \; percentile \; probability \; basis$$

LTA_{acute} = 28.6 µg/L

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

where,

$$\sigma^2 = \ln\left(\frac{CV^2}{4} + 1\right)$$

$$\sigma^2 = \ln\left(\frac{1.1669^2}{4} + 1\right)$$

$$\sigma^2 = 0.293$$

$$z = 2.326 \; for \; 99^{th} \; percentile \; probability \; basis$$

$$LTA_{chronic} = 52.8 \text{ µg/L}$$

Step 3 - Most Limiting LTA

To protect a waterbody from both acute and chronic effects, the more limiting of the calculated LTA_{acute} and $LTA_{chronic}$ is used to derive the effluent limitations. LTA_{acute} is the most limiting LTA.

Step 4 - Calculate the Permit Limits

The *TSD* and the Department's *Reasonable Potential Analysis and Effluent Limits Development Guide* recommends using the 95th percentile for the Average Monthly Limit (AML) and the 99th percentile for the Maximum Daily Limit (MDL). The maximum daily limit (MDL) and the average monthly limit (AML) are calculated as follows:

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

where,

$$\sigma^2 = \ln(CV^2 + 1)$$

$$\sigma^2 = \ln(1.1669^2 + 1)$$

$$\sigma^2 = 0.859$$

$$z = 2.326 \; for \; 99^{th} \; percentile \; probability \; basis$$

MDL = 160 µg/L

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

where,

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

$$\sigma^2 = \ln\left(\frac{1.1669^2}{4} + 1\right)$$

$$\sigma^2 = 0.293$$

$$z = 1.645 \; for \; 95^{th} \; percentile \; probability \; basis$$

$$n = number \; of \; sampling \; events \; required \; per \; month \; (minimum \; of \; 4)$$

AML = 60 µg/L

Summary of Permit Effluent Limitations

As discussed in Section I of this appendix, technology-based limits were applied to each discharge and evaluated to determine whether these limits may result in any exceedances of WQS in the receiving water. If exceedances could occur, then water quality-based effluent limits were developed. The following summarizes the effluent limits developed for the outfall.

Outfall 001: The reasonable potential analysis demonstrates that discharge at the water quality-based effluent limits for metals will not cause or contribute to an exceedance of WQS at or beyond the boundary of the mixing zone in Niblack Anchorage. However, effluent discharge at the technology-based effluent limits for copper and lead could result in an exceedance of WQS at the boundary of the authorized mixing zone. Consequently, water quality-based effluent limits are implemented to ensure protection of WQS. In a few cases, the total suspended solids (TSS), chronic mercury, and cadmium limits, technology-based effluent limits, which are more stringent than water quality-based effluent limits, have been imposed by the permit. Additionally, the reasonable potential analysis showed that the discharge of arsenic, chromium, nickel, selenium and silver would not cause or contribute to an exceedance of their applicable water quality criterion. Therefore, water quality-based effluents limits were not needed for these parameters, and in addition, there are no technology-based limits associated with these parameters.

The permit also includes flow limits to ensure that the volume discharged does not exceed the flow assumptions used to develop the allowable dilution (mixing zone). Since flow and concentration limits are included in the permit, mass limits are not needed. Controlling flow and concentration is the same as controlling mass. See Table B-4 for a summary of Outfall 001 effluent limits.

Table B-4: Outfall 001 Effluent Limits

Parameter	Units	Daily Maximum		30-Day Average	
		Effluent Limit	Basis for Limit	Effluent Limit	Basis for Limit
Flow	gpm	300	design capacity	Report	catchment area and precipitation
Cadmium [a]	µg/L	100	ELG	50	ELG
Copper [a]	µg/L	160	Acute Aquatic WQS	60	Acute Aquatic WQS
Lead [a]	µg/L	600	ELG	243	Chronic Aquatic WQS
Mercury [b]	µg/L	2.0	ELG	1.0	ELG
Zinc [a]	µg/L	1,500	ELG	750	ELG
TSS	mg/L	30	ELG	20	ELG
pH [c]	s.u.	6.0 to 9.0	ELG	6.0 to 9.0	ELG

Notes:
a. Metals shall be measured as total recoverable.
b. Mercury shall be measured as total.
c. The limit reflects that there is a pH mixing zone, covers a range, and does not offer specific daily and monthly limits.

APPENDIX C. 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 at 18 AAC 70.240 through 18 AAC 70.270 are satisfied, as well as provide justification to authorize a mixing zone in an APDES permit. In order to authorize a mixing zone, all criteria must be met. The permit writer must document all conclusions in the permit Fact Sheet; however, if the permit writer determines that one criterion cannot be met, then a mixing zone is prohibited, and the permit writer need not include in the Fact Sheet the conclusions for when other criteria were met.

Criteria	Description	Resources	Regulation	MZ 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 water body (e.g. flow and flushing rates) - Permit writer performs modeling exercise and documents analysis in Fact Sheet at: ►Section 4.3 Mixing Zone Analysis - describe what was done to reduce size.	•Technical Support Document for Water Quality Based Toxics Control •Fact Sheet, Appendix C •Fact Sheet, Appendix D • DEC's RPA Guidance • EPA Permit Writers' Manual	18 AAC 70.240 (a)(2) 18 AAC 70.245 (b)(1) - (b)(7) 18 AAC 70.255(e) (3) 18 AAC 70.255 (d)	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 4.3 Mixing Zone Analysis. . . . Attach additional documents if necessary.		18 AAC 70.240 (a)(3)	Y

Criteria	Description	Resources	Regulation	MZ 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		18 AAC 70.255(f)	
Existing use	Does the mixing zone…			
	(1) partially or completely eliminate an existing use of the water body outside the mixing zone? No **If yes, mixing zone prohibited.**		18 AAC 70.245(a)(1)	Y
	(2) impair overall biological integrity of the water body? No **If yes, mixing zone prohibited.**		18 AAC 70.245(a)(2)	Y
	(3) provide for adequate flushing of the water body to ensure full protection of uses of the water body outside the proposed mixing zone? Yes **If no, then mixing zone prohibited.**		18 AAC 70.250(a)(3)	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? No **If yes, then mixing zone prohibited.**		18 AAC 70.250(a)(4)	Y
	Does the mixing zone…			

Criteria	Description	Resources	Regulation	MZ Approved Y/N
Human consumption	(1) produce objectionable color, taste, or odor in aquatic resources harvested for human consumption? No **If yes, mixing zone may be reduced in size or prohibited.**		18 AAC 70.250(b)(2)	Y
	(2) preclude or limit established processing activities of commercial, sport, personal use, or subsistence shellfish harvesting? No **If yes, mixing zone may be reduced in size or prohibited.**		18 AAC 70.250(b)(3)	Y
Spawning Areas	Does the mixing zone…			
	(1) discharge in a spawning area for anadromous fish or Arctic grayling, northern pike, rainbow trout, lake trout, brook trout, cutthroat trout, whitefish, sheefish, Arctic char (Dolly Varden), burbot, and landlocked coho, king, and sockeye salmon? No **If yes, mixing zone prohibited.**		18 AAC 70.255 (h)	Y
Human Health	Does the mixing zone…			
	(1) contain bioaccumulating, bioconcentrating, or persistent chemical above natural or significantly adverse levels? No **If yes, mixing zone prohibited.**		18 AAC 70.250 (a)(1)	Y

Criteria	Description	Resources	Regulation	MZ Approved Y/N
	(2) contain chemicals expected to cause carcinogenic, mutagenic, tetragenic, or otherwise harmful effects to human health? No **If yes, mixing zone prohibited.**			Y
	(3) Create a public health hazard through encroachment on water supply or through contact recreation? No **If yes, mixing zone prohibited.**		18 AAC 70.250(a)(1)(C)	Y
	(4) meet human health and aquatic life quality criteria at the boundary of the mixing zone? Yes **If no, mixing zone prohibited.**		18 AAC 70.255 (b),(c)	Y
	(5) occur in a location where the department determines that a public health hazard reasonably could be expected? No **If yes, mixing zone prohibited.**		18 AAC 70.255(e)(3)(B)	Y
Aquatic Life	Does the mixing zone…			
	(1) create a significant adverse effect to anadromous, resident, or shellfish spawning or rearing? No **If yes, mixing zone prohibited.**		18 AAC 70.250(a)(2)(A-C)	Y
	(2) form a barrier to migratory species? No **If yes, mixing zone prohibited.**			Y

Criteria	Description	Resources	Regulation	MZ Approved Y/N
	(3) fail to provide a zone of passage? No **If yes, mixing zone prohibited.**			Y
	(4) result in undesirable or nuisance aquatic life? No **If yes, mixing zone prohibited.**		18 AAC 70.250(b)(1)	Y
	(5) result in permanent or irreparable displacement of indigenous organisms? No **If yes, mixing zone prohibited.**		18 AAC 70.255(g)(1)	Y
	(6) result in a reduction in fish or shellfish population levels? No **If yes, mixing zone prohibited.**		18 AAC 70.255(g)(2)	Y
	(7) prevent lethality to passing organisms by reducing the size of the acute zone? No **If yes, mixing zone prohibited.**		18 AAC 70.255(b)(1)	Y
	(8) cause a toxic effect in the water column, sediments, or biota outside the boundaries of the mixing zone? No **If yes, mixing zone prohibited.**		18 AAC 70.255(b)(2)	Y

Criteria	Description	Resources	Regulation	MZ Approved Y/N
Endangered Species	Are there threatened or endangered species (T/E spp) at the location of the mixing zone?If yes, are there likely to be adverse effects to T/E spp based on comments received from USFWS or NOAA. 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.**	Applicant or permit writer requests list of T/E spp from USFWS prior to drafting permit conditions.	Program Description, 6.4.1 #5 18 AAC 70.250(a)(2)(D)	Y