ALASKA POLLUTANT DISCHARGE ELIMINATION SYSTEM

PERMIT MODIFICATION FACT SHEET – DRAFT

Individual Permit: AK0062278 – EXXONMOBIL ALASKA LNG LLC, Cook Inlet Geotechnical Surveys

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

Public Comment Period Start Date: **January 14, 2016**
Public Comment Period Expiration Date: **February 13, 2016**
Alaska Online Public Notice System

Technical Contact: Jamie Grant
Alaska Department of Environmental Conservation
Division of Water
Wastewater Discharge Authorization Program
555 Cordova Street
Anchorage, AK 99501
(907) 269-4720
Fax: (907) 269-3487
jamie.grant@alaska.gov

Proposed issuance of an Alaska Pollutant Discharge Elimination System (APDES) permit modification to:

EXXONMOBIL ALASKA LNG LLC

For wastewater discharges from:

Geotechnical Surveys in Cook Inlet
3201 C Street, Suite 506
Anchorage, AK 99501

The Alaska Department of Environmental Conservation (Department or DEC) proposes to modify APDES individual permit AK0062278 – ExxonMobil Alaska LNG LLC, Cook Inlet Geotechnical Surveys (existing Permit). The modified Permit authorizes and sets modifications to the discharge conditions of pollutants from geotechnical survey operations to waters of the United States. In order to ensure protection of water quality and human health, the modified Permit places limits on the types and amounts of pollutants that can be discharged from these operations and outlines best management practices to which these operations must adhere.

This permit modification fact sheet explains the nature of potential changes to discharges from geotechnical facilities operated by EMALL in state waters of the Cook Inlet and the development of the modified Permit including:

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

Public Comment

Consistent with 18 AAC 83.130(f), DEC will consider comments only on the proposed modifications to the existing Permit. All other provisions of the existing Permit shall remain in effect for the term defined in the existing Permit unless those provisions are subject to a separate modification process consistent with 18 AAC 83.130(f).

Persons wishing to comment on, or request a public hearing for the draft Permit modification 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 modified Permit condition(s) and the relevant facts upon which the comments are based. Commenters are encouraged to cite specific modified 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 modification. 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 modification will become the proposed final modified Permit.

The proposed final modified 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 modified Permit review

period, the Department will make a final decision regarding modified Permit issuance. A final modified Permit will become effective 30 days after the Department's decision, in accordance with the state's appeals process at 18 AAC 15.185.

Appeals Process

The Department will transmit the modified Permit, fact sheet (amended as appropriate), and the Response to Comments on the modified content to anyone who provided comments during the public comment period or who requested to be notified of the Department's final decision.

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
410 Willoughby Street, Suite 303
Juneau AK, 99811-1800

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 modified Permit, fact sheet, 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 modified Permit, fact sheet, and other information are located on the Department's Wastewater Discharge Authorization Program website: http://www.dec.state.ak.us/water/wwdp/index.htm .

Alaska Department of Environmental Conservation Division of Water Wastewater Discharge Authorization Program 555 Cordova Street Anchorage, AK 99501 (907) 269-6285	Alaska Department of Environmental Conservation Division of Water Wastewater Discharge Authorization Program 43335 Kalifornsky Beach Rd. - Suite 11 Soldotna, AK 99669 (907) 262-5210

TABLE OF CONTENTS

1.0 INTRODUCTION – INDIVIDUAL PERMIT MODIFICATION 7
1.1 Applicant 7
1.2 Authority 7

2.0 BACKGROUND INFORMATION 7
2.1 EMALL Program Modifications in the Cook Inlet 8

3.0 MODIFIED FACILITY INFORMATION 9
3.1 Modifications to Effluent Characterization of Geotechnical Drilling Fluids and Drill Cuttings at the Seafloor (Outfall 001) 10

4.0 EFFLUENT LIMITS AND MONITORING REQUIREMENTS 11
4.1 Monitoring Requirements 11
4.2 Geotechnical Drilling Fluids and Drill Cuttings at the Seafloor (Outfall 001) 11

5.0 RECEIVING WATERBODY 11
5.1 Water Quality Standards 11
5.2 Water Quality Status of Receiving Water 12
5.3 Mixing Zone Analysis 12
5.4 Zone Of Deposit 16

6.0 ANTIBACKSLIDING 17

7.0 ANTIDEGRADATION 18

8.0 OTHER LEGAL REQUIREMENTS 22
8.1 Permit Expiration 22

9.0 REFERENCES 23

APPENDIX A. FIGURES 26
Figure 1. Area of Coverage Map 26
Figure 2. North Cook Inlet Landfall Area 27
Figure 3. South Cook Inlet Landfall Area 28
Figure 4. Proposed Marine Terminal Area – Nikiski, AK 29
Figure 5. Cook Inlet Fish Habitat 30

APPENDIX B. MIXING ZONE CHECKLIST 31

LIST OF TABLES

Table 1: EMALL Program Modifications – Summary 9

Table 2: EMALL Program – Modified Borehole Locations 9

Table 3: Modifications to Effluent Characteristics for Geotechnical Drilling Fluids and Drill Cuttings at the Seafloor (Outfall 001) 10

Table 4: Summary of NOAA Bottom Current Meter Data 11

Table 5: Modifications to Mixing Zone Sizes 13

1.0 INTRODUCTION – INDIVIDUAL PERMIT MODIFICATION

In a cover letter with an attached application and supporting materials dated December 21, 2015 and December 28, 2015, ExxonMobil Alaska LNG LLC (EMALL or applicant) requested modifications to Alaska Pollutant Discharge Elimination System (APDES) individual permit AK0062278 – EMALL, Cook Inlet Geotechnical Surveys (existing Permit). Per Alaska Administrative Code 18 AAC 83.135, DEC is modifying the existing Permit to authorize additional drilling fluids, borehole count, borehole locations, and mixing zones for turbidity in accordance with Alaska Water Quality Standards (WQS) 18 AAC 70.240-70.270 (as amended June 26, 2003). Modifications also include the potential use of cement or grout to plug and abandon boreholes, if necessary. Information contained in this fact sheet is based on the applicant's modification request and follow-up information requested by DEC. Geotechnical survey facilities will operate in coastal waters of Cook Inlet (Figure 1, Appendix A).

1.1 Applicant

This fact sheet provides information on the modification to an APDES permit for the following entity:

Name of Project:	EMALL, Cook Inlet Geotechnical Surveys
APDES Permit No.:	AK0062278
Project Location:	Cook Inlet (Area of Coverage Map: Appendix A, Figure 1)
Mailing Address:	3201 C Street, Suite 506 Anchorage, AK 99501
Facility Contact:	Mr. Charlie Kominas

The applicant requests the following discharges be modified in the existing Permit:

Discharge Outfall	Discharge Type	Receiving water
Outfall 001	Geotechnical Drilling Fluids and Drill Cuttings at the Seafloor	Cook Inlet

For more information about individual discharge and borehole modifications, refer to Figures 1 through 4 in Appendix A and Table 2.

1.2 Authority

DEC is the APDES permitting authority for regulating discharges associated with the existing Permit and is modifying the existing Permit consistent with 18 AAC 83.135 and 18 AAC 83.480. Section 301(a) of the Clean Water Act (CWA) and 18 AAC 83.015 provide that the discharge of pollutants to waters of the United States (U.S.) is unlawful except in accordance with an APDES permit including modified permits. A violation of a condition contained in the existing Permit or components of the final modified Permit constitutes a violation of the CWA and subjects the permittee to the penalties specified in Alaska Statute (AS) 46.03.020(13).

2.0 BACKGROUND INFORMATION

On June 30, 2015, the Department issued the existing Permit which authorizes discharges of geotechnical drilling fluids and drill cuttings to the seafloor (Outfall 001) and deck drainage (Outfall 002) in State Waters of the Cook Inlet from EMALL Program's geotechnical investigation facilities. The EMALL Program includes geotechnical surveys of the seafloor in Cook Inlet and is a component of the Alaska LNG Project intending to establish the infrastructure needed to enable the

commercialization of natural gas resources on the North Slope of Alaska. The survey focus is on the collection of shallow marine sediment and geotechnical engineering data to inform placement of a pipeline route crossing from the west side of Cook Inlet to a potential LNG marine terminal located in Nikiski on the east side of Cook Inlet.

The existing Permit was developed based on an understanding that a typical shallow borehole in a marine environment would refill with accumulated sediment over time (self-heal). However, during the 2015 project season EMALL encountered two unanticipated shallow artesian freshwater aquifers in the proposed Nikiski marine terminal area that prevented the boreholes from naturally filling in with sediment. The materials determined to be necessary to properly plug and abandon the aquifer were not authorized discharges under the existing Permit. Borehole plugging and abandonment is a common industry procedure that may include the use of bentonite, a mechanical plug-like device, and at times, cement or grout. EMALL ultimately had to work with the Department and other state and local agencies to plug and abandon a borehole as an emergency action. Without the ability to plug and abandon boreholes, the unanticipated artesian aquifers encountered by the permittee hampered the implementation of the EMALL Program. In addition, the EMALL Program also encountered several boreholes that were unstable or had boulders or cobbles that impeded progress. The use of bentonite would also be beneficial under both of these unforeseen situations.

Due to the new stratigraphic information obtained from the 2015 season challenges, EMALL has determined that it will be necessary to use bentonite to increase borehole stability and cement or grout for plugging and abandoning under artesian conditions. EMALL has also determined that additional geotechnical data must be obtained to support sound engineering and design decisions (see Tables 1 and 2). The remaining EMALL program will be adjusted to include investigations in deeper waters of the Nikiski marine terminal area, including potentially deeper boreholes, and the use of a larger casing (10-inches). To support these program adjustments, EMALL has submitted a request to modify permit conditions for Outfall 001 - Geotechnical Drilling Fluids and Drill Cuttings at the Seafloor, associated zones of deposit, and mixing zones in the existing Permit.

2.1 EMALL Program Modifications in the Cook Inlet

The modified EMALL Program will continue operations in the coastal waters of Cook Inlet along a defined survey corridor (Appendix A, Figures 1 through 4). The EMALL Program was originally designed to obtain sediment core samples from 42 borehole locations within the designated survey corridor from sample depths ranging from 50-200 feet (ft). EMALL has completed 25 of the 42 marine terminal borings consistent with the terms of the existing Permit in the 2015 open water season. The EMALL Program will continue with the eight borehole locations around the potential pipeline transition areas in the 2016 open water season. Modification requests to the existing Permit include four alternate locations around pipeline transition areas and 24 additional boreholes in deeper waters around the marine terminal area with target depths ranging from 50 to 300 ft. Table 1 provides a summary of remaining boreholes, borehole additions, and alternate locations proposed by EMALL Program for the modified Permit. Borehole location adjustments or additions may occur within 1,000 ft of the originally proposed locations (Table 2) with actual coordinates reported in the End of Survey Report.

Table 1: EMALL Program Modifications – Summary

Survey Area	Original Borings	2015 Borings Completed	Additional Borings Requested	Total Borings Remaining
Potential Pipeline Transition Areas	8	0	4	12
Marine Terminal Area	34	34	24	24

Table 2: EMALL Program – Modified Borehole Locations

Borehole	Water Depth (Feet)	Nearest Shore Fishery Lease (Meters)	Latitude (N)	Longitude (W)	Borehole	Water Depth (Feet)	Nearest Shore Fishery Lease (Meters)	Latitude (N)	Longitude (W)
MB-35	34.5	212	60.65812	-151.38068	MB-53	56.1	325	60.65752	-151.38607
MB-36	36.4	271	60.65688	-151.38034	MB-54	56	323	60.65785	-151.38741
MB-37	32.2	255	60.65583	-151.37887	MB-55	-1.6	0	60.68859	-151.3984
MB-38	38.2	366	60.65507	-151.38028	MB-56	5.1	0	60.68802	-151.40014
MB-39	46.7	464	60.65439	-151.38151	MB-57	18.7	0	60.68703	-151.39965
MB-40	52.7	520	60.6542	-151.38249	MB-58	14.6	0	60.68612	-151.39912
MB-41	44.3	525	60.65268	-151.38148	BP-1	-3.2	2884	60.77544	-151.25537
MB-42	47.3	568	60.65344	-151.38284	BP-2	14	3117	60.77778	-151.25592
MB-43	52.8	601	60.65225	-151.38262	SC-1	0	223	61.13144	-151.07951
MB-44	52.3	585	60.65179	-151.38226	SC-1A	9.7	139	61.12824	-151.07429
MB-45	52.3	543	60.65133	-151.3819	SC-2	5.7	95	61.1291	-151.07568
MB-46	51.2	428	60.65038	-151.38042	SC-2A	16	295	61.12543	-151.06969
MB-47	50.3	440	60.64969	-151.38097	SL-1	-8.1	5650	60.78151	-151.19118
MB-48	53.5	558	60.65446	-151.38365	SL-1A	3.8	5769	60.78257	-151.19011
MB-49	57.7	546	60.65541	-151.38512	SL-2	6.7	5890	60.78365	-151.18901
MB-50	53.6	507	60.65553	-151.38373	SL-2A	10.2	6032	60.78489	-151.18775
MB-51	58.9	495	60.6559	-151.38551	VP-1	5.9	0	61.11979	-151.08686
MB-52	59.2	450	60.65633	-151.38584	VP-2	17	98	61.11792	-151.08057

Notes: Due to unknown field encounters or conditions, the Department will allow actual locations to vary up to 1000-foot from each identified location, provided all conditions within the Permit are maintained and the changes do not cause a violation to WQS.

3.0 MODIFIED FACILITY INFORMATION

The EMALL program will be conducting geotechnical surveys in 2016 using the same Comacchio MC-S skid-mounted rotary drilling unit on the deck of a Skate 3–Seacore mobile offshore drilling unit (MODU) as described in the existing Permit. However, the original casing diameter is expected to increase from nine inches to 10 inches. The increase in casing diameter and changes to the water depth at borehole locations will have a direct effect on the volume and discharge rate, which results in a

modification to the mixing zones authorized by the existing Permit. The use of alternative fluids also requires permit modification.

3.1 Modifications to Effluent Characterization of Geotechnical Drilling Fluids and Drill Cuttings at the Seafloor (Outfall 001)

Changes to the EMALL Program are expected to increase the maximum discharge volume of drilling fluids and drill cuttings from 323 to 460 gallons (gal) in the Nikiski marine terminal area, and decrease the maximum discharge volume from 323 to 290 gal in upper Cook Inlet. These volume changes affect the critical effluent assumptions used to model the mixing zones for turbidity and the zone of deposit (see Sections 5.3 and 5.4). However, the expected concentration of total suspended solids (TSS) discharged remains unchanged (see Table 3). The addition of bentonite as a drilling fluid option should not result in any measurable changes to aquatic toxicity from the previously authorized two non-toxic fluid systems. Similar to the existing Permit, a suspended phase particulate (SPP) toxicity test was provided to determine the 50 percent (%) lethal concentration (LC_{50}) and confirm that the fluids and additives are non-toxic to aquatic life. In a 96-hour LC_{50} SPP toxicity test, a lab evaluates the occurrence and magnitude of toxicity to aquatic life from a mixture over a period of 96 hours. A solution with a concentration of 30,000 parts per million (ppm) by weight (3% solution) or less is considered to be toxic if there is a 50% lethality rate or greater (EPA Method 1619). The SPP toxicity results for the additional fluid system shows that a LC_{50} endpoint was not observed at 1,000,000 ppm (100 % solution), which is consistent with the results of the two fluid systems already approved for discharge in the existing Permit. The SPP toxicity test results indicate the fluids will not have significant acute affects for the anticipated discharge volumes. The Department has reviewed these SPP toxicity results and finds the results to be satisfactory. Table 3 provides discharge characteristics approved in the existing Permit and summarizes the changes to those discharge characteristics in the modified Permit.

Table 3: Modifications to Effluent Characteristics for Geotechnical Drilling Fluids and Drill Cuttings at the Seafloor (Outfall 001)

Characteristic of Condition	Modified Permit
Maximum Discharge in Nikiski Area (per borehole)	460 gal
Maximum Discharge in Upper Cook Inlet Area (per borehole)	290 gal
Drilling Fluid Mixture: Bentonite (new fluid) [a]	5 kilograms : 1 cubic meter or 5,000 milligrams/Liter (mg/L)
Discharge Ratio of Drilling Fluids to Drill Cuttings [a]	4:1
% Fines (TSS) from Sediment Discharged (Nikiski Area) [a]	8-10% (~48,000 mg/L)
% Fines (TSS) from Sediment Discharged (Upper Cook Inlet) [a]	18-20% (~96,000 mg/L)
96-hour LC_{50} SPP Toxicity for MaxGel-Wyoming (Bentonite) [a]	>1,000,000 ppm (>100% by Weight)

Notes:

a. Modified Permit conditions reflected in the table remain unchanged from the existing Permit conditions

4.0 EFFLUENT LIMITS AND MONITORING REQUIREMENTS

4.1 Monitoring Requirements

Proposed changes do not result in modifications to the effluent limits or monitoring requirements developed in the existing Permit. The permittee is required to continue conducting effluent and receiving water monitoring via observation as outlined in the existing Permit.

4.2 Geotechnical Drilling Fluids and Drill Cuttings at the Seafloor (Outfall 001)

The modified Permit allows for the use of drilling fluids or chemical additives with a similar SPP Toxicity (96hr LC_{50}) to the fluids characterized in Section 3.1 of the modified Permit. Changes to drilling fluids or additives that have not been identified in the existing or modified Permit will require Department review and approval to ensure that the mixture does not constitute a substantial or material change under 18 AAC 83.135, that if known at the time of issuing this modification, would have resulted in different permit conditions.

5.0 RECEIVING WATERBODY

The receiving waterbody characteristics have not changed from the existing Permit. Cook Inlet is unique and noted for large tides, strong currents, extensive mudflats, high turbidity, and fluctuations in salinity due to large glacial and freshwater inputs from surrounding drainages. As shown in the existing Fact Sheet, a summary of bottom current information for the receiving waterbody near boring locations are listed in Table 4 below for reference.

Table 4: Summary of NOAA Bottom Current Meter Data

Mooring Name	10th Percentile (m/s)	50th Percentile (m/s)	90th Percentile (m/s)
Unocal Pier	0.229[a]	0.81	1.33[a]
Nikiski Offshore	0.296[b]	1.40	2.10
East Forelands	0.404	1.57	2.20[b]
North Forelands	0.339	1.10	1.66
Beluga Shoal	0.297	0.96	1.31
Fire Island	0.375	1.23	1.67

a. Critical bottom current conditions for the Upper Cook Inlet portion of the survey.
b. Critical bottom current conditions for the Nikiski and Boulder Point portions of the survey.

5.1 Water Quality Standards

Section 301(b)(1)(C) of the CWA requires the development of limits in permits necessary to meet WQS by July 1, 1977. Per 18 AAC 83.435, conditions in permits are required to ensure compliance with WQS. The WQS are composed of waterbody use classifications, an antidegradation policy, numeric water quality criteria, and narrative water quality criteria. The use classification system designates the beneficial uses that each waterbody is expected to achieve. The numeric and narrative water quality criteria are deemed necessary by the state to support the beneficial use classification of each waterbody. The antidegradation policy ensures that the beneficial uses and existing water quality are maintained.

Waterbodies in Alaska are designated for all uses unless the water has been reclassified under 18 AAC 70.230 as listed under 18 AAC 70.230(e). Some waterbodies in Alaska can also have site–specific water quality criterion per 18 AAC 70.235, such as those listed under 18 AAC 70.236(b). The Department has determined that there has been no reclassification nor has site-specific water quality criteria been established for the Cook Inlet Geotechnical Survey area requested by the applicant. The Department has determined that all of the marine use classes must be protected in state waters in Cook Inlet.

5.2 Water Quality Status of Receiving Water

Any part of a waterbody for which the water quality does not, or is not expected to, intrinsically meet applicable WQS is defined as a "water quality limited segment" and placed on the state's impaired waterbody list. For an impaired waterbody, Section 303(d) of the CWA requires states to develop a 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.

Cook Inlet is not included on the *Alaska's Final 2010 Integrated Water Quality Monitoring and Assessment Report*, July 15, 2010 as an impaired waterbody nor is the subject waterbody listed as a CWA 303(d) waterbody as requiring or having a TMDL.

5.3 Mixing Zone Analysis

Per 18 AAC 70.240 – 70.270 as amended through June 26, 2003, the Department authorized EMALL for two area dependent chronic mixing zone sizes for turbidity in the existing Permit. While the critical receiving water conditions for the modified Permit remain consistent with the existing Permit, the critical effluent conditions are different in the modified Permit and result in different sizes of mixing zones. The difference is due to a maximum discharge volume increase for the Nikiski marine terminal area and maximum discharge volume decrease for the upper Cook Inlet area.

EMALL submitted a modified mixing zone request that provides information required by 18 AAC 70.260, including available evidence necessary to demonstrate consistency with mixing zone regulations. By applying different critical effluent conditions to the previous modeling methods and assumptions, the mixing zone sizes have been adjusted. In addition, the application and *Amended Discharge Modeling Report* submitted by EMALL provided information necessary to evaluate if the mixing zones authorized by the existing Permit would be appropriately sized or if a new size should be authorized by the Department.

Based on evaluation of the modeling results, the Department authorizes modifications to the two different sizes of chronic mixing zones for turbidity that are dependent on the regional location of the discharge. Water quality criteria must be met at the boundary of the newly authorized mixing zones. The rectangular shaped chronic mixing zones extend from the surface of the water to the seafloor and are centered on the point of discharge and longitudinally oriented in the prevailing current directions as described below.

Table 5: Modifications to Mixing Zone Sizes

Mixing Zone Location	Dilution Factor	Current Mixing Zone Length (m)	Current Mixing Zone Width (m)	Modified Mixing Zone Length (m)	Modified Mixing Zone Width (m)
Nikiski marine terminal area (East side of the Cook Inlet)	1500	1378	93	1696	112
Upper Cook Inlet (West side, Between Beluga and Tyonek)	3000	1856	105	1608	81.5

Appendix B, 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 consideration of 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. All criteria must be met in order to authorize a mixing zone. The Department's evaluation of this criteria is consistent with the existing Permit and there may be some redundancies between the existing Permit and the modified Permit evaluation. The following sections summarize the Department's regulatory mixing zone analysis.

5.3.1 Size

Per 18 AAC 70.255, the Department has determined the mixing zone sizes for the discharge of Geotechnical Drilling Fluids and Drill Cuttings at the Seafloor (as described above) are appropriate and as small as practicable based on modeling of critical receiving water and effluent conditions and meeting mixing zone regulatory requirements.

Critical receiving water conditions considered in the CORMIX model are consistent with the existing Permit and use the 10th percentile low current conditions and the 90th percentile high current conditions at each of the investigation areas (Table 4). Critical effluent conditions for both mixing zones were evaluated based on modifications to maximum regional water depths (Table 2) and casing size to derive a revised discharge volume. The resulting discharge volumes can be found in Table 3. Assuming the total discharge volumes would occur over a 30-second period, the critical effluent flow rate in Nikiski area is 920 gallons per minute (gpm) and in the upper Cook Inlet portion, the critical effluent flow rate is 579 gpm. Using methods consistent with the existing Permit, critical receiving water conditions, and modifications to the critical effluent conditions, the modeling results indicate that the low (10th percentile) current scenarios continue to represent the most conservative model.

The Department is authorizing the modification of two area-dependent mixing zones. The mixing zone specific to the East side of the Cook Inlet (Nikiski area) has increased from 1,378 meters by 93 meters to 1,696 meters by 112 meters (Table 4). The mixing zone modification specific to the West side of the Cook Inlet (Between Beluga and Tyonek) results in a decrease from 1,856 meters by 105 meters to 1,608 meters by 81.5 meters (Table 4). As the mixing dimensions described in Section 6.2 were determined using critical effluent and receiving water conditions, water quality criteria for turbidity will be

met at the boundary of all mixing zones authorized by the modified Permit. Based on the nature of the pollutants in the discharge of Geotechnical Drilling Fluids and Drill Cuttings at the Seafloor, no lethality to passing organisms is expected (Section 3.1). Lastly, the drilling fluids in the discharge do not contain concentrations of pollutants that pose a risk of bioaccumulation or bioconcentration. Aquatic life and human health are protected and the mixing zones are as small as practicable (see Section 5.3.4 and 5.3.6).

5.3.2 Technology

Per 18 AAC 70.240(a)(3), the Department is required to determine if "an effluent or substance will be treated to remove, reduce, and disperse pollutants, using methods found by the Department to be the most effective and technologically and economically feasible, consistent with the highest statutory and regulatory treatment requirements" before authorizing a mixing zone.

Applicable "highest statutory and regulatory requirements" as defined in 18 AAC 70.990(30) [2003] includes the following three parts:

- Any federal TBEL identified in 40 CFR 125.3 and 40 CFR 122.29, as amended through August 15, 1997, adopted by reference at 18 AAC 83.010;
- Minimum treatment standards in 18 AAC 72.040; and
- Any treatment requirement imposed under another state law that is more stringent than the requirement of this chapter.

There are no applicable ELGs and discharges from the EMALL Program are not comparable to those used in oil and gas drilling such that development of TBELs using case-by-case BPJ citing 40 CFR 435 is appropriate. The Department has determined that prohibitions, BMPs, and narrative WQBELs are the most effective and feasible methods to control the pollutant discharges from the EMALL Program.

The EMALL Program will not have a domestic wastewater discharge and therefore this part of the definition does not apply.

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 modified Permit prohibitions and BMP requirements are consistent with 18 AAC 83. In addition, 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 besides those in 18 AAC 72, which are addressed in the paragraph above.

5.3.3 Existing Use

Per 18 AAC 70.245, time-area prohibitions associated with known fisheries have been established and the mixing zones have been appropriately sized to fully maintain and protect existing receiving water uses under the terms of the modified Permit. The discharge volumes and ambient receiving water characteristics at the discharge location have been examined to ensure the biological integrity of Cook Inlet is protected. Reportedly, several borehole sites are located within or near the boundaries of set net

leases. In order to ensure the discharge neither partially nor completely eliminates existing uses of the waterbody as a fishery, the modified Permit prohibits discharges at a time or location that could preclude or limit established processing activities or commercial, sport, personal use, or subsistence fish or shellfish harvesting. In addition, the volume and type of effluent discharged, the large tidal fluctuations and flushing occurring in Cook Inlet, and the short durations the mixing zones will be present forms the basis of the determination that the mixing zones are appropriately sized and restricted, such that existing uses and biological integrity of the waterbody will be maintained and fully protected under the terms of the modified Permit as required per 18 AAC 70.245 (a)(1) and (a)(2).

5.3.4 Human Consumption

Per 18 AAC 70.250(b)(2) and (b)(3), the subject pollutants will not produce objectionable color, taste, or odor in aquatic resources harvested for human consumption, nor will the discharge preclude or limit established processing activities or commercial, sport, personal use, or subsistence fish and shellfish harvesting. The drilling fluids proposed by the EMALL Program do not contain pollutants that are expected to produce objectionable color, taste, or odor in aquatic resources. Significant flushing in Cook Inlet is expected to rapidly disperse the low-volume discharges. See Section 5.3.3 for time-area prohibitions to protect fishery uses.

5.3.5 Spawning Areas

Per 18 AAC 70.255(h), a mixing zone is not authorized in an area of anadromous fish spawning or resident fish spawning reds for Arctic grayling, northern pike, rainbow trout, brook trout, cutthroat trout, whitefish, sheefish, Arctic char (Dolly Varden), burbot, and landlocked Coho, king, and sockeye salmon. The modified Permit does not allow 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.

5.3.6 Human Health

Per 18 AAC 70.250 and 18 AAC 70.255, the mixing zone shall be protective of human health and will not result in pollutants discharged at levels that will bioaccumulate, bioconcentrate, or persist above natural levels in sediments, water, or biota or at levels that otherwise will create a public health hazard through encroachment on a water supply or contact recreation uses. As indicated in Section 5.3.4, pollutants to be discharged will not produce objectionable color, taste, or odor in aquatic resources harvested for human consumption. Furthermore, due to the time-area restriction around fishery lease areas, the pollutants discharged will not preclude or limit established processing activities of commercial, sport, personal-use, or subsistence fish and shellfish harvesting.

An analysis of the wastewater characteristics of the drilling fluids indicate no direct or indirect human health concerns and the mixing zone application indicates the proposed drilling fluids and drill cuttings discharges as controlled by the modified Permit limitations and requirements are protective of human health.

5.3.7 Aquatic Life and Wildlife

Per 18 AAC 70.250(a)(2)(A-C), 18 AAC 70.250(b)(1), 18 AAC 70.255(g)(1) and (2), and 18 AAC 70.255(b)(1) and (2), pollutants for which the mixing zone will be authorized will not result in concentrations outside of the mixing zone that are undesirable, present a nuisance to aquatic life, permanent or irreparable displacement of indigenous organisms, or a reduction in fish or shellfish population levels. There is no acute criteria for turbidity in WQS and based on the toxicity results discussed in Section 3.1, the discharge will not result in lethality to passing organisms. The mixing zones were determined using critical effluent and receiving water conditions and are as small as practicable. Based on there being no lethality to drifting organisms (Section 3.1), low discharge volume at the seafloor, tidal fluctuations at the point of discharge, and short discharge durations, the Department concludes aquatic life and wildlife will be maintained and protected.

5.3.8 Endangered Species

Per 18 AAC 70.250(a)(2)(D), the mixing zone is not expected to cause an adverse effect on threatened or endangered species. Impacts to overall water quality, and any threatened or endangered species therein, are not expected based on the discharge characteristics and the extreme tidal fluctuations associated with the receiving water. The National Marine Fisheries Service (NMFS) and the United States Fish and Wildlife Service (USFWS) indicated that there are two listed endangered species. The following endangered species may occur in Cook Inlet in the vicinity of the discharge: Cook Inlet Beluga Whale (*Delphinapterus leucas*) and Stellar Sea Lion (*Eumetopias jubatus*). See existing Permit Section 11.3 and 11.4 for more information on endangered species.

5.4 Zone Of Deposit

Per 18 AAC 70.210(b), the Department has reviewed information provided by the applicant for the alternative drilling fluids and cement discharge to the seafloor. Information provided indicates that the zone of deposit required for the new materials would be 12 meters in radius. Because the fluids in the existing Permit remain unchanged, and the zone of deposit modelled for the existing Permit (16-meter radius) is inclusive of the size required for the permit modifications, the Department has determined that no change to the zone of deposit size is warranted. However, because there was change in materials being deposited, the Department evaluated these new materials per 18 AAC 70.210(b) in order to include these materials in the existing zone of deposit authorized in the existing Permit.

Similar to the materials authorized in the existing Permit, the zone of deposit will be composed of common concrete or naturally occurring sand and gravel cuttings from the borehole with trace amounts of drilling fluids attached to the surface of the particles. The modified Permit maintains prohibitions on the use of unapproved chemical additives and the discharge of hydrocarbons, oil, and grease. Per Sections 5.3.3 through 5.3.7, the characteristics of the drilling fluid modifications have no potential to have a direct or indirect impact on human health, bioaccumulate, persist in the environment, or have impacts on aquatic life. The deposit is expected have a short duration. Due to the tidal currents in the vicinity, the zone of deposit will be dispersed by the high energy tidal currents over the course of several tidal cycles. In order to ensure the use of the waterbody as fishery is protected, a time-area restriction is imposed that corresponds the location and timing of the fish or shellfish harvesting activity. The Department has determined the nature and duration of the deposit is not expected to adversely impact the receiving water and the uses of the waterbody beyond the boundary of the authorized zone of deposit are not impacted due to the time-area restriction imposed by the existing Permit.

6.0 ANTIBACKSLIDING

Per 18 AAC 83.480, "effluent limitations, standards, or conditions must be at least as stringent as the final effluent limitations, standards, or conditions in the previous permit." Per 18 AAC 83.480(c), 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 a permit is renewed or reissued."

Effluent limitations may be relaxed as allowed under 18 AAC 83.480, CWA §402(o) and CWA §303(d)(4). Per 18 AAC 83.480(b), relaxed limitations are allowed 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 the Department determines that technical mistakes were made.

CWA §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 §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 §303(d)(4) or 18 AAC 83.480(b) are satisfied, 18 AAC 83.480(c) prohibits relaxed limits that would result in violations of WQS or ELGs.

State regulation 18 AAC 83.480(b) only applies to effluent limitations established on the basis of CWA Section 402(a)(1)(B), and modification of such limitations based on effluent guidelines that were issued under CWA Section 304(b). Accordingly, 18 AAC 83.480(b) applies to the relaxation previously established 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.

This permitting action does not modify limits set through ELGs or WQS. Instead, the permitting action modifies previously established conditions in the existing Permit. Per 18 AAC 83.480(a), interim effluent limitations, standards, or conditions must be at least as stringent as the final effluent limitations, standards, or conditions in the previous permit, unless the circumstances on which the previous permit was based have materially and substantially changed since the permit was issued, and the change in circumstances would constitute cause for permit modification or revocation and reissuance under 18 AAC 83.135.

Per 18 AAC 83.135(a) When the Department receives any new information, including information received through a request to modify, the Department may in accordance with this section determine if there is cause to modify. If the Department finds cause, the Department may modify in accordance with this section.

> (b) Cause to modify a permit, but not to revoke and reissue the permit unless the permittee requests or agrees, includes: (1) a material and substantial alteration or addition to the permitted facility or activity occurred after permit issuance, and the alteration or addition justifies the imposition of permit conditions different from the existing permit;

Based on the EMALL application for a modification, the Department has determined that there is new information that was not available during the development of the permit that justifies modifications to existing Permit conditions. EMALL Program modifications have been proposed that materially and

substantially alter the facility and activities post issuance of the existing Permit. These material and substantial alterations and the justification for these alterations are discussed in Sections 2.0, 3.0, and 6.0. The Department finds that had this information been known and included as a part of the original application process, the Department would have had different permit conditions and allowed for the addition of comparably non-toxic drilling materials (such as bentonite and cement or grout) for borehole stability and plugging and abandonment, a larger mixing zone to accommodate the use of larger equipment, and field location flexibility. Further, the Department finds that the receiving waters will not be impaired by these modifications and that the level of water quality is maintained and protected. Therefore, these allowances will not negatively affect the receiving water and are consistent with the State's antidegradation policy.

7.0 ANTIDEGRADATION

Section 303(d)(4) of the CWA states that, for waterbodies where the water quality meets or exceeds the level necessary to support the waterbody's designated uses, WQBELs may be revised as long as the revision is consistent with the State's antidegradation policy. The antidegradation policy per 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 of the fact sheet analyzes and provides rationale for Department decisions in the modified Permit issuance with respect to the antidegradation policy. This analysis only is for the increased minor and localized degradation authorized via the modified Permit.

The approach used by the Department to implement the antidegradation policy is based on the requirements in 18 AAC 70 and the Department's *Policy and Procedure Guidance for Interim Antidegradation Implementation Methods, July 14, 2010 (Interim Methods)*. Using these requirements and policies, the Department determines whether a waterbody or portion of a waterbody is classified as Tier 1, Tier 2, or Tier 3. 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 all discharges under the Modified Permit will be to Tier 2 waters, which is the next highest level of protection and is more rigorous than a Tier 1 analysis. As a result, any discharges to Tier 1 waterbodies are not eligible for coverage under the Modified Permit and would require individual permit coverage. The receiving water for the discharges from the EMALL Program is Cook Inlet, which is a Tier 2 water.

Wastewater discharged under the Modified Permit is subject to a Tier 2 antidegradation analysis, as detailed in the *Interim Methods* and outlined in 18 AAC 70.015(a)(2). Per 18 AAC 70.015(a)(2), if the quality of water exceeds levels necessary to support propagation of fish, shellfish, and wildlife and recreation in and on the water, that quality must be maintained and protected unless the Department finds that the five specific requirements of the antidegradation policy at 18 AAC 70.015(a)(2)(A)-(E) are satisfied. The Department's findings are as follows:

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.*

Based on the evaluation required per 18 AAC 70.015(a)(2)(D), the Department has determined that the most reasonable and effective pollution prevention, control, and treatment methods are being used and the lowering of water quality is necessary.

In 2009 and 2010, an Alaska Economic Performance Report written by the Department of Commerce, Community, and Economic Development (DCCED) indicates that Alaska's oil and gas industry continues to be the largest source of state revenue while creating some of the highest paying jobs in the State (DCCED, 2011). The total contribution from the oil and gas industry was $6.2 billion during fiscal year 2010. The oil and gas industry also supports local economies by purchasing significant amounts of equipment, parts, fuel, food, freight, and other services. The Alaska LNG project serves to provide significant benefits to Alaskans statewide.

In addition, Alaska's Department of Natural Resources (DNR) tracks oil and gas activity in the State when it develops findings for lease sales (DNR, 2011). The January 2009 Best Interest Finding for the lease sale in Cook Inlet included the following socio-economic information on the oil and gas industry:

- Alaska's economy depends heavily on revenues related to oil and gas production and government spending resulting from those revenues. Oil and gas lease sales generate income to state government through royalties (including bonuses, rents, and interest), production taxes, petroleum corporate income taxes, and petroleum property taxes. Total oil revenue totaled $11.2 billion in fiscal year (FY) 2008.

- The Alaska state-wide economy depends heavily on revenues related to petroleum development, which totaled $4.57 billion in fiscal year 2007. The petroleum industry is Alaska's largest industry, annually spending $2.1 billion, including $422 million on payroll and $1.7 billion on goods and services.

- Oil and gas is an important component of revenues to support government services to Alaskans. At the end of the state's fiscal years of 2007 and 2012, oil and gas revenues represented 88 and 83 percent of the total revenue to the state, respectively.

- Overall, this spending generated 33,600 jobs, $1.4 billion in payroll, and added value to the Alaska economy of $1.8 billion for total output of $3.1 billion in 2007. Oil and gas accounts for 12 percent of private sector jobs and 20 percent of private sector payroll. The oil and gas industry has the highest monthly wage in Alaska, averaging $7,754, which is 2.8 times higher than the statewide average of $2,798 (in 2007).

- In the Matanuska-Susitna Borough, it is estimated that over 350 residents are employed by the oil and gas industry with an average monthly wage of $8,382. The economic impact of the oil and gas industry in the Matanuska-Susitna Borough was an additional 2,105 jobs for Matanuska-Susitna residents, with a payroll of $84 million. The induced impacts were 1,558 jobs and $38 million in payroll. Total economic impact was estimated to be 4,016 jobs and $158 million for the Matanuska- Susitna Borough.

- In Anchorage, it is estimated that about 2,400 workers are employed by the oil and gas industry. Estimated total payroll is over $239 million with an additional $845 million in goods and services in the Anchorage economy. Indirect impact of the oil and gas industry is estimated to be 11,600 jobs and $431 million in payroll, with an induced impact of 2,320 jobs and $69 million in payroll.

- The oil and gas industry has been important to the economy of the Kenai Peninsula for over 40 years, and five of the top 10 employers are connected to the oil and gas industry. Direct impact of the oil and gas industry has been estimated at 674 jobs with a payroll of $63 million. Indirect

economic impacts are estimated to be an additional 2,822 jobs and $94 million in payroll. The induced impacts were 777 jobs and $20 million in payroll. Total economic impact on the Kenai Peninsula was 4,273 jobs and $177 million in payroll, which was 26 percent of the area's employment and 36 percent of the area's payroll. Taxable properties for the oil and gas industry were reported at $607 million, and 8 of the top 10 property tax payers in the borough were oil and gas industry companies.

- Agrium Corporation has entered into a cost reimbursement agreement with Alaska Industrial Development and Energy Authority (AIDEA) and is in the process of obtaining permits needed for the restart of the plant. Prior to closure due to dwindling natural gas supplies in 2007, Agrium's Kenai facility provided an economic multiplier of over 9 dollars for every million cubic feet (mcf) of gas consumed at the plant or an annual 350 million dollar economic benefit (at its lowest operating point). The plant provided over 650 direct and indirect, high-paying, skilled year-around manufacturing jobs (McDowell Group).
- The Alaska LNG Project will create approximately 15,000 jobs during the construction phase, and an estimated 1,000 full-time jobs during operation. The influx of construction workers during the project will also provide indirect economic benefits (Alaska LNG Project – Preliminary Resource Report 1, 2014). The new pipeline will establish the infrastructure needed to enable the commercialization of the vast natural gas resources discovered on Alaska's North Slope in 1968 and thereafter. The Alaska LNG Project will span from the North Slope to local markets across Alaska, and finally to a new LNG plant in Nikiski, Alaska for distribution to foreign export markets. In Nikiski, the estimated peak construction workforce for Alaska LNG Plant could exceed 5,000 workers and 1,500 workers for the marine terminal during the seven-year construction period. Once operating, the Alaska LNG Plant and marine terminal estimate needing 350 full-time personnel. (Alaska LNG Project – Preliminary Resource Report 1, 2014).

The Department finds that the requirements of this part of the antidegradation analysis have been 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.*

All applicable criteria found in 18 AAC 70.020 are met at the boundaries of the authorized mixing zones ensuring that the quality of the waterbody as a whole is protected and maintained.

The geotechnical survey discharges at the seafloor will result in a temporary zone of deposit and an authorized chronic mixing zone for turbidity that has been sized to ensure the applicable turbidity water quality criterion is met at the boundaries of the mixing zones.

Note that 18 AAC 70.235 pertains to site-specific criteria and site-specific criteria have not been developed for the waterbody in the vicinity of the EMALL Program. In addition, 18 AAC 70.030 pertains to WET limits and there are no WET limits or monitoring requirements contained in the modified Permit. An SPP Toxicity test was conducted and submitted to DEC during the application process that verified that the drilling fluids are not acutely toxic. Water quality criteria for the discharges will be met at the boundary of the chronic mixing zones and applicable criteria will not be violated.

The Department finds that the requirements of this part of the antidegradation analysis have been met.

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

As previously mentioned, Cook Inlet is protected for all marine use categories per 18 AAC 70.020(a)(2)(A-D). The tidal currents anticipated at the discharge locations for Geotechnical Drilling Fluids and Drill Cuttings at the Seafloor are expected to result in rapid dispersal of turbidity. The mixing zones for turbidity have been sized to ensure water quality criteria are met at the boundary of the mixing zone. To ensure the discharge of Geotechnical Drilling Fluids and Drill Cuttings at the Seafloor do not affect existing uses, a time-area restriction is imposed that corresponds the location and timing of the fish or shellfish harvesting activity. The limitations and requirements of the modified Permit ensure that existing uses established in the WQS for Cook Inlet will be protected.

The Department finds that requirements of this part of the antidegradation analysis have been 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.*

As discussed in Section 5.3.2, the Department has determined that prohibitions, BMPs, and narrative WQBELs are the most effective and technologically and economically feasible methods to control the pollutant discharges from the EMALL Program. The limitations imposed on Geotechnical Drilling Fluids and Drill Cuttings at the Seafloor (Outfall 001) in the modified Permit are the same as the existing Permit and rely on effective and reasonable pollution prevention strategies that minimize the volume of discharge and prohibit the use of toxic chemicals. The permittee is limited to the use of drilling fluids that have comparable toxicity to those identified in the Permit. Base fluid or additive substitutions that may significantly increase toxicity or have hydrocarbons, oil, and grease are prohibited. The modified Permit prohibits the discharge of oil as determined by visual observation on the receiving water and a Static Sheen Test (EPA Method 1617). The prohibition on discharge of hydrocarbons, oil, and grease for all discharges protects aquatic life and human health and welfare. The permittee will limit the discharge volume by containerizing all drill cuttings for onshore disposal and recirculating drilling fluids. Discharges resulting from Outfall 001 will be no greater than the volume of the pipe as it is removed from the seafloor.

The waste stream is controlled by implementing practicable and effective pollution prevention and control strategies as the most effective and reasonable methods. The Department finds that requirements of this part of the antidegradation analysis have been 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 requirements" are defined in 18 AAC 70.990(30), as amended through June 26, 2003, and *Interim Methods*. Accordingly, there are three parts to the definition, which are:

- Any federal TBEL identified in 40 CFR 125.3 and 40 CFR 122.29, as amended through August 15, 1997, adopted by reference at 18 AAC 83.010;
- Minimum treatment standards in 18 AAC 72.040; and

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

The first part of the definition includes all any established TBELs. The Modified Permit contains no TBELs because there is no national industrial category for geotechnical survey discharges or other ELGs with similar discharges or pollutants to inform a case-by-case TBEL by BPJ. The Department determined that WQBELs and pollution control strategies adequately control the pollutant discharges. Accordingly, all limits contained in this Modified Permit are narrative WQBELs.

The second part of the definition appears to be in error, as 18 AAC 72.040 considers discharge of sewage to sewers and not minimum treatment. The correct reference appears to be 18 AAC 72.050, minimum treatment for domestic wastewater. There will be no domestic wastewater discharged from the geotechnical facility. Therefore, 18 AAC 72.050 does not apply.

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 Modified Permit is consistent with 18 AAC 83. Further, neither the regulations in 18 AAC 15 nor another state law that the Department is aware of, impose more stringent treatment requirements than 18 AAC 70 besides those in 18 AAC 72, which are addressed in the paragraph above. All limits contained within the Modified Permit are controlled by 18 AAC 70.

The Department has determined that the treatment of the discharge conforms to the highest statutory and regulatory requirements and the finding is met.

8.0 OTHER LEGAL REQUIREMENTS

8.1 Permit Expiration

The modified Permit will expire June 30, 2020 as scheduled in the existing Permit and provided the permittee does not request early termination. This permit modification will not affect the permit expiration date.

9.0 References

1. Alaska Department of Commerce, Community, and Economic Development. Division of Economic Development. 2009 Alaska Economic Performance Report. February 2011.

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

3. Alaska Department of Environmental Conservation. Alaska's Final 2010 Integrated Water Quality Monitoring and Assessment Report.

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

5. Alaska Department of Environmental Conservation. 18 ACC 70. Water Quality Standards, as amended through June 26, 2003.

6. Alaska Department of Environmental Conservation. 18 ACC 70. Water Quality Standards, as amended through July 1, 2008.

7. Alaska Department of Environmental Conservation. 18 ACC 70. Water Quality Standards, as amended through April 8, 2012.

8. Alaska Department of Environmental Conservation. 18 AAC 83. Alaska Pollutant Discharge Elimination System Program. As amended Through October 23, 2008.

9. Alaska Department of Environmental Conservation. 18 ACC 72. Wastewater Disposal, as amended through December 23, 2009.

10. ADF&G 2014. *Anadromous Fish Catalog*. Retrieved December 16, 2014, from Anadromous Fish Catalog: http://extra.sf.adfg.state.ak.us/FishResourceMonitor/?mode=awc

11. Alaska LNG Project 2014. Alaska LNG Project – Preliminary Resource Report No. 1 – General. October 2014. Docket No PF-21-000. Document Number: USAKE-PT-SRREG-00-0001.

12. Biesinger, K.E., A.E. Lempke, W.E. Smith, and R.M. Tyo. 1976. Comparative Toxicity of Polyelectrolytes to Selected Aquatic Animals. Journal of Water Pollution Control Federation. Vol 48, No. 1: 183-187.

13. DNR 2009. Cook Inlet Areawide Oil and Gas Lease Sale: Final Finding of the Director. Alaska Department of Natural Resources, Division of Oil and Gas, Cook Inlet Best Interest Finding. January 20, 2009

14. Doneker, R.L. and G.H. Jirka. 2012. CORMIX User Manual - A Hydrodynamic Mixing Zone Model and Decision Support System for Pollutant Discharges into Surface Waters. Prepared for U.S. Environmental Protection Agency. EPA-823-K-07-001 – 2012 update.

15. DOR. 2014. Revenue Sources Book, Fall 2014. Alaska Department of Revenue – Tax Division. December 2014.

16. EPA. 2006. Technical Support Document for the 2006 Effluent Guidelines Program Plan. December 2006. EPA-821R-06-018.

17. EPA 1991b. Technical Support Document for Water Quality-based Toxics Control. Office of Water, EPA/505/2-90-001, PB91-127415. Washington D.C.

18. EPA 1992c. U.S. EPA, Region 10. Region 10 Guidance: Best Management Practices Plans in NPDES Permits. Prepared by Water Division, Wastewater Management and Enforcement Branch, Seattle, WA. June 1992.

19. EPA 1993a. Development Document for Effluent Limitations Guidelines and Standards for the Offshore Subcategory of the Oil and Gas Extraction Point Source Category (Final). Office of Water, EPA #921-R-93-003. U.S. EPA, Washington DC. January 1993.

20. EPA 1996. EPA Guidance on Application of Mixing Zone Policies in EPA-Issued NPDES Permits. Robert Perciasepe, Assistant Administrator, Office of Water. August 6, 1996.

21. EPA. 2006. Technical Support Document for the 2006 Effluent Guidelines Program Plan. December 2006. EPA-821R-06-018.

22. EPA 2010. Permit Writers' Guide to Water Quality-based Permitting for Toxic Substances. EPA 883-K-10-001005. Office of Water. Washington, D.C., December 2011.

23. EPA 2011. Analytic Methods for the Oil and Gas Extraction Point Source Category. EPA 821-R-11-004. Office of Water. Washington, D.C., July 1987.

24. FDA. 2013. Select Committee on GRAS Substances (SCOGS) Opinion: Guar Gum. U.S. Food and Drug Administration.

25. Ferguson, R.I. and M. Church. 2004. A Simplified Universal Equation for Grain Settling Velocity. Journal of Sedimentary Research, Vol. 74, No. 6: 933-937.

26. Huppert, H.E. and J.E. Simpson. 1980. The Slumping of Gravity Currents. Journal of Fluid Mechanics.Volume 99: 785-799

27. ICIEMAP. 2010. Integrated Cook Inlet Environmental Monitoring and Assessment Program (ICIEMAP), Draft Report. Submitted by: Cook Inlet Regional Citizens Advisory Council RCAC and Kinnetic Laboratories, Inc. to NOAA/NOS/OR&R and EPA Region 10.

28. Jirka 2004 Integral Model for Turbulent Buoyant Jets in Unbounded Stratified Flows. Part I: Single Round Jet. Jirka, Gerhard H., Environmental Fluids Mechanics, vol. 4, pp. 1-56, 2004.

29. KLI. 2007. Current and Suspended Sediment Investigation, Knik Arm – Cook Inlet, Alaska. Data Report. Prepared by Kinnetic Laboratories, Inc. Prepared for Knik Arm Bridge and Toll Authority, HDR Alaska, Inc., and URS Corporation.

30. KLI. 2010. Produced Water Discharge, Fate and Transport in Cook Inlet 2008-2009, NPDES Permit No, AKG-31-5000, Final Report. Submitted by Kinnetic Laboratories, Inc. to the U.S. Environmental Protection Agency and Alaska Department of Environmental Conservation. MOA. 2007.

31. McDowell 2004. The Economic Impact of Closing Agrium Kenai Nitrogen Operations-Draft Report. McDowell Group, Inc. March 2004

32. MOA 2007. Municipality of Anchorage, Drainage Design Guidelines. Document No. WMP CPg09001, March 2007 version 4.09, Project Mgt. & Engineering Dept

33. Okkonen and Howell 2003. Measurements of Temperature, Salinity, and Circulation in Cook Inlet, Alaska. Okkonen, Stephen R. and Howell, Stephen S., Institute of Marine Science, University of Alaska, Fairbanks and Cook Inlet Regional Citizens Advisory Council. October, 2003.

34. Pure-Bore MSDS. Clear Solutions International Ltd. Pure-Bore Safety Data Sheet No: 5001EC.

35. Okkonen, S.R. and S.S. Howell. 2003. Measurements of Temperature, Salinity and Circulation in Cook Inlet, Alaska. Final Report. University of Alaska Coastal Marine Institute and U.S. Minerals Management Service, OCS Study MMS 2003-036.

36. Okkonen, S.R., S. Pegau, and S. Saupe. 2009. Seasonal Boundary Conditions for Cook Inlet, Alaska.Final Report. University of Alaska Fairbanks, OCS Study MMS 2009-041.

37. Seacore. Specification Sheet for Skate 3 Range Jack-up Platform.

38. Seacore. 2014. Secovis Specification Sheet for Guar Gum based drilling mud.

39. Tetra Tech. 2013. Results from Geotechnical General Permit Dilution Modeling Scenarios. Technical Memorandum. Prepared for U.S. EPA, Region 10.

40. Thackston, E.L. and M.R. Palermo. 2004. Improved Methods for Correlating Turbidity and Suspended Solids for Monitoring. DOER Technical Notes Collection (ERDC TN-DOER-E8), U.S. Army Engineer Research and Development Center, Vicksburg, MS.

41. USGS 1999. U.S. Geological Survey. Water Quality Assessment of the Cook Inlet Basin, Alaska Summary of Data Through 1997. Water Resources Investigations Report 99-4116. Anchorage, Alaska. 1999.

APPENDIX A. FIGURES

Figure 1. Area of Coverage Map

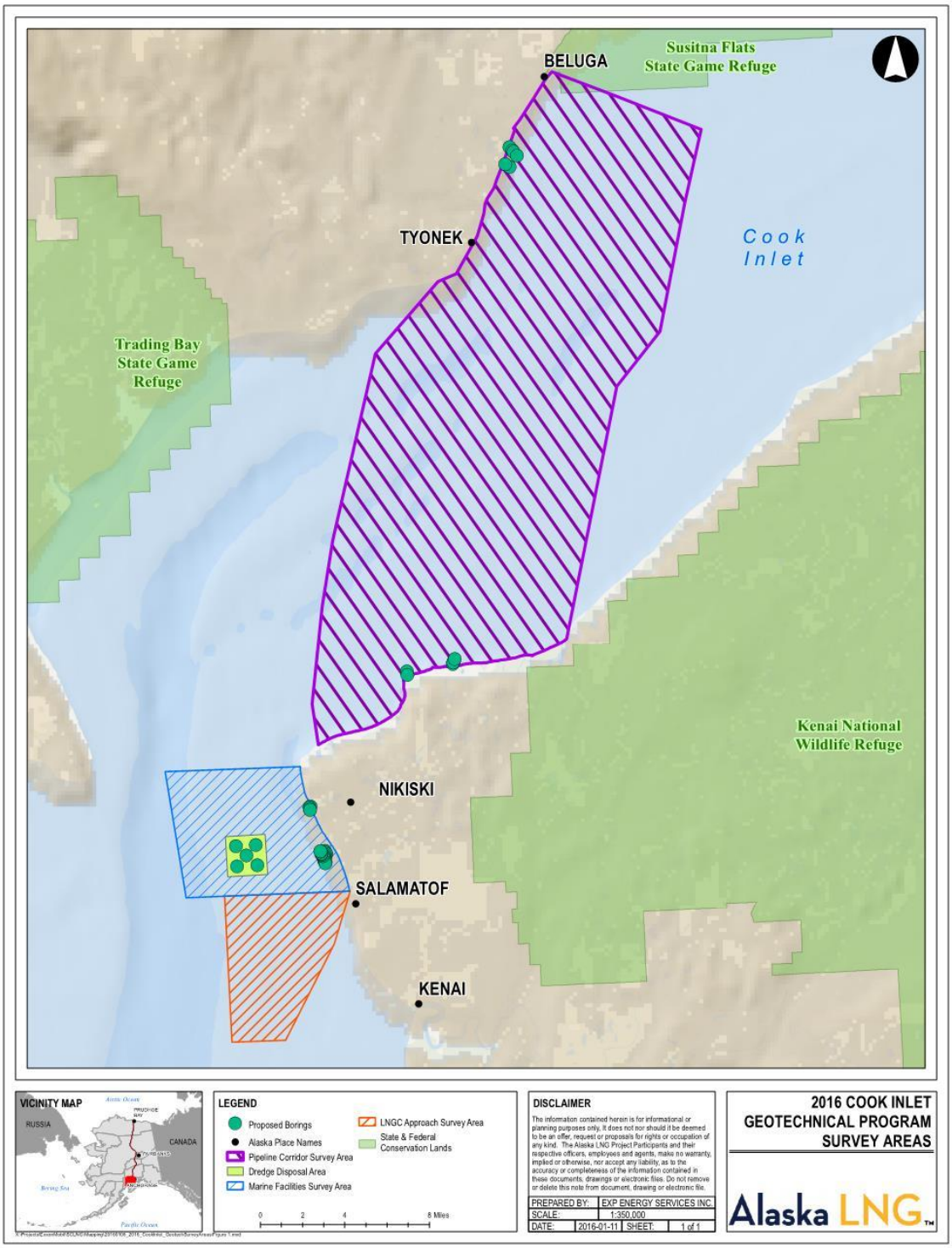
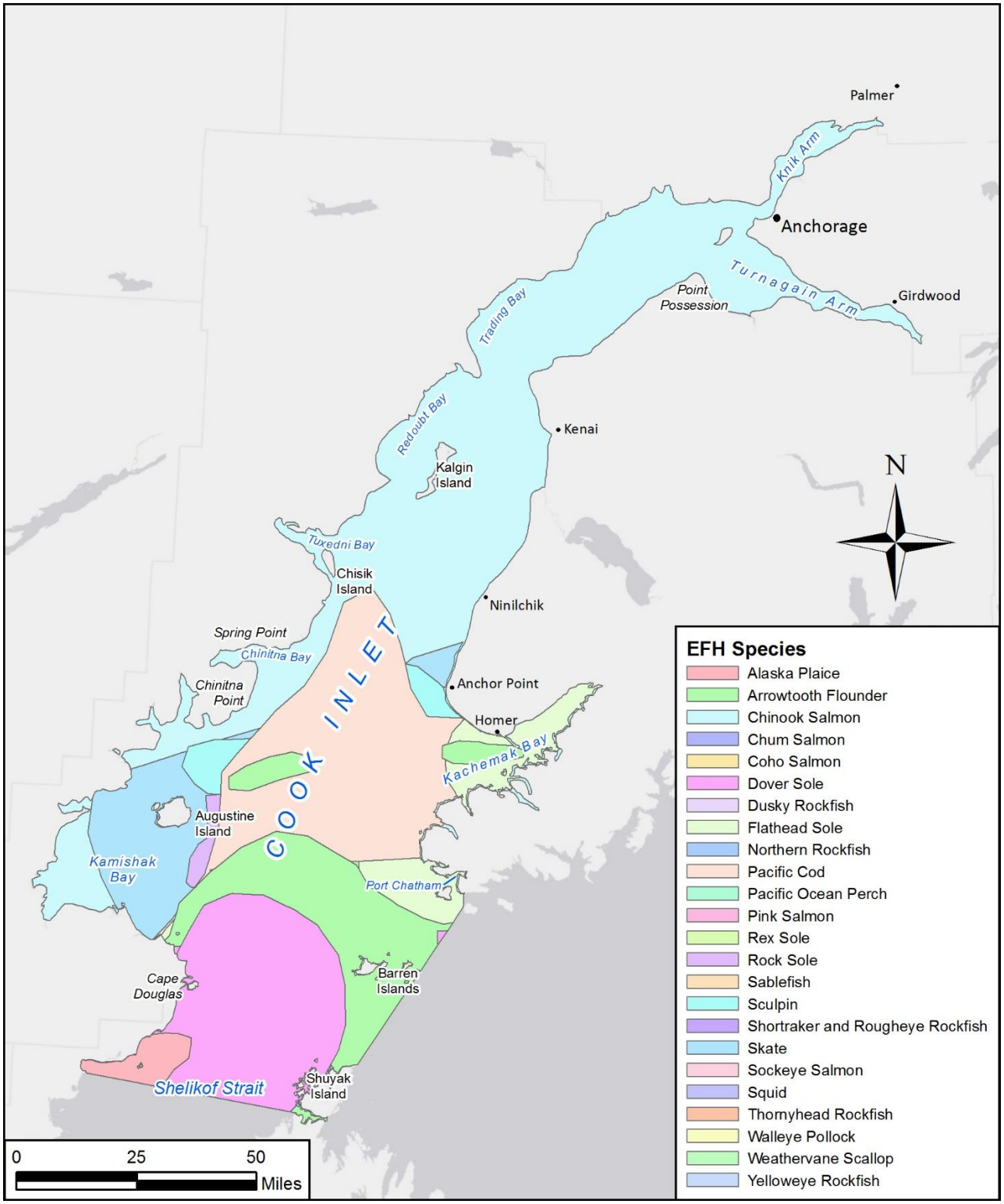


Figure 2. North Cook Inlet Landfall Area

Figure 3. South Cook Inlet Landfall Area

Figure 4. Proposed Marine Terminal Area – Nikiski, AK

Figure 5. Cook Inlet Fish Habitat



APPENDIX B. MIXING ZONE 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**	**Answer & Resources**	**Regulation**
Size	Is the mixing zone as small as practicable? Permit writer conducts analysis and documents analysis in Fact Sheet at: Section 5.3 Mixing Zone Analysis	Yes, mixing zone as small as practicable. Technical Support Document for Water Quality-Based Toxics Control •Fact Sheet, Section 5.3 • Fact Sheet, Section 5.3.1 • DEC's RPA Guidance • EPA Permit Writers' Manual	18 AAC 70.240 (a)(2) 18 AAC 70.245 (b)(1) - (b)(7) 18 AAC 70.255(e) (3) 18 AAC 70.255 (d)
Technology	Were the most effective technological and economical methods used to disperse, treat, remove, and reduce pollutants? **If yes**, describe methods used in Fact Sheet at Section 5.3 Mixing Zone Analysis.	Answer: Yes Fact Sheet, Section 5.3.2	18 AAC 70.240 (a)(3)
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	18 AAC 70.255(f)
Existing use	Does the mixing zone…		
	(1) Partially or completely eliminate an existing use of the waterbody outside the mixing zone? **If yes, mixing zone prohibited.**	Answer: No Fact Sheet Section 5.3.3	18 AAC 70.245(a)(1)
	(2) Impair overall biological integrity of the waterbody? **If yes, mixing zone prohibited.**	Answer: No Fact Sheet Section 5.3.4	18 AAC 70.245(a)(2)

	(3) Provide for adequate flushing of the waterbody to ensure full protection of uses of the waterbody outside the proposed mixing zone? **If no, then mixing zone prohibited.**	Answer: Yes Fact Sheet Section 5.3.3	18 AAC 70.250(a)(3)
	(4) Cause an environmental effect or damage to the ecosystem that the Department considers to be so adverse that a mixing zone is not appropriate? **If yes, then mixing zone prohibited.**	Answer: No Fact Sheet Section 5.3	18 AAC 70.250(a)(4)
Human consumption	Does the mixing zone…		
	(1) Produce objectionable color, taste, or odor in aquatic resources harvested for human consumption? **If yes, mixing zone may be reduced in size or prohibited.**	Answer: No Fact Sheet Section 5.3.4	18 AAC 70.250(b)(2)
	(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.**	Answer: No Fact Sheet Section 5.3.4	18 AAC 70.250(b)(3)
Spawning Areas	Does the mixing zone…		
	(1) discharge in a spawning area for anadromous fish or Arctic grayling, northern pike, rainbow trout, lake trout, brook trout, cutthroat trout, whitefish, sheefish, Arctic char (Dolly Varden), burbot, and landlocked Coho, king, and sockeye salmon? **If yes, mixing zone prohibited.**	Answer: No Fact Sheet Section 5.3.5	18 AAC 70.255 (h)
Human Health	Does the mixing zone…		
	(1) Contain bioaccumulating, bioconcentrating, or persistent chemical above natural or significantly adverse levels? **If yes, mixing zone prohibited.**	Answer: No Fact Sheet Section 5.3.6	18 AAC 70.250 (a)(1)
	(2) Contain chemicals expected to cause carcinogenic, mutagenic, tetragenic, or otherwise harmful effects to human health? **If yes, mixing zone prohibited.**	Answer: No Fact Sheet Section 5.3.6	
	(3) Create a public health hazard through encroachment on water supply or through contact recreation? **If yes, mixing zone prohibited.**	Answer: No Fact Sheet Section 5.3.6	18 AAC 70.250(a)(1)(C)
	(4) Meet human health and aquatic life quality criteria at the boundary of the mixing zone? **If no, mixing zone prohibited.**	Answer: Yes Fact Sheet Section 5.3.6	18 AAC 70.255 (b),(c)

	(5) Occur in a location where the Department determines that a public health hazard reasonably could be expected? **If yes, mixing zone prohibited.**	Answer: No Fact Sheet Section 5.3.6	18 AAC 70.255(e)(3)(B)
Aquatic Life	Does the mixing zone…		
	(1) Create a significant adverse effect to anadromous, resident, or shellfish spawning or rearing? **If yes, mixing zone prohibited.**	Answer: No Fact Sheet Section 5.3.7	18 AAC 70.250(a)(2)(A-C)
	(2) Form a barrier to migratory species? **If yes, mixing zone prohibited.**	Answer: No Fact Sheet Section 5.3.7	
	(3) Fail to provide a zone of passage? **If yes, mixing zone prohibited.**	Answer: No Fact Sheet Section 5.3.7	
	(4) result in undesirable or nuisance aquatic life? **If yes, mixing zone prohibited.**	Answer: No Fact Sheet Section 5.3.7	18 AAC 70.250(b)(1)
	(5) Result in permanent or irreparable displacement of indigenous organisms? **If yes, mixing zone prohibited.**	Answer: No Fact Sheet Section 5.3.7	18 AAC 70.255(g)(1)
	(6) Result in a reduction in fish or shellfish population levels? **If yes, mixing zone prohibited.**	Answer: No Fact Sheet Section 5.3.7	18 AAC 70.255(g)(2)
	(7) Prevent lethality to passing organisms by reducing the size of the acute zone? **If yes, mixing zone prohibited.**	Answer: No Fact Sheet Section 5.3.7	18 AAC 70.255(b)(1)
	(8) cause a toxic effect in the water column, sediments, or biota outside the boundaries of the mixing zone? **If yes, mixing zone prohibited.**	Answer: No Fact Sheet Section 5.3.7	18 AAC 70.255(b)(2)
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.**	Answer: Yes Fact Sheet Section 5.3.8	Program Description, 6.4.1 #5 18 AAC 70.250(a)(2)(D)