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January 29, 2021

Patricia LaFramboise
Alaska Regional Supervisor for Leasing and Plans
Bureau of Ocean Energy Management
Alaska OCS Region
3801 Centerpoint Drive, Suite 500
Anchorage, Alaska 99503

Re: Request for Approval for Ancillary Activities – Hilcorp 2021 Lower Cook Inlet Geohazard Survey

Dear Ms. LaFramboise:

Hilcorp Alaska, LLC (Hilcorp) is proposing to conduct geohazard and geotechnical surveys over lease blocks in the Lower Cook Inlet (6405, 6406, 6455, and 6456) as shown in the attached figure. These surveys are proposed to obtain information necessary to evaluate shallow hazards and conduct an archaeological evaluation in accordance with Notice to Lessees (NTL) 2005-A01 and NTL 2005-A03.

Hilcorp requests approval to conduct survey activities over these lease blocks (on-lease activities) under an Ancillary Activity approval. Request for approval for activities to be conducted off-lease will be submitted under separate cover. As required under 30 CFR 550.208, Hilcorp is providing this notice at least 30 days prior to conducting the activity.

The proposed survey is essentially the same program proposed for 2020 and authorized under AKOCSR Permit 20-10; this program was delayed due to COVID-19. Details of the survey are provided in the attached Project Description.

If you have questions or need additional information, please contact me at 346-237-2275 or via email at kkaufman@hilcorp.com

Sincerely,

Kathryn Kaufman
Environmental Specialist

Enclosures

Hilcorp Alaska, LLC
2021 Lower Cook Inlet Geohazard and Geotechnical Survey

PROJECT DESCRIPTION

Introduction

Hilcorp Alaska, LLC (Hilcorp) plans to conduct geohazard and geotechnical survey over Outer Continental Shelf lower Cook Inlet leases in spring 2021. The surveys are required to obtain information necessary to evaluate shallow hazards and conduct an archaeological evaluation in accordance with Notice to Lessees (NTL) 2005-A01 and NTL 2005-A03, and to comply with lease stipulations and permit requirements prior to conducting exploration drilling activities.

Hilcorp is proposing to conduct geohazard and geotechnical surveys over lease blocks 6405, 6406, 6455, and 6456. The proposed survey area is presented in Figures 1 and 2. It includes approximately 138 square kilometers (km^2).

The following three general fields of study will be required.

- Shallow hazards survey and shallow hazards assessment for drilling hazards down to 150 meters. (An analysis of existing 3-D seismic data will be utilized to assess for shallow hazards down to 1,000 m.)
- Geotechnical surveys for location of a jack-up drill rig.
- Archaeological study of any anomalies on the seabed.

Schedule

Activities are expected to be conducted between approximately April and October 2020 and take approximately 30 days. The first activity is the sound source verification (SSV), which is expected to take 2-3 days. The geohazard survey is proposed to take approximately 20 days, while the geotechnical survey is expected to take approximate 3-4 days.

Survey Vessel

A single vessel will be used to conduct both shallow hazard and geotechnical surveys; geotechnical surveys will begin upon completion of the shallow hazard survey. A source verification (SSV) is required to establish distances for specific project environmental parameters for this survey, a separate vessel will be used to conduct the SSV.

Shallow hazard survey equipment is generally hull mounted or towed behind a single vessel. The vessel that will be used to conduct shallow hazard surveys will be the Research Vessel (R/V) Woldstad (Figure 3), owned and operated by Support Vessels of Alaska. The R/V Woldstad is a 121-foot heavy weather vessel with a deep draft (12 ft) powered by twin screw Caterpillar 3508 designed for cruising speeds up to 10 knots. The R/V Woldstad was built originally for the State of Alaska to patrol the icy waters of the Bering Sea and Aleutian Islands and is ice reinforced.

The R/V Woldstad has both a stern deck area with a 6-ton deck crane and a large forward deck area with a 12-ton deck crane, davit, hydraulic multi-beam pole, plenty of below deck dry storage, and a deck load capacity of up to 20 tons. The R/V Woldstad has an endurance of over 35 days continuous cruising (8,500 miles) or over 60 days of 24/7 surveying. A 10-ton stern a-frame meeting the latest ABS standards has been engineered for the projects requiring an a-frame. The bow thruster and twin drive systems

makes the R/V Woldstad very maneuverable; the forward deck area allows for easy and accurate deployment and retrieval of scientific/research gear. The Controllable Pitch Propellers provides for smooth towing speeds without having to shift in and out of gear. Specifications of the R/V Woldstad are provided in Figure 4.

The vessel used to support the SSV activities will be the R/V Thunder, which is owned by eTrac. R/V Thunder and specifications are shown in Figures 5 and 6 below.

Figure 1. Proposed Geohazard and Geotechnical Survey - Regional Overview

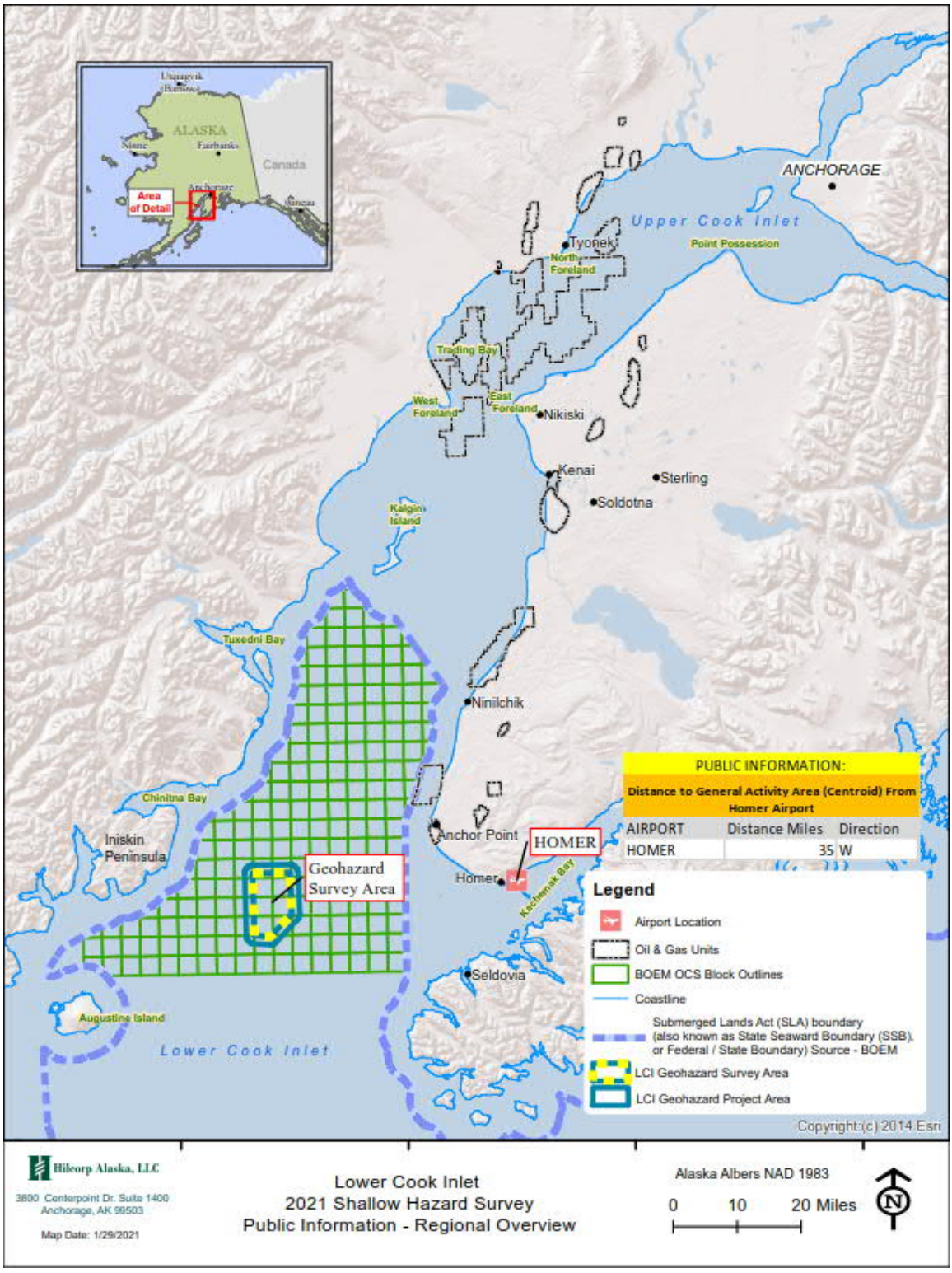

Figure 2. Proposed Geohazard and Geotechnical Survey Areas

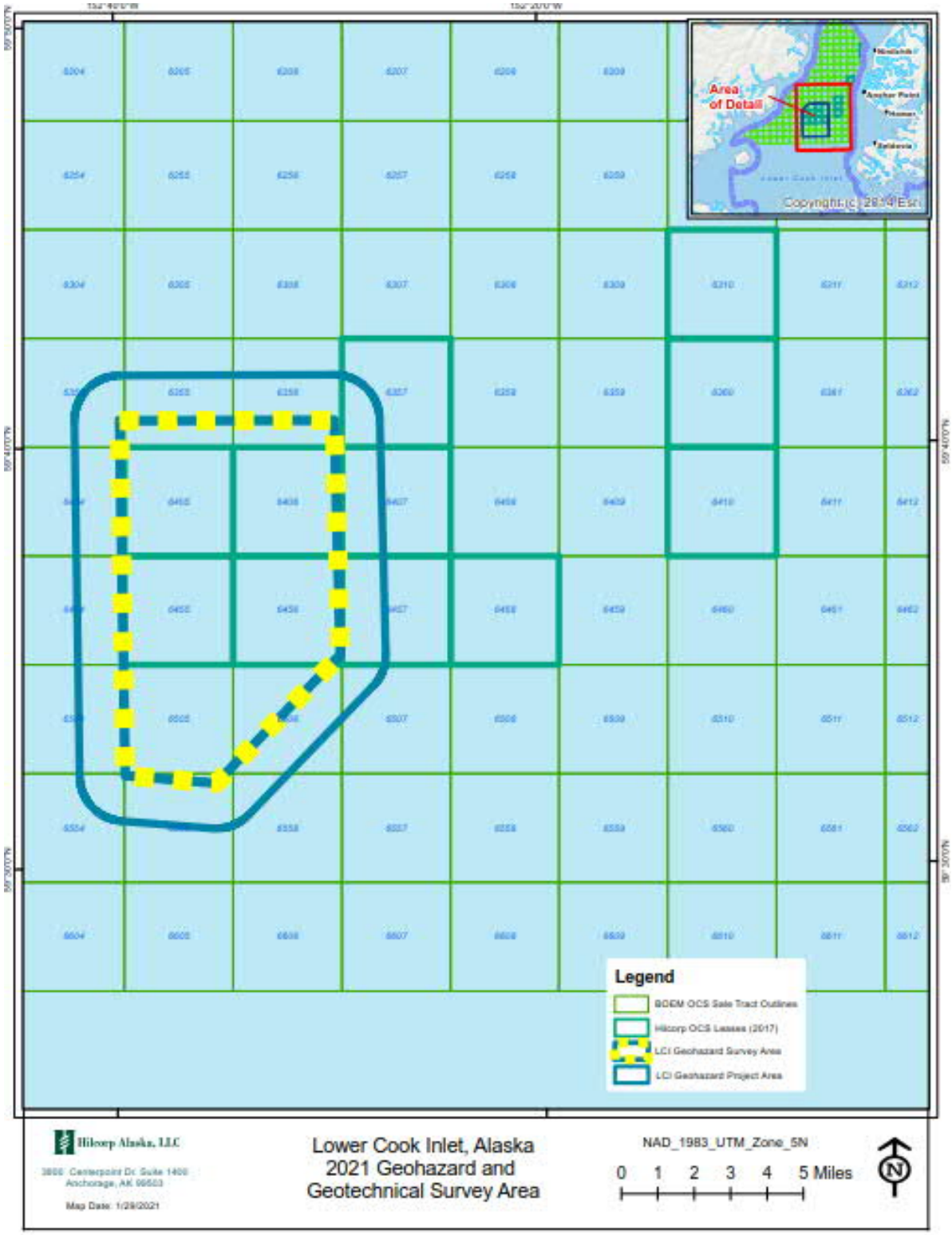

Figure 3 R/V Woldstad

Figure 4 R/V Woldstad Specifications

Dimensions Length overall: 121 ft Beam: 28 ft Draft: 12 ft Interior Features: Offices: 2 Cabins: 9 Marine Heads: 3 (3 showers) Berths: 19 passengers, 5 crew	Engines (2) Engine(s): Caterpillar 3508 Engine(s): Total power: 2,000 HP Cruising Speed: 10 knots Tankage Freshwater: 4,000 gal. Fuel: 30,000 gal. Holding Tank: 180 gal.

Deck Equipment 12 Ton Fwd Deck Crane 6 Ton Stern Deck Crane Davit Tender(s) Hydraulic Multi-beam arm Deck Load (20-ton) Safety Gear Life Raft (25 person) Immersion Suits (Assortment of sizes) Exposure Suits (Assortment of sizes) Medical Chest with 24/7 Med Call Assist Fire Fighting (Automatic and Manual) SART (Search and Rescue Transmitter) 406 EPIRB Full Safety specs provided upon request.	Electrical (2) 60 KW Generators 120/240 VAC (1) 55 KW Generator 120/240 VAC Electronics Full range of navigation equipment Full list provided upon request. Additional Equipment Water Maker (2) Satellite phone (Iridium) Washer and Dryer (2) Marine Sanitation Device (USCG/Marpol Compliant) Bow Thruster Large Dry Storage Area Portable Deck Shed (dry/wet)

Figure 5 R/V Thunder

Figure 6 R/V Thunder Specifications

Dimensions Length Overall: 70 ft Beam: 20 ft Draft: 31 inches	Engines (2) 2 x 1050 hp Caterpillar C18's Electrical Generators: 2 Northern Lights (20kw)
Deck Equipment A frame Crane	 Electronics Full range of navigation equipment
Safety Equipment 2 FireBoy Fire Systems 2 Life rafts (8) man	Additional Equipment Water maker Autopilot

Shallow Hazards Survey

The geohazard survey will be conducted to provide information on potential drilling hazards. The suite of equipment proposed for the survey consists of:

- Multi-beam echosounder – provide water depths and seafloor morphology
- Side scan sonar – provides acoustic images of the seafloor
- Sub-bottom profiler – provides information about sub-seafloor sediment stratification with penetration up to 15 meters and decimeter resolution
- UHD Sparker multi-channel sub-bottom profiler – provides intermediate surface imaging with penetration up to 150 meters
- Magnetometer – detects ferrous items
- An analysis of existing 3-D seismic data will be utilized to assess for shallow hazards down to 1,000 m.

The towed systems will be positioned using a Kongsberg High Precision Acoustic Positioning (HiPAP) 351P ultra-short baseline (USBL) underwater positioning system rated to 3,000 meters with a transponder attached to the tow fish. The USBL, multibeam, and parametric sub-bottom systems will all be pole mounted with offsets measured from the vessel's reference point. The surface towed streamers will be towed from the port side of the vessel and positioned with offsets and layback calculations from the tow point. The bottom towed systems, side scan and magnetometer, will all be positioned with the USBL with a cable counter for redundancy.

Geotechnical Survey

Geotechnical surveys will be conducted to provide information on sea floor conditions that may present hazards to rig set down or drilling operations and to obtain physical and chemical data on surface and near sub-surface sediments.

Coring

Core samples will be collected up to 8 meters below the seafloor. Samples will be collected using a RIC 5500 Vibracore sampler. The attached core tube is driven into sediment by the force of gravity, enhanced by vibration energy. The vibrations cause a thin layer of material to mobilize along the inner and outer tube wall, reducing friction and easing penetration into the substrate. The liquid spaces in the matrix allow sediment grains to be displaced by the vibrating tube.

Cone penetration measurements

Cone penetration measurements will be collected to determine soil stability and jack-up leg penetration. The ocean bed subsurface is characterized by hydraulically pushing a steel cone into the seabed. Sensors on the tip of the cone collect data. Standard cone penetrometers collect information to classify soil type by using sensors that measure cone-tip pressure and friction. The equipment proposed will be 100kN ROSON CPT configured for 8-meter penetrations.

Analysis of Survey Results

Upon completion of the survey, a site evaluation will be conducted to obtain a detailed interpretation of the data to identify possible seabed risks related to unstable soil, steep slopes, or surface faults. This evaluation will identify the risk of possible scour around the legs of the jackup or soil failure if near a submarine channel with steep banks, risk of shallow gas, and provide other information required to locate a jackup rig in a safe and environmentally sensitive manner, comply with requirements as outlined by BOEM NTLs and regulations, and comply with typical requirements for the underwriters of jackup drilling rigs.

Shallow Hazard Report and Assessment

A shallow hazard report and a shallow hazards assessment survey will be conducted in accordance with NTL 2005-A01. These are two distinct, but related evaluations which will be conducted to identify seafloor and subseafloor features that may adversely affect or be adversely affected by proposed exploration activities. They will provide a comprehensive geological description by evaluating the area around the surface location of each proposed drill-site.

To ensure the shallow hazards report meets BOEM's needs under 30 CFR 550.214, the shallow hazard report will provide at a minimum the components recommended in NTL 2005-A01 as a guide for targeting technical work. The geohazard survey will be performed in accordance to NTL 2005-A01 and NTL 2005-A03, provide information about the seabed, and identify shallow hazards so they can be avoided. Qualified and experienced personnel will perform the field

survey, process and analyze data, and prepare the shallow hazards report and shallow hazards assessment.

Archaeological Survey

The archaeological study will be conducted in accordance with NTL 2005-A03 to evaluate the existence and location of any archaeological resources which may be impacted by proposed operations. This survey must be performed if the Regional Director determines that submerged archaeological resources may exist on or near lease areas under BOEM authority. On September 13, 2019 BOEM submitted notification to Hilcorp in accordance with regulations in 30 CFR 550.194(a) that BOEM has reason to believe that an archaeological resource may exist in the area where these geohazard and geotechnical surveys are proposed. Therefore, the archaeological surveys in accordance with NTL 2005-A03 would need to be conducted and an archaeological report must be submitted with the Exploration Plan.

The archaeological survey will be conducted as part of the high-resolution geophysical survey conducted to evaluate the area for shallow hazards. Data from this survey will be evaluated by an archaeologist that meets the requirements of Section 112(a)(1) of the National Historic Preservation Act. A survey geophysicist will be present during field operations to ensure quality of data collection.

Wildlife Considerations

Disturbance of marine mammals from the proposed activities described above is unlikely. In 2019 Hilcorp petitioned the National Marine Fisheries Service (NMFS) and the U.S. Fish and Wildlife Service (USFWS) to promulgate Incidental Take Regulations (ITRs) pursuant to Section 101(a)(5) of the Marine Mammal Protection Act for the non-lethal unintentional taking of small numbers of marine mammals incidental to oil and gas exploration, development, and production activities in Cook Inlet. The ITRs were promulgated on July 31, 2019 and August 1, 2019, respectively. Hilcorp submitted a request for a Letter of Authorization (LOA) from NMFS and USFWS for Year 3 activities (April 1 2021- March 30, 2022), including this proposed Geohazard and Geotechnical Survey on January 22, 2021.

Geohazard and geotechnical survey activities will be conducted in accordance with the ITRs and LOAs. These authorizations require Hilcorp take the measures outlined in the Marine Mammal Monitoring and Mitigation Plan for Hilcorp Alaska Oil and Gas Activities (attached).

Considerations for Other Cook Inlet Users

Hilcorp has implemented a Stakeholder Engagement Program that will help minimize conflicts with other user groups in the lower Cook Inlet such as subsistence users, port authorities, fishing organizations, and interested individuals. Hilcorp will coordinate with these groups to avoid conflicts to the maximum extent practicable.

MARINE MAMMAL MONITORING AND MITIGATION PLAN
FOR
HILCORP ALASKA AND HARVEST ALASKA
OIL AND GAS ACTVITIES
COOK INLET, ALASKA

Prepared for

Hilcorp Alaska, LLC

and

Harvest Alaska, LLC

3800 Centerpoint Drive, Suite 1400

Anchorage, Alaska 99503

Prepared by

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301 Calista Court

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June 2019

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ACRONYMS AND ABBREVIATIONS

2D	two-dimensional
3D	three-dimensional
4MP	Marine Mammal Monitoring and Mitigation Plan
AGL	above ground level
AOGCC	Alaska Oil and Gas Conservation Commission
BOEM	Bureau of Ocean Energy Management
BSEE	Bureau of Safety Environment and Enforcement
cui	cubic inches
dB re 1 µPa	decibels referenced to one microPascal
EZ	Exclusion Zone
ft	feet
Harvest Alaska	Harvest Alaska, LLC
Hilcorp Alaska	Hilcorp Alaska, LLC
hrs	hours
IHA	Incidental Harassment Authorizations
ITR	Incidental Take Regulations
kg	kilograms
km	kilometers
lbs	pounds
L_{pk}	peak level
LOA	Letters of Authorization
m	meters
MMPA	Marine Mammal Protection Act
NMFS	National Marine Fisheries Service
NOAA	National Oceanic and Atmospheric Administration
OCS	Outer Continental Shelf
PAM	passive acoustic monitoring
PSO	Protected Species Observer
PTS	permanent threshold shift
rms	root-mean-square
s	seconds
SEL	sound exposure level
SPL	sound pressure level
SSV	sound source verification
SZ	Safety Zone
TTS	temporary threshold shift
UAS	Unmanned Aerial System
VHF	very high frequency
VSP	vertical seismic profiling

1.0 INTRODUCTION

Hilcorp Alaska, LLC (Hilcorp Alaska) and Harvest Alaska, LLC (Harvest Alaska) hereinafter referred to jointly as the "Applicant" hereby petitions the United States Fish and Wildlife Service (USFWS) to promulgate regulations pursuant to Section 101(a)(5) of the Marine Mammal Protection Act (MMPA) for the non-lethal unintentional taking of small numbers of sea otters incidental to oil and gas exploration, development, and production activities in Cook Inlet, Alaska for the period of five years beginning June 1, 2019 extending through June 1, 2024. Hilcorp Alaska has been operating in Alaska since 2011 owning interests and operating in over 29 oil and gas field production facilities located in both Cook Inlet (Figure 1) and the North Slope.

The geographic area of activity covers a total of approximately 2.7 million acres (10,926 square kilometers [km^2]) in Cook Inlet. It includes land and adjacent waters in Cook Inlet including both State of Alaska and Federal Bureau of Ocean Energy Management (BOEM) Outer Continental Shelf (OCS) waters (Figure 2). The area extends from the north at the Susitna Delta on the west side and Point Possession on the east side of Cook Inlet to southwest of Homer in lower Cook Inlet.

This document summarizes the marine mammal monitoring and mitigation plan (4MP) for the activities. Marine mammal monitoring and mitigation methods have been designed to meet the requirements and objectives which will be specified in the individual Letter of Authorizations (LOA). As this current 4MP is submitted as part of the incidental take regulations (ITR) petition, the Applicant recognizes some details of the 4MP may change upon receipt of the authorizations.

The ITR Petition includes activities to be conducted by the Alaska Gasline Development Corporation (AGDC) north of the Forelands, but this 4MP is solely for the use of Harvest Alaska and Hilcorp Alaska.

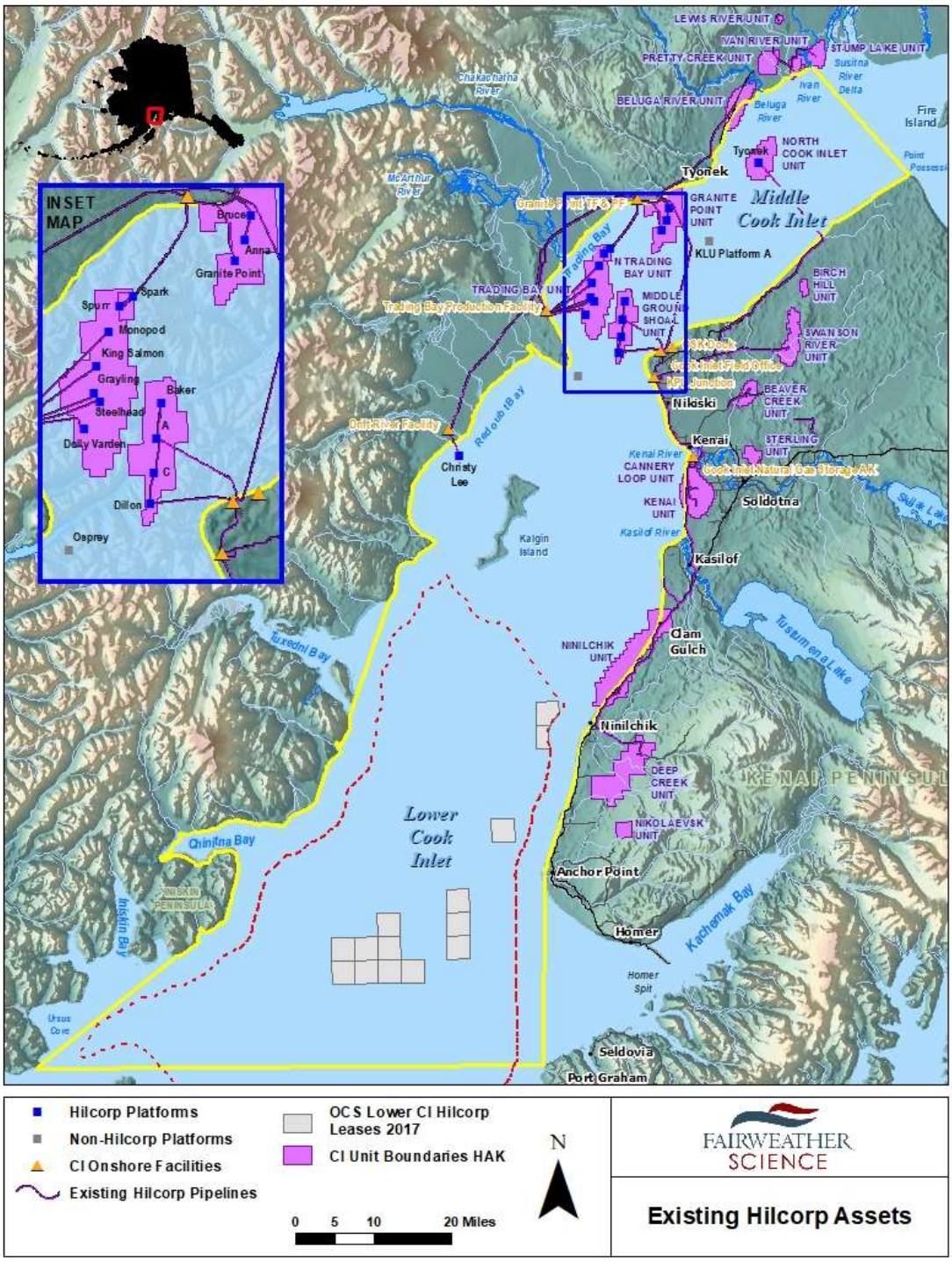

Figure 1. Map showing existing Hilcorp Alaska assets in Cook Inlet.

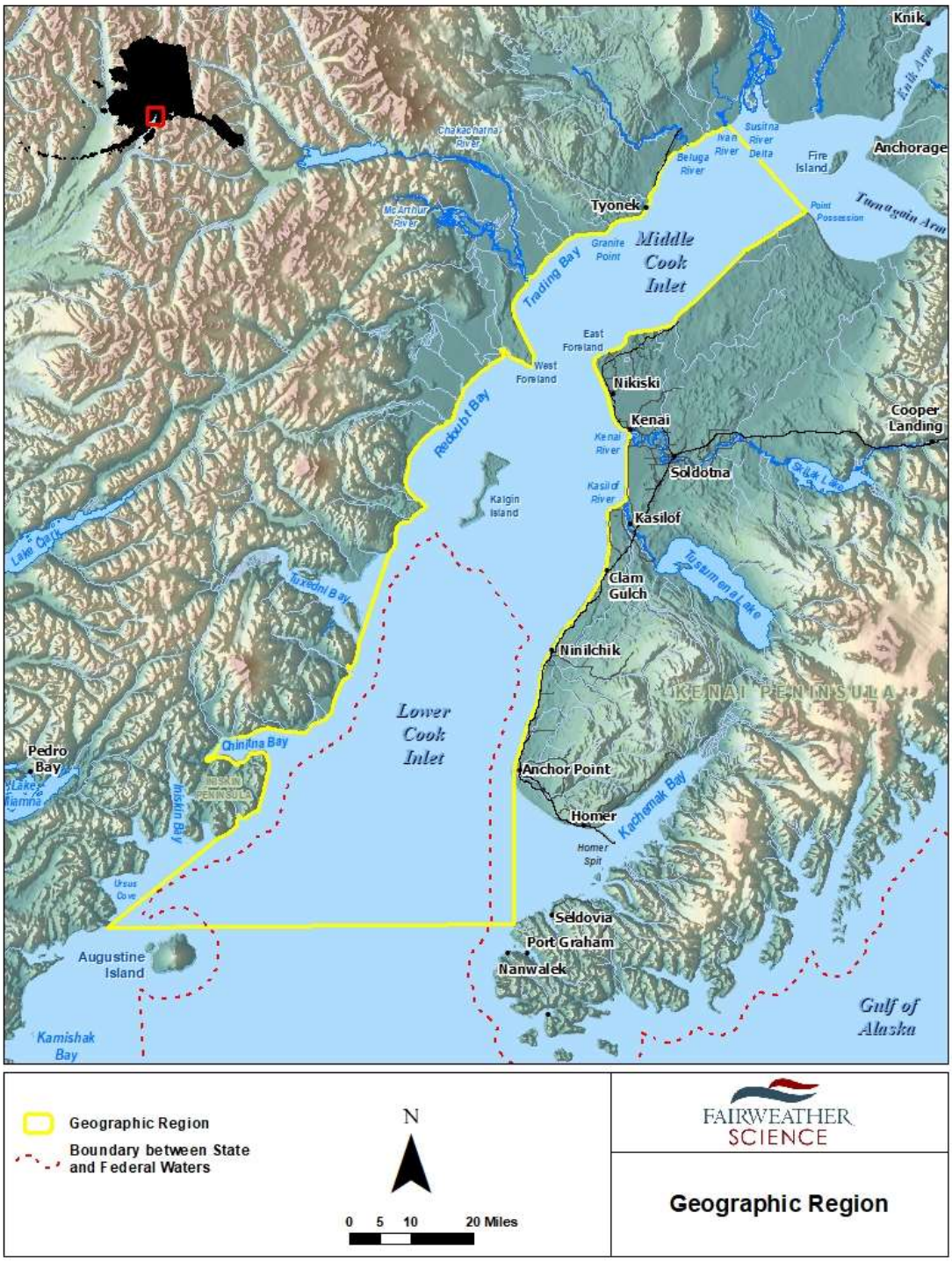

Figure 2. Geographic region of ITR Petition.

2.0 DESCRIPTION OF ACTIVITIES

The scope of this Petition includes four stages of activity, including exploration, development, production, and decommissioning activities within the Applicant's area of operations in and adjacent to Cook Inlet within the Petition's geographic area (Figure 2). Because Cook Inlet has had active oil and gas activities for over 60 years, this Petition includes all four stages in different areas. Table 1 summarizes the planned activities within the geographic scope of this Petition and the following text describes these activities in more detail. This section is organized into two primary areas within Cook Inlet: lower Cook Inlet (south of the Forelands to Homer) and middle Cook Inlet (north of the Forelands to Susitna/Point Possession. Figure 3 illustrates the activities in lower Cook Inlet and illustrates the activities in middle Cook Inlet in Figure 4.

Table 1. Summary of planned activities for Harvest Alaska and Hilcorp Alaska included in ITR Petition.

Project Name	Cook Inlet Region	Year(s) Planned	Seasonal Timing	Anticipated Duration	Anticipated Noise Sources
Anchor Point 2D seismic survey	Lower Cook Inlet, Anchor Point to Kasilof	2021 or 2022	April-October	30 days (10 days in-water seismic)	Marine: 1 source vessel with airgun array, 1 node vessel Onshore/Intertidal: Shot holes, tracked vehicles, helicopters
OCS 3D seismic survey	Lower Cook Inlet OCS	2019 or 2020	April-October	45-60 days	1 source vessel with airgun array, 2 support vessels, 1 mitigation vessel potentially
OCS geohazard survey	Lower Cook Inlet OCS	2019-2021	April-October	30 days	1 vessel with echosounders and/or sub-bottom profilers
OCS exploratory wells	Lower Cook Inlet OCS	2020-2022	February-November	40-60 days per well, 2-4 wells per year	1 jack-up rig, drive pipe installation, vertical seismic profiling, 2-3 tugs for towing rig, support vessels, helicopters
Iniskin Peninsula exploration and development	Lower Cook Inlet, west side	2020-2022	April-October	180 days	Construction of causeway, vibratory sheet pile driving, vessels
Platform & pipeline maintenance	Middle Cook Inlet	2019-2024	April-October	180 days (each year)	Vessels, water jets, hydraulic grinders, pingers, helicopters, and/or sub-bottom profilers
North Cook Inlet Unit subsea well geohazard survey	Middle Cook Inlet	2020	April-October	14 days	1 vessel with echosounders and/or sub-bottom profilers
North Cook Inlet Unit well abandonment activity	Middle Cook Inlet	2020	April-October	90 days	1 jack-up rig, tugs towing rig, support vessel, helicopters
Trading Bay area geohazard survey	Middle Cook Inlet	2020	April-October	30 days	1 vessel with echosounders and/or sub-bottom profilers
Trading Bay area exploratory wells	Middle Cook Inlet	2020	April-October	120-150 days	1 jack-up rig, drive pipe installation, tugs towing rig, support vessel, helicopters
Granite Point development drilling	Middle Cook Inlet	2019	June-October	120-150 days	1 jack-up rig, tugs towing rig, 1 vessel with echosounders

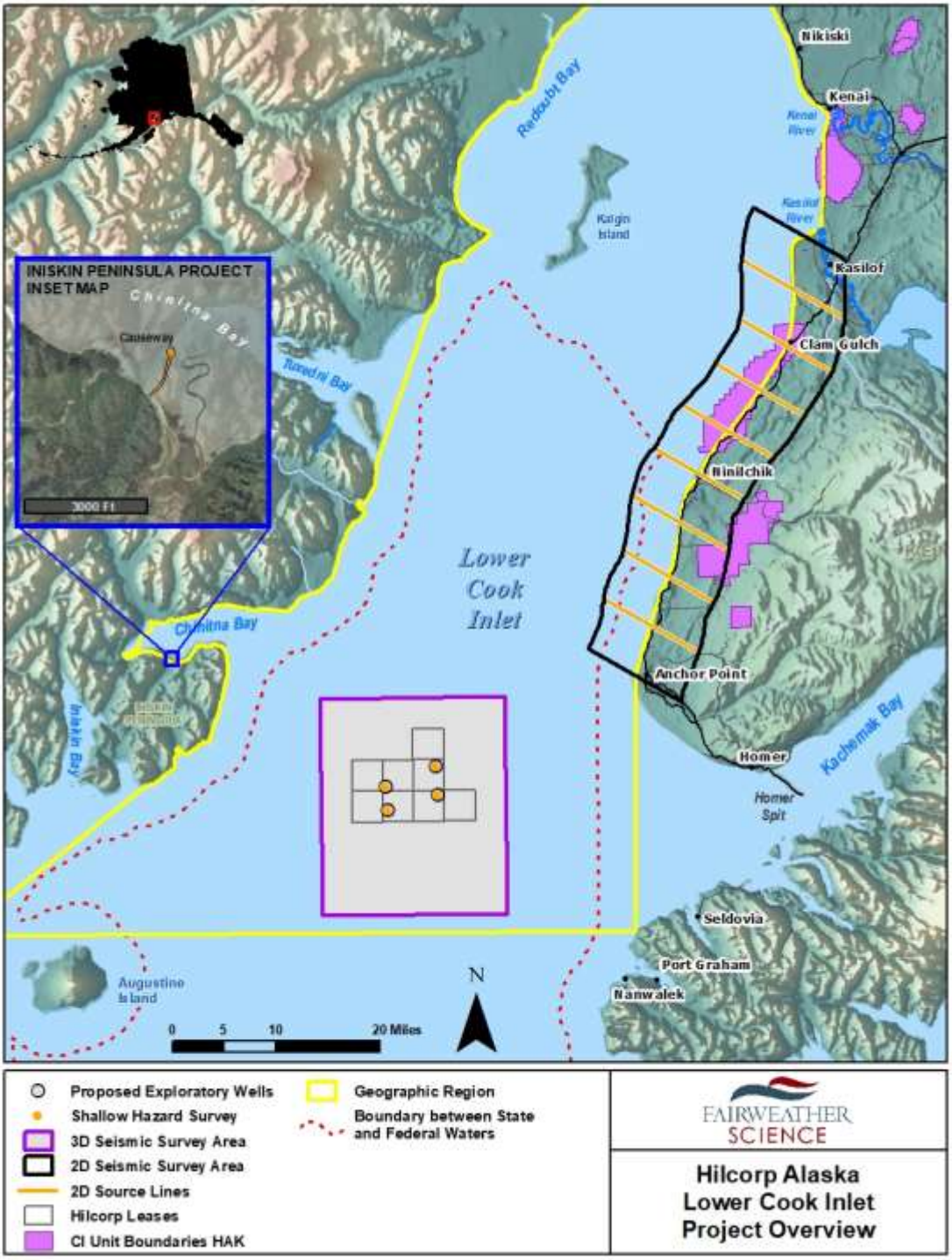

Figure 3. Map showing planned activities in lower Cook Inlet.

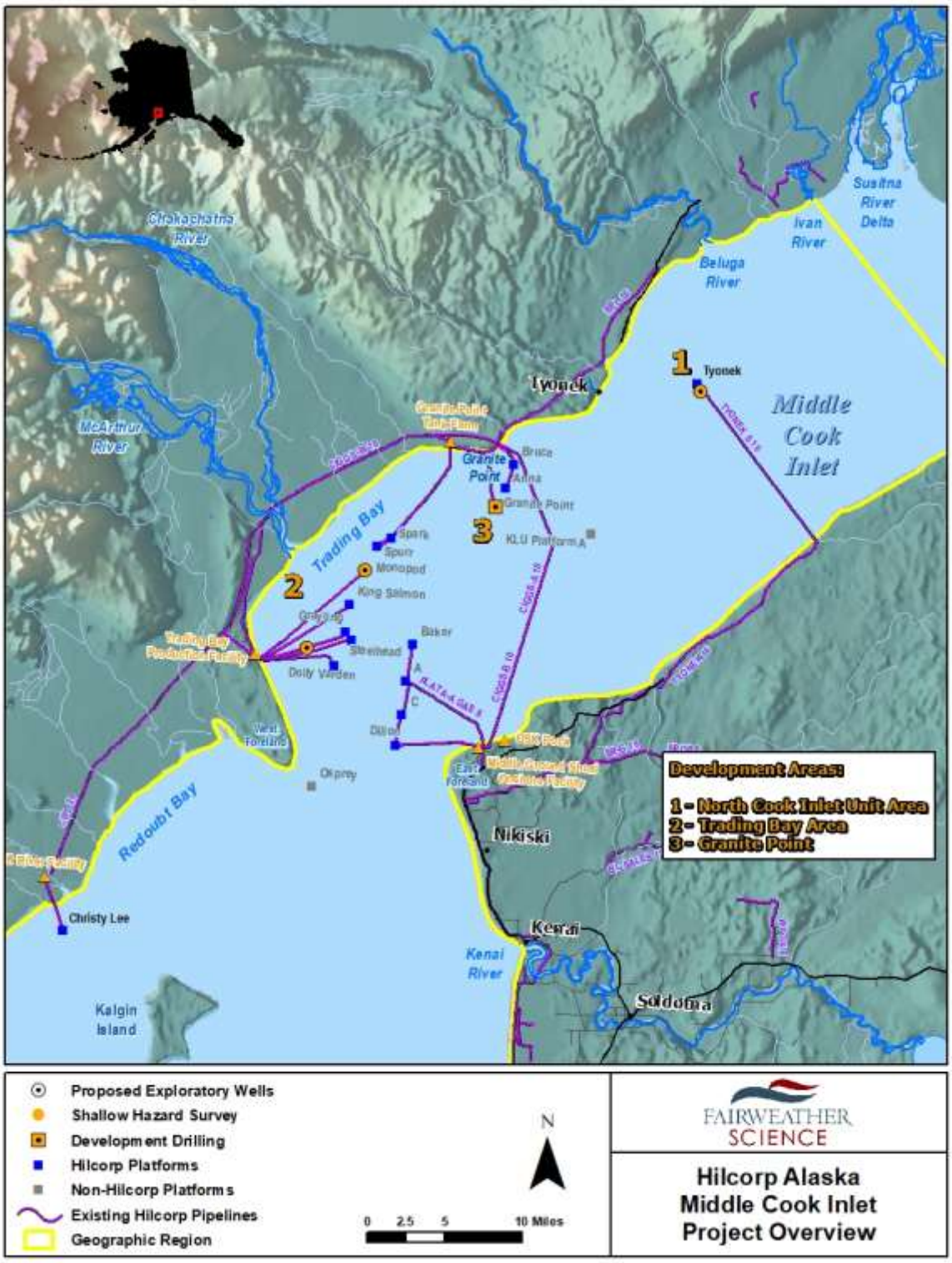

Figure 4. Map showing existing and planned activities in middle Cook Inlet.

2.1 ACTIVITIES WITHIN LOWER COOK INLET

2.1.1 2D Seismic Survey

During the time frame of this Petition, the region of interest to conduct a two-dimensional (2D) survey is in the marine, intertidal, and onshore area on the eastern side of Cook Inlet from Anchor Point to Kasilof (Figure 3). The area of interest is approximately 8 km (5 miles [mi]) on each side of the coastline with source lines spaced every 8 km (5 mi). The anticipated timing of the planned 2D survey is in the open water season (April through October) in either 2020 or 2021. The actual survey duration will take approximately 30 days in either year.

The 2D seismic data are acquired using airguns in the marine zone, airguns in the intertidal zone when the tide is high and drilled shot holes in the intertidal zone when the tide is low and drilled shot holes in the land zone. The data are recorded using an autonomous nodal system (i.e., no cables) that are deployed in the marine, intertidal, and land zones.

Although the precise volume of the airgun array is unknown at this time, Hilcorp will use an airgun array similar to what has been used for surveys in Cook Inlet by Apache (2011-2013) and SAExploration (2015): either a 2,400 cubic inch (cui) or 1,760 cui array. In addition, the source vessel will be equipped with a 440 cui shallow water source which it can deploy at high tide in the intertidal area in less than 1.8 meter (m, 6 feet [ft]) of water. Source lines are oriented along the node line.

A single vessel is capable of acquiring a source line in approximately 1-2 hours (hrs). In general, only one source line will be collected in one day to allow for all the node deployments and retrievals, and intertidal and land zone shot holes drilling. There are up to 10 source lines, so if all operations run smoothly, there will only be 2 hrs per day over 10 days of airgun activity. Hilcorp Alaska anticipates the entire operation to take approximately 30 days to complete to account for weather and equipment contingencies.

2.1.2 3D Seismic Survey

During the time frame of this Petition, Hilcorp Alaska plans to collect 3D seismic data for approximately 45-60 days starting September 1, 2019 over 8 of the 14 OCS lease blocks in lower Cook (Figure 3). The 3D seismic survey is comprised of an area of approximately 790 km^2 (305 mi^2) through 8 blocks. The length of the survey will depend on weather, equipment, and marine mammal delays (contingencies of 20% weather, 12% equipment, 10% marine mammal).

Polarcus is the intended seismic contractor, who has provided a more refined survey design based on vessel size and capability. The general seismic survey design is provided below. The 3D seismic data will be acquired using a specially designed marine seismic vessel towing 8-12 x ~2,500-m (1.5 mi) recording cables with a dual air gun array. The survey will involve one source vessel, one support vessel, one chase vessel, and potentially one mitigation vessel. The anticipated seismic source to be deployed from the source vessel is a 14-airgun array with a total volume of 1,945 cui. Crew changes are expected to occur every four to six weeks using a helicopter from shore bases in lower Cook Inlet.

The proposed seismic survey will be active 24 hours (hrs) per day. The array will be towed at a speed of approximately 7.41 km/hr (4 knots), with seismic data collected continuously. Data acquisition will occur for approximately 3-5 hrs, followed by a 1.5-hr period to turn and reposition the vessel for another pass. The turn radius on the seismic vessel is approximately 3,200-4,828 m (2-3 mi), which includes a run-out

area where guns are active, but outside the full-fold data acquisition area. The total area of airgun operations will be approximately 528 km2 (204 mi2).

The data will be shot parallel to the Cook Inlet shorelines in a southwest/northeast direction or northeast/southwest direction going straight into or out of the tides. This operational direction will keep recording equipment/streamers in line with Cook Inlet currents and tides and keep the equipment away from shallow waters on the east and west sides. This operational direction will keep recording equipment/streamers in line with Cook Inlet currents and tides and keep the equipment away from shallow waters on the east and west sides. The program may be modified if the survey cannot be conducted as a result of noise conditions onsite (i.e., ambient noise). The airguns will typically be turned off during the turns, however, depending on the daylight hours and length of the turn, Hilcorp Alaska may use the smallest gun in the array (45 cui) as a mitigation airgun where needed.

2.1.3 Geohazard and Geotechnical Surveys

Upon completion of the 3D seismic survey over the lower Cook Inlet OCS leases, Hilcorp Alaska plans to conduct a geohazard survey on site-specific regions within the area of interest prior to conducting exploratory drilling. The precise location is not known, as it depends on the results of the 3D seismic survey, but the location will be within the lease blocks. The anticipated timing of the activity is in either the fall of 2019 or the spring of 2020. The actual survey duration will take approximately 30 days.

The suite of equipment used during a typical geohazards survey consists of single beam and multi-beam echosounders, which provide water depths and seafloor morphology; a side scan sonar that provides acoustic images of the seafloor; a sub-bottom profiler which provides 20 to 200 m (66 to 656 ft) sub-seafloor penetration with a 6- to 20-centimeter (cm, 2.4-7.9-inch [in]) resolution. Magnetometers, to detect ferrous items, may also be used. Geotechnical surveys are conducted to collect bottom samples to obtain physical and chemical data on surface and near sub-surface sediments. Sediment samples typically are collected using a gravity/piston corer or grab sampler.

2.1.4 Exploratory Drilling

Hilcorp Alaska plans to conduct the exploratory drilling program April to October between 2020 and 2022. The exact start date is currently unknown and is dependent on the results of the seismic survey, geohazard survey, and scheduling availability of the drill rig. It is expected that each well will take approximately 40-60 days to drill and test. Beginning in spring 2020, Hilcorp Alaska plans to possibly drill two and as many as four exploratory wells, pending results of the 3D seismic survey in the lower Cook Inlet OCS leases. After testing, the wells may be plugged and abandoned (P&A).

The drilling program for the well will be described in detail in an Exploration Plan to BOEM. The Exploration Plan will present information on the drilling mud program; casing design, formation evaluation program; cementing programs; and other engineering information. After rig up/rig acceptance by Hilcorp Alaska, the wells will be spudded and drilled to bottom-hole depths of approximately 2,100 to 4,900 m (7,000 to 16,000 ft) depending on the well. It is expected that each well will take about 40-60 days to drill and up to 10-21 days of well testing. If two wells are drilled, it will take approximately 80-120 days to complete the full program; if four wells are drilled, it will take approximately 160-240 days to complete the full program.

Depending on the rig selection and location, the drilling rig will be towed on site using up to three ocean-going tugs licensed to operate in Cook Inlet. Rig moves will be conducted in a manner to minimize any

potential risk regarding safety as well as cultural or environmental impact. While under tow to the well sites, rig operations will be monitored by Hilcorp Alaska and the drilling contractor management. Very High Frequency (VHF) radio, satellite, and cellular phone communication systems will be used while the rig is under tow. Helicopter transport will also be available.

Helicopter flights to and from the rig are expected to average two per day. Flight routes will follow a direct route to and from the rig location, and flight heights will be maintained 300 to 450 m (1,000 to 1,500 ft), as practicable, above ground level (AGL) to avoid acoustical harassment of marine mammals. The aircraft will be dedicated to the drilling operation and will be available for service 24 hrs a day.

2.1.4.1 Well Plugging and Abandonment (P&A)

When planned and permitted operations are completed, the well will be suspended according to Bureau of Safety and Environmental Enforcement (BSEE) regulations. The well casings will be landed in a mudline hanger after each hole section is drilled. When the well is abandoned, the production casing is sealed with mechanical plugging devices and cement to prevent the movement of any reservoir fluids between various strata. Each casing string will be cutoff below the surface and sealed with a cement plug. A final shallow cement plug will be set to approximately 3.05 m (10 ft) below the mudline. At this point, the surface casing, conductor, and drive pipe will be cutoff and the three cutoff casings and the mudline hanger are pulled to the deck of the jack-up rig for final disposal. The P&A procedures are part of the Well Plan which is reviewed by BSEE prior to being issued an approved Permit to Drill.

2.1.4.2 Drive Pipe and Conductor Installation

A drive pipe is a relatively short, large-diameter pipe driven into the sediment prior to the drilling of oil wells. The drive pipe serves to support the initial sedimentary part of the well, preventing the looser surface layer from collapsing and obstructing the wellbore. Drive pipes are installed using pile driving techniques. Hilcorp Alaska proposed to drive approximately 60 m of 76.2-cm pipe at each well site prior to drilling using a Delmar D62-22 impact hammer (or similar). This hammer has an impact weight of 6,200 kilograms (kg, 13,640 pounds [lbs]). The drive pipe driving event is expected to last one to three days at each well site, although actual pounding of the pipe will only occur intermittently during this period. Conductors are slightly smaller diameter pipes than the drive pipes used to transport or "conduct" drill cuttings to the surface. For these wells, a 50.8-cm [20-in] conductor pipe may be drilled, not hammered, inside the drive pipe, dependent on the integrity of surface formations.

2.1.4.3 Vertical Seismic Profiling

Once the well is drilled, accurate follow-up seismic data may be collected by placing a receiver at known depths in the borehole and shooting a seismic airgun at the surface near the borehole, called vertical seismic profiling (VSP). These data provide high-resolution images of the geological layers penetrated by the borehole and can be used to accurately correlate original surface seismic data. The actual size of the airgun array is not determined until the final well depth is known, but typical airgun array volumes are between 600 and 880 cui. VSP typically takes less than two full days at each well site.

2.1.5 Iniskin Peninsula Exploration Project

Hilcorp Alaska initiated baseline exploratory data collection in 2013 for a proposed land-based oil and gas exploration and development project on the Iniskin Peninsula of Alaska, near Chinitna Bay (Figure 3). The proposed project is approximately 97 km (60 mi) west of Homer on the west side of Cook Inlet in the Fitz

Creek drainage. New project infrastructure includes material sites, a 6.9 km (4.3 mi) long access road, prefabricated bridges to cross four streams, an air strip, barge landing/staging areas, fuel storage facilities, water wells and extraction sites, an intertidal causeway, a camp/staging area, and a drill pad. Construction is anticipated to start in 2020.

An intertidal rock causeway is proposed to be constructed adjacent to the Fitz Creek staging area to improve the accessibility of the barge landing during construction and drilling operations. The causeway will extend seaward from the high tide line approximately 366 m (1,200 ft) to a landing area 46 m (150 ft) wide. Rock fill will be sourced from the Gaikema material site. The causeway will enable more consistent use of the Fitz Creek staging area to receive freight and fuel with fewer limitations due to short high tide windows and result in less dependency on the Camp Point staging area. The causeway will also enable quicker response to emergency incidents (including spill events) and reduce the risk associated with materials logistics and fuel deliveries. After the causeway is no longer needed for the project, it is proposed that the rock fill be removed and relocated to a landowner-approved upland fill area, exposing the natural mud flat surface. Tidal action, wave action, and currents will be free to naturally fill and cover the area disturbed by project's causeway. The project camp site is located along the historic road alignment at a location where bedrock can be quarried and the pad developed by cutting to grade and utilizing excavated rock for fill.

A dock face will be constructed around the rock causeway so that barges will be able to dock along the causeway. The causeway will need to be 75% built before the construction of the dock face will start. The dock face will be constructed with 18-m (60-ft) tall Z-sheet piles, all installed using a vibratory hammer. It will take approximately 14-25 days, depending on the length of the work shift, assuming approximately 25% of the day actual pile driving. The timing of pile driving will be in late summer or early winter, after the causeway has been partially constructed.

2.2 ACTIVITIES WITHIN EXISTING COOK INLET ASSETS

The Applicant operates multiple assets throughout Cook Inlet in State of Alaska waters, including gathering facilities and platforms while Harvest operates the transmission pipelines, the Drift River Terminal, and the Christy Lee loading platform (Figure 4).

2.2.1 Offshore Production Platforms

Of the 17 production platforms in central Cook Inlet, 15 are owned by Hilcorp Alaska Figure 4). The two remaining platforms are owned by Furie (KLU Platform A) and Glacier Oil and Gas (Osprey). Hilcorp Alaska performs routine construction on their platforms, depending on needs of the operations. Construction activities may take place up to 24 hrs a day. In-water activities include support vessels bringing supplies five days a week up to two trips per day between OSK and the platform. Depending on the needs, there may also be barges towed by tugs with equipment and helicopters for crew and supply changes.

2.2.2 Granite Point Development Drilling

Hilcorp Alaska plans to conduct a multi-well development drilling program at the Granite Point Platform between June and November 2019. The exact start date is currently unknown and is dependent on scheduling availability of the drill rig and receipt of all applicable authorizations. A jack-up rig will be cantilevered over the Granite Point Platform and utilized to complete the drilling program with the same equipment and methods as described in Section 1.5.3 (lower Cook Inlet OCS exploratory wells). All currently proposed wells are sidetracks and or completions of existing wellbores. It is expected that each

well will take approximately 40-60 days to drill and test and convert to production if applicable. A geohazard survey over the areas of interest would be conducted to locate potential hazards prior to drilling with the same suite of equipment as described in Section 2.1.3, with the exception of the use of a sub-bottom profiler. Because the wells are sidetracks, there is no need to survey beneath the seafloor so only echosounders and side scan sonar are used (all above 200 kHz).

2.2.3 Routine Maintenance

Each year, Hilcorp Alaska must verify the structural integrity of their platforms and pipelines located within Cook Inlet. Routine maintenance activities include: subsea pipeline inspections, stabilizations, and repairs; platform leg inspections and repairs; and anode sled installations and/or replacement.

As this is a five-year plan, the exact dates each year are not known. In general, pipeline stabilization and pipeline repair are anticipated to occur in succession for a total of 6-10 weeks. However, if a pipeline stabilization location also requires repair, the divers will repair the pipeline at the same time they are stabilizing it. Pipeline repair activities are only to be conducted on an as-needed basis whereas pipeline stabilization activities will occur annually. During underwater inspections, if the divers identify an area of the pipeline that requires stabilization, they will place Sea-Crete bags at that time rather than waiting until the major pipeline stabilization effort that occurs later in the season.

2.2.3.1 Pipeline Inspections

The Applicant employs dive teams to conduct physical inspections and evaluate cathodic protection status and thickness of subsea pipelines on an annual basis. If required for accurate measurements, divers may use a water jet to provide visual access to the pipeline. For stabilization, inspection dive teams may place Sea-Crete bags beneath the pipeline to replace any materials removed by the water jet. Results of the inspections are recorded and significant deficiencies are noted for repair.

Multi-beam sonar and sub-bottom profilers may also be used to obtain images of the seabed along and immediately adjacent to all subsea pipelines. Strong currents within the Cook Inlet can scour and erode the seafloor beneath the pipelines, creating potentially significant integrity issues.

2.2.3.2 Pipeline Stabilization

Scour spans beneath pipelines greater than 23 m (75 ft) have the potential to cause pipeline failures. To be conservative, scour spans of 15 m (50 ft) or greater identified using multi-beam sonar surveys are investigated using dive teams. Divers perform tactile inspections to confirm spans greater than 15 m (50 ft). The pipeline is stabilized along these spans with Sea-Crete concrete bags.

While in the area, the divers will also inspect the external coating of the pipeline and take cathodic protection readings if corrosion wrap is found to be absent.

2.2.3.3 Pipeline Repair

Significant pipeline deficiencies identified during pipeline inspections are repaired as soon as practicable using methods including, but not limited to, U.S. Department of Transportation-approved clamps and/or fiber glass wraps, bolt/flange replacements, and manifold replacements. In some cases, a water jet may be required to remove sand and gravel from under or around the pipeline to allow access for assessment and repair. The pipeline surface may also require cleaning using a hydraulic grinder to ensure adequate repair. If pipeline replacement is required, an underwater pipe cutter such as a diamond wire saw or hydraulically-powered Guillotine saw may be used.

2.2.3.4 Platform Legs

Platform leg integrity and pipeline-to-platform connections beneath the water surface are evaluated by divers on a routine basis. Platform legs, braces, and pipeline-to-platform connections are evaluated for cathodic protection status, structure thickness, excessive marine growth, damage, and scour. If required, divers may use a water jet to clean or provide access to the structure. Material removed from the seafloor may be replaced by Sea-Crete bags to stabilize the pipeline. Cathodic protection of the platform legs and associated pipelines are evaluated using a submersible Silver Chloride half-cell coupled to a digital multi-meter. Cathodic protection readings are taken continuously while the divers travel down legs, along members/pipelines, and at all inspected nodes. Measurements are collected while the cathodic protection system remains active.

Rope access teams may use magnetic particle inspection to detect structure surface and near-surface flaws. If necessary, remedial grinding using a hydraulic under water grinder may be required to determine extent damage and/or to prevent further crack propagation. All inspection results are recorded and significant deficiencies are noted for repair.

Platform leg integrity along the tidal zone is inspected on a routine basis. Difficult-to-reach areas may be accessed using either commercially-piloted unmanned aerial systems (UAS) or certified rope access teams.

2.2.3.5 Pingers

Several types of moorings are deployed in support of Hilcorp Alaska operations; all of which require an acoustic pinger for location or release. The pinger is deployed over the side a vessel and a short signal is emitted to the mooring device. The mooring device responds with a short signal to indicate that the device is working, to indicate range and bearing data, or to illicit a release of the unit from the anchor. These are used for very short periods of time when needed.

2.2.4 North Cook Inlet Unit Subsea Well P&A Activity

The discovery well in the North Cook Inlet Unit was drilled over 50 years ago and is planned to be abandoned, so Hilcorp Alaska plans to conduct a geohazard survey to locate the well and conduct P&A activities for a previously drilled subsea exploration well in 2020 (Figure 4).

The geohazard survey location is approximately 402-804 m (¼-½ mi) south of the Tyonek platform and will take place over approximately seven days with a grid spacing of approximately 250 m (820 ft). The suite of equipment used during a typical geohazards survey consists of single beam and multi-beam echosounders, which provide water depths and seafloor morphology; a side scan sonar that provides acoustic images of the seafloor; a sub-bottom profiler which provides 20 to 200 m (66 to 656 ft) sub-seafloor penetration with a 6- to 20-cm (2.4-7.9-in) resolution. The echosounders and sub-bottom profilers are generally hull-mounted or towed behind a single vessel. The vessel travels at 3-4.5 knots (5.6-8.3 km/hr).

After the well has been located, Hilcorp Alaska plans to conduct P&A activities over a 60-90 day time period in May through July in 2020. The jack-up rig will be similar to what is described in Section 2.1.4. (the *Spartan 151* drill rig, or similar). The rig will be towed onsite using up to three ocean-going tugs. Once the jack-up rig is on location, divers working off a boat will assist in preparing the subsea wellhead and mudline hanger for the riser to tie the well to the jack-up. Once the riser is placed, the BOP equipment is made up to the riser. At this point, the well will be entered and well casings will be plugged with mechanical devices and cement and then cutoff and pulled. A shallow cement plug will be set in the surface casing to

3.05 m (10 ft) below the mudline hanger. The remaining well casings will be cutoff and the mudline hanger will be recovered to the deck of the jack-up rig for disposal. The well abandonment will be performed in accordance to Alaska Oil and Gas Conservation Commission (AOGCC) regulations.

2.2.5 Trading Bay Area Exploratory Drilling

Hilcorp Alaska plans to conduct exploratory drilling activities in the Trading Bay area. The specific sites of interest have not yet been identified, but the general area is shown Figure 4. Hilcorp Alaska will conduct geohazard surveys over the areas of interest to locate potential hazards prior to drilling with the same suite of equipment as described in Section 2.1.4. The survey is expected to take place over 30-60 days in 2019 from a single vessel.

The exploratory drilling and well completion activities will take place in site-specific areas based on the geohazard survey. Hilcorp Alaska plans to drill 1-2 exploratory wells in this area in the open water season of 2020 with the same equipment and methods as described in Section 2.1.4.

3.0 MITIGATION AND MONITORING

The Applicant will implement a robust monitoring and mitigation program for marine mammals using USFWS-approved Protected Species Observers (PSOs) for Petition activities. Marine mammal monitoring and mitigation methods have been designed to meet the requirements and objectives which will be specified in the ITRs promulgated by USFWS. The Applicant recognizes some details of the monitoring and mitigation may change upon receipt of the individual LOAs issued by USFWS each year. Specific mitigation measures will depend on the specific project.

3.1 MITIGATION MEASURES

3.1.1 Applicable Noise Criteria

Under the MMPA, USFWS has defined levels of harassment for marine mammals. Level A harassment is defined as "…any act of pursuit, torment, or annoyance which has the potential to injure a marine mammal or marine mammal stock in the wild." Level B harassment is defined as "…any act of pursuit, torment, or annoyance which has the potential to disturb a marine mammal or marine mammal stock in the wild by causing disruption of behavioral patterns, including, but not limited to, migration, breathing, nursing, breeding, feeding, or sheltering."

For Level A, the NOAA Technical Memorandum NMFS-OPR provides guidelines for assessing the onset of permanent threshold shifts (PTS) from anthropogenic sound. Under this guideline, marine mammals are separated into five functional hearing groups; source types are separated into impulsive (e.g., seismic, pipe driving, sub-bottom profiler) and non-impulsive (tugs towing rigs, drilling, water jet, hydraulic grinder); and require analyses of the distance to the peak received sound pressure level (SPL, L_{pk}) and 24-hr cumulative sound exposure level (SEL_{24h}). For purposes of this Petition, the otariid functional group is considered a proxy for sea otters.

USFWS also considers the Level A (injury) threshold for impulsive sound as 190 decibels referenced to one microPascal (dB re 1 µPa) root mean square (rms) and 180 dB re 1 µPa rms for non-impulsive sound. The current USFWS Level B (disturbance) threshold for assessing the onset of temporary threshold shifts (TTS) for both impulsive and non-impulsive sounds is 160 dB re 1 µPa rms.

Table 2 provides a summary of the disturbance guidelines. For purposes of this section, all underwater SPLs are reported as dB re 1 µPa.

Table 2. Summary of USFWS acoustic thresholds.

Marine Mammals	Injury (Level A) Threshold				Disturbance (Level B) Threshold
	Impulsive[1]	Non-Impulsive[1]	Impulsive	Non-Impulsive	All
Sea otters	232 dB L_{pk} 203 dB SEL	219 dB SEL	190 dB rms	180 dB rms	160 dB rms

[1]Based on NMFS acoustic criteria for otariid pinnipeds (NMFS 2016).

The acoustic characteristics of each of the activities are described in the following section and summarized in Table 3. Not all sources of noise will result in Level A or B acoustic harassment; each description identifies whether this source was included in the evaluation of harassment.

Table 3. Summary of noise sources for each activity.

Activity	Sound Pressure Levels (dB re 1 µPa)	Frequency	Reference
General vessel operations	145-175 dB rms at 1 m	10 Hz – 1,500 Hz	Richardson et al. 1995; Blackwell and Greene 2003; Ireland and Bisson 2016
General aircraft operations	100-124 dB rms at 1 m	<500 Hz	Richardson et al. 1995
2D seismic survey (2400 cui airgun)	217 dB peak at 100 m 185 dB SEL at 100 m 197 dB rms at 100 m	<300 Hz	Austin and Warner 2012; 81 FR 47239
3D seismic survey (2400 cui airgun)	217 dB peak at 100 m 185 dB SEL at 100 m 197 dB rms at 100 m	<300 Hz	Austin and Warner 2012; 81 FR 47239
Geohazard Surveys	210-220 dB rms at 1 m	Echosounders & side scan sonar: >200 kHz High resolution sub-bottom profiler: 2-24 kHz Low resolution sub-bottom profiler: 1-4 kHz	Manufacturer specifications
Exploratory drilling rig	137 dB rms at 1 m	<200 Hz	Marine Acoustics Inc. 2011
Tugs under load towing rig	167 dB rms 1 at m	<500 Hz	Austin et al. 2013
Drive pipe installation	190 dB rms at 55 m	<500 Hz	Illingworth and Rodkin 2014
Vertical seismic profiling	227 dB rms at 1 m	<500 Hz	Illingworth & Rodkin 2014
Rock laying for Iniskin causeway	Less than dredging: 136-141 dB rms at 12-19 m	<500 Hz	Nedwell and Edwards 2004; URS 2007
Vibratory sheet pile driving for Iniskin	175 dB peak at 10 m 160 dB SEL at 10 m 160 dB rms at 10 m	<100-2,500 Hz	Illingworth & Rodkin 2007
Offshore production platforms	97-111 dB rms at 0.3-19 km	<500 Hz	Blackwell and Greene 2003
Water jet	176 dB rms at 1 m	500 Hz – 2 kHz	Austin 2017
Hydraulic grinder	159 dB at 1 m	<1 kHz	Stanley 2014
Drones	100 dB rms at 1 m	<500 Hz	Christiansen et al. 2016
Pingers	192 dB rms at 1 m	4-14 kHz	Manufacturer specifications

3.1.2 Description of Exclusion and Safety Zones

The Exclusion Zone (EZ) is defined as the area in which all operations are **shut down** in the event a marine mammal enters or is about to enter this zone. For activities included in this Petition, there are different EZs depending on the species and sound source. The EZ for sea otters is based on USFWS requirements which are different than NMFS for Level A. The Safety Zone (SZ) is an area larger than the EZ and is defined as the area within which operations may power down in the event a marine mammal enters, is about to enter or may be considered a Level B harassment.

The distances for the EZ and SZ for the activities are summarized in Table 4 and described in the following text.

1) The distances to the Level A thresholds for the 2D/3D seismic activity were calculated using the methods described in Section 6 of the Petition and the Level B is based on Apache field-verified distance (81 FR 47239). The EZ is rounded up to 50 m and the SZ is 7,300 m.
2) The distances to the Level A and B thresholds for the vibratory sheet pile driving were calculated using the methods described in Section 6 of the Petition. The EZ is rounded up to 50 m and the SZ is rounded up to 100 m.
3) The distances to the thresholds for the sub-bottom profiler were calculated using the methods described in Section 6 of the Petition. The EZ is rounded up to 50 m and the SZ is 3,000 m.
4) The distances to the Level A thresholds for the pipe driving were calculated using methods described in Section 6 of the Petition and the distance to the Level B is based on Illingworth & Rodkin (2014) measurements of 55 m to the 190 dB zone and 1,600 m to the 160 dB zone. The EZ is 55 m and the SZ is 1,600 m.
5) The distances to the Level A thresholds for the VSP are based on Illingworth & Rodkin (2014) m measurements of 120 m to the 190 dB threshold and 2.47 km to the 160 dB threshold. The EZ is 120 m and the SZ is rounded up to 2.5 km.
6) The distances to the Level A thresholds for the water jet were calculated using methods described in Section 6 of the Petition and the distance to the Level B is based on Austin (2017) measurements of 860 m to the 120 dB zone. The EZ is rounded up to 15 m and the SZ is rounded up 50 m.

Table 4. Radii of exclusion zone and safety zone for Hilcorp Alaska and Harvest Alaska activities.

Activity	Exclusion Zone Radius	Safety Zone Radius
2D/3D seismic survey	50 m	7,300 m
Vibratory sheet pile driving	50 m	100 m
Sub-bottom profiler	50 m	3,000 m
Pipe driving	120 m	1,600 m
Vibratory sheet pile driving	50 m	100 m
Water jet	15 m	50 m

3.1.3 Sound Source Verification Survey

When site-specific measurements are not available for noise sources of concern for acoustic exposure, USFWS often requires a sound source verification (SSV) to characterize the sound levels, propagation, and to verify the monitoring zones (EZ and SZ). Hilcorp Alaska plans to perform an SSV for the 3D seismic survey in lower Cook Inlet. Hilcorp Alaska will work with USFWS to determine if an SSV is needed for other activities occurring in the Petition region.

3.1.4 Aircraft Mitigation Measures

To minimize the possibility of adverse effects from aircraft noise on marine mammals, Hilcorp Alaska will ensure that helicopters used to transport equipment and personnel will maintain an altitude of 304 m (1,000 ft) as practicable when transiting over Cook Inlet waters. Practicability is determined by the pilot in command. Conditions that would make it impracticable to maintain this altitude may include: adverse weather conditions, safety considerations, and reduced flight time (e.g., very short platform to platform flights do not have the time to reach 1,000 ft).

3.1.5 Seismic and Geohazard Survey Mitigation Measures

For the 2D survey, PSOs will be stationed on the source vessel during all seismic operations and geohazard surveys when the sub-bottom profilers are used. Because of the proximity to land, PSOs may also be stationed on land to augment the viewing area. For the 3D survey, PSOs will be stationed on at least two of the project vessels, the source vessel and the chase vessel. For the VSP, PSOs will be stationed on the drilling rig. For geohazard surveys, PSOs will be stationed on the survey vessel. The viewing area may be augmented by placing PSOs on a vessel specifically for mitigation purposes or using UAS. PSOs will implement the following mitigation measures.

3.1.5.1 Clearing the Exclusion Zone

Prior to the start of daily seismic, geohazard surveys, or when activities have been stopped for longer than a 30 minute period, the PSOs will clear the EZ for a period of 30 minutes. Clearing the EZ means no marine mammals have been observed within the EZ for that 30 minute period. If any marine mammals have been observed within the EZ, ramp up cannot start until the marine mammal has left the EZ or has not been observed for a 30-minute period.

3.1.5.2 Shut Down Procedure

A shut down occurs when all airgun or sub-bottom profilers activity is suspended. The operating airguns or profiler will be shut down completely if a marine mammal approaches the EZ. The shut down procedure will be accomplished within several seconds (of a "one shot" period) of the determination that a marine mammal is either in or about to enter the EZ.

Following a shut down, airgun or sub-bottom profiler activity will not resume until the marine mammal has cleared the EZ. The animal will be considered to have cleared the EZ if it:

- Is visually observed to have left the EZ, or
- Has not been seen within the EZ for 15 min in the case of pinnipeds, sea otters, and harbor porpoise, or
- Has not been seen within the EZ for 30 min in the case of cetaceans.

3.1.5.3 Ramp Up and Power Up Procedures

A "ramp up" procedure gradually increases airgun volume at a specified rate. Ramp up is used at the start of airgun operations, including after a power down, shut down, and after any period greater than 10 minutes in duration without airgun operations. USFWS normally requires that the rate of ramp up be no more than 6 dB per 5-minute period. Ramp up will begin with the smallest gun in the array that is being used for all airgun array configurations. During the ramp up, the EZ for the full airgun array will be maintained.

The following information has been included from NMFS' Biological Opinion to Lease Sale 244. Figure 5 shows a flow diagram indicating some seismic exploration mitigation measures under various scenarios described in mitigation measures 2c-2j in the NMFS Biological Opinion to Lease Sale 244.

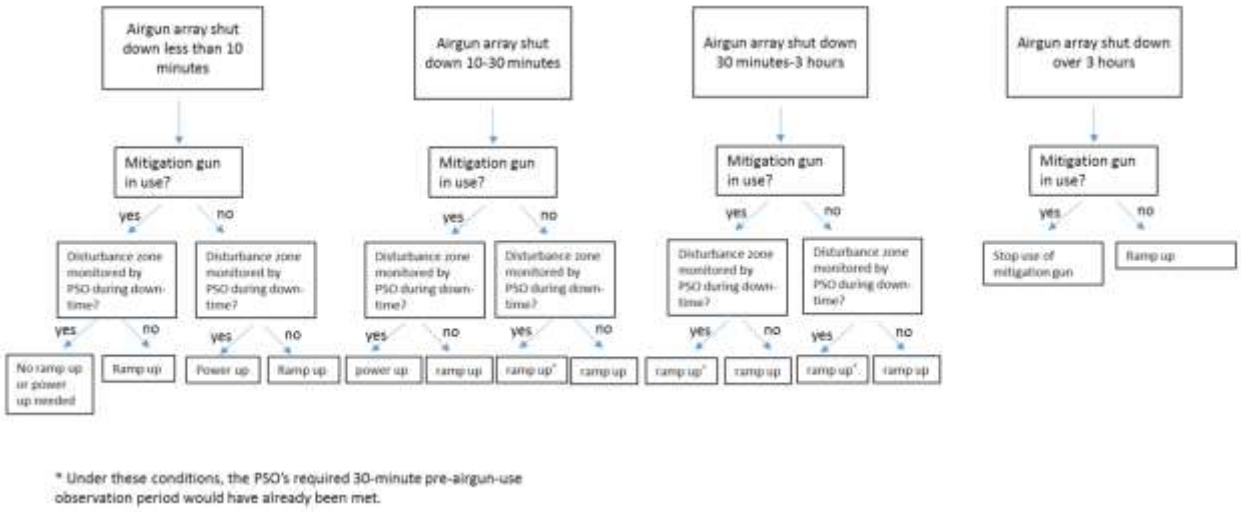

Figure 5. A flow diagram of suggested mitigation gun procedures in the NMFS Biological Opinion to Lease Sale 244.

3.1.5.4 Speed or Course Alteration

If a marine mammal is detected outside the EZ and, based on its position and relative motion, is likely to enter the EZ, the vessel's speed and/or direct course may, when practical and safe, be changed. This technique also minimizes the effect on the seismic program. This technique can be used in coordination with a power down procedure. The marine mammal activities and movements relative to the seismic and support vessels will be closely monitored to ensure that the marine mammal does not approach within the EZ. If the mammal appears likely to enter the EZ, further mitigative actions will be taken, i.e., either further course alterations, power down, or shut down of the airguns.

3.1.6 Pipe and Sheet Pile Driving Mitigation Measures

Soon after the drill rig is positioned on the well head, the conductor pipe will be driven as the first stage of the drilling operation. Two PSOs (one operating at a time) will be stationed aboard the rig during this two to three day operation monitoring an EZ of 1.6-km (1-mi). The impact hammer operator will be notified to shutdown hammering operations at the approach of a marine mammal to the EZ. A ramp up of the hammering will begin at the start of each hammering session. The ramp-up procedure involves initially starting with three soft strikes, 30 seconds apart. This delayed-strike start alerts marine mammals of the pending hammering activity and provides them time to vacate the area. Monitoring will occur during all hammering sessions.

A dock face will be constructed on the rock causeway in Iniskin Bay. Two PSOs will be stationed either on a vessel or land during the 14-21 day operation to monitor the SZ and EZ. PSOs will implement similar monitoring and mitigation strategies as the pipe installation.

For impact hammering, "soft-start" technique shall be used at the beginning of each day's pipe/pile driving activities or if pipe/pile driving has ceased for more than one hour to allow any marine mammal that may be in the immediate area to leave before pile driving reaches full energy.

- The EZ will be cleared 30 minutes prior to a soft-start to ensure no marine mammals are within or entering the EZ.

- Begin impact hammering soft-start with an initial set of three strikes from the impact hammer at 40% energy, followed by a one minute waiting period, then two subsequent 3-strike sets.
- Immediately shut down all hammers at any time a marine mammal is detected entering or within the EZ. Hammering operations will not begin until the EZ has been visually inspected for at least 30 minutes to ensure the absence of marine mammals.
- Initial hammering starts will not begin during periods of poor visibility (e.g., night, fog, wind).
- Any shut-down due to a marine mammal sighting within the EZ must be followed by a 30-minute all-clear period and then a standard, full ramp-up.
- Any shut-down for other reasons resulting in the cessation of the sound source for a period greater than 30 minutes, must also be followed by full ramp-up procedures

3.1.7 Water Jet Measures

A PSO will be present on the dive support vessel when divers are using the water jet. Prior to in-water use of the water jet, an EZ of 50 m around the DSV will be established. The water jet will be shut down if marine mammals are observed within the EZ.

3.1.8 Tugs Towing Rig Measures

Two PSOs will be stationed on one of the tugs when the drilling rig is being towed to the site. The tugs are not able to shut down operations.

3.2 MONITORING

3.2.1 Protected Species Observers

The Applicant will implement a robust monitoring and mitigation program for marine mammals using USFWS-approved PSOs for Petition activities. Much of the activities will use vessel-based PSOs, but land-based or platform-based PSOs may also be used to augment project-specific activities. Marine mammal monitoring and mitigation methods have been designed to meet the requirements and objectives which will be specified in the ITRs promulgated by USFWS. The Applicant recognizes some details of the monitoring and mitigation program may change upon receipt of the individual LOAs issued by USFWS each year.

The main purposes of PSOs are: to conduct visual watches for marine mammals; to serve as the basis for implementation of mitigation measures; to document numbers of marine mammals present; to record any reactions of marine mammals to Petition activities; and, to identify whether there was any possible effect on accessibility of marine mammals to subsistence hunters in Cook Inlet. These observations will provide the real-time data needed to implement some of the key measures.

The specific objectives of the monitoring and mitigation program provide:

- the basis for real-time mitigation, as required by the various permits;
- the information needed to estimate the number of "takes" of marine mammals by harassment, which must be reported to USFWS;
- data on the occurrence, distribution, and activities of marine mammals in the areas where the Petition activity was conducted; and,
- information to compare the distances, distributions, behaviors, and movements of marine mammals relative to the Petition activities

PSOs will be on watch during all daylight periods for project-specific activities. The observer(s) will watch for marine mammals from the best available vantage point on the vessel or station. Ideally this vantage

point is an elevated stable platform from which the PSO has an unobstructed 360° view of the water. The PSOs will scan systematically with the naked eye and with binoculars. When a mammal sighting is made, the following information about the sighting will be carefully and accurately recorded:

- Species, group size, age/size/sex categories (if determinable), behavior when first sighted and after initial sighting, heading (if consistent), bearing and distance from the PSO, apparent reaction to activities (e.g., none, avoidance, approach, paralleling, etc.), closest point of approach, and behavioral pace.
- Time, location, speed, activity of the vessel, sea state, ice cover, visibility, and sun glare.
- The positions of other vessel(s) in the vicinity of the PSO location.
- The vessel's position, speed, water depth, sea state, ice cover, visibility, and sun glare will also be recorded at the start and end of each observation watch, every 30 minutes during a watch, and whenever there is a change in any of those variables.

An electronic database or paper form will be used to record and collate data obtained from visual observations. The PSOs will enter the data into the data entry program installed on field laptops. The program automates the data entry process, reduces data entry errors, and maximizes PSO time spent looking at the water.

4.0 REPORTING

The results of PSO monitoring, including estimates of exposure to key sound levels, will be presented in weekly, monthly, and 90-day reports. Reporting will address the requirements established by USFWS in the LOAs. The technical report(s) will include the list below.

- Summaries of monitoring effort: total hours, total distances, and distribution of marine mammals throughout the study period compared to sea state, and other factors affecting visibility and detectability of marine mammals;
- Analyses of the effects of various factors influencing detectability of marine mammals: sea state, number of observers, and fog/glare;
- Species composition, occurrence, and distribution of marine mammal sightings including date, water depth, numbers, age/size/gender categories (when discernable), group sizes, and ice cover;
- Analyses of the effects of seismic program:
    - Sighting rates of marine mammals during periods with and without project activities (and other variables that could affect detectability),
    - Initial sighting distances versus project activity,
    - Closest point of approach versus project activity,
    - Observed behaviors and types of movements versus project activity,
    - Numbers of sightings/individuals seen versus project activity,
    - Distribution around the vessels versus project activity,
    - Summary of implemented mitigation measures, and
    - Estimates of "take by harassment".

Injured, dead, or distressed seas otters that are not associated with project activities (e.g., animals known to be from outside of the project area, previously wounded animals, or carcasses with moderate to advanced decomposition or scavenger damage) will be reported to USFWS within 48 hrs of the discovery. Photographs, video, location information, or any other available information will be provided to USFWS.