bp

BP Exploration (Alaska) Inc.
P. O. Box 196612
900 E. Benson Boulevard
Anchorage, AK 99519-6612
USA

December 18, 2013

Dr. Bill Ingersoll
Chief, Plans Section
Bureau of Ocean Energy Management
Alaska OCS Region
3801 Centerpoint Drive , Suite #500
Anchorage, Alaska 99503-5823

Request for Approval for Ancillary Activities
2014 Winter Geotechnical and Seabottom Investigation
Liberty Development
Beaufort Sea, Alaska

Dear Dr. Ingersoll:

BP Exploration (Alaska) Inc. (BPXA) requests approval to conduct a 2014 Winter Geotechnical and Seabottom Investigation in support of the Liberty Development. The purpose of the investigation is to provide soils information for possible material sites, future pad locations, for evaluating proposed pipeline routing, and to provide a visual inspection of the seabottom environment.

In support of this request, the following is attached:

- Project Description
- Figure
- United States Fish and Wildlife Service Letter of Authorization
- Project Spill Response Plan
- Off-Shore Cultural Resources Review by Northern Land Use Research Alaska

BPXA has approval or is currently seeking approval from the following agencies:

- Alaska Department of Natural Resources, Division of Mining, Land and Water
- Alaska Department of Natural Resources, Office of History and Archaeology
- US Army Corps of Engineers
- US Fish and Wildlife Service
- US Environmental Protection Agency
- North Slope Borough Planning and Community Services
- North Slope Borough Inupiat History, Language and Culture Division

If you have any questions or need additional information regarding this project, please contact me at (907) 564-5328 or via email at Pauline.Ruddy@bp.com.

Sincerely,

Pauline Ruddy, Land Use Permitting and Compliance Advisor
BPXA HSE-Alaska

2014 Winter Geotechnical Investigation
Project Description / Plan of Operations
Liberty Development

Introduction

BP Exploration (Alaska) Inc. (BPXA) proposes to conduct a geotechnical investigation in support of the Liberty development. The project scope includes two areas of investigation: on shore and off shore, extending into state and federal waters of the Beaufort Sea.

Purpose

The purpose of the on shore geotechnical investigation is to:

- Investigate potential material sites for adequate quality and quantity of granular material

The purpose of the offshore geotechnical investigation is to:

- Provide soils information for the possible future offshore pad locations
- Provide soils information for evaluating proposed pipeline routing
- Possible visual inspection of the seabottom environment

Scope of Work

On Shore Route Reconnaissance and Geotechnical Investigation

The on shore geotechnical investigation will utilize existing ice roads, to the most practicable extent. If the project area is beyond the ice road, or the ice road is not available for use, reconnaissance of a tundra ravel route will be performed. The selected route may require crossing three main water bodies: the Seven Mile Slough, Sagavanirktok River (Sag), and the Kadleroshilik River (Kad) (see Figures). The ice conditions and water depths at each of the three crossings will be examined prior to mobilization of geotechnical project equipment. Work will commence once tundra travel has been officially opened by the Alaska Department of Natural Resources, Division of Mining, Land and Water. The on shore route reconnaissance will take approximately three days. The proposed path of travel will only utilize crossings that meet the required ice thickness as described below. Ice thickening is not anticipated.

On shore route reconnaissance and route selection:

- Approximately two, tundra travel approved vehicles, RD85 Rolligons (RD85) or Snowcat Tuckers (Tuckers) will be utilized for route assessment.
- Ice thickness of the three main water bodies will be assessed by using a thermal probe mounted to one of the vehicles. The probe will use hot water to melt a 1 inch diameter hole through the ice to the mudline. A weighted cloth tape will be lowered through the hole to determine ice thickness.
- Depending on ice conditions, a total of 48 to 60 inches of ice is required for project equipment travel across water bodies.
- If the ice thickness does not meet minimum requirements, the route will be moved slightly to find areas that do meet ice thickness requirements.
- Equipment may be re-fueled within the Sag River Delta area.

On shore geotechnical investigation scope of work includes:

- A smooth track Tucker equipped with thermal probe will be used to monitor river ice conditions for safety, transport soil samples, and serve as a personnel carrier when needed.
- A geotechnical drill rig specifically configured for shallow soils exploration will be used for this project. The drill will be mounted in an enclosed and lighted rubber tracked trailer so the drill and work area are protected from the weather and elevated off the ground by about 6 feet. A roller-driven RD85will pull the enclosed trailer. A second RD85 will support the drill operation, assist with drill moves, and provide fuel. A generator and all support tools will be carried on the trailer or accompanying RD85.
- The borehole diameter will be approximately 8 to 10 inches.
- Soil cuttings from the boreholes will be used to backfill the holes.
- Closed PVC pipe will be placed in some boreholes as part of the sampling procedure and may be left in place when the borings are backfilled.
- After ground disturbance from drilling has stabilized (approximately 20 to 30 days), final ground temperature will be recorded and the PVC cut at ground surface. A Tucker will be used to access the sites for ground temperature measurements.
- A GPS track log will be recorded for all tundra travel.
- Up to 50 boreholes will be drilled throughout the project areas to identify the optimum material site. An additional 20 to 30 boreholes will be drilled at the optimal material site to verify the material source. The locations are based on the terrain, geology, geometry, and are generally spaced approximately 500 to 1,000 feet apart.

Off Shore Route Selection and Geotechnical Investigation

The off shore geotechnical investigation will also require reconnaissance by a field crew to determine the best route for travel based on sufficient ice thickness and wildlife considerations. The ice conditions will be examined and thickened (as needed) prior to mobilization of geotechnical project equipment. The off shore travel route activities are scheduled to begin in March 2014.

Off shore route selection and preparation includes:

- A local native Alaskan Protected Species Observer (PSO) will assist the field crew by traveling the proposed pipeline route and island locations to select the appropriate travel routes based on snow and ice conditions. The route will be cleared using forward looking infrared radar (FLIR) for possible Polar Bear denning prior to activities.
- The crew will utilize two all-terrain vehicles for transport: a Tucker and / or RD85. Both vehicles will work concurrently and within close proximity of each other and one vehicle will include a trained bear guard.
- Ice thickness will be assessed by using a thermal probe mounted to one of the vehicles. The probe will use hot water to melt a 1 inch diameter hole through the ice to the mudline. A weighted cloth tape will be lowered through the hole to determine ice thickness.

- Although it is not anticipated, if ice is of insufficient thickness for personnel and equipment, the crew will utilize a Tucker (or similar vehicle used for conventional ice road construction) equipped with auger and pumper to make holes to pump water to the surface to thicken the ice as necessary. Natural seawater may be used to thicken and / or ground the ice for the offshore work.

Off shore geotechnical investigation includes:

- A geotechnical drill rig specifically configured for shallow soils exploration will be used for this project. The drill will be mounted in an enclosed and lighted rubber tracked trailer, so that the drill and work area are protected from the weather and elevated off the sea ice by about 6 feet. A RD-85 will pull the enclosed trailer within the project area. A second RD85 will support the drill operation, assist with drill moves, and provide fuel. A generator and all support tools will be carried on the trailer or accompanying RD85.
- The second RD85will be equipped with two 500 gallon fuel tanks to re-supply drilling equipment working on the sea ice. Fuel transfers occur within the drilling enclosure. No refueling will be conducted directly on the sea ice.
- The field team will drill approximately 40 geotechnical boreholes from the sea ice to depths of approximately 100 feet below the ground seafloor to explore the subsurface conditions.
- Up to 20 geotechnical boreholes are planned to be drilled in federal waters. The project area includes approximately 8 square miles within federal waters.
- The borehole diameter is approximately 8 to 10 inches
- Only sea water will be used for circulation during drilling or casing activities. Drilling fluids or additives will not be used for the geotechnical program.
- When drilling through floating ice, auger cuttings typically do not return to the ice surface. In near-shore areas where the sea is bottom fast or near bottom fast, some cuttings may come to the ice surface. This material, generally less than 1 cubic yard, will be removed from the ice surface and placed in 55 gallon drums or equivalent, and disposed of properly.
- Closed PVC pipe (casing) may be placed in some boreholes and left in place when the borings are backfilled. Temporary equipment placed in the PVC pipe will be used to measure the ground temperature profile. After ground disturbance from drilling has stabilized, about 20 to 30 days, final ground temperature will be recorded and the PVC and temporary equipment will be cut at mudline. The Tucker will be used to access the sites for ground temperature measurements. If soil conditions are suitable, a cone penetrometer test (CPT) will be used in addition to standard sampling methods. The cone will be advanced from mudline to the appropriate depth (less than 50 feet) using an approximately 10 inch diameter auger. The cone system records tip resistance, sleeve friction, dynamic pore pressure, temperature, cone inclination, and is helpful to further characterize the soil properties. The CPT holes are separate from the geotechnical soil borings, however they are placed within close proximity of the soil borings. Less than 50 CPT's will be performed, and no CPTs are planned in federal waters.

Possible Seabottom Investigation

A visual inspection of the seabottom is proposed using a downhole camera or a remotely operated vehicle (ROV). The ROV will be tethered to the controlling unit at the surface capable of capturing video images of the seafloor.

- The field team will utilize a conventional pumper unit and a Tucker vehicle to accomplish the work. The access routes and work areas will be the same as the geotechnical boring program.
- Holes of sufficient size to allow entry of the ROV (approximately 12 inches at largest point) will be drilled into the ice by the auger-equipped pumper. The ROV will be lowered into the ice hole (approximately 18 inches in diameter) and will search the seafloor to define its local characteristics (e.g. featureless or rock cover with observed concentrations of biota/kelp cover).
- Approximately 40 locations will be drilled, however the total number of sites examined by ROV or camera will be dependent upon weather and sea ice conditions.

Monitoring and Mitigation

Sound Considerations

If conditions allow, underwater sounds associated with boring through ice and collecting sediment cores may be characterized. A cabled submersible hydrophone attached to a recorder on the surface or a submersible hydrophone and recorder will be lowered through the ice into the water at distances from 10 meters to 100 meters from the boring operation. Locations will be selected along the project's transit corridor to avoid unnecessary disturbance of the surrounding sea ice. Broadband sounds may be recorded.

Ice Pack Monitoring

Horizontal ice pack movement of the land fast ice formation in Foggy Island Bay was noted during the 2013 Liberty geotechnical program and this year's program will characterize the extent of surficial movement of the ice pack.

Two to four remote sensors will be installed in the ice pack within the project area. The sensors are fully self-contained in a protective case which is mounted to a steel pole installed in the ice pack. Battery packs power the satellite uplink GPS system and track the sensor's location (longitude, latitude, and vertical) to within 0.5 foot accuracy. The data will be periodically downloaded and processed. Sensors and poles will be removed at the end of the winter season.

Wildlife Considerations

BPXA has consulted with the National Marine Fisheries Service (NMFS) regarding mitigation and methods for avoiding seal lairs. The areas are small enough that a seal encounter is expected to be improbable based on seal structure densities multiplied by the area of the footprint and a buffer zone). The route of travel will be minimized to further reduce likelihood of seal lair encounters. The PSO will be utilized during the initial site reconnaissance to identify

and where possible avoid areas of snow accumulation that could support resting liars and birth liars.

The project will be covered under a Letter of Authorization (LOA) from the U.S. Fish and Wildlife Service for conducting activities in Polar Bear habitat and appropriate mitigation efforts will be taken to avoid seal liars and breathing holes. The BPXA Polar Bear and Wildlife Interaction Plans will be followed. Travel will be conducted to locations at depths greater than the six foot bathymetry (areas near shore may be four feet deep or less).

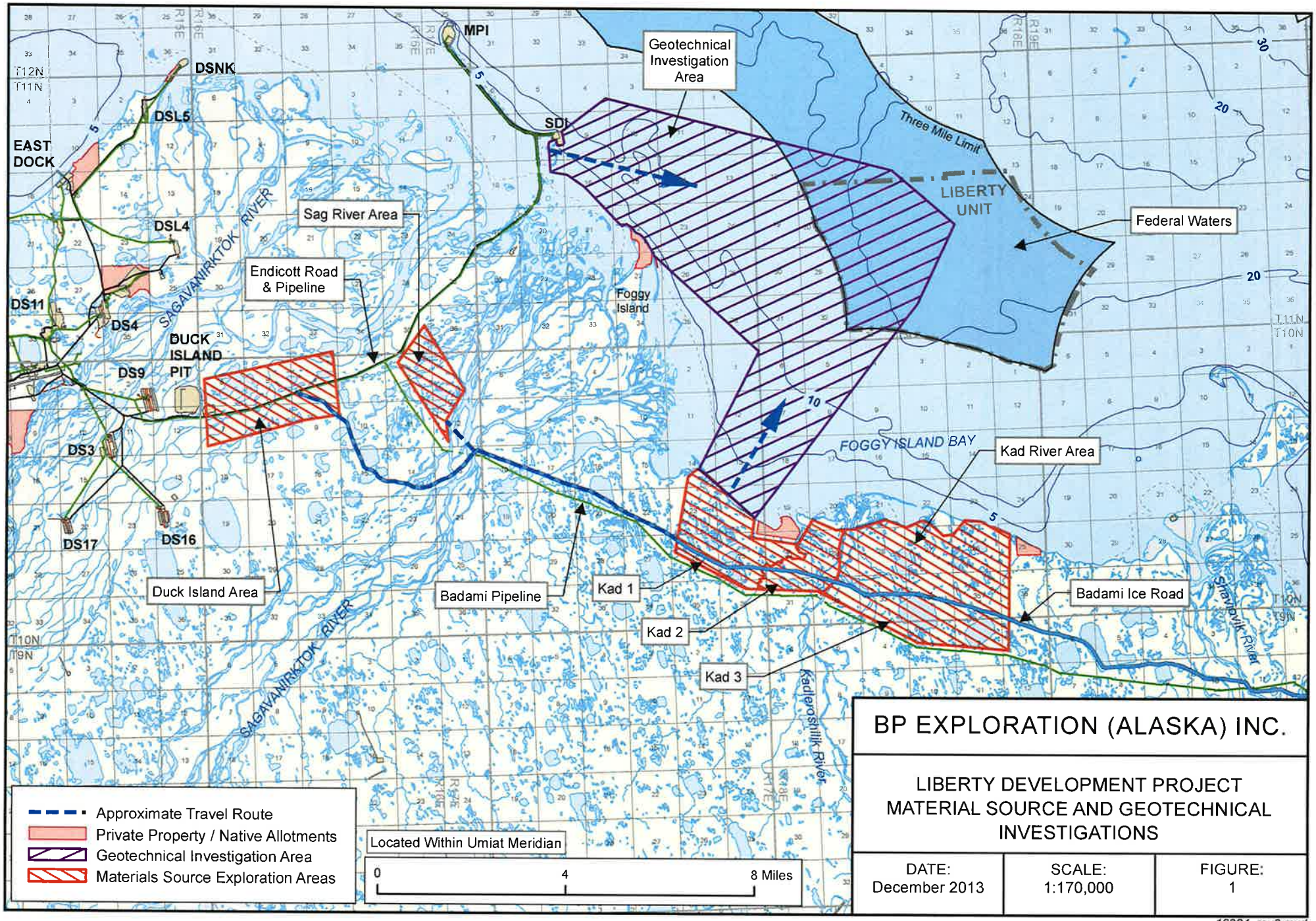
All travel routes and areas of geotechnical investigation will be surveyed with FLIR for possible Polar Bear presence prior to activities.

Archeological Considerations

Northern Land Use Research Alaska (NLURA) has researched the existing archeological clearances and through determined the on shore and off shore investigation areas are within cleared areas.

Schedule

The on shore and offshore programs are scheduled to begin in March 2014, and conclude by early May 2014. The timing of the on shore and off shore work will be determined based on ice and weather conditions.



BP EXPLORATION (ALASKA) INC.

LIBERTY DEVELOPMENT PROJECT
MATERIAL SOURCE AND GEOTECHNICAL INVESTIGATIONS

DATE:	SCALE:	FIGURE:
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United States Department of the Interior

FISH AND WILDLIFE SERVICE
1011 E. Tudor Road
Anchorage, Alaska 99503-6199

IN REPLY REFER TO:

AFES/MMM

JUL 03 2013

Ms. Christina May
Wildlife Compliance Advisor
BP Exploration (Alaska) Inc.
900 East Benson Boulevard
P.O. Box 196612
Anchorage, Alaska 99519-6612

Dear Ms. May:

We have reviewed your request dated June 10, 2013, seeking Letters of Authorizations (LOAs) for the incidental and intentional take of polar bears and Pacific walruses during activities associated with the BP Exploration (Alaska) Inc. (BPXA) 2013-2014 Liberty Development Project in Foggy Island Bay, Alaska.

In response to your request, enclosed is an LOA (13-12) that authorizes BPXA to take small numbers of polar bears and Pacific walruses incidental to oil and gas industry activities associated with this project at the locations identified in your LOA request. We have also determined that the proposed activities will not need an additional authorization for intentional take of polar bears and Pacific walruses, beyond those authorized on January 15, 2013, under our LOA for intentional Take (13-INT-02). Please refer to that LOA for your authorities to haze polar bears if required.

Major elements of the proposed project include:

- Offshore Winter Geotechnical Investigation, boreholes and trenching;
- Onshore Winter Geotechnical Investigation;
- Offshore Strudel Scour Surveys;
- Geophysical reconnaissance and bathymetry on pipeline routing;
- Shallow Hazard Survey;
- Wetland Characterization;
- Archeology Clearance;
- Potential Avian, Marine Mammal and Fisheries Surveys.

BPXA's *Polar Bear and Walrus Interaction Plan for BPXA Areas of Operation Document Number: UPS-US-AK-ALL-ALL-HSE-DOC-00495-2,* Revision Date:. September 11, 2012, contains appropriate safeguards to limit human/bear interactions and is incorporated by reference. Full implementation of this plan is expected. If questions or concerns arise regarding polar bears during the project period, U.S. Fish and Wildlife Service (Service), Marine Mammals

TAKE PRIDE IN AMERICA

Management Office (MMM) biologists are available for consultation at the phone numbers listed below and noted in your Interaction Plan.

BPXA camps and personnel can limit encounters with polar bears by being observant of approaching animals (i.e., the use of polar bear guards or monitors) and breaking off interactions, if practicable, by allowing the animals to continue their travel. If a polar bear interaction escalates into a life threatening situation, section 101(c) of the Marine Mammal Protection Act allows, without specific authorization, the take (including lethal take) of a polar bear if such taking is imminently necessary for self-defense or to save the life of a person in immediate danger, and such taking is reported to the Service, MMM within 24 hours.

Further, the Service has completed intra-Service consultation under the Endangered Species Act of 1973, as amended (ESA), on the issuance of this LOA and has determined that the issuance this LOA is not likely to jeopardize the continuing existence of polar bears and Pacific walruses. No additional authorization under the ESA is required.

If any changes develop in your projects during the 2013 or 2014 seasons, such as activities or location, please notify the Service, MMM prior to the planned operation. This will allow us to evaluate the activity and, if appropriate, amend your LOA. This authorization is issued in accordance with MMPA Incidental Take Regulations published in the *Federal Register* (76 FR 47010), dated August 3, 2011. Please review these regulations.

If you should have any further questions, please contact Mr. Craig Perham, at (907) 786-3810, or Mr. Christopher Putnam, at (907) 786-3844, of our Marine Mammals Management Office.

Sincerely,

Acting Chief, Marine Mammals Management

Enclosure

cc: Mr. Richard Shideler, Alaska Department of Fish and Game (email)
U.S. Fish and Wildlife Service, Fairbanks Fish and Wildlife Field Office
U.S. Fish and Wildlife Service, Office of Law Enforcement
North Slope Borough, Department of Law

IN REPLY REFER TO:

United States Department of the Interior

FISH AND WILDLIFE SERVICE
1011 E. Tudor Road
Anchorage, Alaska 99503-6199

AFES/MMM

U.S. Fish and Wildlife Service

LETTER OF AUTHORIZATION
(13-12)

ISSUED: July 3, 2013
EXPIRES: December 31, 2014

BP Exploration (Alaska), Inc. (BPXA) is hereby authorized to take small numbers of polar bears and Pacific walrus incidental to activities occurring during the 2013-2014 Liberty Development Project in Foggy Island Bay, Alaska. These activities are discussed in detail in the *Request for Letter of Authorization for the Incidental Take of Polar Bears and the Pacific Walrus;* and *Request to Take by Harassment (Deterrent Activities) while conducting activities at the Liberty Development Project (June 10, 2013).*

Major elements of the proposed project include:

- Offshore Winter Geotechnical Investigation, boreholes and trenching;
- Onshore Winter Geotechnical Investigation;
- Offshore Strudel Scour Surveys;
- Geophysical reconnaissance and bathymetry on pipeline routing;
- Shallow Hazard Survey;
- Wetland Characterization;
- Archeology Clearance;
- Potential Avian, Marine Mammal and Fisheries Surveys.

This Letter of Authorization (LOA) and the required conditions below apply to all BPXA employees, contractors and personnel performing BPXA-approved work under the scope of operations to be conducted. The LOA is subject to the following conditions:

1. The Polar Bear Interaction Plan (*Polar Bear and Walrus Interaction Plan for BPXA Areas of Operation Document Number: UPS-US-AK-ALL-ALL-HSE-DOC-00495-2*), Revision Date: September 11, 2012, is approved and all provisions must be complied with unless specifically noted otherwise in this LOA. A copy of this LOA and the approved interaction and avoidance plans listed above must be posted on site and available for all personnel engaging in the activities approved under the authority of this LOA.

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2. BPXA Operations Managers, or their designees, must be fully aware, understand, and be capable of implementing the conditions of this LOA.

3. Intentional take is prohibited under this LOA.

4. This authorization is valid only for those activities identified in the *Request for Letter of Authorization for the Incidental Take of Polar Bears and the Pacific Walrus;* and *Request to Take by Harassment (Deterrent Activities) while conducting activities at the Liberty Development Project,* dated June 10, 2013.

5. At the discretion of the U.S. Fish and Wildlife Service (Service), BPXA must allow the Service to place an observer on site, including any facilities, vessels, aircraft or vehicles, to monitor the impacts of the activity on marine mammals, when requested.

6. Polar bear monitoring, reporting, and survey activities will be conducted in accordance with 50 CFR 18.128. The basic monitoring and reporting requirements follow:

    - BPXA must cooperate with the Service, and other designated Federal, State, or local agencies to monitor the impacts of oil and gas exploration activities on polar bears.

    - BPXA must not conduct activities that operate nor pass within one mile (approximately 1600 meters) of known polar bear dens, and all observed dens must be reported to the Service, Marine Mammals Management Office (MMM) within 12 hours of discovery. Should occupied dens be identified within one mile of activities, BPXA will cease work within the immediate area and will contact the MMM for guidance. The MMM will evaluate these instances on a case-by-case basis to determine the appropriate action. Potential actions may range from cessation or modification of work to conducting additional monitoring, and BPXA must comply with any additional measures specified.

    - Polar bear den detection surveys will be required prior to any activities occurring in potential polar bear denning habitat.

    - BPXA will provide copies of the polar bear observation form to all BPXA contractors operating under the LOA.

    - BPXA must designate a qualified individual or individuals to report any polar bear sightings, or signs of polar bears, such as tracks, scat, or diggings, to the MMM by phone or by emailing the polar bear observation form within 24 hours of visual observation.

    - An annual report of all encounters and hazing events must be submitted to the Service, MMM by the end of the calendar year of the first year. A final report, as required under 50 CFR 18.128(f), of all encounters and hazing events during the

full duration of the project must be submitted to the Service, MMM within 90 days from the expiration date of this LOA.

This Letter of Authorization is valid for the period indicated on this authorization, unless extended or terminated in writing by the U.S. Fish and Wildlife Service, Marine Mammals Management Office.

Acting Chief, Marine Mammals Management

July 3, 2013
Date

Date: March 11, 2013
TO: BPXA Liberty Geotechnical Exploration
RE: **SPILL EMERGENCY RESPONSE PLAN**

Spill Prevention and Response

Fueling of the Tuckers or Rolligons will be conducted by certified fueler. The fueling operations will be conducted both on pad and on sea ice. Drip pans will be used and shovels and collection bags will be available to contain any small spills. Clean-up will include double bagging absorbent pads separately from snow. Bags should not be overloaded and easily picked up with one hand (i.e., less than 50 pounds) and double bagged. Bags shall be taken to Endicott Environmental or as directed.

All spills are reportable:

- **ALL spills must be immediately reported to Endicott security, 659-6800, Harmony hub 111.**
- **Security will contact Endicott Environmental who performs the applicable spill reporting to the NRC.**

Three systems will be available for emergency communication with and by Golder personnel when traveling off site:

- Primary system is the BPXA harmony radio. The ice safety crew will have a harmony as well as each Rolligon operator during geotechnical operations. In addition, the team lead will also have a harmony.
- Secondary system is the Cruz radio network during the ice reconnaissance and the Peak Network during the geotechnical operations. Peak radios are installed in the LATV or RD-85's and in the Sled. This allows for communication with Peak Base, which is operated on a 24-hour basis, and between the Sled and the Rolligons.
- Third system is local cellular phone service as a back-up communication system. The Tucker will have a 3-watt cell booster and the Rolligons will have 3-watt bag phones.

Golder Associates Inc.
2121 Abbott Road, Suite 100
Anchorage, AK 99507 USA
Tel: (907) 344-6001 Fax: (907) 344-6011 www.golder.com

Golder Associates: Operations in Africa, Asia, Australasia, Europe, North America and South America

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Fire Response

The Rolligons and Tuckers are equipped with Ansul style fire extinguishers. BPXA Security and the AA will be notified immediately.

Injury Response

First aid equipment and eye wash station is provided in the Drill Sled. The drillers, helpers, and all Golder personnel have current first aid and CPR training. If a serious injury occurs that requires helicopter evacuation, BPXA Endicott Security will be notified and they will call for help to transport the injured to the nearest emergency aid station. The AA will be immediately notified of any spill, injury, or fire event.

Oil Spill Response

The fueling operations will be in accordance with best management practices, BPXA fuel transfer procedures and the Golder fueling plan. During fueling operations, drip pans will be used and absorbent pads, shovels and collection bags will be available to contain any small spills. The Rolligon or Tucker will be refueled at a location pre-approved by the Area Authority. Peak (Deadhorse), BPXA Endicott Security, and the AA will be notified immediately of any fuel spills.

Each pickup truck is equipped with a spill kit and shovel. Each Rolligon and Tucker also have spill response kits that includes portable duck ponds, large quantity of absorbent pads, collection bags, shovels to respond to small spills. Oily waste bags will be filled and light enough to be picked up by one hand. The bags will be double bagged, properly sealed and labeled.

ACS is the primary spill response contractor and Cruz has an ice road crew working at Badami who can provide an immediate spill response crew including a Tucker, Steiger with trailer, light plants, Tioga Heater, large spill kits, and an 8-man crew.

For immediate spill response needs:

- **Alaska Clean Seas (ACS): 659-2405**
- **Cruz Construction: 659-2021**

NORTHERN LAND USE RESEARCH ALASKA, LLC
Specialists in Cultural Resource Management
4101 Arctic Boulevard, Suite 206, Anchorage, Alaska 99503
Phone: (907) 345-2457 Fax: (907) 563-2085 Email: nlur@northernlanduse.com

December 4, 2013

Michael Tilleman
BP Exploration (Alaska) Inc.
900 East Benson Blvd.
Anchorage, Alaska 99508

RE: Cultural Resources Review, Liberty 2014 Geotechnical Exploration

BP Exploration (Alaska), Inc. (BPXA) proposes to conduct geotechnical exploration in the Foggy Island Bay area of the Alaskan Beaufort Sea during the winter season of 2014. The approximately 60 mi² project area is in state and federal waters, and on state lands (Figure 1). The offshore area lies mainly within the Liberty Unit and also includes portions of the Duck Island Unit as well as non-unit areas. The onshore area is located at the mouth and on the west bank of the Kadleroshilik River. In the offshore area, field teams will drill approximately 40 geotechnical boreholes from sea ice to depths of approximately 100 feet below the seafloor to explore subsurface conditions. Onshore, field teams will drill approximately 50 boreholes at the optimal material site to verify the material source. Borehole locations will be based on terrain, geology, geometry, and generally will be spaced approximately 500 to 1,000 feet apart.

Northern Land Use Research Alaska, LLC (NLURA) archaeologists have undertaken a review of previous reports, surveys, and consultation documents to assess potential impacts to cultural resources within the project area. This memorandum provides a summary of the assessed materials, and recommendations for the proposed project.

Offshore investigation area:

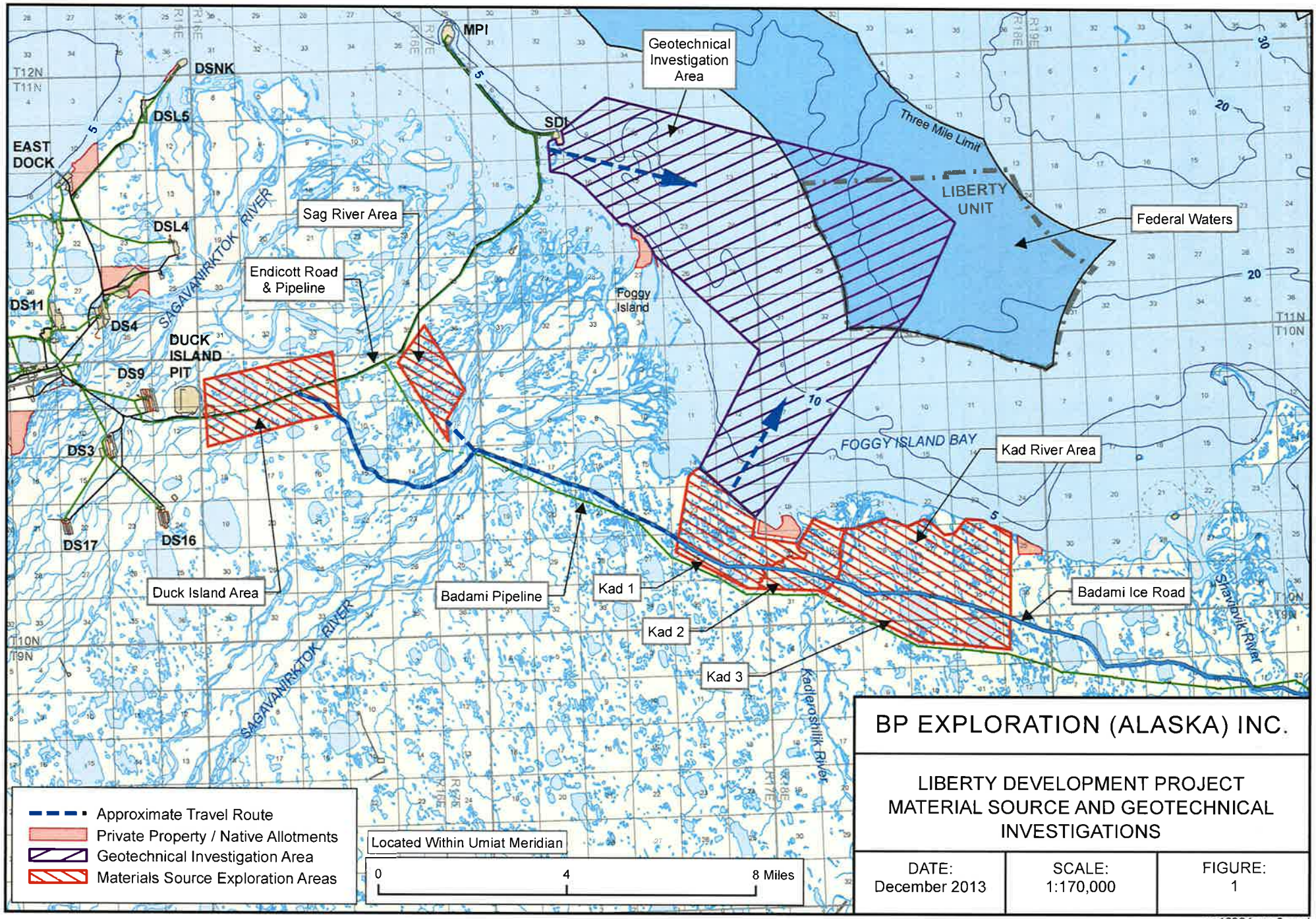
The principal resource containing information on potential and specific submerged shipwreck sites in the region is the US Department of the Interior, Bureau of Ocean Energy Management (BOEM) Alaska Shipwreck Database (BOEM 2013). The BOEM database contains no records for shipwrecks with locational information within the project area. The nearest wreck site recorded in the shipwreck database is that of the whaler *Reindeer*, which ran aground in 1894 in the vicinity of Reindeer Island, about 14 miles northwest of the project area. There are no recorded shipwrecks in Foggy Island Bay, and no potential shipwreck materials have been noted in remote-sensing surveys of the area.

Several remote-sensing and geotechnical drilling investigations have specifically targeted Foggy Island Bay and the Liberty project area (summarized in Rogers 2013). These data have been used to ascertain the potential for buried or relict terrestrial landforms in the vicinity, as well as submerged historic resources such as shipwrecks or aircraft.

Marmaduke and Watson (1999) identified a number of buried and near-surface distributary channels and channel fragments, identified as remnants of the Sagavanirktok delta front complex from a lower sea level stand. However, the MMS (cited in Darigo et al. 2007) suggested that smaller channel fragments could be buried strudel-scour depressions. Subbottom profiles also show a depression-like feature, lying adjacent to a possible buried island or other geomorphic high point. The authors interpret this as a "narrow terrace or floodplain", which was an active drainage before ca. 10,000 BP (Marmaduke and Watson 1999). Marmaduke and Watson (1999) concluded that: "The eastern margin channel is the only readily identifiable terrestrial feature in the near surface sediments in the Liberty Project survey area. None of the sediments associated with the channel indicate preservation of landforms likely to contain archaeological remains of terrestrial origin."

Reanier (2008), on the basis of previous remote-sensing data as well as the Minerals Management Service's database of known Alaskan shipwrecks, concluded that "…there are no presently known cultural resources on the sea floor in the Liberty Development Project area" and that the potential for buried terrestrial landforms was "highly unlikely".

Remote-sensing data and geotechnical cores from the Liberty project area acquired in the summer of 2013 were also analyzed for potential cultural resources (Rogers 2013). No cultural resources, of either historic or prehistoric origin, were identified in any of the materials recovered for analysis or in remote-sensing data.



BP EXPLORATION (ALASKA) INC.

LIBERTY DEVELOPMENT PROJECT
MATERIAL SOURCE AND GEOTECHNICAL INVESTIGATIONS

DATE:	SCALE:	FIGURE:
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On-shore investigation area:

Numerous archaeological surveys have been undertaken in the vicinity of the BP Liberty potential material source area since the 1970s (i.e., Campbell 1974; Lobdell 1980, 1987, 1998a, 1998b; and Reanier 2004, 2008), resulting in the identification of numerous cultural resources. Sites in the vicinity of the project area are presented in Table 1. The material source area itself was extensively surveyed in late summer of 2013 (Higgs 2013). Known cultural resource sites in the area were relocated, and no new sites were identified. All known sites are shown in Figure 2. The report recommended the establishment of a 250-foot buffer zone around the single previously known cultural resource site within the project APE (pingo site XBP-00081).

Table 1. AHRS sites in the vicinity of 2014 Liberty on-shore geotechnical investigations.

AHRS#	Site Name and/or Description	NRHP Status	Site in Relation to APE*
XBP-00023	Foggy Island Bay House Ruin	No Determination	Outside APE
XBP-00024	Foggy Island Bay #2 (two sod house ruins, and grave)	No Determination	Outside APE
XBP-00025	Kadleroshilik River (sod house ruin)	No Determination	Outside APE
XBP-00026	Foggy Island Bay #3 (*Ekoolook Inaat*, sod house ruin)	No Determination	Outside APE
XBP-00060	Foggy Island Bay Burial	No Determination	Outside APE
XBP-00062	Foggy Island Bay House Ruin 2	No Determination	Outside APE
XBP-00081	Sako (survey monument and prehistoric site)	No Determination	Within APE
XBP-00083	William Ekolook Grave	No Determination	Outside APE

*Site locations are based on coordinates given in UTM NAD 83, Zone 6, as recorded in the AHRS database.

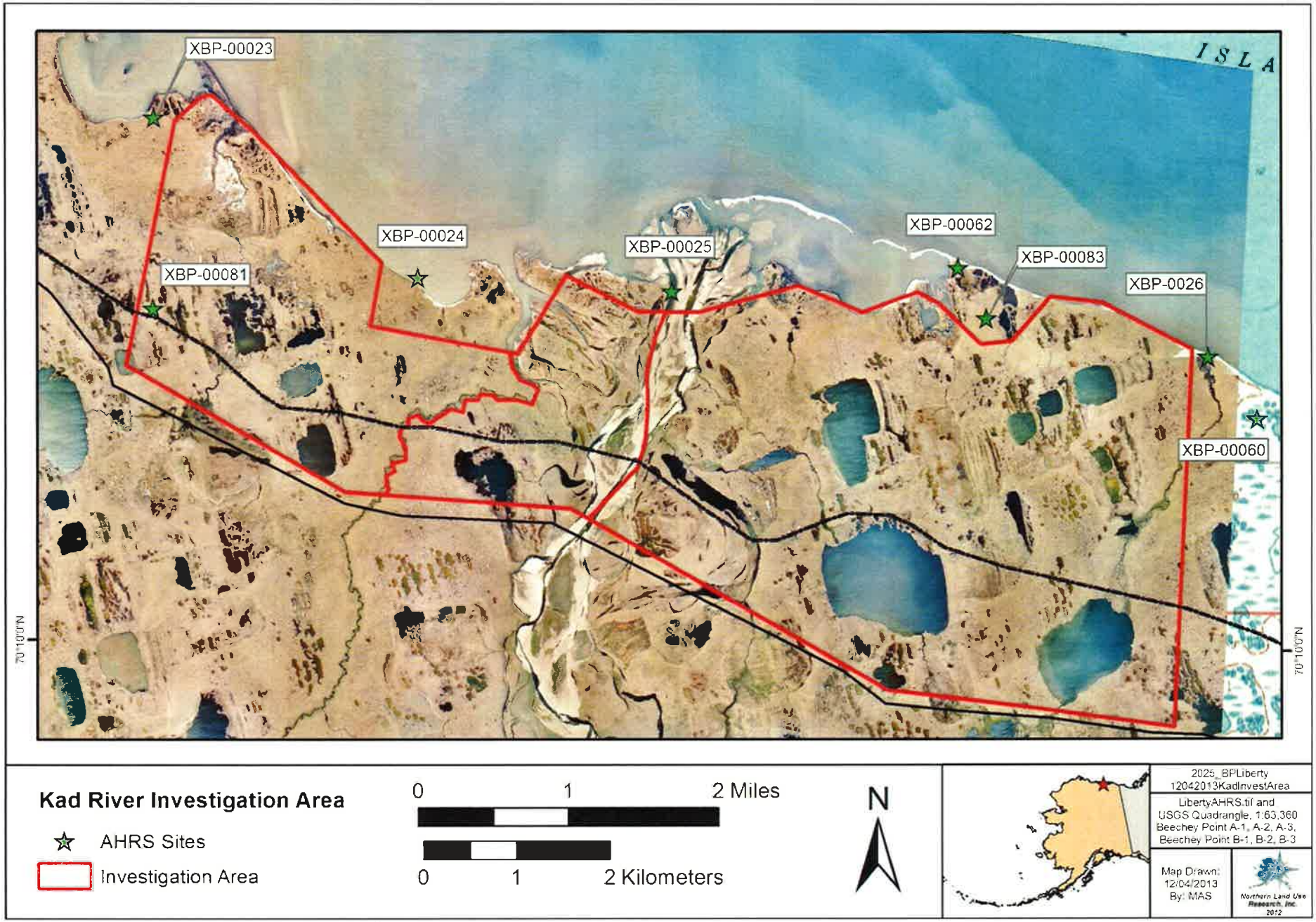

Figure 2. On-shore Liberty 2014 Geotechnical Investigation area, showing AHRS sites in relation to project APE.

Conclusion and Management Recommendations:

No cultural resources, of either historic or prehistoric origin, have been identified in off-shore areas of the project APE. Several previously identified on-shore cultural resources are located in or near the project area (see Table 1; Figure 2). All previously identified sites should be protected with buffer zones to ensure that they remain unaffected by field operations.

Sincerely,

Jason S. Rogers, PhD
NLURA Project Archaeologist

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