MISCELLANEOUS LAND USE PERMIT
GEOPHYSICAL EXPLORATION APPLICATION

State of Alaska
Department of Natural Resources, Division of Oil & Gas
550 W. 7th Ave, Suite 1100, Anchorage, AK 99501-3563
Phone: 907-269-8800 Fax: 907-269-8943
Permitting Email: dog.permitting@alaska.gov

SECTION I: APPLICANT INFORMATION

1. Applicant:

Name: SAExploration, Inc

Mailing Address: 8240 Sandlewood Place, Suite 201

City: Anchorage

State: Alaska Zip Code: 99507

Phone: 907-522-4499 Fax: 522-4498

Email: ssimonds@saexploration.com

2. Applicant Contact:

First Name: Ashley Last Name: Rogers

Title: Permitting Coordinator

Is the Mailing Address the same as Applicant's Mailing Address? ☒ Yes
If "No", please provide information below:

Mailing Address: Enter Mailing Address.

City: Enter City. State: Enter State. Zip Code: Enter Zip Code.

Phone: Enter Phone. Fax: Enter Fax.

Email: Enter Email.

SECTION II: THIRD PARTY INFORMATION
(Fill out this section only if you are applying for the Applicant)

Third Party Company Name: Enter 3rd Party Company Name.

First Name: Enter First Name. Last Name: Enter Last Name.

Title: Enter Title.

Mailing Address: Enter Mailing Address.

City: Enter City.

State: Enter State. Zip Code: Enter Zip Code.

Phone: Enter Phone. Fax: Enter Fax.

Email: Enter Email.

Describe the affiliation to the Applicant:

Describe your affiliation to the Applicant.

SECTION III: APPLICATION DATE AND NUMBER
(FOR DIVISION USE ONLY)

Application Date:

Application Number:

SECTION IV: PROJECT DESCRIPTION

1. Project Name:	Narwhal Phase II
2. Proposed Start Date:	1-15-2022

3. Project Activities: Seismic Exploration

A. Describe what and where:

SAExploration, Inc. and their joint venture partner, Kuukpik Corporation (Kuukpik SAE, LLC) are pleased to submit their plan of operations document for the Narwhal Phase II seismic program. Kuukpik SAE plans to conduct a three dimensional (3D) seismic program. This plan of operations will cover the winter 2022 season, commencing approximately January 2022 or upon tundra travel opening and continuing until completed or when conditions no longer support tundra travel. The seismic survey area encompasses approximately 59 square miles. All lands fall within the North Slope Borough (NSB) and land ownership within the survey area falls on state-owned and BLM managed lands (Federal lands) in the National Petroleum Reserve in Alaska (NPRA) as well as Kuukpik Corporation lands. Kuukpik SAE will be using new recording methodology to image potential targets, Kuukpik SAE will employ the best available technology to acquire better quality and higher resolution seismic data. Kuukpik SAE will begin operations with mobilization efforts and an estimated start date of January 15th, 2022; start with ice checking and the recording crew follow thereafter. Ice checking and recording will continue until the close of tundra travel season. Kuukpik SAE will stage equipment from existing facilities in Deadhorse and equipment will be trucked via existing roadways to a point of access to the tundra. Since the seismic survey lies within the Colville River Unit, a gravel pad may be used for staging of the camp. A mobile sled camp will be used and located on tundra or an ice pad. The location and mobility of the camp will be determined by availability of suitable gravel pads, environmental conditions, and crew movements. There will also be several staging areas located on gravel or ice pads used during the project that are separate from the base camp location. All mobile equipment will have a navigation system installed for logistics and hazard identification. Tracked and wheeled tundra vehicles will be used to transport the sleigh camp along the tundra. When the survey is completed, the camp and equipment will travel back to the ice pad for offloading and then trucked back to our Deadhorse pad location. Snow packed trails will be made throughout the project area. These trails will be maintained to reduce environmental impact and to aid in crew travel /re-supply. The location of these trails will depend on snow coverage and terrain conditions. Surveyors will establish survey controls by setting up a base station and a control will be set with a satellite navigation system transported by tracked vehicles. One of the highest risk potentials for arctic operations is properly verifying the integrity of the ice. This will be done by “ice checking units” consisting of a Tucker vehicle capable of supporting 24-hour operations. Snow machines may also be used for survey types of operations. The units will be equipped with ground penetrating radar systems, which are extremely accurate when used over fresh water. Where river channels exist, unusual surface fracturing is evident or drillings shows substandard ice, travel routes will be clearly marked to insure a safe travel route. Freeboard testing (ice stabilization) may also be conducted when working on floating ice to ensure the ice has the strength to safely hold the equipment. Preliminary trails or snail trails will be established for every foot that the vibrators must travel on the sea ice, lakes or rivers, which will minimize the potential for breaking through the ice. Survey will also map each hazard and that hazard will be uploaded into the vehicle TigerNav system. This survey will include mapping sensitive willow areas. Extreme care will be used while working in these areas. Minimal equipment traffic will be allowed in heavy willow areas. In low snow years, snow surveys will be conducted to substantiate depths and will be recorded for equipment movement efforts.

Kuukpik SAE is committed to operate in a manner that all operations or activities do not damage or affect the social, cultural or community in the areas where we work. If it is determined that willows are in the area, SAE has developed a willow protocol that ensures these areas are mapped and defined by size. Willow areas will first be identified via aerial photos and possibly snow machines. The areas will then be marked on maps. It is the responsibility of the survey manager to ensure that willow areas are recorded on the hazard maps and appropriate markings are in place. During the ground truthing of willows, Subsistence Representatives will be responsible for assisting in identifying sensitive willow areas and defining size. Survey will mark trails to be followed by the crews if it is determined that the area is accessible. Seismic operations will be conducted utilizing approximately 9 rubber tracked vibrators for source and 15,0000 nodal autonomous recording channels for receivers. Each receiver point consists of a receiver unit node and geophone. Receivers are transported to each location with the use of a low ground pressure Tucker Sno-Cat, truck or Kubota. Each vehicle is manned by up two personnel and can carry up to 275 receiver points. The receiver lines are generally 330 feet apart with geophones placed 165 feet down line. Typically, the source lines run parallel to receiver lines offset 330 feet from receiver line at 41.25-foot intervals between lines and stations. At any given time, there could be up to 38 receiver lines placed on the ground with approximately 76 lines being active. All receivers on the ground are recording 24 hours per day until the patch is complete. The energy source is Vibrosies. Each source point is occupied by a single vibrator which generates frequencies during a “sweep” of approximately 2.0 to 96 Hz. The duration of each sweep is between 4 to 32 seconds per source point. Using the SDS methodology, multiple vibrators can collect data at the same time. Additional infill source and receiver lines may be added to improve data imaging in certain areas or situations, such as when lines have been modified to avoid cultural sites, geographic features, or to mitigate impacts to wildlife.

The SAE HSE advisor and the local hire subsistence representative will revisit every campsite after camp has moved on, to review the area and sign-off that no damage occurred.

Equipment at camp sites will include long haul fuel tractors, remote fuelers, water maker, incinerator, resupply and survival sleigh, tractors, loaders, and tuckers.

Sanitary conditions in the kitchen and diner and washrooms will be maintained in full compliance with governmental regulations. Grey water will be filtered and treated to meet the discharge requirements of the Alaska Pollution

Discharge Elimination System (APDES). During the active work season, crews will travel to the camp area either by via tundra travel

B. Number of Line Miles (2D) N/A and/or Square Miles (3D) 59

C. Waste Management:

Food waste generated by field operations will be stored in vehicles until the end of the shift. Waste will then be consolidated at camp in wildlife resistant containers until disposal. All food waste generated in camp will also be collected and stored in the same consolidation area. A skid-mounted incinerator will be used for disposal of daily solid waste. This equipment falls within the regulatory requirements of 40 CFR60 and has been approved by the DEC. The incinerator will use on an average 1 to 2 gallons per hour while in use. The use of electricity is for the motor to the unit that maintains the air to fuel mixture. Personnel operating the unit are trained using EPA methods for monitoring opacity and will use established best management practices. Any wastes generated by seismic operations will be properly stored and disposed of in accordance with applicable permit stipulations and Kuukpik SAE controls. Grey water generated from the mobile camp will be discharged according to general permit AKG331132 and 18 AAC 83.210 and APDES discharge limits. The SAE sleigh camp is permitted by the DEC. Toilets are "PACTO" type to eliminate "black water". Ash from the incinerator will be backhauled to the North Slope Borough disposal facility in Deadhorse. The sleigh camp will move approximately every two to five days depending on weather conditions. An inspection by the HSE Advisor will be done after camp has left are to ensure that area is clean of all debris.

D. Staging and Storage Areas:

Camp and associated equipment will be trucked on existing road infrastructure and/or ice roads to a point of access to the project, most likely a temporary ice pad or gravel pad. The crews will utilize existing gravel roads or ice roads to access the pad that will allow access to the tundra and provide a resupply area for the crews. Incidental support materials may be stored at the pad. However, no solid waste or hazardous wastes will be stored at the pad at any time. The SAE camp will be transported to the pad, where it will be moved onto the tundra, pinned together and transported to the project area. The camp will remain close to the survey activities and will move every 2-5 days depending on survey progress and available snow cover. When the survey is complete, the camp and equipment will travel along the tundra back to the pad for offloading and trucking back to SAE Deadhorse storage pad.

E. Airstrips and Landing Zones:

The use of airstrips and/or landing zones is not anticipated for this project.

F. Historical Properties and Cultural Resources:

An archeological study was permitted through the NSB and the State of Alaska in 2018. A Letter of Concurrence from the State of Alaska Historical Preservation Officer is anticipated in advance of the beginning of this program.

G. Anadromous Fish Streams and Other Streams:

Itkillik River (330-00-10700-2151) Colville River (330-00-10700) Nechelik Channel (330-00-10800)

4. Associated Structures:

A. Structures:

N/A

B. Other:

Click here to enter text.

5. Type of Equipment:

150 man camp, 9 AHV-4 Vibes, 7 Case Tractors, 10 Support Trailers, 1 Support Vehicle, 2 D7 Loaders, 18 Tuckers, 1 Sno-Cat's, 1 Skid steer, 1 Snow machines, 1 Piston Bully, 2 Univibs, 1 GPS Base Station Trailers, 1 Grouser Plow. 1 loader, 1 Fuel Tank. NOTE: Equipment approved for tundra travel may be added/deleted as needed based on weather, mechanical issues, terrain etc.

6. Other:

N/A

SECTION V: SEQUENCE AND SCHEDULE OF ACTIVITIES

Are supplemental pages for Sequence and Schedule of Activities included in Appendix B? ☐ Yes ☒ No

Project Milestone #	Project Milestone	Proposed Start Date	Proposed End Date
1.	Advance Survey Crew/Ice Checking	1/15/2022	5/31/2022
2.	Project Mobilization	1/20/2022	1/15/2022
3.	3D Survey	1/25/2022	5/22/2022
4.	Project De-Mobilization	5/22/2022	5/25/2022
5.	Summer fly overs	7/15/2022	8/31/2022
6.	Enter Milestone.	Enter Date.	Enter Date.
7.	Enter Milestone.	Enter Date.	Enter Date.
8.	Enter Milestone.	Enter Date.	Enter Date.
9.	Enter Milestone.	Enter Date.	Enter Date.
10.	Enter Milestone.	Enter Date.	Enter Date.

SECTION VI: LAND STATUS

State of Alaska Surface Lands:

Are supplemental pages for Land Status included in Appendix B? ☒ Yes ☐ No

Meridian, Township, Range, And Section(s): U011N004E Sect 33-36

Oil And Gas Mineral Estate Lessee: ConocoPhillips Alaska Inc.

Access Authorization(s):

Special Use Lands: ADL 50666

Jointly Managed Lands: Click here to enter text.

Other Considerations: TWUA A2019-86 Water, TWUA A2018-31 Water, TWUA A2017-120 Water, TWUA A2018-117 WATER, ADL 388902 CP, ADL 388905 CP, ADL 64098 ASR, ADL 414843 ASR, LAS 30004 Water Rights,

Project Activities/Components	GPS Coordinates
Advance Survey Crew/Ice Checking	Click here to enter text.
Project Mobilization	Click here to enter text.
3D Survey	Click here to enter text.
Project De-Mobilization	Click here to enter text.
Summer fly overs	Click here to enter text.

Meridian, Township, Range, And Section(s): U011N005E SEC 31-34

Oil And Gas Mineral Estate Lessee: ConocoPhillips Alaska Inc., Oil Search, LLC

Access Authorization(s):

Special Use Lands: ADL 050666

Jointly Managed Lands: Click here to enter text.

Other Considerations: TWUA A2021-19 Water, TWUA A2018-117 Water, TWUA A2020-74 WATER, LAS 30004 Water Rights, ADL 391587 CP, ADL 392975 OIL SEARCH, ADL 388903 CP, ADL 64098 ASR, ADL 414843,

Project Activities/Components	GPS Coordinates
Advance Survey Crew/Ice Checking	Click here to enter text.
Project Mobilization	Click here to enter text.
3D Survey	Click here to enter text.
Project De-Mobilization	Click here to enter text.
Summer fly overs	Click here to enter text.

Meridian, Township, Range, And Section(s): U0010N004E Sect. 1-4, 9-16, 21-28, 33-36

Oil And Gas Mineral Estate Lessee: ConocoPhillips Alaska Inc.

Access Authorization(s):

Special Use Lands: ADL 050666

Jointly Managed Lands: Click here to enter text.

Other Considerations: ADL 390337, ADL 388902, ADL 390672 CP, ADL 391773 CP,ADL 390673 CP, ADL 391535 CP, ADL 64098 ARCTIC SLOPE, ADL 414843 ARTIC SLOPE, TWUA A2018-31 WATER, TWUA A2017-120 WATER, TWUA A2017-116 WATER, TWUA A2019-204 WATER, TWUA A2017-114 WATER, LAS 30039 WATER RIGHTS, LAS 22108 WATER RIGHTS, LAS 22374, LAS 388907, LAS 23603, LAS 23603,

Project Activities/Components	GPS Coordinates
Advance Survey Crew/Ice Checking	Click here to enter text.
Project Mobilization	Click here to enter text.
3D Survey	Click here to enter text.
Project De-Mobilization	Click here to enter text.
Summer fly overs	Click here to enter text.

Meridian, Township, Range, And Section(s): U0010N005E SEC 3-10, 15-22, 27-34

Oil And Gas Mineral Estate Lessee: OIL SEARCH, LLC, CONOCOPHILLIPS, BACHNER, J ANDREW, THREE MOUNTAIN OIL

Access Authorization(s): Click here to enter text.

Special Use Lands: ADL 050666

Jointly Managed Lands: Click here to enter text.

Other Considerations: ADL 393170, ADL 393171, ADL 414661, ADL 393691, ADL 393172, ADL 391538, ADL 390679, ADL 391919, ADL 391916, ADL 391917, ADL 391923, ADL 391918, ADL 391922, ADL 390677, ADL 391537, ADL 391016, ADL 416202, ADL 391015, ADL 390676, ADL 392945, ADL 393690, ADL 416050, ADL 391914, ADL 390675, ADL 64098 ASR, ADL 414843 ASR, ADL 415701, ADL 415857, ADL 415932, ADL 393166, ADL 393167, TWUA, A2020-75 WATER, TWUA A2019-84 WATER, TWUA A2014-38 WATER, TWUA A2018-117 WATER, TWUA A2018-31 WATER, TWUA A2019-187, TWUA A2019-97 WATER, TWUA A2017-170 WATER, TWUA A2019-142 WATER, TWUA A2019-143 WATER, TWUA A2019-152 WATER, TWUA A2019-179 WATER, TWUA A2019-204 WATER, TWUA A2021-118 WATER, TWUA A2021-120 WATER, ADL 64098 ARCTIC SLOPE, ADL 414843 ARCTIC SLOPE, LAS 30003 WATER RIGHTS, LAS 30079 WATER RIGHTS, LAS 30038 WATER RIGHTS, LAS 30042 WATER RIGHTS, LAS 23603, LAS 27591, LAS 22108

Project Activities/Components	GPS Coordinates
Advance Survey Crew/Ice Checking	Click here to enter text.
Project Mobilization	Click here to enter text.
3D Survey	Click here to enter text.
Project De-Mobilization	Click here to enter text.
Summer fly overs	Click here to enter text.

Meridian, Township, Range, And Section(s): U009N004E SECT 1,12,13,24,25,36

Oil And Gas Mineral Estate Lessee: OIL SEARCH, CONOCOPHILLIPS

Access Authorization(s):

Special Use Lands: ADL 050666

Jointly Managed Lands: Click here to enter text.

Other Considerations: ADL 392346, ADL 392341, ADL 414592, ADL 415863, ADL 392342,

Project Activities/Components	GPS Coordinates
Advance Survey Crew/Ice Checking	Click here to enter text.
Project Mobilization	Click here to enter text.
3D Survey	Click here to enter text.
Project De-Mobilization	Click here to enter text.
Summer fly overs	Click here to enter text.

Meridian, Township, Range, And Section(s): U09N005E Sect. 3-10, 15-22, 27-34

Oil And Gas Mineral Estate Lessee: OIL SEARCH, LLC, CONOCOPHILLIPS

Access Authorization(s):

Special Use Lands: ADL 050666

Jointly Managed Lands: Click here to enter text.

Other Considerations: ADL 392345, ADL 392346, ADL 414593, ADL 41466, ADL 421273, ADL 415927, ADL 421230, ADL 414593, ADL 392348, ADL 392349, ADL 414592, ADL 415863, ADL 392606, ADL 392350, ADL 392606

Project Activities/Components	GPS Coordinates
Advance Survey Crew/Ice Checking	Click here to enter text.
Project Mobilization	Click here to enter text.
3D Survey	Click here to enter text.
Project Demobilization	Click here to enter text.
Summer fly overs	Click here to enter text.

SECTION VII: PERFORMANCE GUARANTY

Bonded Company: The Guarantee Company

Type: State wide Number: EM1148565 Amount: 100,000.00

Bonding Company: See bond on file

Mailing Address: Enter Mailing Address.

City: Enter City. State: Enter State. Zip Code: Enter Zip Code.

Phone: Enter Phone. Fax: Enter Fax. Email: Enter Email.

SECTION VIII: INSURANCE

Comprehensive General Liability Insurance:

Amount of Insurance: 1,000,000

Insurer Name: Arthur Gallagher Risk Management Services

Mailing Address: 1900 West Loop South

City: Houston State: TX Zip Code: 77027

Phone: 713-6232330 Fax: 7136226722 Email: Enter Email.

SECTION IX: GLOSSARY OF TERMS

Are supplemental pages for Glossary of Terms included in Appendix B? ☐ Yes ☒ No

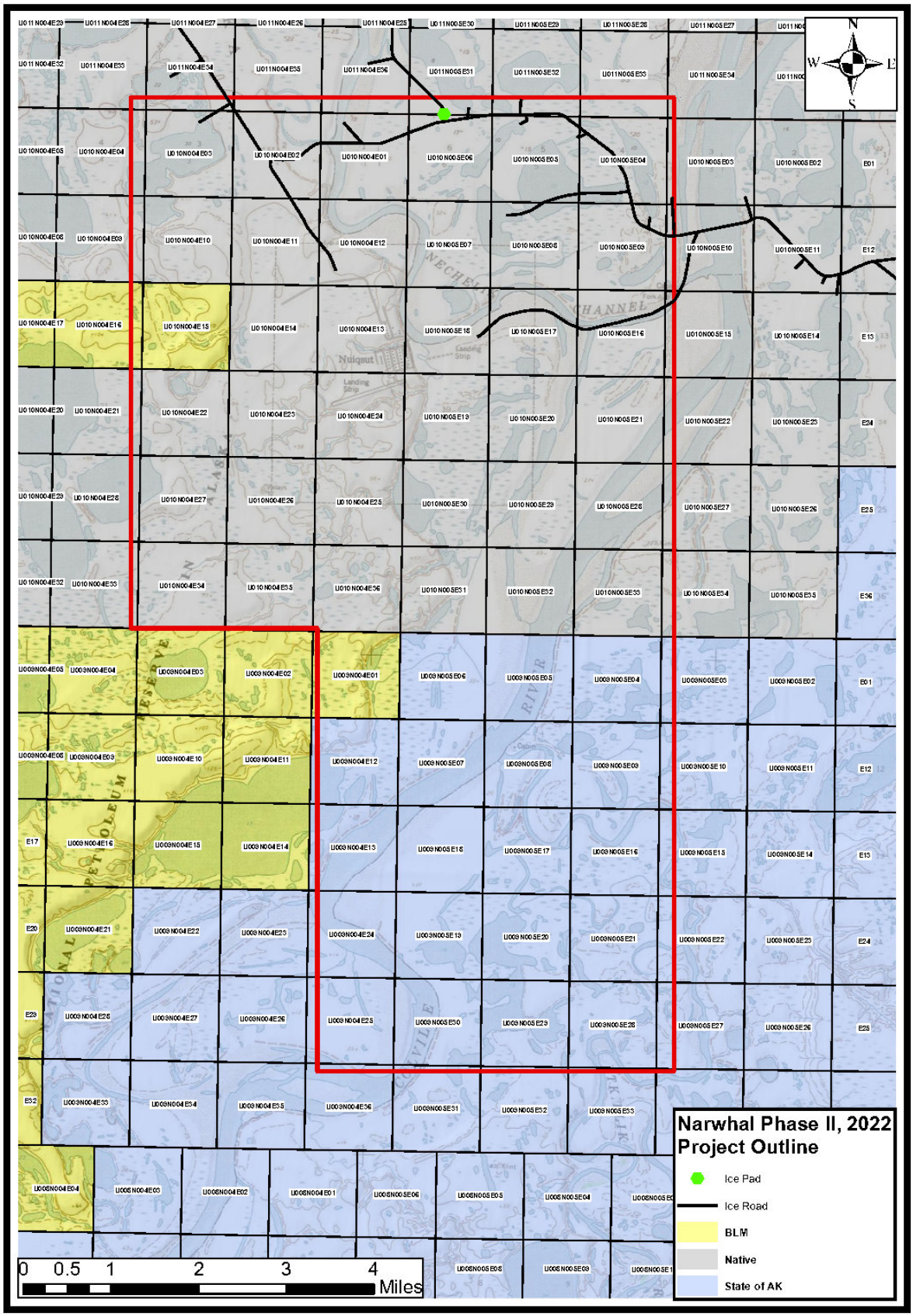
Term #	Term	Term Definition
1.	Enter Term.	Enter Term Definition.
2.	Enter Term.	Enter Term Definition.
3.	Enter Term.	Enter Term Definition.
4.	Enter Term.	Enter Term Definition.
5.	Enter Term.	Enter Term Definition.
6.	Enter Term.	Enter Term Definition.
7.	Enter Term.	Enter Term Definition.
8.	Enter Term.	Enter Term Definition.
9.	Enter Term.	Enter Term Definition.
10.	Enter Term.	Enter Term Definition.

SECTION X: CONFIDENTIALITY

The undersigned hereby requests that each page/section of this application marked confidential be held confidential under AS 38.05.035(a)(8).

APPLICANT CONTACT:

Sign here.	Ashley Rogers	Permitting Coordinator	10/20/2021
Signature	Name	Title	Date


Narwhal Phase II, 2022
Project Outline
Ice Pad
Ice Road
BLM
Native
State of AK
0 0.5 1 2 3 4
Miles
N
W
E
S
Nuiqsut
CHANNEL

Plan of Operations:

Narwhal Phase II

PLAN OF OPERATIONS
WINTER SEISMIC SURVEY
2022

Narwhal Phase II

Plan of Operations 2022

Introduction

SAExploration, Inc. and their joint venture partner, Kuukpik Corporation (Kuukpik SAE, LLC) are pleased to submit their plan of operations document for the Narwhal Phase II seismic program. Kuukpik SAE plans to conduct a three dimensional (3D) seismic program. This plan of operations will cover the winter 2022 season, commencing approximately January 2022 or upon tundra travel opening and continuing until completed or when conditions no longer support tundra travel.

Scope

Kuukpik SAE is proposing to acquire seismic data for oil exploration. Using new recording methodology to image potential targets, Kuukpik SAE will employ the best available technology to acquire better quality and higher resolution seismic data. Kuukpik SAE will begin operations with mobilization efforts and an estimated start date of January 15th, 2022; start with ice checking and the recording crew follow thereafter. The project will continue until the close of tundra travel season or project completion.

Location

The seismic survey area encompasses approximately 59 square miles. All lands fall within the North Slope Borough (NSB) and land ownership within the survey area falls on state-owned and BLM managed lands (Federal lands) in the National Petroleum Reserve in Alaska (NPRA) as well as Kuukpik Corporation lands. The project area will include the following townships, sections, and ranges in the Umiat Meridian.

Township/Range	Sections
U11N 4E	33-36
U11N 5E	31-34
U10N 4E	1-4, 9-16, 21-28, 33-36
U10N 5E	3-10, 15-22, 27-34
U09N 4E	1, 12, 13, 24, 25, 36
U09N 5E	3-10, 15-22, 27-34

The program area will be acquired using the following parameters which may change during time leading up to and during project.

Table 1 Typical Parameters

Receivers	**Distance**	**Sources**	**Distance**
Line interval	330 feet	Line Interval	330- feet
Station interval	110- 165 feet	Station spacing	41.25 feet
Recording Parameters	**Quantity**	**Type**	
Receiver/Source lines	100/181	Vibroseis	
Vibe trucks	9	Vibroseis	

Cultural Interface

Kuukpik SAE will coordinate seismic activities with the NSB Department of Planning and Community Services and the Inupiat Community of the Arctic Slope (ICAS) to mitigate and to prevent potential conflicts with subsistence users. Prior to the commencement of the 2022 winter season, representatives of Kuukpik SAE will hold pre-application meetings with the NSB, State of Alaska, and federal agencies to discuss the upcoming project. A simops plan is being developed to coordinate activities in and around Nuiqsut. Any subsistence hunting and fishing that will occur in the area of operations will be documented during community outreach. This project will include the village of Nuiqsut. It is anticipated that protocols and procedures will be developed which will allow both subsistence and exploration activities to co-exist during the seismic survey.

Permit Requirements

The table below lists the permits, approvals, authorizations, and supporting documents that maybe required for the operations described location in this plan.

Table 2 Permits and Authorizations

Agency	Authorization
Federal	
US Dept. of the Interior, Bureau of Land Management	Authorization/Approval to Conduct Seismic Surveys within the NPRA

US Fish and Wildlife Service (USFWS)	Letter of Authorization (LOA), Polar Bear Incidental Take and Intentional Take (deterrence)
North Slope Borough	
Planning Department	Development Permit
IHLC Department	Form 600
TLUI Department	Form 500
ICAS Department	Coordination
State of Alaska	
Department of Natural Resources, Office of History and Archaeology (OHA)	Letter of Concurrence
Department of Natural Resources, Division of Oil and Gas (DOG)	Geophysical Exploration Permit Statewide Miscellaneous Land Use
Department of Natural Resources, Division of Mining, Land and Water (DLMW)	Off-road Travel Permit Storage Permit
Department of Environmental Conservation (ADEC)	Public Water System Permit Alaska Pollutant Discharge Elimination System (APDES) General Permit for graywater discharge
Department of Fish and Game (ADFG)	Title 16 Fish Habitat Permit
Division of Environmental Health Safety	Establishment Permit (kitchen)
Other Approvals	
Lease Holders	Letter of Non-Objection or Surface Access Agreements
Area Units	Letter of Non-Objection
Arctic Slope Regional Corporation (ASRC)	Letter of Non-Objection
Kuukpik Corporation	Letter of Non-Objection

Camp and Staging Areas

Currently, there are several options for camp and staging area locations. Since the seismic survey lies within the Colville River Unit, a gravel pad may be used for staging of the camp. A mobile sled camp will be used and located on tundra or an ice pad. The location and mobility of the camp will be determined by availability of suitable gravel pads, environmental conditions, and crew movements. There will also be several staging areas located on gravel or ice pads used during the project that are separate from the base camp location. These areas provide a resupply area for the crews, space for data downloading and recharging of recording equipment, and allow equipment access to the tundra. The staging area locations will shift as project activities progress. Specific locations for the camp, staging areas, and associated ice pads will be selected in the late fall of 2021 and updated maps will be created at that time.

Mobilization and Access

Due to the dynamic nature of the seismic survey, there are several methods for the transport of camps and seismic equipment. Tracked vehicles will be used for transportation, operations, and logistics and will move across the tundra as the project progresses. When on the tundra, the mobile field camp will stay in one location for up to seven days before moving, remaining close to the layout and crews. During transport, up to five camp trailers are pulled by Steigers in a formation called a string. All mobile equipment will have a navigation system installed for logistics and hazard identification. Kuukpik SAE will utilize existing gravel pads, ice roads or ice pads to stage equipment and provide tundra access for seismic operations.

Survey and Ice check

Surveyors will establish controls by setting up a base station equipped with a satellite navigation system transported by tracked vehicles. The survey will also map each hazard that is discovered and enter it into the navigation system. This navigation system allows each vehicle to display the program area and all identified hazards within the area. The system is tracked in real time and a screen is located in each vehicle.

One of the highest risk potentials for arctic operations is properly identifying the integrity of the ice. Ice integrity identification will be accomplished by “ice checking units” consisting of snow machines and a Tucker capable of supporting 24-hour operations. The survey units will be equipped with ground penetrating radar systems (GPR) which are extremely accurate over fresh water. In addition, each ice check unit is equipped with a battery-operated ice auger which is used to verify the calibration of the GPR, measure ice depths on sea ice, and verify depths where the GPR units cannot reach. Ice checking is conducted in a grid pattern and will vary in spacing depending on results of ice thickness. Where river channels exist, unusual surface fracturing is evident, or drillings shows substandard ice, the standard grid size will be tightened to insure a safe path for the equipment to follow. Freeboard testing for ice stabilization is also conducted when working on floating ice to insure the ice has the strength to safely hold the equipment.

Preliminary trails or “snail trails” will be established and displayed in the navigation system for every foot that the vibrators will travel on lakes, rivers, or sea ice which will minimize the potential for breaking through the ice. Hazards and information that will be displayed in the navigation system are:

- Standard seismic survey area
- Safe routes of travel
- Surface facilities and infrastructure
- Underground pipeline crossings with weight restrictions
- Wildlife exclusion areas
- Cultural resources
- Native allotments
- Thin ice and low snow
- Sensitive vegetation

River and Lake Crossings

Seismic crews may encounter floating or thin ice at river crossings and on lakes which may not safely support the weight of equipment. In these situations, water may be added to the existing ice layer to thicken the area and strengthen the ice for crossing. Water will be withdrawn from permitted sources if this activity is required. There also may be areas on rivers, streams, and lakes that need to be protected with snow when traversing from tundra to ice for crossing. To reduce the chances of impacts to riverbanks and tundra, Kuukpik SAE will construct snow ramps and establish that the ice is grounded or is of sufficient depth to cross.

Willow Protocol

When willows are located in the survey area, Kuukpik SAE's willow protocol ensures the areas are defined by size and entered into the navigation system. It is the responsibility of the survey manager to ensure that willow areas are recorded on the hazard maps and appropriate markings are in place. Willow areas will first be identified via aerial photos and possibly snow machines. During the ground truthing of willows, subsistence representatives will be responsible for assistance with identification of sensitive willow areas. Areas of activities will be defined by size and density of willow. If it is determined that the area can be safely accessed, trails will be marked for crew access and followed by the seismic survey crews. In areas where willows cannot be traversed with larger vehicles, the crews will utilize snow machines or foot traffic to access the receiver points.

Recording Operations

Seismic operations will be conducted utilizing 9 rubber tracked vibrators for source and 15,000 nodal autonomous recording channels for receivers.

Each receiver point consists of a receiver unit node and geophone. Receivers are transported to each location with the use of a low ground pressure Tucker Sno-Cat, truck or Kubota. Each vehicle is manned by up two personnel and can carry up to 275 receiver points. Recording operations continue for 24 hours per work day. Communications with the crews while in the field will be via VHF radio systems and wireless data transfer radios.

The receiver lines are generally 330 feet apart with geophones placed 165 feet down line. Typically, the source lines run parallel to receiver lines offset 330 feet from receiver line at 41.25-foot intervals between lines and stations. At any given time, there could be up to 38 receiver lines placed on the ground with approximately 76 lines being active. All receivers on the ground are recording 24 hours per day until the patch is complete.

The energy source is Vibrosies. Each source point is occupied by a single vibrator which generates frequencies during a "sweep" of approximately 2.0 to 96 Hz. The duration of each sweep is between 4 to 32 seconds per source point. Using the SDS methodology, multiple vibrators can collect data at the same time. This means that only a single vibrator is required to travel down any source line thereby

reducing risk of compaction or damage to the tundra. Additional infill source and receiver lines may be added to improve data imaging in certain areas or situations, such as when lines have been modified to avoid cultural sites, geographic features, or to mitigate impacts to wildlife.

Fuel Supply, Storage, and Spill Response

Vehicles and other equipment will be supplied by a fuel delivery vehicle or fuel storage tanks with double-walled construction and 110% containment. Dye is added to all fuel to aid in spill detection. On average, about 7,000 gallons of ultra-low sulfur diesel fuel will be consumed per day. If the camp is connected to shore power, fuel consumption will be reduced. Fuel transfers will be conducted in accordance with the applicable regulatory requirements and comply with SAE's Fluid Transfer Procedure. SAE's fueling procedures include spill management practices such as drip plan placement under parked vehicles and placement of vinyl liners with foam dikes under all valves or connections to fuel tanks. Spills of any size are cleaned by SAE and evaluated to improve spill prevention procedures. If a spill occurs, the crew will immediately stop work and evaluate the situation. The release will be reported, and the contaminated snow will be removed for disposal. Documentation and reporting are conducted by the SAE Health, Safety, and Environmental (HSE) advisor according to the SAE Spill Response Plan.

Waste Management

A waste management plan (WMP) will be developed and implemented for each area of operation. The WMP will include a cradle to grave line item for each waste stream that will be generated. Some non-hazardous waste may be incinerated on-site or transported for disposal at approved facilities. Hazardous wastes (if any) and Universal wastes (batteries and bulbs) will be managed in Satellite Accumulation Areas (SAAs). Any wastes generated will be properly stored and disposed of in accordance with applicable regulations and requirements. The Alaska Waste Disposal and Reuse Guide (aka Redbook) and the project specific WMP will guide Kuukpik SAE in all waste generation, management, and disposal.

Wildlife

As a result of the proposed seismic activity, the human-wildlife interactions may arise. Wildlife that may be present in the area during the winter season are polar bears, grizzly bears, arctic and red fox, wolverine, musk ox, over-wintering caribou, some bird species (e.g. owls, ravens), and ringed seals. The project team will develop ways to mitigate potential impacts to wildlife by following SAE's authorizations and permits, established best practices, and wildlife interaction plans including the Polar Bear Interaction Plan. The project will also rely on the guidance and help of the wildlife regulatory agencies, the US Fish and Wildlife Service (USFWS) and the State of Alaska's Department of Fish & Game (ADFG).

Kuukpik SAE will be requesting a seismic-specific Letter of Authorization (LOA) for incidental polar bear take from the USFWS. Kuukpik SAE will partner with other companies to conduct an aerial Forward Looking InfraRed (FLIR) survey for maternal polar bear dens prior to operations. If putative dens are discovered, Kuukpik SAE will work with USFWS to create den specific management plans, including exclusions zones or den specific monitoring and mitigation measures. Kuukpik SAE work crews will be trained on awareness and understanding of the potential for interactions, including managing work site

attractants and camp/work area awareness to mitigate any potential conflict with animals. Crew members will also undergo a training on polar bear den habitat and detection to enhance the work crews' ability to identify a polar bear den that may not have been detected during the aerial FLIR survey.

Grizzly bears also inhabit the general area in the project but are likely to be inactive (i.e. denning) during the winter season. ADFG has fitted the majority of resident North slope grizzly bears with GPS collars, and will inform the project of possible dens (and associated exclusion zones) in the project area. Should a grizzly or polar bear, or their associated den be encountered, crews will follow the procedures for initial response, safe work shutdown, and reporting as outlined in the wildlife interaction plan. Any type of bear dens, suspected or confirmed, will be reported as soon as possible, and within 24 hours.

Historic and Cultural Resources

Previous cultural resources study to identify the historic and cultural resources have been completed in the program area. The results of the study will guide Kuukpik SAE's activities to avoid disturbing known cultural resources. Cultural resources that fall within the project area will have avoidance buffers placed around them. An archeological clearance will be applied for through the NSB and the State of Alaska Office of History and Archaeology. As part of the cultural resources responsibility Kuukpik SAE will contact the Traditional Land Use Inventory (TLUI) database, maintained by the NSB for information for avoidance purposes on this project.

Previously recorded and any new AHRS sites will be avoided by all proposed seismic activities. All areas will have 500-foot buffers placed around them as a non-activity zone. Any native allotments will be avoided and will also have a 500-foot buffer. This information will be uploaded in the Navigation system to ensure no vehicles enter avoidance areas.

Communication & Supervision

The following personnel can be contacted for more information:

Table 3 Communications Information

Company	Name	Title	Office phone	Mobile phone
SAE	Rick Trupp	General Manager of Alaska	907-522-4499	907-280-9442
SAE	Roland Ramsey	Operations Supervisor	907-522-4499	403-542-0015
SAE	Ashley Rogers	Permits Coordinator	907-522-4499	907-267-0313

Figure 1 Project Map

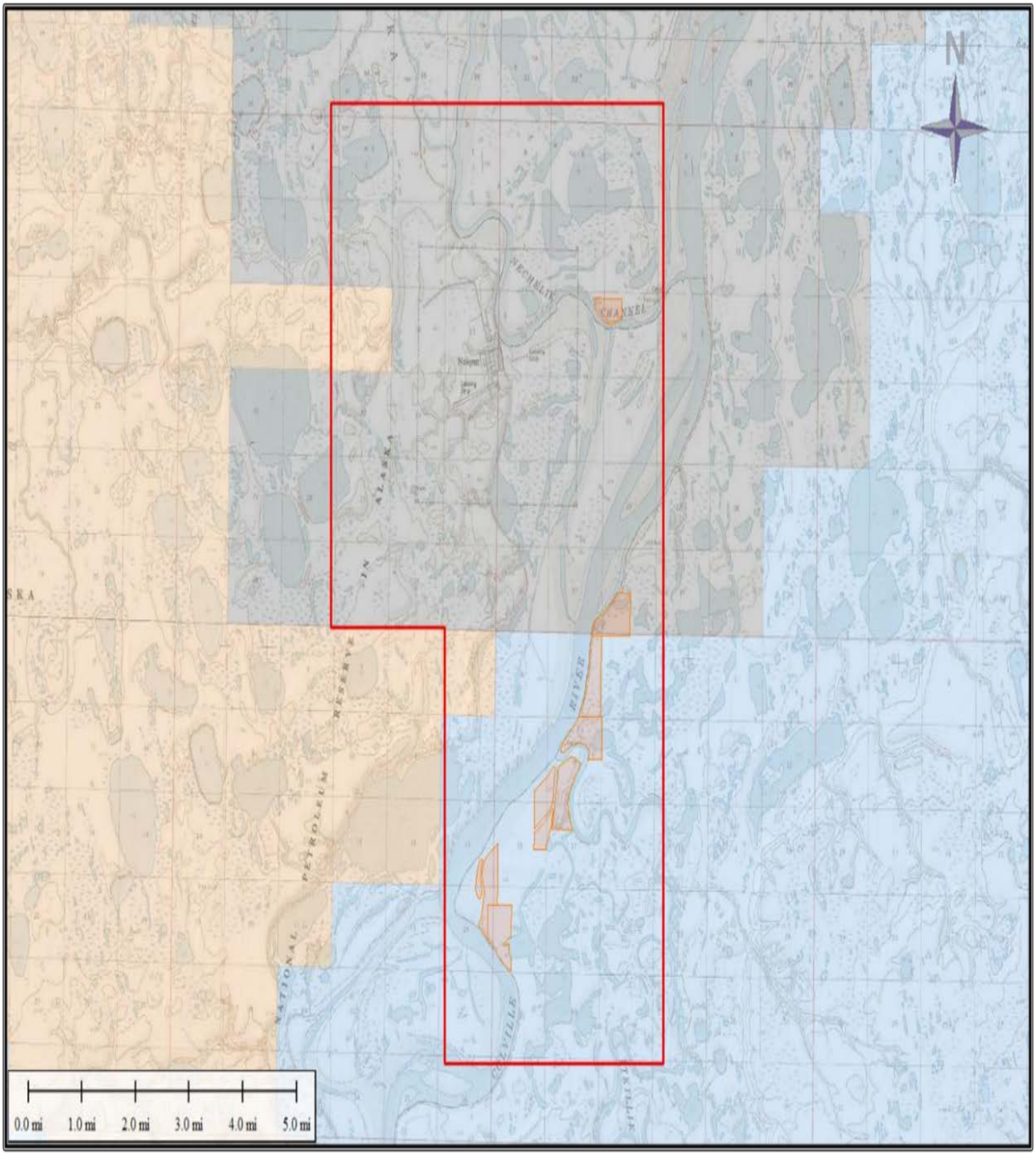


Table 4 Equipment List

Equipment Type	Description
AHV-4 vibe truck	Track
AHV-4 vibe truck	Track
AHV-4 vibe truck	Track
AHV-4 vibe truck	Track
AHV-4 vibe truck	Track
AHV-4 vibe truck	Track
AHV-4 vibe truck	Track
AHV-4 vibe truck	Track
AHV-4 vibe truck	Track
Case or Steiger tractor	Long Haul Fueler
Case or Steiger tractor	Long Haul Fueler
Case tractor	Remote Fueler
Case tractor	Remote Fueler
Case tractor	Line Crew
Case tractor	Line Crew
Case tractor	Field Shop
Dozer / loader	D7G
Dozer / loader	D7G
Fuel tank	Fueler
Tucker	Personal Carrier
Tucker	Personal Carrier

Equipment Type	Description
GPS base	Single Axle Tucker Trailer Tracks
Tucker	Vibe Tech
Support vehicle	Loader
Support trailer	Vibe Tender
Support trailer	Node Charging
Support trailer	Recorder/Coordinator
Support trailer	Cable Battery Shack
Support trailer	Incinerator
Support trailer	Water Maker
Support trailer	Tracked Equipment trailers
Support trailer	Tracked Equipment
Support trailer	Equipment trailers
Support trailer	Equipment trailers
Tucker	Node Tucker
Tucker	Node Tucker
Tucker	Node Tucker
Tucker	Node Tucker
Tucker	Node Tucker
Tucker	Node Tucker
Tucker	Node Tucker
Tucker	Node Tucker

Equipment Type	Description
Tucker	Ice Cat
Tucker	Ice Cat
Tucker	Ice Cat
Tucker	Ice Cat
Tucker	Ice Cat
Tucker	Instrument Tech
Tucker	Client Tucker

Equipment Type	Description
Misc.	Loader
Misc.	Piston Bully
Misc.	Skid steer
Misc.	Snow Machine
Misc.	Grouser Plow
Misc.	Univibe
Misc.	Univibe

Table 6: Best Management Practices for Ice Loads

Equipment	Contact Area Tractor	Contact Area Trailer	Tractor displacement	TARE (lbs.)	PAYLOAD (lbs.)	GVW (lbs.)	Fresh Ice (inches)	Sea Ice (inches)
Tucker Vehicles								
Tucker 1643	8320		1.38	9,200	2,300	11,500	18	23
Tucker 1644 line truck (loaded)	8320		1.68	11,700	2,300	14,000	20	25
Trailers - 4 track								
Tucker Trailer - Vibe Tender		6677	5.24	13,000	22,000	35,000	28	34
Vibe tender & Steiger	8640	6677	10.42	68,000	22,000	90,000	47	51
Tucker Trailer - Batt Shack		6677	4.49	13,000	17,000	30,000	28	34
Battery shack & Steiger	8640	6677	9.84	68,000	17,000	85,000	45	50
Tucker Trailer - Recorder		6677	4.04	13,000	14,000	27,000	28	34
Recorder & Steiger	8640	6677	9.49	68,000	14,000	82,000	43	48
Dozers and Loaders								
D7G	6677		8.39			56,000	37	47

977 Loader	5008		11.18			56,000	39	47
Vibrators								
AHV IV ATI Tracks (on plate)	12380		7.67			95,000	54	66
AHV IV ATI Tracks (traveling)	12380		7.67			95,000	46	52
AHV IV Wheels (on plate)	7692		9.49			73,000	48	54
AHV IV Wheels (traveling)	7692		9.49			73,000	42	48
Steigers (single)								
Steiger with winch	8640		6.37			55,000	35	41
Steiger with blade/loader	8640		7.06			61,000	36	42
Steigers & Trailers - 4 track								
Steiger with Tucker Trailer	8640	6677	9.95	68,000	18,000	86,000	45	50
Steiger with Challenger Trailer	8640	6677	15.19	82,000	49,280	131,280	60	64

Equipment Photos

Photo 1: Example of Nodes, - Cable-Free/Radio-Free Autonomous Data Recorder

Photo 2: Tucker, 11,000 pounds

Photo 3: AHV4 Commander Vibrator (Source Equipment) Approx. 60,000 pounds with tires

Photo 4: Vibe rectangular baseplate