

SEISMIC EXPLORATION ON THE COASTAL PLAIN

Purpose and Need

SA Exploration has requested to conduct 3 Dimensional (3D) Winter Seismic Exploration Surveys on the Coastal Plain of the USFWS Arctic National Wildlife Refuge in Alaska. The proposed seismic exploration would begin in winter 2018/2019 and, if not finished in one year, would continue through winter 2019/2020. Seismic exploration generates acoustic waves that are picked up by sensors as the waves bounce off subsurface formations. From this information, images can be created that show subsurface topography and formations including those areas of potential hydrocarbons.

The purpose of the proposed seismic activity is to acquire quality, high resolution seismic data, using vibroseis techniques to identify potential oil and gas reserves. Approval of the proposed action would authorize SAE to conduct 3D seismic surveys beginning when frost and snow cover are at sufficient depths to protect tundra and would continue through the winter seasons until tundra travel has been closed.

Analysis of this project will include access to the program area from Deadhorse, storage of fuel, and the use of up to two mobile camps, each capable of housing up to 160 people. The total proposed project area would encompass the entire Coastal Plain, approximately 2,600 sq. miles (1,664,000 acres) (program area).

Access

Equipment would be staged at existing facilities in Deadhorse, Alaska. The camp trailers and seismic equipment would be trucked via existing gravel road from Deadhorse to a point of access where the camp trailers and equipment could be moved over tundra or sea ice to the program area. Access to the program area would entail crossing state land after the Alaska Department of Natural Resources has opened tundra travel. The state would allow tundra travel when they determine there is adequate snow cover and frozen ground. The Coastal Areas criteria are six inches of snow and 23 degrees Fahrenheit soil temperature at approximately one foot snow depth and the Foothills Areas are nine inches of snow and 23 degrees Fahrenheit soil temperature at approximately one foot depth. SAE has obtained a permit from the State. No ice roads would be constructed for this project.

Before camp trailers and seismic equipment enter the program area, an advance survey team in either Tucker Sno Cat (Tucker) or steigers would scout environmental conditions, such as ice thickness and low snow areas and would map a trail for the rest of the crew and camp to follow. To determine ice conditions, tucker vehicles and, potentially, snow machines equipped with ground penetrating radar systems (GPR) would be used to test ice thickness. In addition, ice conditions would be checked with battery operated ice augers to verify the calibration of the GPR, measure ice depths on sea ice, or verify depths where the GPR units cannot reach. Freeboard testing (ice stabilization) would also be conducted along potential routes on floating ice to ensure ice is strong enough to safely hold equipment. Preliminary trails would be established along sea ice routes, lakes or rivers that vibrators would travel to prevent the potential for equipment breaking through ice.

Prior to the beginning of operations, cultural sites, polar bear dens and native allotments would be identified on a map for the advanced survey crew. They would verify, identify, stake and map avoidance areas such as environmental hazards, important habitat features including (but not limited to) polar bear den sites, sensitive willow areas, cultural sites, native allotments, and low snow areas. All cultural or historic sites within the project area would be avoided with a 500-foot buffer around the sites and Native Allotments would also be avoided. All mobile equipment would have a navigation system installed for logistics and for mapping/locating avoidance areas.

At stream crossings, the advance crew would identify steep streambanks and, depending on the crossing, would either avoid the crossing and identify a different route or recommend a snow ramp over the stream. Survey crews would identify the lowest grade areas to safely cross rivers or drainages and avoid steep slopes, wherever possible, or find other routes of travel that would be more practical and safe for equipment movement.

Rivers that could be crossed during implementation of seismic activities include: Canning River, Sadlerochit River, Hulahula River, and Okpilak River Jago River, Amavariak River, Katakuvuk River, Okerokovik River, Akutotak River, Niguanak River, Kimikpaurauk River, Siksik River, Sikrelurak River, Angun River, and the Kogotpak River.

Where there is unstable ice, unusual ice surface fracturing or drillings (with augers) shows substandard ice, the standard seismic survey grid would be modified to insure a safe path for camp moves or equipment travel. Although vibroseis vehicles could travel over ungrounded (but suitable) ice, they would only be allowed to operate on grounded ice, with the exception of lagoon areas that are 10 feet in depth or less.

Tracked tundra vehicles (such as steigers) would be used to transport sled camps along the tundra. The camp would remain close to seismic survey activities and could move every 2-3 days depending on survey progress and snow cover. The camp would move to the next predetermined camp site over pre-packed snow trails with adequate snow cover and on flat ground. Prepacking would be conducted using tuckers and/or steigers pulling a groomer. Crew and camp travel routes, as well as resupply routes, would be along snow packed trails throughout the project area. At some stream crossings, it could be necessary to build snow ramps or protect stream banks with additional snow cover by moving snow from drifts to the stream banks with a front end tracked loader. The location of snow trails would depend on snow cover and terrain conditions. During travel on State lands, SAE would attempt to coordinate with companies to use existing or planned trails.

Predetermined snow routes have not been identified at this time because routes within the project area would be located based on camp locations, results of cultural and wildlife surveys, local knowledge, community consultation, and environmental terrain and conditions.

If low snow conditions are encountered, the advanced crew would use a procedure based on State of Alaska guidance to continuously sample snow depths along the routes. Low snow areas would be avoided and these locations would be loaded into all vehicle navigational systems.

After completion of seismic activity, the camps and all equipment would return to Deadhorse on grounded sea or tundra depending on camp logistics. In this case, the return route would be over identified snow routes.

Camp Facilities

The support camps would be immediately adjacent to seismic exploration activities and would move every 2-3 days as seismic exploration activities move across the program area. It is expected that there would be a total of 360 miles of snow trails associated with moving up to two camps across the entire program area.

Camps would be located in areas of adequate snow cover and away from hazards and sensitive areas. Camps would not be located on lakes or rivers, and would be a minimum 500 feet from waterbodies.

Each camp would be able to accommodate up to 160 people and would consist of sled-mounted units including; a kitchen and diner, sleeping areas, washrooms, laundry, offices, shops, medical clinic, storage, generator rooms, and storage compartments. There would be approximately 50 trailers including support trailers that make up a camp. Due to the size of the project, there could be 40-50 different camp locations (for 2 crews/camps) throughout the project area. The camp would be moved along pre-packed snow trails and could be moved up to 2 miles every few days depending on weather, snow cover and the advancement of the seismic survey.

Equipment lighting would consist of tail lights, headlights and reflectors. A sled camp would use flood lights (typically 250 watts) on trailers in and around the camp areas for crew safety. Seismic line work would use vehicle lights for travel and during lay down and pick up of survey nodes. Airstrip lighting would only be used during landing and takeoff, approximately 3 times per week and only during low light environments.

The remote camp would be independent of any land based power, therefore generators would be in use 24 hours a day, 7 days a week. The generators would be contained within trailers and the decibel (dB) level would be within Occupational Safety and Health Administration (OSHA) standards which is less than 85 dB outside the trailers.

Approximately 6,000 – 7,000 gallons of fuel would be delivered every day by ground vehicle to the camps and resupply of food and other supplies would occur twice or more a week. Crew changes would be twice a week and could occur by aircraft or ground vehicle. The existing airstrip at Kaktovik would be used whenever feasible.

SAE plans to construct temporary airstrips on tundra and lakes as necessary to support the program. A flat area or lake suitable for an airstrip with adequate snow cover would be groomed using a tucker or a steiger pulling a groomer. It is possible that airstrips could be used within 5 miles of each camp location. The advance surveyors would identify appropriate locations that could be used for airstrips. Landing strips would only be in areas that have adequate space for safely landing aircraft. Aircraft using these landing strips would be equipped with both wheels and skis.

Fuel Supply and Storage

A rolligon or steiger would be used to tow fuel tanks on skis/tracks for refueling operations. All fuel would be ultra-low sulfur for vehicles and equipment. In the event the supply is disrupted by weather or other unforeseen events, fuel would be delivered by aircraft on temporary airstrips.

Fuel storage and fueling would be located at least 100 feet from any water body and all equipment fuel locations would be tracked and recorded. All fuel tanks would be double-wall tank construction and capable of holding 110% of the fuel volume in case of a spill. Fuel dye is added to all fuel as part of spill detection. There could be up to 20,000 gallons of fuel in camp at any given time. Fueling procedures include spill management practices such as drip pan placement under any vehicle parked and placement of vinyl liners with foam dikes under all valves or connections to diesel fuel tanks.

All spills, no matter the size, would be tracked and cleaned up by SAE. SAE currently has a Spill Prevention Countermeasure Control (SPCC) plan for fueling and fuel storage operations associated with seismic operations as well as a site specific seismic SPCC plan. All reportable spills would be communicated through the proper agencies and according to reporting requirements.

A total of 6,000-7,000 gallons of fuel would be the average daily consumption per crew. If the project is a 100-day season, it is estimated that the total amount of fuel needed would be about 650,000 gallons per crew.

Field Operations

Seismic operations would be conducted utilizing 12-15 rubber tracked vibrators (vibrators are switched to wheels for sea ice operations) and 20,000 to 25,000 wireless autonomous recording devices (nodes/geophones) for each of the two crews. Receiver points (20,000-25,000) occupied with wireless nodes and a single geophone (recorder) would be laid out along a line that is perpendicular to source lines (routes driven by the vibrators). There could be up to 48 receiver lines placed on the ground at a time with approximately 32 lines being active at any given time. Although there may only be 32 lines required to be recorded for any given source point, all wireless nodes on the ground would record 24 hours per day. Vibroseis vehicles would be positioned between 41.25 and 200 feet from an adjacent receiver point on a given line. In a typical square mile there would be 4 linear miles of receivers and 8 linear miles of source. Receivers would be transported to and from each location with a low ground pressure Tucker that could carry up to 220 receiver points and manned by three personnel.

In order to maintain data quality, lines should not be moved more than 30% of the cross line distance; however, in areas that require avoidance due to wildlife, cultural features or terrain, some points would be dropped. Any movement of source or receiver or exclusion of source/receiver would result in a reduction or loss of data or quality of data.

The energy source for the seismic wave is Vibroseis which would exert 64,000 pounds of peak force on the ground. Each source point is occupied by a single vibrator which generate frequencies during a "sweep" of approximately 1.5 to 96 Hz and designed to travel down. The duration of each sweep is anticipated to be 16 to 24 seconds per source point. Multiple vibrators spaced at least 1,320 feet apart, would collect data at the same time. This methodology means that

only a single vibrator is required to travel down any source line, reducing risk of compaction or damage to the tundra. Vibrators would only operate on snow covered tundra or grounded ice, with exception of lagoon areas that are less than 10 feet of water depth. The duration and decibel level of the source varies depending on such factors as terrain and weather conditions; however, the levels are so low that hearing protection is not required for seismic crew members.

Recording operations would run 24 hours per day with two 12 hour shifts. Communications with the crews, while out in the field, would be via VHF radio systems and wireless data transfer radios. The camp would also have a satellite communication system for phone and internet access.

Prior to seismic activities, SAE would work with the North Slope Borough, State of Alaska, and other federal agencies to identify archeological, historic, and traditional sites and would avoid these sites with a 500-foot buffer.

Water Use

Potable water would be produced at camp with a skid-mounted snow melter. Water would be produced by melting snow or, if it is a low snow year, supplemental water could be collected by withdrawing water from lakes or other areas with fresh water or hauled in. SAE does not anticipate large quantities of water needing to be withdrawn from lakes or that ice aggregate would need to be utilized. If water would need to be withdrawn from lakes or other fresh water sources, SAE would be required to obtain permission from the BLM and the State of Alaska. Any water withdrawn would be processed through a Department of Environmental Conservation (DEC) approved water system, which consists of filtration and chlorination that is regulated by the DEC.

If there is not an adequate source of snow or water from lakes to generate water for the camps, water would be transported over snow trails by ground vehicle to each camp to ensure crews have approximately up to 3,500 gallons of water per day.

Where floating ice is encountered that would not safely support the weight of equipment, SAE could request a permit with the State of Alaska Department of Fish & Game, to apply water to increase the thickness of the ice and establish temporary river crossings.

Waste Management

Food waste generated during field operations would be stored in vehicles until the end of the shift. All garbage would be consolidated at camp in wildlife resistance containers until further disposal. A skid-mounted incinerator would be used for daily garbage waste.

Any waste generated by seismic operations would be properly stored and disposed of in accordance with applicable permit stipulations and SAE controls. Food waste would be continually incinerated to avoid attracting wildlife. Gray water generated from the mobile camp (approximately 1,000 -2,500 gallons per crew day) would be discharged according general permit AKG332000 and 18 AAC 83.210 and Alaska Pollution Discharge Elimination System (APDES) discharge limits. Toilets would be "PACTO" type to eliminate "black water". Ash

from the incinerator would be back-hauled to the North Slope Borough disposal facility in Deadhorse.

Wildlife Encounters

All Polar Bear sightings would be reported to the USFWS. Any type of bear dens, suspected or confirmed would be reported to the USFWS or ADF&G agency personnel. SAE has submitted a petition to get an approved Incidental take authorization for working around polar bears. If a seal lair is identified, a 500 foot buffer would be implemented and the location recorded. Personnel would remain at least a one-half mile distance from brown bear dens and 1-mile from polar bear dens. SAE would adhere to a 1-mile operational exclusion zone around all known polar bear dens during the denning season (November-April, or until the female and cubs leave the areas). Should previously unknown occupied dens be discovered within 1-mile of activities, work would cease and the USFWS contacted for guidance.

SAE would perform an aerial FLIR survey¹ with the approval of USFWS, as required by USFWS Incidental Take Regulations. Den detection surveys are generally conducted during the first half of December. The area covered by the FLIR survey would depend on the USFWS requirement.

Community Relations

SAE is coordinating with the Native Village of Kaktovik and Kaktovik Iñupiat Corporation to ensure communication with the community as well as to reduce winter surveys occurring during peak subsistence activity. SAE has proposed providing a daily map of activity to be displayed in the community for subsistence users and would employ subsistence representatives. This is the same map that SAE would provide to all stakeholders.

SAE would establish an oversight panel for subsistence and the native communities to address subsistence issues and report back to the communities near the project area and the agencies overseeing the project. If a permit is authorized, the Kaktovik oversight panel would be formed in the fall of 2018 in advance of the winter survey season. The Subsistence Oversight Panel would be designed to fit the community's needs and tailored to the unique subsistence activities of Kaktovik hunters. The panel would be comprised of subsistence users identified during community meetings and through guidance from KIC and the Native Village of Kaktovik and would include:

- One subsistence user from Kaktovik
- One subsistence representative from crew operations
- One KIC representative
- One SAE representative
- One ASRC representative

The proposed oversight panel would: 1) Meet with the community of Kaktovik prior to the season start to discuss the concerns; 2) Document past subsistence activities in the area; 3) Work

¹ Thermal imaging survey

with a biologist hired by SAE on any wildlife or environmental issues, if necessary 4) Conduct advanced crew scouting with a subsistence representative; 5) Staff a subsistence observer on each crew-each shift to scout with the survey crew teams and consult on any unknown subsistence or cultural sites; and 6) Address any key issues with communities.