Questions and Responses from June and October Community Information Sessions

TGS NOPEC Geophysical Company ASA, Petroleum GeoServices and Multi Klient Invest AS

Northeastern Canada 2D Seismic Exploration Survey

November 2012

Introduction

This document has been prepared to share information and to continue communication with the communities of Kimmirut, Iqaluit, Pangnirtung, Qikiqtarjuaq, Clyde River and Pond Inlet. The questions in this document were asked in information sessions held in the communities in June and October 2012. Some of the responses were provided during the community sessions, however a few required additional research. All responses are included in this document.

All sources referenced throughout the report will be available at the hamlet office, or provided by email, upon request.

The questions and responses have been grouped into three subject areas:

- The Proposed Project
- Marine Mammals
- Seismic Surveys

The Proposed Project

Question: Who are you? What is the company that is doing this?
Response: We work for a company called NEXUS Coastal Resource Management. Our company was hired by Multi Klient Invest to facilitate dialogue with the communities. Multi Klient Invest AS is the company that will be operating and conducting the proposed 2D Seismic Survey.

Question: How far (depth) is it from the air gun to the ocean floor?
Response: The distance between the air gun and the ocean floor depends on the ocean bathymetry. The project map illustrates the bathymetry of Baffin Bay and Davis Strait. Bathymetry tells us how far away the ocean floor is from the surface. Since the air gun will be relatively near the surface of water (approximately 9 metres, or 27 feet), we can use the bathymetry to tell us how far the air gun will be from the surface. On this map, the darker the colour, going from light purple to dark blue, the further the ocean floor is from the surface. In some areas (dark blue), the air gun will be as far as 5km, roughly 15,000 feet or as close as 500 metres, which is roughly 1500 feet from the ocean floor.

Question: How long will the project take to complete?
Response: The proposed project could be over a span of five years, based on the results of the first year. The survey vessel will only be in operation during the ice-free months.

Question: How much impact will it (the proposed project) have?
Response: The design of the 2D seismic survey includes mitigation measures to lessen the project's impact on the environment. These mitigation measures include a 20 minute ramp up procedure, marine mammal observers, fisheries liaison officers, pollution prevention protocols, and communicating with communities. Past projects have shown that 2D seismic surveys have caused little to no effect to the marine environment.

Question: If and when something goes wrong on the project, is the company held accountable? How?
Response: The Project Proponents are committed to protecting the environment. There are protocols in place to prevent and clean up environmental damage caused by a vessel. These protocols follow international standards and regulations. The Arctic Shipping Pollution Prevention Act (ASPPA) and the Arctic Shipping Pollution Prevention Regulators (ASPPR) develop the protocols for having a vessel in Arctic waters. In addition, the vessel will have contingency plans and safety management systems on board. Also, the vessel will avoid areas of ice, as the survey cannot be completed near ice. This will reduce the chance of collision with an iceberg or ice floe.

Question: Was it the company's strategy to do this last minute so not many people would show up to the meeting?
Response: No, as was explained during the sessions, and in prior communications with the Hamlet, this information session is the first step of the engagement process. It was not the company's intention to have the meeting at the last minute. The purpose of this meeting is to explain the project and to gather community members' questions, concerns and suggestions and bring those questions, concerns and suggestions to the company. Communication with your community will continue. This can be in the form of further meetings, newspaper ads, posters, radio announcements, mail and email. Due to feedback about the meeting time, all future meetings will take into consideration that this is not an ideal time for public meetings.

Question: What happens with the information? Who has access?
Response: The information collected from the 2D seismic survey will be collected and held by the Project Proponent.

Question: What if they notice a lot of algae in the water during the survey? What will happen? Will the survey stop?
Response: This has been researched in the past. Studies have shown that algae are not negatively affected by the sound produced from 2D Seismic Surveys. The survey will not stop.

Question: This information is for the benefit of an oil company? For oil exploration, correct?
Response: The data and information documented throughout the survey can be used in a number of ways. In addition to learning about what's below the ocean floor, information about whales, fish, and the marine environment will be collected. The information collected may influence decisions that are made in the community. For example, we can further our understanding about whale migratory paths. The information collected about what's below the ocean floor is property of the Project Proponent and as such, they can sell that information to other companies.

Question: What type of benefit could a seismic test have (to residents)?
Response: There will be opportunities for residents to work on the project. As we have discussed, Marine Mammal Observers and Fisheries Liaison Officers will be hired from Nunavut. Community members that are trained to be Marine Mammal Observers and Fisheries Liaison Officers will bring new skills and knowledge back to Nunavut.

Question: What will the negative impacts be (from the project)?
Response: The potential impacts from the project may vary but a number of mitigation measures will be implemented to avoid or diminish these impacts. Possible effects of the project

on whales include short term behavioural changes and temporary hearing loss. As we have mentioned, the Project Proponents will be taking precautionary steps to avoid the possible negative effect of the project. These measures include following the 'Canadian Statement of Practice with respect to the Mitigation of Seismic Sound in the Marine Environment', having a Fisheries Liaison Officer to communicate with the fishery, and following the protocols put in place by Arctic Shipping Pollution Prevention Act (ASPPA), safety management systems, contingency plans, and the Arctic Shipping Pollution Prevention Regulators (ASPPR).

Question: Is this not the same project as the other seismic survey in Lancaster Sound that got stopped in 2010?
Response: No, this is not the Lancaster Sound project from 2010. This is a different project in a different area that is funded and operated by a different company.

Question: Will I have a say?
Response: Yes, that is why we are here. We are here on behalf of the Project Proponents to discuss the project with your community and to document your questions, concerns and ideas about this project. The Project Proponents would like to work with communities to so that the project can be mutually beneficial.

Question: What is the research for?
Answer: The research is to better understand the ocean floor for potential resource development

Question: Who is funding the project?
Answer: Multi Klient Invest is funding this project. They are wholly owned subsidiary of Petroleum GeoServices.

Question: Who is buying the data collected?
Answer: At this point in time no one has purchased the data collected. However, potential buyers of such information may include commercial fishery organizations, the Government and industry.

Marine Mammals

Question: Will the sound impact marine mammal migration?
Response: Sound generated by humans has been shown to impact some marine mammal migration. Determining the nature of the impact is a complex subject and depends on a variety of factors including: species, sex, age, presence of offspring, prior experience, time of year, location of the survey, and many others.

Bowhead whales have been shown to alter their migratory route by twenty to thirty kilometers in order to avoid the noise from seismic testing (Richardson, Miller & Greene, 1999). Humpback whales, gray whales and harbour porpoises have shown similar changes in behaviour, while some other species, such as sperm whales, have been shown to be far less deterred by the noise (Weilgart, 2007). However, summering bowheads showed no detectable avoidance of seismic surveys, no change in general activities or call activities (Richardson et al., 2007 in Weilgart, 2007).

While whales seem to generally avoid seismic noise, it has also been shown that some species, such as the humpback whale, will return to follow their normal migration route once they have passed the area of disturbance (McCauley et al. 2000). Determining the effect of man-made noise on migrating marine mammals remains highly uncertain.

Question: Is there research from Greenland that says if whales were harmed?
Response: Currently there are no scientific studies from Greenland looking at the effect of recent seismic survey activity on whales. This year a study was released providing insight into the seasonal presence of background noise in the North Atlantic (Klink et al, 2012). Observed seasonal variations in background noise levels were caused by human activities (seismic surveys, commercial shipping), ocean surface wind and whales communicating. The study did not determine if a seismic survey affected blue, fin and sperm whales. However, sounds from blue, fin and sperm whales were recorded seasonally at both study locations (Klink et al, 2012).

The National Environmental Research Institute of Denmark has also released guidelines for Environmental Impact Assessments in Greenland (Boertmann et al, 2009), which lists beluga, narwhal and bowhead whales, as well as walrus, as species particularly sensitive to seismic surveys (p.22).

Question: Is there an impact on hearing to whales and seals?
Response: It is difficult to know if an animal is negatively impacted as a result of this project. It is not ethical to capture marine mammals and subject them to testing in captivity. The available information on the impact of man-made noise to marine mammals and seals have been from modeling and direct observations during seismic surveys. Several papers have used models to predict the impact of sound intensity, measured in decibels (dB), on the hearing of marine mammals. The 'Canadian Statement of Practice on the Mitigation of Seismic Noise in the Marine Environment' states that at 500m, or 1500 feet, the sound intensity is at a level where no permanent damage would occur to marine mammals (based on what is known about marine mammals).

Question: Will the narwhal conservation area be bothered after this project is completed?
Response: No survey activity will occur within the narwhal conservation area and proposed seismic survey activity surrounding the conservation area is minimal. However, to mitigate any potential effects of the project on narwhal and other marine mammals during the proposed project, the proposed project will adhere to the 'Canadian Statement of Practice on the Mitigation of Seismic Noise in the Marine Environment'. If additional projects were to occur after this proposed 2D Seismic Survey, then Environmental Assessments would need to be completed for each project.

Question: Will the survey impact narwhal?
Response: The potential impacts, if any, on narwhal and other marine mammals will vary. These impacts may include behavioral changes, loss of hearing and the potential for death (if a marine mammal is directly underneath the sound source). However, to our knowledge, no marine mammal deaths have been directly linked to seismic surveys. The effect of seismic surveys on marine mammals will vary depending on the species and individuals within a species.

To limit the potential effect of the proposed project on narwhal and other marine mammals, the project proponent will implement mitigation measures. These mitigation measures include a 20-

minute ramp up procedure, marine mammal observers and passive acoustic monitoring. In addition, the proposed project will adhere to the 'Canadian Statement of Practice on the Mitigation of Seismic Noise in the Marine Environment'.

Question: How can you determine if you have harmed a marine mammal?
Response: In the marine environment, it is difficult to determine if a project has an effect on marine mammals as marine mammals are constantly moving and there are other factors in the environment that can affect marine mammals. These other factors can include ships, earthquakes, and icebergs breaking apart. To limit the potential effect of this project on marine mammals, the project will follow the 'Canadian Statement of Practice with respect to the Mitigation of Seismic Sound in the Marine Environment'.

Question: How would you know that whales are there if they are under water?
Response: Some surveys use passive acoustic monitoring, which will allow the vessel to listen for the whales under water. Passive acoustic monitoring is a technique used to listen for whales under the water. A hydrophone, which is an underwater microphone, is placed in the water and people listen to the hydrophone for sounds that whales make. Passive acoustic monitoring is being researched as a possible option for this project

In addition, there will be Marine Mammal Observers on board the survey vessel looking for whales at the surface of the water.

Question: What will happen if the animals are negatively impacted?
Response: It is difficult to know if an animal is negatively impacted as a result of this project. As we have mentioned, the project will follow the "Canadian Statement of Practice with respect to the Mitigation of Seismic Sound in the Marine Environment". The Canadian Statement of Practice was developed to lessen the potential for seismic survey to effect the marine environment.

Seismic Surveys

Question: If I were beside the air gun in the water would I survive?
Response: Determining the effects of a seismic blast on living creatures is a complex task which is not well understood. This is due to the difference in characteristics of sound in air versus water, different methods of measuring sound intensity and the range of frequencies which are able to be heard by a given creature (Cummings, 2003). While it is not possible to say for certain if a person could survive the blast from an air gun, they would certainly experience negative effects. One report suggests that the lethal zone for marine mammals from a large seismic air gun array is 7 meters (approximately 21 feet) (Parvin, Nedwell & Harland, 2007). Despite the lack of conclusive scientific evidence, the blasts from air guns are still considered "potentially lethal" (Popper and Hastings, 2009). Organisms close to the blast risk organ damage from the potential rupture of gas-filled cavities, such as the lungs or ears (Weilgart, 2007).

Question: Have there been any differences in the sand/mud or microorganisms on the ocean floor from seismic surveys?
Response: Studies have shown that algae and other microorganisms are not negatively affected by the sound produced from 2D seismic surveys.

Question: How far is the after affect going to carry?
Answer: Sound travels further in the water than in the air. Noise from other boats, and natural phenomenon, like earthquakes can be heard throughout the oceans. This constant background noise is present throughout the oceans and whales have begun to adapt to this noise by communicating in higher frequencies.

The effect of the seismic survey in a distance, will contribute to this background noise, but only for a short period of time. It is impossible to determine how far such as 100km or 1000km the sound from the project will travel and be distinguishable from other noises in the environment.

Question: How far does the sound travel under water?
Answer: The sound source will be pointed at the bottom of the ocean. However, there will be some sound that travels outwards from the sound source and sound will bounce off the ocean floor to be reflected back to the survey equipment.

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