National Energy Board

Office national de l'énergie

Environmental Assessment Report for the

NORTHEASTERN CANADA 2D SEISMIC SURVEY

(Baffin Bay/Davis Strait)

Canada

CANADA OIL AND GAS OPERATIONS ACT (COGOA)

ENVIRONMENTAL ASSESSMENT REPORT EXECUTIVE SUMMARY

TGS NOPEC Geophysical Company ASA and MultiKlient Invest AS (MKI), a wholly-owned subsidiary of Petroleum GeoServices (PGS), have entered into a joint venture to conduct a two dimensional (2D) seismic survey in Baffin Bay and Davis Strait over five years during the open water season (July-Nov) beginning in 2014 (the Project). MKI would be the company that operates the Project if it is approved. MKI has applied to the National Energy Board (Board) for a geophysical operations authorization for the Project under paragraph 5(1)(b) of the COGOA.

MKI's proposed Project is located seaward of Canada's 12 nautical mile boundary and outside of the Outer Land Fast Ice Zone to the Greenland border. The northern extent of the program is approximately 180 km from the mouth of Lancaster Sound, extending south to the 61 N parallel. The Project would collect up to approximately16,173 km of 2D seismic data. The Project includes the use of seismic arrays, a support vessel, and associated re-supplying activities.

When TGS, PGS and MKI filed the preliminary Project description on 8 January 2011, the Board was required to undertake an environmental assessment (EA) for the Project under the former *Canadian Environmental Assessment Act* (CEA Act). Following the repeal of the CEA Act and the enactment of the *Canadian Environmental Assessment Act, 2012* on 6 July 2012, the Board continued its EA under the COGOA.

The Board has considered the information provided by MKI, government authorities, Inuit groups, and the general public in its review of the Project. The analysis in this EA Report is based on evidence on the record for the Project, including the information received from public meetings held in Pond Inlet, Clyde River, Qikiqtarjuaq and Iqaluit, Nunavut.

As detailed in this EA Report, various potential adverse environmental effects of the Project were assessed including effects on marine mammals, traditional harvesting, and commercial fishing. The NEB is of the view that, taking into account MKI's implementation of its proposed commitments, environmental protection procedures and mitigation measures, and through its compliance with the Board's regulatory requirements and the conditions included in this EA Report, the Project would not be likely to cause significant adverse environmental effects.

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LIST OF ABBREVIATIONS

2D	two-dimensional
AANDC	Aboriginal Affairs and Northern Development Canada
AFA	Arctic Fisheries Alliance LP
BFC	Baffin Fisheries Coalition
Board or NEB	National Energy Board
CCO	Chief Conservation Officer
CEA Act	*Canadian Environmental Assessment Act*
CEA Act 2012	*Canadian Environmental Assessment Act, 2012*
COGOA	*Canada Oil and Gas Operations Act*
COSEWIC	Committee on the Status of Endangered Wildlife in Canada
CWS	Canadian Wildlife Service
dB	decibel
DFO	Fisheries and Oceans Canada
EA	Environmental Assessment
EC	Environment Canada
FCN	Federal Coordination Notification
GHG	greenhouse gas
in^3	cubic inch
IQ	Inuit Qaujimajatuqangit (Inuit Traditional Knowledge)
km	kilometre
km^2	square kilometre
m	metre
MARPOL	International Convention for the Prevention of Pollution from Ships
mm	millimeter
MMO	Marine Mammal Observer
MKI	MultiKlient Invest AS
PGS	Petroleum GeoServices
the Project	NorthEastern Canada 2D Seismic Survey in Baffin Bay/Davis Strait
QIA	Qikiqtani Inuit Association
SARA	*Species at Risk Act*
SOPEP	Shipboard Oil Pollution Emergency Plan
TGS	TGS NOPEC Geophysical Company ASA

1.0 INTRODUCTION

TGS NOPEC Geophysical Company ASA (TGS) and MultiKlient Invest AS (MKI), a wholly-owned subsidiary of Petroleum GeoServices (PGS), have entered into a joint venture to conduct a two dimensional (2D) seismic survey in Baffin Bay and Davis Strait over five years during the open water season (July-Nov) beginning in 2014 (the Project). MKI would be the company that operates the Project if it is approved. MKI has applied to the National Energy Board (NEB or Board) for a geophysical operations authorization for the Project under paragraph 5(1)(b) of the *Canada Oil and Gas Operations Act* (COGOA).

1.1 Project Overview

The seismic survey would involve a seismic ship travelling back and forth across the area shown in the map below (Map 1) towing an array of airguns that produce pulses of sound waves under the water. The sound waves pass through the water and into the rock below the seabed. The reflected sound waves from the rock layers are detected and recorded by listening devices on the streamers called hydrophones, which are also towed by the seismic survey ship. The loudness of the airguns is estimated to be 230 decibels at a distance of 1 meter away, and will be repeated every 13 to 15 seconds, 24 hours a day while operating. The Project would collect up to approximately 16,173 km of 2D seismic data.

Section 4.0 provides a detailed description of the work associated with the Project.

1.2 Project Purpose

MKI has proposed the Project to gain a better understanding of the offshore geology in Baffin Bay and Davis Strait and determine the regional extent of geological formations. MKI believes a high-quality modern regional data set is required to compliment historic data. The results of the survey may be used to inform new exploration activities.

1.3 Baseline Information and Sources

The analysis in this Environmental Assessment Report (EA Report) is based on MKI's Environmental Impact Assessment and responses to information requests as well as letters of comment from various communities and fisheries organizations, Fisheries and Oceans Canada (DFO), Environment Canada (EC), the Government of Nunavut and oral comments from community members provided during public meetings conducted by the NEB.

Information filed with the NEB pertaining to the environmental assessment can be found on the NEB website (www.neb-one.gc.ca) by following the North/Offshore Public Registries link. For more details on how to obtain documents, please contact the Chief Conservation Officer (CCO) at the address specified in Section 9.0 of this EA Report.

2.0 ENVIRONMENTAL ASSESSMENT PROCESS

When TGS, PGS and MKI filed a preliminary Project description on 8 January 2011, the NEB was required to undertake an environmental assessment (EA) under the *Canadian Environmental Assessment Act* (CEA Act) because the Project required an authorization under paragraph 5(1)(b) of the COGOA.

The Nunavut Planning Commission determined on 19 January 2011 that the proposed Project falls outside the boundaries of the North Baffin Regional Land Use Plan and that no conformity review with the approved plan is required; consequently the Project was not forwarded to the Nunavut Impact Review Board for screening.

On 6 July 2012, the CEA Act was repealed and the *Canadian Environmental Assessment Act, 2012* (CEA Act 2012) was enacted. The Project is not captured by the CEA Act 2012 or the transitional provisions and an EA under the CEA Act 2012 is not required. The Board continues to have a mandate under the COGOA to consider the environmental effects of the Project.

2.1 EA Coordination Process

Under the CEA Act the NEB was the Federal Environmental Assessment Coordinator for the Project. On 26 January 2011, the NEB issued a Federal Coordination Notification (FCN) letter pursuant to section 5 of the CEA Act *Regulations Respecting the Coordination by Federal Authorities of Environmental Assessment Procedures and Requirements* to identify the potential involvement of federal departments in the EA process. EC, DFO and Natural Resources Canada identified themselves as a Federal Authority in possession of specialist or expert information or knowledge necessary to conduct the EA for this Project.

The FCN letter was also circulated to the Canadian Environmental Assessment Agency, the Nunavut Impact Review Board, the Government of Nunavut, the Qikiqtani Inuit Association (QIA), World Wildlife Fund – Canada, Oceans North, the Canada and Newfoundland Offshore Petroleum Board, Aboriginal Affairs and Northern Development Canada (AANDC) and Foreign Affairs and International Trade Canada for their information.

2.2 Public Participation in the EA Process

On 14 June 2011, the NEB determined that public participation pursuant to subsection 18(3) of the CEA Act was appropriate for EA of this Project. After the CEA Act was repealed, MKI partially waived the privilege provided by the *Canada Petroleum Resources Act* by consenting to the disclosure of materials related to the EA for the Project. This enabled public participation in the Project's EA process to continue.

On 23 June 2011, the NEB withdrew the CCO's delegation to consider the Project application. The NEB subsequently authorized Board Member David Hamilton to report and make

recommendations to the Board on the Project application under section 15 of the *National Energy Board Act*.

The Board facilitated public participation by maintaining a public registry on the NEB website[1], releasing a discussion paper for public comment, and holding public meetings in the communities of Pond Inlet, Clyde River, Qikiqtarjuaq and Iqaluit to collect oral comments on the Project.

EC, the Government of Nunavut, DFO, the QIA, fisheries associations, and various Inuit communities submitted letters of comment to the NEB regarding the Project. Aboriginal consultation is further discussed in Section 6.0 of this EA Report.

2.3 The NEB's EA Methodology

The Board's approach to assessing the environmental effects of the Project begins with a description of the Project (Section 4.0), a description of the setting and the environmental and socio-economic elements within that setting (Section 5.0), and a summary of environmental and socio-economic concerns raised by the public (Section 6.0). Based on these, the NEB identified Project-environment interactions expected to occur and any resulting potential adverse environmental effects (Section 7.1). If there were no expected Project-environment interactions, or interactions resulted in positive or neutral effects then no further examination was deemed necessary.

The NEB then assessed the potential adverse environmental and socio-economic effects, as well as the adequacy of the applicant's proposed environmental protection strategies and mitigation measures (Section 7.2). Where there were any residual effects remaining after proposed mitigation, cumulative effects were considered (Section 7.3). Conditions of approval related environmental matters are listed in Section 7.4. The NEB's determination of significance is provided in Section 8.0.

3.0 SCOPE OF THE EA

In initiating the EA under the CEA Act, the NEB considered the factors set out in paragraphs 16(1)(a) through (d) of the CEA Act. After the CEA Act was repealed, and given the status of the EA, the Board found it appropriate to retain this scope for the remainder of its EA under COGOA. The scope of the EA includes the Project's proposed seismic operations and related activities within the Project area, as described in Section 4.0.

[1] Documents related to the EA of the Project can be accessed on the public registry at http://www.neb-one.gc.ca/clf-nsi/rthnb/nrthffshr/dclrtnsgnfcntcmmrcldscvr/tgspgs2011nrthstrncnd/tgspgs2011nrthstrncnd-eng.html.

3.1 Future Exploration

This EA Report does not assess the effects of future exploration or the potential impacts of offshore drilling. The Board is not aware of any future plans for seismic exploration in this area. Currently there are no active exploration licences in the Baffin Bay and Davis Strait area.

3.2 Strategic or Regional Environmental Assessments

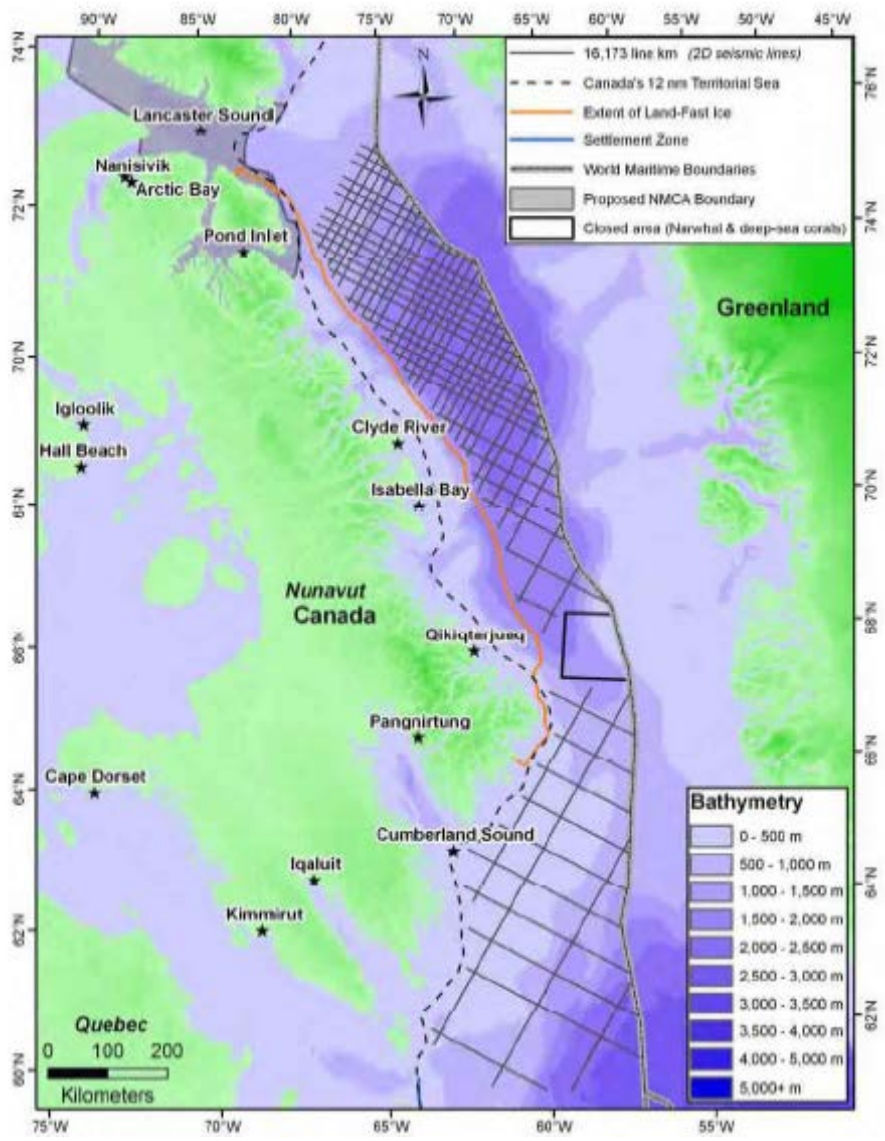
A strategic or regional environmental assessment has not been completed for the area in which the Project is proposed. A strategic environmental assessment is an initiative that may be undertaken by AANDC in the future and could be used to assist in making decisions with respect to issuing exploration licences, among other things. The NEB is required to assess applications that are before the Board on a case-by-case basis. The Board's determination of the Project's potential for significant environmental impacts under COGOA is independent of possible or pending strategic or regional assessments and planning or management processes, although such information would be considered if it were available and appropriate.

4.0 DESCRIPTION OF THE PROJECT

4.1 Location

The proposed Project will occur seaward of Canada's 12 nautical mile boundary and outside of the Outer Land Fast Ice Zone to the Greenland border (see Map 1 below). The northern extent of the seismic survey is approximately 180 km from the mouth of the proposed Lancaster Sound National Marine Conservation Area extending south to the 61 N parallel. The majority of the Project will be conducted in deep waters covering an area of approximately 16,173 linear kilometres.

Map 1: Project Location



4.2 Project Timing

The survey is proposed to be conducted in the open water season (from July through to November), depending on weather and ice conditions, for up to 5 years starting in 2014.

4.3 Project Components

The Project is comprised of the activities described in the following table.

Description of Physical Activities
Seismic Data Acquisition: ▪ A source (airgun) array, containing up to 34 active airguns in total (in three sub-arrays) would be towed behind a seismic vessel to generate sound energy. ▪ The airgun array has a total volume of 4135 in^3 and would discharge alternately every 13 to 15 seconds, and would operate 24 hrs per day. ▪ The airguns would produce sound energy that can be measured in decibels (dB). The peak sound pressure level from the company's seismic array would be approximately 230 dB at a distance of 1 m from the array. Sound levels from the arrays would drop rapidly with distance away from the array, and sound energy traveling horizontally away from the arrays would be less than those traveling vertically. The sound generating source will be adapted to reduce received sound levels to 180dB within a 500 meter safety radius. ▪ A solid streamer would be towed behind the seismic vessel, which contains positioning transceivers and hydrophones that would receive and record sound data. ▪ Streamers are filled with solid polyurethane foam and towed at a depth of 4 m to 10 m below the ocean surface. ▪ Streamers would extend approximately 10,050 m behind the seismic vessel.
Seismic and Support Vessel Travel and Operations: ▪ The proposed seismic vessel is a heli-deck equipped, ICE-C class vessel that measures 86 m long and 16 m wide, has a draft of 5.8 m, and would accommodate a crew of 47 persons. The seismic vessel would operate at a cruising speed of 13 knots when mobilizing to and demobilizing from the area of operations, and would operate at an average speed of 5 knots when acquiring seismic information. ▪ Waste suitable for incineration will be incinerated on board. Glass, metals etc. will be segregated and sent ashore. Sewage is treated through the onboard sewage treatment plant before discharge. Food waste would be ground (macerated) and discharged from the vessel at a minimum distance of 12 nautical miles from shore. ▪ The seismic vessel would mobilize to the Baffin Bay/Davis Strait via St. Johns Newfoundland. ▪ The supply vessel will provide supplies to the seismic vessel and assist in emergency situations. The supply vessel may also be used to survey the way ahead for hazards and will be staffed by a Marine Mammal Observer (MMO) and a Fisheries Liaison Officer. ▪ The program will not require refuelling at sea.

Description of Physical Activities
Non-Seismic Data Collection Activities: ▪ Passive Acoustic Monitoring of marine mammals would be initiated on a trial basis to monitor the presence of cetaceans. ▪ A gravity meter and operator will be onboard the vessel.

5.0 DESCRIPTION OF THE ENVIRONMENT

5.1 Biophysical Conditions

5.1.1 Marine Environment

The Project occurs within the Arctic Climatic Region, which is characterized by mean annual air temperatures below 10 degrees Celsuis. Water depths range from 350 m to 3,660 m in the southern area of the Davis Strait. Sea ice is present in the Project area. Open water periods may start as early as June when openings appear in Baffin Bay. Generally, Baffin Bay and Davis Strait are cleared of all sea ice by mid-August. Freeze-up may start as early as late August in Western Baffin Bay; however, there is considerable inter-annual variability. Wind north of 65 degrees N, has an annual speed of 5-6 meters/second that increases south of 65 degrees N to 7-8 metres/second. The minimum wind speed is reached during mid-summer throughout the region; however, maximum wind speeds can be reached as early as October or November.

The Davis Strait is over 950 km across at its greatest width and at least 300 km wide at its most narrow location. Surface water circulation in the Strait is strongly affected by counter-clockwise flowing currents. Sub-marine topography includes an undersea ridge which is the continuation of the mid-Labrador ridge, extending from the coast of Baffin Island to Greenland.

5.1.2 Wildlife

Wildlife in the Project area includes marine mammals such as bowhead, Beluga, and killer whales; Narwhal; harbour porpoise; polar bears; walrus; and ring, harbour, bearded, hooded and harp seals. Marine birds, fish and marine invertebrates are also present in the Project area.

Marine Mammals

The Hudson Bay/Foxe Basin and Davis Strait/Baffin Bay populations of bowhead whales have been identified as ‘Threatened’ by both the federal *Species at Risk Act* (SARA) and the Committee on the Status of Endangered Wildlife in Canada (COSEWIC). Bowhead whales are often associated with the edge of pack ice and move closer to shore in the summer months. Bowheads migrate large distances throughout the eastern Canadian Arctic from both Foxe Basin and Baffin Bay regions. Bowheads that have been tagged in west Greenland generally moved westward across Davis Strait using leads in the ice in the spring to the Lancaster Sound and northern Baffin Island region in the summer. Migrating bowheads may be encountered in offshore regions, especially in the areas east of Bylot Island. Bowheads using the east coast of Baffin Island in August and September may also be encountered. Habitat modeling indicates at

least one area of highly suitable bowhead habitat may exist along the eastern shore of Baffin Island within 30 km of shore.

Narwhal are present throughout the eastern arctic and common in coastal areas. COSEWIC and SARA have identified the population as “Special Concern”. It is believed most Narwhal overwinter in Baffin Bay, Davis Strait and Hudson Strait. The whales will move up the leads into Pond Inlet and Lancaster Sound when the pack ice breaks up. Studies conducted by DFO indicate Narwhal show a preference for deep fjords and the continental slope along eastern Baffin Island in the summer and fall. Narwhal are typically hunted from May through September. A portion of the Narwhal over-wintering area in Davis Strait is closed to Greenland halibut fishing; the Narwhal don’t typically enter this area until November.

Beluga whales overwinter in highly productive areas like Baffin Bay, Hudson Strait and Davis Strait. Their summer ranges tend to be in warm shallow bays and estuaries of large rivers. Beluga will migrate south in the fall to overwinter amongst the pack ice, in leads and polynyas where open water provides access to air. It is unlikely Beluga will be encountered in the offshore during the seismic program as they will be in the shallow estuarine areas for the summer. The Cumberland Sound Beluga population has been listed as “Threatened” by SARA and COSEWIC, whereas the Eastern Hudson’s Bay Beluga populations are assigned a status of “Endangered”. Beluga are harvested year-round by community members.

Killer whales will frequent the Baffin Bay and Davis Strait area in summer and are often seen inshore during the spring and summer. Information regarding their use of offshore habitat is limited. Similarly, there is little information on the Harbour Porpoise. Since they are not commonly found in deep oceanic waters it is unlikely they will be encountered during the seismic program.

Several pinnipeds including ringed, harp, harbour and hooded seals are found within the study area; the ringed seal being the most common. The Atlantic walrus is hunted in the Nunavut region year round, their habitat preference being shallow near shore areas with high bivalve productivity.

The Baffin Bay and Davis Strait polar bear populations overlap with the study area. Seasonal distribution of polar bears is largely dependant on the seasonal variation in sea-ice conditions. The main prey of the polar bear is ringed seals. Polar bears within Baffin Bay and Davis Strait typically spend the open-water season on Bylot Island and the shores of Baffin Island; it is therefore unlikely they will be encountered during the seismic program.

The following species are listed in the SARA.

Species	Scientific Name	COSEWIC Designation	SARA Status
Bowhead whale (Eastern Arctic population)	*Balaena mysticetus*	Non-active	Endangered
Narwhal	*Monodon monoceros*	Special concern	No Status
Beluga Whale (Eastern Hudson Bay Population)	*Delphinapterus leucas*	Endangered	No Status
Harbour Porpoise	*Phocoena phocoena*	Special concern	Threatened
Atlantic Walrus	*Odobenus rosmarus rosmarus*	Special concern	No status
Polar Bear	*Ursus maritmus*	Special concern	Special concern

Marine Birds

There are several species of seabirds that are associated with the waters of Davis Strait. Most species and individuals occur near the coast, with the diversity and abundance of marine birds decreasing in areas further offshore. The most commonly occurring marine birds in the offshore areas include thick-billed murr, dovekie, black-legged kittiwake, Icelandic gull, common eider, glaucous gull, northern fulmar, king eider, Thayer's gull, and black guillemot.

The Ivory Gull, which may occur in the project area, is listed in the SARA.

Species	Scientific Name	COSEWIC Designation	SARA Status
Ivory Gull	*Pagophila eburnea*	Endangered	Endangered

Fish and Marine Invertebrates

Over 183 species of fish have been identified within the following 3 ecozones: Baffin Bay-Davis Strait Offshore, Lancaster Sound region and Baffin Bay-Davis Strait near shore. Arctic cod, Arctic sculpin, fish doctor, two horn sculpin and rock grenadier are some of the first species to be studied in the region. Greenland halibut or Greenland turbot form one of the commercial fisheries in the region, northern shrimp forming the other.

Among marine invertebrates, copepods dominate the zooplankton community in Baffin Bay and Davis Strait with other groups such as chaetognaths, amphipods, gastropods, ctenophores and hydrozoans also being important. The zooplankton planktonic ecosystem in the region is characterized by a brief summer period of intense productivity following the spring phytoplankton bloom.

Benthic invertebrates occurring in the Project area include: arthropods, molluscs, echinoderms, annelids, terebellid, and polychaetes. The Northern shrimp is the most important commercial invertebrate species within the project area.

5.2 Traditional Land and Resource Use

The primary land uses in the Project area are subsistence hunting and fishing. Of particular importance are the harvesting activities related to marine species from coastal communities (including Iqaluit, Pangnirtung, Qikiqtarjuaq, Clyde River and Pond Inlet). MKI relied on two major studies published by the Nunavut Wildlife Management Board for the purposes of the environmental impact assessment; the Nunavut Wildlife Harvest Study and the Final Report of the Inuit Bowhead Knowledge Study. The studies illustrate that harvesting occurs within coastal areas removed from the offshore area of the proposed Project survey lines. Moreover, the seismic survey will take place entirely in waters no closer than 12 nautical miles from the Canadian coastline.

MKI has indicated it will not conduct survey work in fjords, inlets or bays, therefore the survey will not occur near harvesting areas. However, concerns have been raised by Inuit communities regarding the potential effect of seismic operations on harvesting activities.

6.0 ABORIGINAL CONSULTATION

6.1 Consultation Conducted by MKI

MKI has been discussing the Project with Aboriginal groups since January 2011 including meetings with federal and Nunavut departments and agencies, Hunter and Trappers Organizations, and the communities of Clyde River, Pond Inlet, Qikiqtarjuaq, Kimmirut, Pangnirtung and Iqaluit. A summary list of MKI's consultation activities can be found in Appendix 2.

On 31 May 2011, Shari Gearheard filed a petition with the Board from the community of Clyde River opposing the Project. In June 2011, QIA, Arctic Fisheries Alliance LP (AFA) and Baffin Fisheries Coalition (BFC) filed letters of comment with the Board indicating a need for further

consultation between MKI and stakeholders. In July 2011, MKI decided to postpone the Project until the 2012 season so that it could invest more time and resources to consult with the Inuit communities and other stakeholders, achieve a better understanding of Inuit traditional knowledge and build personal relationships. MKI subsequently revised the Project commencement date several times.

NEB Information Request #1 dated 23 February 2012 asked MKI to respond to the letters of comment received by the Board. In response, MKI addressed questions raised by the QIA, AFA, BFC, and Shari Gearheard and committed to conducting an Aboriginal Traditional Knowledge Study. Furthermore, MKI indicated that it had contracted NEXUS Coastal Resource Management to assist in developing an Aboriginal consultation plan. In May 2012, MKI outlined the details of its consultation program in its response to NEB Information Request #2.

As previously discussed, after the CEA Act was repealed in July 2012, MKI enabled public participation in the Project's EA process to continue by partially waiving the privilege provided under the *Canada Petroleum Resources Act*.

Following MKI's community meetings in June, October, November and December 2012, MKI distributed Community Engagement Reports summarizing the meetings, back to the communities they visited and the NEB. In response to comments raised at the June and October meetings MKI circulated a Question and Response Document, as well as a Supplementary Report on marine seismic research and mitigation measures. MKI also translated the Question and Response Document and Supplementary Report into Inuktitut.

General themes that arose from MKI's June 2012 community meetings included:

- Concerns regarding the impact of the Project on traditional resources;
- Interest in economic opportunities for each community that could be available from the Project;
- Willingness to collaborate to ensure negative effects are mitigated; and
- The need for more study/public education on the effect of seismic surveys on fish and whales.

Recommendations made by community members during the meetings included:

- Impact Benefits Agreement with the communities;
- Continuation of consultation and engagement measures;
- Use of Passive Acoustic Monitoring; and

- The undertaking of an Inuit Qaujimatuqangit (IQ) study[2].

MKI participated in the public meetings conducted by the NEB in the communities of Pond Inlet, Clyde River, Qikiqtarjuaq and Iqaluit from 29 April 2013 to 2 May 2013. On behalf of MKI, representatives from NEXUS Coastal, PGS and TGS provided a presentation on the Project and answered questions related to the Project when possible. A number of questions related to MKI's environmental impact assessment were not addressed during the public meetings and MKI committed to following up.

On 30 August 2013, MKI filed with the Board responses to outstanding questions from the NEB's public meetings. MKI assessed the interaction between certain marine mammal species and MKI's Project and used the results to inform its survey acquisition plan. MKI provided additional details on the role of the MMOs and committed to the installation of Passive Acoustic Monitoring onboard the seismic vessel to listen for cetaceans. Passive Acoustic Monitoring can be used during periods of low visibility to delay ramp-up or initiate a shut down if a vocalizing cetacean is heard. MKI also indicated the MMO final observation reports will be shared with communities. Additionally, MKI and its Community Liaison Officers will work with the BFC and AFA to share the timing and location of the program in an effort to avoid interaction between the respective operations.

After the public comment period ended, MKI filed a reply with the Board on 8 November 2013. MKI discussed how it will use IQ in the Project design and how it had accessed all publicly available IQ information about marine mammal movements. MKI indicated that it had applied to the Nunavut Research Institute for a Social Sciences and Traditional Knowledge research permit for an IQ study. MKI will work with the communities closest to the Project, namely Pond Inlet, Clyde River and Qikiqtarjuaq, on the IQ study's design.

In MKI's 8 November 2013 reply, MKI reiterated its commitment to continue consultation with the communities during the Project and after field operations end. MKI indicated that it will have a Community Liaison Officer in four of the communities (Pond Inlet, Clyde River, Qikiqtarjuaq and Iqaluit) to facilitate communication between the MKI and the communities throughout the life of the Project. Within its reply, MKI also provided an update regarding the benefits plan required under the COGOA.

6.2 Participation of Aboriginal Groups in the NEB's Regulatory Process

The NEB's regulatory process was designed to facilitate the participation of Aboriginal groups and to enable them to convey their views on the Project. The NEB determined that public participation in the EA process was appropriate in the circumstances of the Project under subsection 18(3) of the CEA Act. Materials related to the EA were posted on the public registry and important NEB documents were translated into Inuktitut. After the CEA Act was repealed,

[2] IQ has been translated to mean Inuit traditional knowledge and has been defined as a body of knowledge and unique cultural insights of Inuit into the workings of nature, humans and animals.

the NEB obtained a partial waiver from MKI to enable public participation in the Project's EA process to continue.

On 22 March 2013, the NEB issued a discussion paper that outlined potential environmental effects, concerns raised, and mitigation measures relevant to the Project. The NEB also conducted public meetings in the communities of Pond Inlet, Clyde River, Qikiqtarjuaq and Iqaluit from 29 April 2013 to 2 May 2013 for the purpose of collecting oral comments on the Project. NEB staff, Board Member David Hamilton, representatives of MKI and interpretors were present at these meetings. Transcripts from the public meetings were posted on the public registry.

During the NEB's public meetings, community members sought information regarding the effects of previous seismic programs on marine mammals, the acoustic properties of marine seismic, sound modeling for the Project and the potential effects of the Project on walrus, seals and polar bears. MKI was unable to answer numerous questions from community members.

On 31 May 2013, the NEB found that there were deficiencies in the Project application regarding the assessment of socio-economic impacts and Inuit consultation. As a result, the NEB suspended its assessment of the Project application. Additional information was filed by MKI on 30 August 2013 and the NEB resumed its assessment of the application. The NEB accepted written comments on the Project from the public until 31 October 2013.

Aboriginal groups actively participated during the EA process. The NEB received letters of comment from many Inuit communities and organizations including QIA, AFA, BFC, Shari Gearheard on behalf of Clyde River, Pond Inlet community members, Municipality of Clyde River, Mittimatalik Hunters & Trappers Organization of Pond Inlet, and Jennifer Brisksky of Pond Inlet. During the NEB's public meetings, community members asked questions of MKI and the NEB, and expressed their concerns regarding the Project.

Issues and concerns raised by Aboriginal peoples throughout the EA process included the following:

- Environmental impacts on marine mammals (including whale migration routes, calving and feeding), fish and invertebrates;
- Effects on traditional and commercial harvesting, including compensation for losses;
- Adequacy of mitigation of potential harm to marine mammals including ramp up times, low visibility procedures and MMOs;
- Need for discussions with communities and use of IQ;
- Employment opportunities, training and benefits including plans for MMOs;
- The use of seismic data, and future exploration plans and the impacts of offshore drilling;
- The absence of a regional environmental assessment or wildlife management planning efforts; and

- The management of waste, wastewater, and ballast water.

6.3 Views of the Board

The Board finds that MKI has made sufficient efforts to consult with potentially-impacted Aboriginal groups and to address concerns raised. MKI postponed the Project commencement date to invest more time and resources to consult with the Inuit communities. MKI subsequently enhanced its consultation program. MKI provided potentially-impacted Aboriginal groups with adequate information about the Project and gave them the opportunities opportunity to make their views known in a timely manner to MKI and the Board. MKI conducted several community engagement meetings and returned to some communities multiple times. In addition to in-person meetings, details about the Project were provided to Aboriginal groups through Community Engagement Reports, Question and Response Document, Supplementary Report, and EA materials posted on the public registry. MKI translated some of these documents into Inuktitut.

The Board also finds that Aboriginal groups had an adequate opportunity to participate in the NEB's EA process. Aboriginal groups filed letters of comment with the Board, and both QIA and AFA were granted extensions to filing deadlines. Aboriginal groups also had the opportunity to ask questions and bring forward concerns during the NEB's public meetings held in potentially-affected communities. Furthermore, transcripts of these public meetings were accessible on the public registry.

The Board notes that MKI has implemented actions and made commitments as a result of its consultation with Aboriginal groups. For example, MKI has:

- contracted NEXUS Coastal Resource Management to assist in developing an Aboriginal consultation plan;

- committed to employing two Inuit Observers, one on the seismic vessel and the other on the support vessel;

- committed to the installation of Passive Acoustic Monitoring onboard the seismic vessel to listen for marine mammals;

- committed to conduct an Aboriginal Traditional Knowledge Study (IQ) study, and to work with Inuit communities on the design of the study;

- prepared a survey acquisition plan based on an interaction assessment of MKI's Project and certain marine mammal species;

- committed to continuing consultation with Inuit communities throughout the duration of the Project as well as after the conclusion of field operations;

- committed to hiring Community Liaison Officers in four of the communities (Pond Inlet, Clyde River, Qikiqtarjuaq and Iqaluit) to facilitate communication between MKI and the communities;

- committed to the sharing of a final observation report with Inuit communities; and
- committed to working with the BFC and AFA to share the timing and location of the program in an effort to avoid interaction between the respective operations.

Concerns regarding potential environmental effects from the Project on traditional resource use have been addressed by the mitigation measures developed by MKI and detailed in section 7.2 of this EA Report. The Board also recognizes that some concerns raised by Aboriginal groups are beyond the scope of the Project and this EA.

The Board is of the view that MKI meaningfully engaged with Aboriginal groups in respect of the Project to an extent that is commensurate with the scope of the Project. The Board expects MKI to continue its consultation activities with Aboriginal groups throughout the lifecycle of the Project. Conditions outlined in Section 7.4 will require MKI to incorporate available IQ into the Project design, provide MMO reports and status updates of environmental commitments to Inuit communities, and conduct Project update meetings.

7.0 ENVIRONMENTAL EFFECTS ANALYSIS

7.1 Project - Environment Interactions

	Environmental Element	Description of Interaction (How, When, Where)	Potential Adverse Environmental Effect
Bio-physical	Air Quality	Release of emissions from the seismic and the support vessel	Decrease in local ambient air quality. Increase in greenhouse gases (GHGs).
	Water Quality and Quantity	Disposal of sanitary and domestic wastes such as grey and black water, solid waste and food waste, as well as ballast water, bilge water and deck drainage	Decrease in local water quality.
	Marine Mammals (bowhead whales, Beluga whales, killer whales, Narwhal, harbour porpoise, polar bears, seals, and walrus)	Noise and disturbance from increased boat traffic	Sensory disturbance including avoidance behavior. Increased mortality risk (whale strikes).
		Sound produced by airgun array	Sensory and physical disturbance causing: • Temporary reduction in hearing sensitivity • Permanent hearing impairment • Masked communication • Changes in behavior and distribution including avoidance of seismic ship and alteration of migration routes.
	Marine Birds	Vessel lighting	Attraction to ship lighting causing injury or mortality from hitting the ship or becoming stranded or entangled in equipment.

	Environmental Element	Description of Interaction (How, When, Where)	Potential Adverse Environmental Effect
		Noise and disturbance from increased boat traffic and airgun array	Hearing damage from seismic activity. Disturbance including localized avoidance.
	Fish	Sound produced by airgun array	Hearing damage from seismic activity. Masked communication. Disturbance including localized avoidance.
		Noise and disturbance from increased boat traffic	Localized avoidance.
	Marine Invertebrates	Sound produced by airgun array	Horizontal and/or vertical distribution shift. Localized avoidance.
		Noise and disturbance from increased boat traffic	
Socio-Economic	Heritage Resources	No interaction with cultural or heritage resources is apparent due to the offshore nature of the activities	n/a
	Traditional and Commercial Resource Use	The seismic survey has the potential to affect the behavior and movement of marine mammals and commercial fish species	Potential disturbance to traditional and commercial resource use if the survey changes the migration routes of marine mammals or fish.
Other	Accidents/Malfunctions	Accidents and spills would have the potential to release hydrocarbons into the marine environment through fuel loss from a vessel collision	Adverse changes to ecosystem process and marine life presence due to spills or accidents, depending upon the spill or accident characteristics.

	Environmental Element	Description of Interaction (How, When, Where)	Potential Adverse Environmental Effect
	Effects of the Environment on the Project	The potential exists for the environment to interact with the Project through sea and ice conditions. Pack ice and sea waves higher than 4 m that may limit accessibility of the vessel and/or the ability to collect data.	The Project schedule may be altered due to weather shut downs.

7.2 Potential Adverse Environmental Effects and Standard Mitigation

In its Environmental Impact Assessment and responses to information requests, MKI committed to routine design and best practice mitigation measures to reduce each of the potential adverse environmental effects that were categorized in Section 7.1.

Potential Adverse Environmental Effect (as identified in Section 7.1)	Proposed Mitigation Measures
Decrease in local ambient air quality and increase in GHGs	▪ Adherence to MARPOL Annex VI, Regulations for the Prevention of Air Pollution from Ships. ▪ Obtain an Arctic Waters Pollution Prevention Certificate in accordance with the *Arctic Waters Pollution Prevention Act*. ▪ Adherence to the Waste Management Plan and Shipboard Oil Pollution Emergency Plan (SOPEP). ▪ Proper maintenance and routine inspection of ship equipment, minimizing vapor loss from fuel tanks and minimizing idling of equipment when not in use.
Decrease in local water quality	▪ Adherence to MKI's Ballast Water Management Plan, Waste Management Plan, and SOPEP. ▪ The vessel will not refuel at sea. ▪ If oil is suspected to be in ballast water it will be tested and, if necessary, treated to ensure that oil concentrations in the discharge do not exceed 15 mg/L. ▪ Any ballast water discharge will comply with Transport Canada's *Guidelines for the Control of Ballast Water Discharge from Ships in Waters Under Canadian Jurisdiction.* ▪ Bilge water will be treated such that the discharge shall contain no more than 15mg/L of oil. ▪ Machinery spaces will be equipped with drip trays, curbs and gutters and other devices to prevent spilled or leaked materials from entering the water. Materials collected in these devices will be collected within a closed system and be returned to the process cycle, recycled, or transferred ashore.
Impacts from increased boat traffic on marine mammals (bowhead whales, Beluga whales, killer whales, Narwhal, harbour porpoise, polar bears, seals, and walrus)	▪ Vessels would maintain a constant speed of approximately 5 knots while surveying. ▪ Vessel speed/course will be altered in response to weather, traffic, fishing activity and mechanical concerns. ▪ The speed restriction would be expected to minimize the likelihood of marine mammal strikes.

Potential Adverse Environmental Effect (as identified in Section 7.1)	Proposed Mitigation Measures
Impacts from sound produced by airgun array on marine mammals (bowhead whales, Beluga whales, killer whales, Narwhal, harbour porpoise, polar bears, ring, harbour, bearded, hooded and harp seals, and walrus)	▪ Mitigation measures set out in the *Statement of Canadian Practice with Respect to the Mitigation of Seismic Sound in the Marine Environment* (The Statement of Canadian Practice) will be adhered to (see Appendix 3). ▪ Four MMOs will be contracted for the duration of the Project, for each rotation, two of whom will be Inuit Observers and two will be experienced MMOs. MKI taught Marine Mammal Observation training to the students in the Arctic College Environmental program. ▪ A safety radius or shut down zone of 500 meters from the airgun array will be maintained. Airguns will be shut down if any marine mammal enters or is anticipated to enter the 500 meter safety zone through observations by the MMOs. ▪ Airgun start-up procedures will not commence unless a 500 meter safety zone is clear of any marine mammal by visual inspection by a trained MMO for a continuous period of at least 30 minutes. ▪ The airgun array will be "powered down" during transit from one seismic line to another. All guns will be turned off except for one, which will function as a signal intended to alert marine mammals of the presence of the vessel. ▪ Airgun start-up procedures will include a "ramping up" period where a single low volume airgun will fire singly, followed gradually by other airgun units in the array. If a marine mammal is sighted within 500 meters of the array during ramp-up the array will be shut down. ▪ Passive Acoustic Monitoring will be used on a trial basis to monitor the presence of vocalising whales and porpoises and will be used prior to ramp-up during periods of low visibility in accordance with The Statement of Canadian Practice. ▪ The project will not take place in the vicinity of the Nunavut Settlement Area. ▪ Sound modelling was conducted for the first year of survey lines. ▪ Vessels would maintain a constant speed of approximately 5 knots while surveying.
Attraction to vessel lighting causing injury or mortality to marine birds, including species at risk	▪ Searches for stranded birds would be conducted on each vessel daily. Procedures developed by the Canadian Wildlife Service (CWS) and Petro-Canada would be used to handle and release the birds. A CWS Bird Handling Permit would be required.

Potential Adverse Environmental Effect (as identified in Section 7.1)	Proposed Mitigation Measures
Impacts from increased boat traffic and sound produced by airgun array on marine birds, fish and fish habitat, and marine invertebrates including species at risk	▪ Vessels would maintain a constant speed of approximately 5 knots while surveying. The speed restriction would be expected to minimize the likelihood of bird or fish strikes. ▪ Start-up procedures for airgun operations would include 'ramping up' of the airgun array such that the smallest airgun would be activated first and additional airguns would be added gradually over a period of 20 minutes until the full operation levels are reached. Ramping up procedures would be used on all occasions when the airgun source is activated following shutdown. Seabirds, fish and marine invertebrates would therefore be warned as they approach the ship and the array.
Disturbance to traditional and commercial resource use	▪ The location of the seismic activity associated with this project will not take place in the vicinity of the Nunavut Settlement Area. ▪ A 12 km buffer or minimum safe distance will be maintained from the land-fast ice and territorial sea boundaries. ▪ Vessels would maintain a constant speed of approximately 5 knots while surveying. ▪ MKI will issue a notice to mariners posting where and when surveying will be occur. ▪ A Fisheries Liaison Officer will maintain daily communication with the fishing fleets in Baffin Bay and Davis Strait. ▪ MKI will send a daily email to AFA and BFC. ▪ Community Liaison Officers in each of the communities will be notified every 12 hours of the seismic vessel position. ▪ The seismic acquisition plan and scheduling of acquisition lines will be shared with AFA and BFC prior to commencement of the survey. MKI, AFA and BFC will exchange their locations and seasons planning information. ▪ MMOs will be visually scanning the 500 meter safety zone for marine mammals during the seismic survey. ▪ In the case of accidental damage to fishing gear, MKI will have available a gear damage compensation contingency plan to provide appropriate and timely compensation to any affected fisheries participants. ▪ MKI has committed to settling claims for damage to commercial fisheries within 60 days of notice of a claim. ▪ MKI has developed and started implementing a community engagement plan.

Potential Adverse Environmental Effect (as identified in Section 7.1)	Proposed Mitigation Measures
	▪ MKI will conduct follow-up meetings for the purpose of communicating the results of the previous seasons' program.
Adverse changes to ecosystem process and marine life presence due to spills or accidents	▪ All Project vessels would adhere to their International Oil Pollution Prevention Certificates and certified SOPEPs. The SOPEP contains the following: o crew member responsibilities o steps and procedures to contain a discharge of oil into the sea using emergency equipment o onboard reporting procedures o a contact list of authorities o drawings of the fuel and oil lines, oil tanks (including capacity and content), and vents and their location on the vessel o the location of the SOPEP locker with a list of the contents of the locker ▪ The master of the ship has the overall responsibility for implementing the SOPEP. ▪ Solid streamers would be used that do not contain fluids. ▪ In the event of a spill, the NEB, Coast Guard, DFO, EC and Transport Canada would be notified immediately. ▪ Spills that occur in a port will follow a Port Oil Contingency Plan. ▪ The vessel will avoid areas of ice. ▪ The support vessel will be on hand and also has containment equipment on board to deal with a spill. ▪ The vessel carries a maximum of 500,000 liters of fuel.

Views of the Board

The potential for adverse effects to marine mammals, traditional harvesting of marine mammals and fish, and commercial fish harvesting are identified by the NEB as the main concerns associated with the Project. The NEB has carefully considered all potential adverse effects and the proposed mitigation noted above in determining the potential for the Project to result in significant adverse effects.

The Board recognizes that no individual mitigation measure would be able to completely eliminate adverse effects to marine mammals, nor would any individual measure be infallible.

However, collectively, the mitigation measures above would minimize the possibility of marine mammals occurring in close enough proximity to the airgun discharges such that they would suffer permanent or temporary hearing damage or behavioural changes. The NEB finds that the Project's residual effects would likely be of short-term duration, in which individual receptors such as marine mammals would be exposed to effects during the seasonal survey, but the effects would be reversible during the life of the Project. The effects would occur at a local to regional scale and would be of low magnitude.

Additionally, DFO concluded in its letter dated 10 June 2011 that the Project is not likely to result in impacts to fish and fish habitat.

The NEB is of the view that for this Project, if MKI follows the above-mentioned mitigation measures, the commitments made within its application and additional submissions to the NEB, and adheres to the NEB's conditions presented in Section 7.4, the Project is not likely to cause significant adverse environmental effects.

7.3 Cumulative Effects Assessment

The assessment of cumulative effects entails the consideration of projects and activities that have been or will likely be carried out that have or would have residual effects that may act in a cumulative manner with the residual effects of the proposed Project on the environment. A residual effect is an environmental effect that remains, or is predicted to remain, even after mitigation measures have been applied.

Identification of Residual Effects from the Project

Potential adverse effects from the Project are identified in Section 7.1 and mitigation measures for each were noted in Section 7.2 of this report. Those effects that were considered highly localized or negligible in magnitude were not considered in this assessment of cumulative effects, as it was determined they would not have potential to interact with residual effects of other projects in any measurable manner. In consideration of MKI's planned mitigation measures, the Board identified the following residual effects from the Project that have potential to interact cumulatively:

- temporary displacement of marine mammals due to exposure to anthropogenic sound input and vessel traffic; and,
- temporary displacement of fish due to exposure to anthropogenic sound input and vessel traffic.

Identification of Other Projects and Activities

Other activities that would be likely to be carried out in the Project area over the same time period as the Project include:

- commercial fishing;
- commercial shipping (domestic and international); and

- scientific research surveys (which gather data on marine ecosystems, geology, climate, etc.)

The Board has not identified any other likely future seismic projects in the area.

Identification and Mitigation of Potential Cumulative Effects

Additional boat traffic resulting from the activities listed above has the potential to contribute cumulatively to the disturbance to marine mammals and fish. If more than one vessel is operating in the same area at any one time, some localized avoidance behavior by whales might be expected.

Mitigation measures to reduce the exposure of marine mammals and fish to simultaneous and overlapping noise sources include the following:

- MKI will send a daily email to AFA and BFC.
- A Fisheries Liaison Officer will maintain daily communication with the fishing fleets in Baffin Bay and Davis Strait.
- MKI will post notices to mariners indicating where and when surveying will occur.

The above measures will inform vessels of their proximity to each other and provide an opportunity to maintain an appropriate distance.

Cumulative Effects Significance Determination

The NEB finds that any potential cumulative environmental effects would be minimal due to the mitigation measures that would reduce exposure of marine mammals to simultaneous and overlapping noise sources. The NEB notes that displacement of marine mammals and fish would be temporary, and reversible. The distance between MKI's seismic vessel and other vessels in the Project area would decrease the potential for cumulative effects to occur.

Therefore, the NEB has determined that it is not likely that there would be any significant cumulative environmental effects resulting from this Project.

7.4 Conditions

The following environmental conditions will be included in any authorization that the NEB grants:

- MKI shall implement or cause to be implemented all of the commitments, policies, practices, mitigative measures, recommendations and procedures for safety and the protection of the environment referred to in its Project application and subsequent filings.
- MKI shall file with the CCO a fishing gear compensation plan 30 days prior to commencement of the Project, and provide copies to the AFA and the BFC. MKI shall

notify the Board CCO of any claims made with respect to the fishing gear compensation plan and their outcomes as soon as practical.

- MKI shall file with the CCO, for approval, an environmental commitments tracking table that includes all of MKI's environmental commitments and mitigation measures 30 days prior to commencement of the Project. MKI shall also file a status update of the commitments following each operational season, annually by February 15.The commitments tracking status update shall be accessible to the public and provided to all of the parties MKI has consulted with.

- MKI shall file with the CCO a report that describes how available IQ has been considered and incorporated in the Project design 30 days prior to commencement of the Project for each operational season.

- MKI shall file an MMO report with the CCO for each operational season, annually by February 15. MKI shall also file a Final MMO report by February 15 following the final operational season. All MMO reports shall be accessible to the public and provided to all of the parties MKI has consulted with. The MMO reports shall include the following information at a minimum:

    - Number of shut downs
    - Reason for shut downs
    - Duration of shut down
    - Area of shut down zone
    - All marine mammal observations and approximate distances from the seismic vessel
    - Significant weather and visibility conditions
    - Sea bird observations
    - Level of MMO effort and active survey time
    - Results of the Passive Acoustic Monitoring Program and any correlation to marine mammal observations.

- MKI shall provide an update to the CCO prior to each operational season that includes any changes in MKI's Species at Risk assessment and cumulative effects.

- MKI shall conduct Project update meetings in interested communities following each operational season for the duration of the Project. MKI shall file with the CCO, and the communities, a summary of the meetings by February 15 for each operational season. The summary shall include the meeting minutes, identify concerns raised during the meetings and explain how MKI will address these concerns.

8.0 THE NEB'S CONCLUSION

The NEB is of the view that with the implementation of MKI's commitments, environmental protection procedures and mitigation measures, and compliance with the Board's regulatory requirements and conditions included in this EA Report, the Project is not likely to result in significant adverse environmental effects.

9.0 NEB CONTACT

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APPENDIX 1: GLOSSARY OF TERMS

Airgun: An airgun is a specialized sound source that creates underwater sound by releasing a burst of compressed air into the water at great speed. During seismic operations airguns are towed in arrays of several airguns. The airguns are fired simultaneously to generate enough sound for geophysical measurements.

Ballast Water: Refers to water held in tanks on ships to increase stability and maneuverability of the ship during transit. Ballast water may be taken on or released depending on the amount or weight of the ship's cargo or during changing sea conditions.

Bilge water: This is water that collects in the lowest point of a ships hull. Most bilge systems are designed to keep the decks clear of accumulated water during wet weather.

Decibel (dB): A decibel is used to quantify sound levels and is a logarithmic scale rather than a linear scale. The human and marine mammal sense of hearing is also logarithmic so decibels are used for sound measurement. For example 0-20 dB is very faint and 90-100 dB is very loud.

Gravity Meter: A device that measures changes in the local gravitational field of the earth. Changes in the gravitational field may be caused by geologic structures.

Hydrophone: A device used to record underwater sound including seismic data.

Masking: When a sound is masked it is not possible to hear it because another louder sound is covering up the particular sound. For example, it is difficult to hear someone talking when you are on a snowmobile because the engine noise masks the speaker's voice.

National Marine Conservation Area: Marine areas managed for sustainable use and containing zones of high protection. They include the seabed, the water above it and any species which occur there. They may also take in wetlands, estuaries, islands and other coastal areas. They are designated by Parks Canada.

Outer Land Fast Ice Zone: Defined by the Nunavut Land Claims Agreement as the area bounded by:

(a) in the north by Latitude 73E 40' off Cape Liverpool on Bylot Island,

(b) in the south, by Latitude 66E 37' N, off Cape Dyer on Baffin Island,

(c) in the west, by the seaward edge of the Territorial Sea boundary off the east coast of Baffin Island, and

(d) in the east, by the maximum limit of land fast ice (1963-1989) as shown on the map titled *Limit of Land Fast Ice - East Baffin Coast*, jointly delivered by the Parties to the registrar, a copy of which is set out in Schedule 16-1 for general information purposes only;

Streamer: Solid cables that are towed 5-10 m below the surface of the water and contain the hydrophones.

APPENDIX 2: MKI CONSULTATION SUMMARY

Dates	Parties	Where
10-11 January 2011	Nunavut Department of Development and Transportation	Iqaluit
10 January 2011	Nunavut Development Corporation	Iqaluit
11 January 2011	Aboriginal Affairs and Northern Development Canada	Iqaluit
11 January 2011	Nunavut Research Institution	Iqaluit
11 January 2011	Qikiqtani Inuit Association	Iqaluit
12 January 2011	Fisheries and Oceans Canada	Iqaluit
17 January 2011	Parks Canada	Via email
19 January 2011	Nunavut Planning Commission	Via email
19 January 2011	World Wildlife Federation	Via email
14 February 2011	Clyde River Hunters and Trappers Organization	Clyde River
16 February 2011	Pond Inlet Baffin Hunters and Trappers Organization	Pond Inlet
17 February 2011	Qikiqtarjuaq Hunters and Trappers Organization	Qikiqtarjuaq
21 February 2011	Iqaluit Hunters and Trappers Organization	Iqaluit
25 May 2011	Community of Pond Inlet	Pond Inlet
26 May 2011	Community of Clyde River	Clyde River
29 November 2011	Nunavut Tunnigavik Inc.	Via email
30 November 2011	Nunavut Wildlife Management Board	Iqaluit
14 June 2012	Community of Pangnirtung	Panqnirtung
20 June 2012	Community of Clyde River	Clyde River
20 June 2012	Clyde River Cultural Centre	Clyde River
21 June 2012	Clyde River Mayor and Council	Clyde River
22 June 2012	Community of Pond Inlet	Pond Inlet
22 June 2012	Pond Inlet Hunters and Trappers Organization and Hamlet Administration	Pond Inlet
25 June 2012	Community of Iqaluit	Iqaluit
25 June 2012	Baffin Fisheries Coalition	Iqaluit
25 June 2012	Government of Nunavut	Iqaluit
25 June 2012	Iqaluit Mayor and Council	Iqaluit
26 June 2012	Government of Nunavut and Qikiqtani Inuit Association	Iqaluit
11 October 2012	Community of Qikiqtarjuaq	Qikiqtarjuaq
12 October 2012	Qikiqtarjuaq Economic Development Officer	Qikiqtarjuaq

Dates	Parties	**Where**
15 October 2012	Community of Kimmirut	Kimmirut
16 October 2012	Kimmirut Hunters and Trappers Organization	Kimmirut
28 November 2012	Qikiqtarjuaq Hamlet Council and Staff	Qikiqtarjuaq
28 November 2012	Qikiqtarjuaq Hunters and Trappers Organization	Qikiqtarjuaq
28 November 2012	Community of Qikiqtarjuaq	Qikiqtarjuaq
29 November 2012	Pangnirtung Hunters and Trapper Organization	Panqnirtung
30 November 2012	Pangnirtung Hamlet Council and Staff	Panqnirtung
30 November 2012	Iqaluit Council	Iqaluit
5 December 2012	Clyde River Hamlet Council and Hunters and Trappers Organization	Clyde River
6 December 2012	Pond Inlet Environmental Technology Students	Pond Inlet
6 December 2012	Pond Inlet Hamlet Council and Hunters and Trappers Organization	Pond Inlet
7 December 2012	Community of Iqaluit	Iqaluit
10 December 2012	Kimmirut Hunters and Trappers Organization	Kimmirut
10 December 2012	Community of Kimmirut	Kimmirut
11 December 2012	Kimmirut Hamlet Council and Staff	Kimmirut
11 December 2012	Iqaluit High School Teachers	Iqaluit
12 December 2012	Iqaluit High School Students and Teachers	Iqaluit

APPENDIX 3: STATEMENT OF CANADIAN PRACTICE WITH RESPECT TO THE MITIGATION OF SEISMIC SOUND IN THE MARINE ENVIRONMENT

Context

The Statement of Canadian Practice with respect to the Mitigation of Seismic Sound in the Marine Environment specifies the mitigation requirements that must be met during the planning and conduct of marine seismic surveys, in order to minimize impacts on life in the oceans. These requirements are set out as minimum standards, which will apply in all non-ice covered marine waters in Canada. The Statement complements existing environmental assessment processes, including those set out in settled land claims. The current regulatory system will continue to address protection of the health and safety of offshore workers and ensure that seismic activities are respectful of interactions with other ocean users.

Definitions

Cetacean: means a whale, dolphin or porpoise.

Critical habitat: means the habitat that is necessary for the survival or recovery of a listed wildlife species and that is identified as the species' critical habitat in the recovery strategy or in an action plan for the species.

Marine Mammal Observer: means an individual trained to identity different species of marine mammals and turtles that may reasonably be expected to be present in the area where the seismic survey will take place.

Marine mammals: means all cetaceans and pinnipeds.

Passive Acoustic Monitoring: means a technology that may be used to detect the subsea presence of vocalizing cetaceans.

Pinniped: means a seal, sea lion or walrus.

Ramp-up: means the gradual increase in emitted sound levels from a seismic air source array by systematically turning on the full complement of an array’s air sources over a period of time.

Seismic air source: means an air source that is used to generate acoustic waves in a seismic survey.

Seismic air source array(s): means one or a series of devices designed to release compressed air into the water column in order to create an acoustical energy pulse to penetrate the seafloor.

Seismic survey: means a geophysical operation that uses a seismic air source to generate acoustic waves that propagate through the earth, are reflected from or refracted along subsurface layers of the earth, and are subsequently recorded.

Statement: means the Statement of Canadian Practice for the Mitigation of Seismic Sound in the Marine Environment.

Whale: means a cetacean that is not a dolphin or porpoise.

Application

1. Unless otherwise provided, the mitigation measures set out in this Statement apply to all seismic surveys planned to be conducted in Canadian marine waters and which propose to use an air source array(s).

2. The mitigation measures set out in this Statement do not apply to seismic surveys conducted:

    a. on ice-covered marine waters; or

    b. in lakes or the non-estuarine portions of rivers.

Planning Seismic Surveys

Mitigation Measures

3. Each seismic survey must be planned to

    a. use the minimum amount of energy necessary to achieve operational objectives;

    b. minimize the proportion of the energy that propagates horizontally; and

    c. minimize the amount of energy at frequencies above those necessary for the purpose of the survey.

4. All seismic surveys must be planned to avoid:

    a. a significant adverse effect for an individual marine mammal or sea turtle of a species listed as endangered or threatened on Schedule 1 of the *Species at Risk Act*; and

    b. a significant adverse population-level effect for any other marine species.

5. Each seismic survey must be planned to avoid:

    a. displacing an individual marine mammal or sea turtle of a species listed as endangered or threatened on Schedule 1 of the *Species at Risk Act* from breeding, feeding or nursing;

    b. diverting an individual migrating marine mammal or sea turtle of a species listed as endangered or threatened on Schedule 1 of the *Species at Risk Act* from a known migration route or corridor;

    c. dispersing aggregations of spawning fish from a known spawning area;

d. displacing a group of breeding, feeding or nursing marine mammals, if it is known there are no alternate areas available to those marine mammals for those activities, or that if by using those alternate areas, those marine mammals would incur significant adverse effects; and

e. diverting aggregations of fish or groups of marine mammals from known migration routes or corridors if it is known there are no alternate migration routes or corridors, or that if by using those alternate migration routes or corridors, the group of marine mammals or aggregations of fish would incur significant adverse effects.

Safety Zone and Start-up

Mitigation Measures

6. Each seismic survey must:

    a. establish a safety zone which is a circle with a radius of at least 500 metres as measured from the centre of the air source array(s); and

    b. for all times the safety zone is visible,

        i. a qualified Marine Mammal Observer must continuously observe the safety zone for a minimum period of 30 minutes prior to the start up of the air source array(s), and

        ii. maintain a regular watch of the safety zone at all other times if the proposed seismic survey is of a power that it would meet a threshold requirement for an assessment under the *Canadian Environmental Assessment Act*, regardless of whether the Act applies.

7. If the full extent of the safety zone is visible, before starting or restarting an air source array(s) after they have been shut-down for more than 30 minutes, the following conditions and processes apply:

    a. none of the following have been observed by the Marine Mammal Observer within the safety zone for at least 30 minutes:

        i. a cetacean or sea turtle,

        ii. a marine mammal listed as endangered or threatened on Schedule 1 of the *Species at Risk Act*, or

        iii. based on the considerations set out in sub-section 4(b), any other marine mammal that has been identified in an environmental assessment process as a species for which there could be significant adverse effects; and

b. a gradual ramp-up of the air source array(s) over a minimum of a 20 minute period beginning with the activation of a single source element of the air source array(s), preferably the smallest source element in terms of energy output and a gradual activation of additional source elements of the air source array(s) until the operating level is obtained.

Shut-down of Air Source Array(s)

Mitigation Measures

8. The air source array(s) must be shut down immediately if any of the following is observed by the Marine Mammal Observer in the safety zone:

    a. a marine mammal or sea turtle listed as endangered or threatened on Schedule 1 of the *Species at Risk Act*; or

    b. based on the considerations set out in sub-section 4(b), any other marine mammal or sea turtle that has been identified in an environmental assessment process as a species for which there could be significant adverse effects.

Line Changes and Maintenance Shut-downs

Mitigation Measures

9. When seismic surveying (data collection) ceases during line changes, for maintenance or for other operational reasons, the air source array(s) must be:

    a. shut down completely; or

    b. reduced to a single source element.

10. If the air source array(s) is reduced to a single source element as per subsection 9(b), then:

    a. visual monitoring of the safety zone as set out in section 6 and shut-down requirements as set out in section 8 must be maintained; but

    b. ramp-up procedures as set out in section 7 will not be required when seismic surveying resumes.

Operations in Low Visibility

Mitigation Measures

11. Under the conditions set out in this section, cetacean detection technology, such as Passive Acoustic Monitoring, must be used prior to ramp-up for the same time period as for visual monitoring set out in section 6. Those conditions are as follows:

a. the full extent of the safety zone is not visible; and

b. the seismic survey is in an area that

i. has been identified as critical habitat for a vocalizing cetacean listed as endangered or threatened on Schedule 1 of the *Species at Risk Act*, or

ii. in keeping with the considerations set out in sub-section 4(b), has been identified through an environmental assessment process as an area where a vocalising cetacean is expected to be encountered if that vocalizing cetacean has been identified through the environmental assessment process as a species for which there could be significant adverse effects.

12. If Passive Acoustic Monitoring or similar cetacean detection technology is used in accordance with the provision of section 11, unless the species can be identified by vocal signature or other recognition criteria:

a. all non-identified cetacean vocalizations must be assumed to be those of whales named in sections 8(a) or (b); and

b. unless it can be determined that the cetacean(s) is outside the safety zone, the ramp-up must not commence until non-identified cetacean vocalizations have not been detected for a period of at least 30 minutes.

Additional Mitigative Measures and Modifications

Mitigation Measures

13. Persons wishing to conduct seismic surveys in Canadian marine waters may be required to put in place additional or modified environmental mitigation measures, including modifications to the area of the safety zone and/or other measures as identified in the environmental assessment of the project to address:

a. the potential for chronic or cumulative adverse environmental effects of

i. multiple air source arrays (e.g., two vessels on one project; multiple projects), or

ii. seismic surveys being carried out in combination with other activities adverse to marine environmental quality in the area affected by the proposed program or programs;

b. variations in sound propagation levels within the water column, including factors such as seabed, geomorphologic, and oceanographic characteristics that affect sound propagation;

c. sound levels from air source array(s) that are significantly lower or higher than average; and

d. species identified in an environmental assessment process for which there is concern, including those described in sub-section 4b).

14. Variations to some or all of the measures set out in this Statement may be allowed provided the alternate mitigation or precautionary measures will achieve an equivalent or greater level of environmental protection to address the matters outlined in sections 6 through 13 inclusive. Where alternative methods or technologies are proposed, they should be evaluated as part of the environmental assessment of the project.

15. Where a single source element is used and the ramping up from an individual air source element to multiple elements is not applicable, the sound should still be introduced gradually whenever technically feasible.

Source: Fisheries and Oceans Website http://www.dfo-mpo.gc.ca/oceans/management-gestion/integratedmanagement-gestionintegree/seismic-sismique/index-eng.asp