

**CANADA-NEWFOUNDLAND and LABRADOR OFFSHORE
PETROLEUM BOARD
SCREENING REPORT**

PART A: GENERAL INFORMATION

Screening Date	September 4, 2012
EA Title	Multi Klient Invest AS Northeast Newfoundland Slope 2D Seismic Survey Program, 2012-2017
Proponent	Multi Klient Invest AS 15150 Memorial Drive Houston, Texas 77079
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C-NLOPB File No.	45006-020-002
CEAR No.	11-01-65425
Location	Northeast Newfoundland Slope
Referral Date	December 5, 2011
EA Start Date	December 13, 2011
CEAA Law List Triggers	Paragraph 138(1) (b) <i>Canada-Newfoundland Atlantic Accord Implementation Act</i> (Accord Act)

Part B: PROJECT INFORMATION

On December 5, 2011, Multi Klient Invest AS (MKI) submitted a project description entitled *Project Description for 2D Marine Regional Seismic Survey Northeast Newfoundland Slope* (RPS Energy 2011) to the Canada-Newfoundland and Labrador Offshore Petroleum Board (C-NLOPB), describing its plans to conduct 2D seismic surveys offshore Newfoundland in the region of the northern Grand Banks, the Flemish Cap, the Orphan Knoll and the Orphan Basin. MKI may conduct 2D seismic surveys in one or more years within the 2012-2017 timeframe. MKI submitted the *Environmental Assessment Northeast Newfoundland Slope 2D Seismic Survey Programme, 2012-2017* (YOLO 2012a) on April 18, 2012. On June 29, 2012, the C-NLOPB requested additional information from MKI to respond to review comments on the April 18 submission. On July 20, 2012, MKI responded to the review comments, via the *Response to Comments from C-NLOPB dated June 29, 2012* (YOLO 2012b). On August 28, 2012 MKI responded to the remaining issues identified by reviewers.

The remainder of Part B summarizes the proposed project, the related environmental setting and existing human use of the area, based on the abovementioned information.

1 Description of Project

The Northeast Newfoundland Slope 2D Geophysical Survey Project, as proposed by MKI, is an offshore regional 2-D seismic reflection survey programme, totalling 40,000 km in the Labrador Basin, Orphan Basin, Flemish Basin and Jeanne d'Arc Basin, that may be conducted at various times between 2012 and 2017 inclusive.

The proposed survey season is May through November each year. The 2012 survey likely will commence in the month of September. Each year's program likely will be about 50 to 70 days in duration. The exact dates will depend on the location, weather conditions, and vessel availability.

2 Description of Environment

The following sections provide a summary of the environmental factors described in the EA Report. A complete description of the biological and physical environment can be found in that report.

2.1 Physical Environment

The survey will be conducted in water depths ranging from approximately 100 m to less than 4000 m. A majority of the Study Area lies within depths of less than 2000 m. The sea surface temperature is warmest in August with a mean temperature of 13.0°C and coldest in March with a mean temperature of 1.0°C.

The atmosphere is coldest in February with a mean temperature of -0.2°C, and warmest in August with a mean temperature of 13.5°C. The occurrence of rain/drizzle is the most likely form of precipitation to be experienced in the Study Area during the proposed operating period of May to November. The Study Area will likely experience the lowest occurrence of precipitation during the months of July. Snow is likely during the months of April, May, October and November. The frequency of snow occurring in the Study Area increases in the southeast, northeast, and northwest regions. During the months of September and October, moderate to heavy rainfall occurred most frequently. The risk of freezing precipitation is very low for the Project window of activities May through November.

Wind predominantly blows from the southwest and is light ($0.5 \leq 5.7$ m/s) 25 to 30% of the time, moderate ($5.7 \leq 9.8$ m/s) 35 to 37% of the time, and strong ($9.8 \leq 17.0$ m/s) 29 to 30% of the time. Gale force winds ($17.0 \leq 24.2$ m/s) were recorded less than 5% of the time. For this survey programme operating season of May to November, the mean wind speed ranges from 6.3 m/s in July to 11.4 m/s in November. Maximum wind speed statistics for the operating season range from 20.5 m/s in July to 31.8 m/s in August.

The presence of advection fog increases from April through July. The month of July has the highest percentage of obscured visibility, most of which is in the form of advection fog, although frontal fog can also contribute. The southwest portion of the Study Area will experience less than 1km of visibility 40% of the time in July. The central portion of the Study Area will experience less than 1km of visibility 50% of the time in July.

The Study Area is strongly influenced by the cold Labrador Current. The circulation of the Continental Shelf waters off eastern Canada is dominated by a general southward flow; from Hudson Strait to the Grand Banks, the waters are transported southward by the Labrador Current. This complex is also influenced by the warm Gulf Stream and the North Atlantic Current (a mixture of the Gulf Stream and the Labrador Current). The Labrador Current consists of an inshore and offshore branch. The inshore branch flows through the Avalon Channel, east of the Avalon Peninsula of Newfoundland, and around Cape

Race. This branch then divides into two parts; one flowing to the west (splitting along both sides of the Burgeo Bank) around the north of St. Pierre Bank and the other flowing to the south between the southern portion of St. Pierre Bank and Green Bank. This southern branch then joins a part of the offshore branch flows southward until it reaches the southern part of Orphan Basin where it gets diverted eastward by the bathymetry. Upon reaching the entrance to the Flemish Pass, the current divides into two branches. One branch continues to flow eastward north of Flemish Cap and the other branch flows southward through the Flemish Pass.

The Study Area should experience wind wave from various directions during the operating season of May to November. Significant wave height, from a southwesterly direction, occurs in the summer from southwesterly wind waves and swells. Wind wave will veer direction in September and October and become westerly and becomes the more dominant component of the combined significant wave height. During the annual 100 year extreme significant wave height analysis, wave heights ranged from 15.2 m to 16.2 m, and for the exception of Grid Point 14697, the highest extreme significant wave heights occurred during the winter in the month of February.

The maximum southern extent of pack ice in the Study Area is in February to the middle of March. The 1/10 concentration ice generally extends down to just below 48°N, but in some years can extend down to 43°N. During the second half of March, the rate of melting at the ice edge increases sufficiently to offset the southward ice drift, and the slow retreat of sea ice generally begins. In early May, the rate of melting increases and the southern ice edge retreats.

The probability of icebergs entering the Study Area is high and will likely be seen as early as March, especially in the northwest region. High probability continues into the surveying activity in May to July, especially in the region nearest the Grand Banks. The probability decreases in the waters southeast of Flemish Cap and northeast of the Orphan Knoll.

2.2 Biological Environment

2.2.1 Species at Risk

There are a number of Species at Risk, as defined under Schedule 1 of the *Species at Risk Act* (SARA) that are likely to be within the Study Area. The following table identifies species likely to be present and their SARA listing and the Committee on the Status of Endangered Wildlife in Canada (COSEWIC) status. A brief description of species listed as endangered or threatened on Schedule 1 is included below.

SPECIES	SARA Status	COSEWIC Status
Blue Whale (<i>Balenoptera musculus</i>)	Schedule 1 – Endangered (May 2002)	Endangered (May 2002)
North Atlantic Right Whale (<i>Eubalaena glacialis</i>)	Schedule 1 – Endangered (2003)	Endangered (May 2003)
Leatherback Turtle (<i>Dermochelys coriacea</i>)	Schedule 1 – Endangered (May 2001)	Endangered (May 2001)
Ivory Gull (<i>Pagophilia eburnea</i>)	Schedule 1 – Endangered (April 2006)	Endangered (April 2006)
Northern Wolffish (<i>Anarhichas denticulatis</i>)	Schedule 1 – Threatened (May 2001)	Threatened (May 2001)
Spotted Wolffish (<i>Anarhichas minor</i>)	Schedule 1 – Threatened (May 2001)	Threatened (May 2001)
Atlantic Wolffish (<i>Anarhichas lupus</i>)	Schedule 1 – Special Concern (2000)	Special Concern (November 2000)

Fin Whale (<i>Balaenoptera physalus</i>)	Schedule 1 – Special Concern (May 2005)	Special Concern (May 2005)
Harbour porpoise (<i>Phocoena phocoena</i>)	Schedule 2 – Threatened (April 2006)	Special Concern (April 2006)
Atlantic cod (<i>Gadus morhua</i>)	Schedule 3 – Special Concern (May 2003)	
Sowerby’s beaked whale (<i>Mesoplodon bidens</i>)	Schedule 3 – Special Concern (November 2006)	Special Concern (November 2006)
Atlantic cod (<i>Gadus morhua</i>) NL population		Endangered (April 2010)
Porbeagle shark (<i>Lamna nasus</i>)		Endangered (May 2004)
White shark (<i>Carcharodon carcharias</i>)		Endangered (April 2006)
Cusk (<i>Brosme brosme</i>)		Threatened (May 2003)
Shortfin mako shark (<i>Isurus oxyrinchus</i>)		Threatened (April 2006)
Blue shark (<i>Prionace glauca</i>)		Special Concern (April 2006)
American plaice (<i>Hippoglossoides platessoides</i>)		Threatened (April 2009)
Basking shark (<i>Cetorhinus maximus</i>)		Special Concern (November 2009)
Roughead grenadier (<i>Macrourus berglax</i>)		Special Concern (April 2007)
Roundnose grenadier (<i>Coryphaenoides rupestris</i>)		Endangered (November 2008)
Atlantic salmon (<i>Salmo salar</i>) various		Endangered, Threatened, Special Concern (November 2010)
Acadian redfish (<i>Sebastes fasciatus</i>) Atlantic population		Threatened (April 2010)
Deepwater redfish (<i>Sebastes mentella</i>)		Threatened (April 2010)
Spiny dogfish (<i>Pagophila ebumea</i>)		Special Concern (April 2010)
Harbour porpoise (<i>Phocoena phocoena</i>)	Schedule 2 – Threatened (April 2006)	Special Concern (April 2006)
Killer whale (<i>Orcinus orca</i>) NW Atlantic/E Arctic populations		Special Concern (November 2008)
Loggerhead sea turtle (<i>Caretta caretta</i>)		Endangered (April 2010)

Blue whales are in the low hundreds in the NW Atlantic and have been sighted only sporadically off the NE coast of Newfoundland. Blue whales are considered rare in the Study Area. Sightings within the Study Area are limited to one blue whale being observed in April 1992. Most sightings are made in the Gulf of St. Lawrence, and off the southwest and south coasts of Newfoundland. It should be noted, however that the distribution maps in the recovery strategy for the population, indicate an area of known occurrence on the east coast of Newfoundland, which overlaps with the Study Area (Sears and Calambokidis 2002 as cited in Beauchamp et al. 2009). A recently proposed Recovery Strategy (DFO

2009) for blue whales is available with a long-term recovery goal to reach a total of 1000 mature individuals through the achievement of three 5-year objectives. A recovery action plan will be developed by 2014.

In 2011, the population of North Atlantic right whales was estimated at about 322 animals (COSEWIC 2003), while more recent estimates suggest the current population numbers about 396 animals (SAR 2011). The Recovery Strategy (Brown *et al.* 2009) noted a goal “to achieve an increasing trend in population abundance over three generations” via seven recovery objectives. Critical habitat has been identified in the Grand Manan Basin (Bay of Fundy) and Roseway Basin (Scotian Shelf). Sightings within the Study Area are limited. Only two right whales were observed within DFO’s data set (1961 to 2007), both occurring in June 2003.

Adult leatherback turtles occur annually in Atlantic Canadian waters to forage, with the majority of turtles present between June and November. Peak occurrences in Canadian waters occur during August-September but there are records for most months of the year. Leatherbacks have been recorded off the coasts of Nova Scotia, and Newfoundland and Labrador, including within the Study Area (ALTRT 2006). In the Recovery Strategy (ALTRT 2006) for the leatherback sea turtle in the Canadian Atlantic Ocean, the recovery goal is to “achieve the long-term viability of the leatherback turtle populations frequenting Atlantic Canadian waters” via six supporting objectives. No critical habitat has been designated.

The Ivory Gull is a rare gull species that is associated with pack ice at all time of the year. Ivory Gulls occur among the pack ice of the Davis Strait, the Labrador Sea, Strait of Belle Isle, and northern Gulf of St. Lawrence. Currently, the Canadian breeding population is estimated at 500 to 600 individuals. During heavy ice winters, the Ivory Gull may occasionally reach the southern Orphan Basin and northern Grand Banks in the Study Area. The thirty-year median of ice concentration shows ice extending into the northern edge of the Grand Banks east to 48°W during late February to late March. This species is expected to be very rare in most winters in the Study Area and absent during the summer.

The northern and spotted wolffish have a very similar life history, except that the northern wolffish inhabits slightly deeper water. Atlantic wolffish is primarily demersal and inhabits shallower areas than northern and spotted wolffishes. During 1980-1984, most wolffish were concentrated on the northeast Newfoundland and Labrador shelf and banks, the southwest and southeast slopes of the Grand Banks, along the Laurentian Channel, and in the Gulf of St. Lawrence. Between 1995 and 2003, the area occupied and density within the area was considerably reduced. The species is still relatively widespread, and therefore exists in considerable numbers. A Recovery Strategy for the northern wolffish and spotted wolffish, and a Management Plan for Atlantic wolffish in Canada was published in 2008 (Kulka *et. al.*, 2008).

2.2.2 Fish and Fish Habitat

A detailed description of the plankton and benthos communities can be found in the EA Report (YOLO 2012a) and *Response to Comments from C-NLOPB* dated June 29, 2012 (YOLO 2012b). There are three main types of marine fish present in the Study Area: pelagic fish, those that live and feed close to the surface; demersal or groundfish, those that live and feed close to the bottom; and shellfish, which include crustaceans and bivalves. A list of the macroinvertebrates and fishes caught during DFO RV surveys within the Study Area is presented in the EA Report. The three species that have typically made up more than 99% of the Study Area harvest in recent years are described below. Other species that have been harvested as incidental by-catch within the Study Area during recent years are described in the EA Report.

The Northern shrimp (*Pandalus borealis*) is distributed from Davis Strait to the Gulf of Maine. It usually occupies soft muddy substrates up to depths of 600 m in temperatures of 1°C to 8°C. Larger individuals generally occur in deeper waters.

The snow crab, (*Chionoecetes opilio*), occurs over a broad depth range in the NW Atlantic from Greenland south to the Gulf of Maine. Snow crab distribution is widespread and continuous in waters off Newfoundland and southern Labrador. Snow crab prefers water temperature ranges between -1°C and 5°C. Large males are most common on mud or mud/sand, while smaller crabs are common on harder substrates.

The Greenland halibut (*Reinhardtius hippoglossoides*) is distributed throughout cold, deep waters of the Labrador-eastern Newfoundland area, inhabiting the continental shelf and slope at depths deeper than 457 m, but can range from 60 to 1600 m. The majority of the adult population is distributed in the deep and warm N Atlantic waters (e.g., Davis Strait, between Greenland and Baffin Island) where spawning occurs in winter or early spring.

Other species that have been harvested as incidental by-catch within the Study Area during recent years include redfish (*Sebastes* spp.), capelin (*Mallotus villosus*), American plaice (*Hippoglossoides platessoides*), Atlantic cod (*Gadus morhua*), roundnose grenadier (*Coryphaenoides rupestris*), roughhead grenadier (*Macrourus berglax*), and wolffishes (*Anarhichas* spp.).

2.2.3 Commercial Fisheries

The Study Area supports a variety of commercial fisheries based on latest available DFO catch landings data. Some of the most important fisheries in and adjacent to the Study Area include those for northern shrimp, snow crab, and Greenland halibut. The Study Area lies within portions of five NAFO Unit Areas; 3K, 3L, 3M, 3N, and 2J. The domestic harvest within the Study Area is two thirds, northern shrimp and one third, snow crab, with a minor component of Greenland halibut / turbot. Together, these three species have typically made up about 96% of the Study Area harvest in recent years.

Northern shrimp is the most significant species harvested within the Study Area in terms of quantity accounting for 63.3% of the total harvest between May and November between 2005 and 2010. Northern shrimp is fished by mobile gear (trawling).

Snow crab is of high importance in the Study Area's fisheries, averaging 11,019 tonnes from May to November, between 2005 and 2010; accounting for about 26.3% of the total harvest. Snow crab is fished using fixed gear (crab pots).

Greenland halibut (often called turbot) represents about 6% of the Study Area catch by quantity, an average of just over 3,081 Mt between May and November between 2005 and 2010. Greenland halibut is fished by fixed gear (gillnets).

2.2.4 Marine Mammals and Sea Turtles

At least 23 marine mammals, including 18 cetacean and five seal species are known or expected to occur in the Study Area. Most marine mammals use the Study Area seasonally, and the region likely represents important foraging areas for many. Sea turtles regularly occur on the Grand Banks and adjacent waters with two species potentially occurring within the Study Area. The EA Report provides a summary of the marine mammals and sea turtles known or expected to occur in the northern Grand Banks Study Area.

Six species of baleen whales occur in the Study Area. Blue whales (*Balaenoptera musculus*) are considered rare and North Atlantic right whales (*Eubalaena glacialis*) are considered extremely rare in the Study Area. The four more common baleen whales are the Fin Whale (*Balaenoptera physalus*), Sei

whale (*B. borealis*), Humpback whale (*Megaptera novaeangliae*) and Minke whale (*B. acutorostrata*). Although some individual baleen whales may be present in offshore waters of Newfoundland and Labrador year-round, most baleen whale species presumably migrate to lower latitudes during winter months. Based on the DFO cetacean sightings database, fin whales have been sighted throughout the Study Area from May to September. Based on the DFO cetacean sightings database, seven sei whale sightings have been reported in the Study Area. Humpbacks are the most commonly recorded mysticete in the Study Area, with sightings occurring year-round, but predominantly during summer. Within the Study Area, minke whales were the fourth most commonly recorded mysticete in the DFO sightings database, with sightings predominantly recorded during summer months.

Twelve species of toothed whales, Odontocetes are known or expected to occur in the Study Area. Many of these species seem to be present in the Study Area only seasonally, but there is generally little information on the distribution and abundance of these species. The twelve species include the: Sperm Whale (*Physeter macrocephalus*), Northern bottlenose whale (*Hyperoodon ampullatus*), Sowerby's beaked whale (*Mesoplodon bidens*); Beluga whale (*Delphinapterus leucas*); Killer whale (*Orcinus orca*); Long-finned pilot whale (*Globicephala melas*), Atlantic white-sided dolphin (*Lagenorhynchus acutus*), Risso's dolphin (*Grampus griseus*), White-beaked dolphin (*L. albirostris*), Common bottlenose dolphin (*Tursiops truncatus*); Striped dolphin (*Stenella coeruleoalba*), and Harbour porpoise (*Phocoena phocoena*).

Five species of true seals may be found in the Study Area: the harp (*Pagophilus groenlandicus*); hooded (*Cystophora cristata*); grey (*Halichoerus grypus*); bearded (*E. barbatus barbatus*); and ringed (*Phoca hispida*) seal. The NE Grand Banks, slope, and Flemish Pass are critical spring feeding grounds for both the harp and hooded seals. The northern portion of the Grand Bank is recognized as a region of mixing between cold water and temperate communities, and the system as a whole shares many species including key trophic and commercially important species such as Atlantic cod, capelin, Greenland halibut and American plaice.

Two species of sea turtles regularly occur on the Grand Banks and adjacent waters and could potentially occur in the Study Area. They are leatherback and loggerhead (*Caretta caretta*). The leatherback sea turtle is listed as endangered under SARA and discussed above. The Atlantic loggerhead is the most common sea turtle in North American waters, and is the largest hard-shelled sea turtle in the world. They are found in both coastal waters and offshore areas, more than 200 km from shore. They have been reported in the Study Area in waters east of the Flemish Cap.

2.2.5 Marine Birds

The Grand Banks area supports large numbers of seabirds during all seasons. There are approximately 25 seabird species that occur in the Study Area that are described in the EA Report. Results of seabird surveys, including the more recent Canadian Wildlife Service (CWS) and monitoring programs for geophysical surveys are also included in the EA Report. In summary, The Eastern Canada Seabirds at Sea (ECSAS) surveys identified that of all the areas identified as hotspots, the Grand Banks was the most important region for seabirds. More specifically, the northeast (includes the location of the Jeanne d'Arc Basin oil production area) and southeast portions (including the Nose and Tail of the bank) were the most productive areas. All seasons, especially the non-breeding season (fall, winter and spring) produced the high concentrations of a variety of species. Murres (*Uria, spp.*) were found in high abundance year-round on the bank, especially in the northeast, although the southern half of the bank had higher concentrations during the winter. During the spring, Black-legged Kittiwakes (*Rissa tridactyla*), Dovekies (*Alle alle*), gulls (*Larus, spp.*) and Northern Fulmars (*Fulmaris glacialis*) were found in relatively high concentrations, particularly on the northeast portion of the bank. During the summer, storm-petrels (*Oceanites oceanicus* and *Oceanodroma leucorhoa*) and shearwaters (*Puffinus, spp.*) were the most abundant birds on the bank, particularly in the northern half (although survey effort was limited in the south). During the fall, Fifield et al. (2009) note that generalizations were difficult to make (because of

reduced ECSAS survey efforts); however, murre, Dovekies and Northern Fulmars had their highest densities (outside the Labrador Shelf). Additionally, the highest density of storm-petrels and shearwaters were recorded during this time. In the winter, high concentrations of Black-legged Kittiwakes, Dovekies, gulls and Northern Fulmars were all found on the Grand Banks and the highest densities of shearwaters in the study area during the winter were found on the southern Grand Bank early in that season.

2.2.6 Sensitive and Special Areas

Potential sensitive areas include: important bird areas (IBA); Ecologically and Biologically Significant Areas (EBSAs), Marine Protected Areas (MPAs) and MPA Areas of Interest (AOI) identified pursuant to the *Oceans Act*; and important coral areas.

There are no IBAs identified within the Study Area. The closest IBA is about 175 km from the Study Area.

DFO (NL Region) identified 11 EBSAs within the Placentia Bay Grand Banks Large Ocean Management Area (PBGB LOMA) as potential AOIs for MPA designation. Such areas may require some level of protection, which may be achieved by implementing a *Fisheries Act* closure, a MPA, or perhaps may be addressed through some other avenues such as a National Marine Conservation Area, or a Marine Wildlife Area.

Four EBSAs overlap the Study Area. The northern extent of the Southeast Shoal and Tail end of the Banks EBSA (area east of 51°W and south of 45°N, extending to the edge of Grand Bank) connects with the Study Area's south-western boundary. The Northeast Shelf and Slope EBSA overlaps the south-central end of the Study Area and includes an edge of the Shelf and Slope (northeastern Grand Bank, starting at the Nose of the Bank, from 48°W to 50°W, and from the edge of the shelf to the 1000 m isobath). The Lily Canyon-Carson EBSA (area from 44.8°N to 45.6°N along the 200 m isobath of the southeast slope of Grand Bank) is within the Study Areas south-western extent. The Virgin Rocks EBSA (from 46°N to 46.8°N and from 50°W to 51°W) is at the southern end. With the exception of the SE Shoal EBSA which has an overall 'high priority' rating, the other EBSAs have an overall 'low priority' rating relative to other EBSAs within the PBGB LOMA.

The common conservation objectives for the PBGB LOMA identified within the Study Area are to ensure that they are not altered and/or disrupted by human activities to the point they can no longer be considered a unique feature and/or fulfill the ecological function that initially triggered their identification as significant in the area.

In 2003, as protection for the Northern cod, the Fisheries Resource Conservation Council (FRCC) recommended the establishment of an experimental 'cod box' in the Bonavista Corridor. The Corridor has been identified as an area important for cod spawning and juvenile cod. The FRCC recommended that this area be protected from all forms of commercial fishery (excluding snow crab trapping) and other invasive activity such as seismic exploration. In April 2003, DFO announced that special conservation measures were required for the Bonavista Corridor, including the Bonavista Cod Box, located about 135 km west of the Study Area.

Several fishing bans occur in NAFO Regions within the Study Area. These areas are in the southern extent of the Study Area and include the following:

- Cod in Divisions 3LNO;
- Redfish in Divisions 3LN;
- American plaice in Divisions 3LNOM;
- Witch flounder in Divisions 3LNO;

- Capelin in Divisions 3NO; and
- Shrimp in Divisions 3NO

In addition, five seamount areas have been identified as Valuable Marine Ecosystems (VMEs). The Orphan Knoll, Newfoundland Seamounts, Corner Seamounts, New England Seamounts were first identified in a response to the 2004 request by the United Nations General Assembly (UNGA) for states and regional fisheries organizations to address significant adverse impacts of fishing on VMEs. On January 1, 2009, seamount mitigative measures were extended to include the Fogo Seamounts off Newfoundland. Of the five identified seamounts, the Orphan Knoll seamount exists in the Study Area. As of January 1, 2007, and until December 31, 2014, the seamounts shall be closed to all bottom fishing activities. Since January 1, 2008, 20% of the fishable area of each seamount has remained open to small scale and restricted exploratory fisheries to gather data for NAFO scientists.

A search of the Department of National Defence (DND) records was conducted to determine the possible presence of unexploded ordinance (UXO) within the Study Area. Their records indicate that there are two WWII-era U-Boat shipwrecks present within the survey area. The associated UXO risk is assessed as negligible. Nonetheless, due to the inherent dangers associated with UXO and the fact that the Atlantic Ocean was exposed to many naval engagements during WWII, should suspected UXO be encountered during the program, MKI should not disturb/manipulate it, mark the location, and immediately inform the Coast Guard.

2.2.7 Research Surveys and Vessel Traffic

DFO conducts a spring survey in sections of 3LNOPs (April-July), and a fall survey of 2HJ3KLMNO (September / October to December). The fall survey may employ two vessels. The DFO Science Advisory Schedule can be accessed on-line to view activities scheduled in Canada <http://www.isdm-gdsi.gc.ca/csas-sccs/applications/events-evenements/index-eng.asp> .

Industry-DFO Collaborative Post-season Trap Surveys for Snow Crab in the fall (Division 2HJ3KLNO) bottom trawl surveys provide data that are used to predict changes in biomass and recruitment for the upcoming fishery in the following year (Division 2HJ3KLNO). The sampling locations occur within the Survey Area.

The DND is likely to be transiting in a non-interference manner within the Study Area during the proposed project's timeframe. It will be necessary to maintain contact with DND throughout each work season.

The Warfare Agent Disposal (WAD) project was initiated by the DND in the early 1990s to address the ocean dumping and burial of weapons and chemicals that occurred after the Second World War. In relation to the Study Area, there is a potential warfare location site that lies in the south-western extent.

The Study Area lies amongst the Great Circle Routes for Canada and Europe, and North America and Europe. The port of St. John's is heavily utilized in the former of these two routes. The heaviest extent of commercial marine traffic occurs along the southwest coast of Newfoundland, mainly through Port Aux Basques and through the entrance to the Gulf of St. Lawrence. These heavily utilized areas are well southwest of the Study Area.

There are three existing offshore production developments (Hibernia, Terra Nova, and White Rose) on the northeastern part of the Grand Banks which fall outside of the boundaries of the Study Area. There are also a number of exploration programs, drilling and geophysical, proposed for this area. The EA Report provides further detail on these. Also, proposed activities may be found on the C-NLOPB website at http://www.cnlopb.nl.ca/env_project.shtml .

Part C: ENVIRONMENTAL ASSESSMENT PROCESS

3. Review Process

On December 5, 2011, MKI submitted a project description *Project Description for 2D Marine Regional Seismic Survey Northeast Newfoundland Slope* (RPS Energy 2011). The Project requires an authorization pursuant to Section 138(1) (b) of the *Canada-Newfoundland Atlantic Accord Implementation Act* and Section 134(1) (a) of the *Canada-Newfoundland and Labrador Atlantic Accord Implementation Newfoundland and Labrador Act*. The C-NLOPB, as Responsible Authority (RA), forwarded the CEEA *Federal Coordination Regulations* (FCR) Section 5 Notification on December 13, 2011 to: Fisheries and Oceans Canada (DFO); Environment Canada (EC); Department of National Defence (DND); Transport Canada (TC); Natural Resources Canada (NRCan); Health Canada; and the Newfoundland and Labrador Departments of Environment and Conservation, Fisheries and Aquaculture, and Natural Resources.

On January 4, 2012, the C-NLOPB notified MKI that a screening level of assessment was required and the proponent was provided with a Scoping Document.

Pursuant to paragraph 12.4(2) of the *Canadian Environmental Assessment Act* (CEA Act), and the *Regulations Respecting the Coordination by Federal Authorities of Environmental Assessment Procedures and Requirements*, the C-NLOPB assumed the role of the Federal Environmental Assessment Coordinator (FEAC) for the screening and in this role was responsible for coordinating the review activities by the expert government departments and agencies that participated in the review.

On April 18, 2012, MKI submitted the *Environmental Assessment Northeast Newfoundland Slope 2D Seismic Survey Programme, 2012-2017* (YOLO 2012a). The C-NLOPB forwarded the EA Report on April 24, 2011 to DFO, EC, Department of National Defence (DND), and the provincial Departments of Environment and Conservation, Fisheries and Aquaculture, and Natural Resources (DNR). The Fish, Food, and Allied Workers Union (FFAW) and One Ocean were also provided a copy of the EA Report for review.

On July 6, 2012, the *Canadian Environmental Assessment Act* (S.C. 1992, c. 37) was repealed when the *Canadian Environmental Assessment Act, 2012* (CEAA 2012) came into force. As a result, environmental assessment for the *Multi Klient Invest AS Northeast Newfoundland Slope Seismic Program* was no longer a federal requirement. However, all other applicable legislative, regulatory and constitutional requirements still must be fulfilled. In particular, safety and environmental protection are priority responsibilities of the C-NLOPB pursuant to the Accord legislation, and the C-NLOPB still must consider the potential environmental effects of activities that are proposed for its authorization.

Therefore, the C-NLOPB informed MKI on July 17, 2012 that it would be continuing and completing this EA.

Comments on the EA Report were received from DFO, EC, DND and the FFAW. In order to address deficiencies in the EA Report, MKI was required to provide a response to the EA Report comments. MKI responded on July 20, 2012 and the C-NLOPB forwarded the responses to DFO, EC, DND and the FFAW. Further correspondence was required to address outstanding comments and MKI was provided the outstanding comments on August 24, 2012. On August 28, 2012, MKI responded to the remaining outstanding comments and the C-NLOPB forwarded the responses to DFO, EC, DND and the FFAW.

It is the obligation of the RAs to consider which physical works and undertakings, in relation to the proposed Project, fall within the scope of the Project. First, there are no associated physical works that should be included in the scope of the Project. Second, if the proposed Project were to proceed, as set out in the application, it would constitute a single Project for the purposes of subsection 15(2) of *CEAA*. For the purposes of subsection 15(3) of *CEAA*, the scoping exercise is complete because an assessment was conducted in respect of every construction, operation, modification, decommissioning, abandonment, or other undertaking proposed by MKI that is likely to be carried out in relation to their proposed Project.

3.1 Scope of Project

MKI proposes to conduct an offshore regional 2-D seismic reflection survey programme, totalling 40,000 km in the Labrador Basin, Orphan Basin, Flemish Basin and Jeanne d’Arc Basin over the period 2012 to 2017 inclusive in the jurisdiction the C-NLOPB. No survey lines will enter within 12 nautical miles territorial waters of Newfoundland and Labrador.

The proposed survey season is May through November each year. The 2012 survey may commence in September. Each program will be about 50 to 70 days in duration,. The exact dates will depend on the location, weather conditions, and vessel availability.

For the 2-D surveys, typical ships tow a single source array 100 to 200 m behind the ship. Following 100 to 200 m behind the source array is a single streamer between 8 and 10 km long. A tail buoy with radar reflectors is attached at the end of the streamer. At the end of the track, the ship will take two to three hours to turn around and start along another track. Spacing between tracks for the 2012 program will range from 50 km to 120 km over the regional spaced survey and 20 km for the dense spaced survey.

The typical marine seismic airgun array sources referenced have a total volume of 3,000 to 5,500 cu. in. consisting of 20 to 30 airguns (type Bolt, Soder-G or Input-output Sleeve Gun II airguns) operating at 2,000 to 2,500 psi. The total pressure per source for those array source volumes will be between 137 to 172 bar-m. The peak-to-peak pressure output will be about 252 dB re 1 µPa @ 1 m.

The seismic air guns chosen for the 2012 program are a Sercel – G Gun 2 system. The guns have a working pressure of 2000 psi. The total pressure source output in peak-to-peak will be 147.4 bar-m and 72.6 bar-m zero-to-peak.

3.2 Boundaries

The boundaries of the Project are defined in the EA Report and are as follows and are acceptable to the C-NLOPB.

<i>Boundary</i>	Description
<i>Temporal</i>	2D Seismic Surveys – From 1 May to 30 November, 2012 to 2017.
<i>Project Area</i>	Defined as a 574,740 km ² area including the area for vessel turning.
<i>Affected/Study Area</i>	The Study Area encompasses the 2-D Project Area; a 20 km estimated distance to account for sound attenuation from the array at a distance where a level that will startle fish.
<i>Regional Area</i>	The Regional Area extends beyond the Study Area and varies according to the life history of the biological VEC.

There may also be an area of influence from the sound array. However, depending on the marine species present, this area of influence will vary in size. Hearing thresholds have been determined for a number of species (seals and odontocetes), but the threshold is not known for others (baleen whales). The sound that is actually received by the marine species depends on the energy released from the source and its

propagation (and loss) through the water column. Therefore, the hearing ability of the species and background noise will affect the amount of noise from an airgun array detected.

3.3 Scope of Assessment

For the purpose of meeting the requirements of the CEAA, the factors that were considered to be within the scope of the environmental assessment are those set out in paragraphs 16(1) (a) through 16(1) (d) of the CEAA, and those listed in the *Multi Klient Invest AS Northeast Newfoundland Slope Area Seismic Program 2012-2017 Scoping Document* (C-NLOPB 2012a).

4. Consultation

4.1 Consultation carried out by MKI

Consultations were undertaken with the following stakeholders:

- Fisheries and Oceans Canada
- Transport Canada
- Environment Canada/Canadian Wildlife Service
- Fish, Food and Allied Workers Union
- One Ocean
- Newfoundland Resources Ltd.
- Ocean Choice Limited
- Clearwater Seafoods
- Icewater Fisheries
- Association of Seafood Producers

Fisheries and Oceans Canada

DFO was contacted by phone for research vessel survey information, such as, RV surveys, dates and locations. DFO's marine mammal research group was contacted by phone and email to obtain the most up to date database information on marine mammals and incidental sea turtles for mapping purposes. Vessel schedules have been exchanged and MKI has produced a map based on data from DFO which depicts all the crab study points.

Transport Canada

Transport Canada was contacted by phone to provide specific information on vessel traffic in the proposed Study Area.

Environment Canada/CWS

Environment Canada (CWS) representatives were contacted by phone and email for database information on marine birds to provide the most up to date information in the EA report.

Fish, Food and Allied Workers Union

A meeting was held with a FFAW representative, and a harvester. FFAW contacted several other harvesters and harvesting organisations that did not attend. The FFAW advised that separate community meetings were not necessary at that time.

MKI described the proposed survey program and provided large scale maps to FFAW depicting the proposed Study Area and the shot lines being considered. Electronic files of the maps were provided on request for distribution to FFAW members and consultations. FFAW described the locations of shrimp and snow crab fisheries, and the areas of most concern. With the detailed spatial information on hand, the discussion focused on how MKI could mitigate spatial and temporal line surveys by modifying the schedule to avoid the intense fishing areas for crab and shrimp.

The FFAW and fisher representative provided their overall concerns for effects of seismic on space conflict with gear and reduced catches. There was a communication problem with two seismic survey vessels in 2011 with fishing vessels. It was strongly emphasized the former can work by good communication and the FLO was to be on the seismic vessel and involved in the dialogue with fishing vessels. There was a request by the FFAW representative to MKI to maintain a distance of 20 km between seismic vessels and fishing vessels with gear in the water as precautionary measure to minimize effects on harvesting. MKI has committed to avoidance of fishing gear through communication tools, including a FLO, notices to shipping and mariners and, as required, the implementation of a gear and vessel damage compensation contingency plan.

The FFAW representative requested to be kept informed of the survey program needs of FLOs to ensure that scheduling could meet MKI requirements. Due to several concurrent active seismic surveys proposed for offshore Newfoundland and Labrador, the pool of FLOs was being more pressed upon to meet all the needs.

One Ocean

One Ocean's Director echoed the concerns of the FFAW representatives in requiring proper advance notice of the program and information about the surveys. One Ocean provides vessel monitoring system (VMS) data service logistics and the overall increased number of seismic surveys required rigorous coordination between MKI and One Ocean.

One Ocean also shared the same concerns for seismic surveys conflicted with fishing vessels, fishing gear and potential reduction in catches. One Ocean was pleased that MKI presented the survey lines at the meeting which focused the mitigative measure discussions and planning for both MKI and harvesters.

Newfound Resources

Representatives of New Found Resources met with MKI. MKI provided an overview of the proposed project survey and presented the survey shot lines for discussion. Newfound Resources is a new stakeholder and much of the meeting focused on the technical aspects of seismic surveys, sound attenuation, and fisheries interactions and effects between the industries.

There was considerable discussion of the reduced shrimp catches experienced in 2011 and the potential for significant loss in revenue if DFO reduced the TAC. Shrimp have been located midwater opposed to be near the bottom where they are normally caught. Normal expected hauls of shrimp were caught when the gear was towed behind the boat at midwater. Generally there is an overall concern for loss in revenue resulting from seismic surveys.

Ocean Choice International

There was no response to three phone calls and emails to Ocean Choice International during preparation of the EA report. OCI did email that there were a host of fisheries that may be affected and requested the mapping of the proposed shot lines be sent for overlaying purposes. No further comments were received.

Clearwater Seafoods Limited Partnership

Clearwater Seafoods was emailed and called with no response. The project description was emailed for review.

Icewater Fisheries

Icewater Fisheries was called on three occasions with no response.

Association of Seafood Producers

The Association of Seafood Producers was called on two occasions with no response.

The C-NLOPB are satisfied that the consultations carried out by MKI, and reported on in the EA Report, included all elements of the Project, and that MKI has addressed substantive concerns about the proposed Project.

4.2 Review of the April 2012 EA Report

The C-NLOPB forwarded the EA Report on April 24, 2012 to DFO, EC, DND, Natural Resources Canada and the provincial Departments of Environment and Conservation, Fisheries and Aquaculture, and Natural Resources. The FFAW and One Ocean also were provided a copy of the EA Report to review.

EC provided comments on the EA Report on 29 May 2012 and requested clarification on the proponent's methodology to prevent and handle the possible oiling of birds and that MKI collect seabird data and provided the protocol for proper bird-handling. EC provided comments on *MKI's Response to Comments from C-NLOPB dated 29th June 2012* on August 3, 2012. They repeated the request for clarification of some of their original comments. All outstanding items were clarified.

DND provided comments on the EA Report on 5 June 2012 which reflected the fact that comments provided by DND and previously forwarded to MKI were absent in the EA Report. DND provided comments on *MKI's Response to Comments from C-NLOPB dated 29th June 2012* on August 16, 2012. They requested that their input of 5 June 2012 be reflected in the environmental assessment, see Section 2.2.7.

The FFAW provided comments on the EA report on 5 July 2012. The key issues were: regular communication between the two industries; timing of the proposed survey and possible conflict with fish harvesting; the unknown long-term effects of seismic on fish, particularly cumulative effects; the dynamics of the fishing industry; and the effects of hydrocarbon spills on the industry. The FFAW provided comments on *MKI's Response to Comments from C-NLOPB dated 29th June 2012* on August 9, 2012. They noted the importance of the DFO Industry Post Season Snow Crab survey and reminded the proponent of the need for continued communication and consultation.

DFO provided comments on the EA Report on 6 June 2012. Their comments focused on the SOCP, MMOs and the conduct of DFO scientific surveys. They also had a number of specific comments pertaining to the accuracy of fish data/landings, SARA information and sensitive areas. DFO provided comments on *MKI's Response to Comments from C-NLOPB dated 29th June 2012* on August 15, 2012. They requested more up-to-date data for fisheries maps and noted the importance of using the most up-to-date management and recovery plans.

The Canadian Wildlife Service (CWS) provided comments on the EA Report on 25 June 2012. Their comments focused on the assessment of all bird species possibly in the area, consistent representation of bird densities in the EA Report, the identification of mitigation measures related to adverse effects of seismic activities and proper bird handling and mitigation procedures. CWS provided comments on *MKI's Response to Comments from C-NLOPB dated 29th June 2012* on August 23, 2012. They requested further clarification on spill response and accuracy of data and research cited in the EA Report.

The consolidated review comments were provided to MKI on June 29, 2012. MKI responded on July 20, 2012, entitled *Response to Comments from C-NLOPB dated 29th June 2012*. MKI's July 20, 2012 response was forwarded to reviewers for assessment that the EA Addendum was an adequate response to their comments. EC, DND, the FFAW and DFO provided further comments on the report entitled,

Response to Comments from C-NLOPB dated 29th June 2012 and these were provided to MKI on August 24, 2012. EC, DND, the FFAW and DFO were provided with MKI's response on August 28, 2012. All reviewers were satisfied that their comments had been adequately addressed. The C-NLOPB believes that all substantive comments within the scope of the EA have been satisfactorily addressed.

5. Environmental Effects Analysis

5.1 Methodology

The C-NLOPB reviewed the environmental effects analysis presented by MKI in its EA Report. A Valued Ecosystem Component (VEC) based assessment, based on the interaction of project activities with VECs, was used in assessing environmental effects, including cumulative effects and effects due to accidental events. The environmental assessment methodology and approach used by the Proponent is acceptable to the C-NLOPB.

Potential adverse environmental effects, including cumulative effects, were assessed with respect to:

- magnitude of impact;
- geographic extent;
- duration, likelihood, and frequency;
- reversibility;
- ecological, socio-cultural and economic context; and
- significance of residual effects following implementation of mitigation measures.

The potential effect significance of residual effects, including cumulative effects, for each VEC was rated in this environmental screening report as follows:

0 = No Detectable Adverse Effect

1 = Detectable Effect, Not Significant

2 = Detectable Effect, Significant

3 = Detectable Effect, Unknown

These ratings, along with the likelihood of the effect, were considered in determining overall significance of residual effects.

In the EA Report, MKI presented information regarding the potential effects of the seismic survey program activities on fish and fish habitat, commercial fisheries, seabirds, marine mammals and sea turtles, species at risk, and sensitive areas. A summary of the effects assessment follows.

5.2 Valued Ecosystem Components/ Potential Environmental Effects

5.2.1 Fish and Invertebrates

1

The seismic survey program will not result in any direct physical disturbance of the bottom substrate. During seismic surveys, survey equipment is not expected to come in contact with the seafloor and deep-water corals and sponges. Therefore the negligible residual effects on fish habitat (i.e., water and sediment quality, phytoplankton, zooplankton, seamounts and benthos) are predicted to be not significant.

The potential effects of exposure to sound on fish and marine invertebrates can be either physical (pathological and physiological) or behavioural. In the natural environment, fish have shown avoidance responses and swim away as an airgun array ramps up or as the survey slowly approaches. The airgun will be ramped-up, thereby allowing fish in the area to move away. Other studies referenced in the 2012 EA Report indicated that fish mortality did not result from exposure to seismic sound sources. Stress responses (physiological effects) to seismic exposure occur in fish but are temporary and reversible. Behavioural responses to seismic have been documented in a number of studies and are reported and

discussed in the 2012 EA Report. In general, fish show startle response and change in direction and speed of swimming. In some studies looking at the effects on commercial catch rates, the change in swimming direction accounted for a decrease in catch rate. Some studies show that this effect was temporary, whereas other studies report that fish behaviour was altered for a number of days (YOLO 2012a). The EA Report states that the temporary nature of these responses varies depending on the fish species and the sound source. Studies to determine effects on the auditory thresholds of fish have shown that Temporary Threshold Shift (TTS) can occur in fish exposed to seismic noise, under certain conditions. However, in the studies referenced by YOLO (2012a) hearing sensitivity recovered within 14 days of exposure. To date, there have been no documented cases of acute mortality of juvenile or adult fish exposed to seismic sound characteristic of typical 2D and 3D seismic surveys. Limited data regarding physiological effects on fish indicate that they are both short-term and most obvious after exposure at close range (YOLO 2012a).

Mitigations consistent with those outlined in the *Geophysical, Geological, Environmental and Geotechnical Program Guidelines* (C-NLOPB 2012b), will be implemented. Spatial and temporal avoidance of critical life history times (e.g., spawning aggregations) should mitigate the behavioural effects of exposure to airgun sound. The effects assessment concluded that physical effects on fish due to project activities will be low in magnitude, in an area of less than 10 km², and of duration of less than two weeks. The likelihood of effects (behavioural and physical) is low and therefore **not significant**.

There is less knowledge of the effects of seismic sound on marine invertebrates, although some studies have been conducted on the sensitivity of certain invertebrate species to underwater sound. They may be capable of detecting vibrations but they do not appear to be capable of detecting pressure fluctuations. The limited studies done to date on the effects on marine invertebrates have not demonstrated any serious pathological or physiological effects. Studies referenced in the 2012 EA Report indicated that available experimental data suggest that there may be physical impacts on the fertilized eggs of snow crab and on the eggs of cod at very close range. The results indicated that effects are short-term and most obvious after exposure at close range. Spatial and temporal avoidance of critical life history times (e.g. spawning aggregations) should mitigate the behavioural effects of exposure to airgun sound. Snow crab, sensitive to the particle displacement component of sound only, will be at least 200 m from the airguns and will not likely be affected by any particle displacement resulting from airgun discharge. Any potential physical or behavioural impact to invertebrate species is considered to be low in magnitude, within an area of less than 10 km², over duration of less than two weeks. The likelihood of effects (behavioural and physical) is low and therefore **not significant**.

5.2.2 Commercial Fishing and DFO Research Surveys

1

Potential interactions with this VEC include the potential for a decrease in catch rates, interference with fishing gear and potential impact on DFO research survey trawls. As indicated above, seismic activity can result in a dispersion of fish species, and subsequently reduced catch rates for a short duration. The Study Area lies within portions of five NAFO Unit Areas; 3K, 3L, 3M, 3N and 2J. Most fishing for relevant species in the NAFO Convention Regulatory Area (RA) is conducted using mobile bottom tending trawls.

The data presented in the EA Report shows average annual catches (2005–2010) of NAFO managed species for each Division which overlaps the Study Area. It indicates the catch of these species separately for Canadian vessels and other Convention nations, the total, and the percent the Canadian portion represents of the total, by managed species.

The Canadian fisheries in the eastern Grand Banks area were dominated until the early 1990s by groundfish harvesting using stern otter trawls, primarily harvesting Atlantic cod, American plaice and a few other species. Today, in this area, snow crab harvesting (fixed gear) tends to be focused in areas along the shelf break and slope. Northern shrimp (mobile gear) trawling overlaps some of these areas but

the gears have a potential to conflict, and thus do not typically overlap in time or location. Shrimp harvesting tends to extend into deeper water in the Study Area and farther eastward into the international waters, where it is also fished by several nations besides Canada within the general area of the Study Area.

Analysis of the average annual domestic harvest for all species (from 2005 to 2010) indicates, June to September were the most productive months during this period, accounting for more than 80% of the annual catch. Northern shrimp is the most significant species harvested within the Study Area in terms of quantity and value of harvest, accounting for more than 63% of the total harvest. The Study Area overlaps with parts of Shrimp Fishing Areas (SFAs) 6 and 7. SFA 7 within 3L and 3M are managed through NAFO, while SFA 6 (consisting of Division 3K plus the Hawke Channel portion of 2J) is managed by Canada's DFO.

Snow crab is of high importance in the Study Area's fisheries, averaging 11,019 tonnes from May to November, between 2005 and 2010; accounting for about 26.3% of the total harvest. The regulatory fishing areas for snow crab are described in the EA Report. The Study Area overlaps with portions of Crab Fishing Areas (CFA) 3Lex (from 170 miles to 200 miles from shore), 3N, MSex (midshore extended), 4 (offshore 3K), 8B (southern Avalon) and 3L200 (beyond 200 nautical miles). Nevertheless, because the fishery uses fixed gear (crab pots), the fishery poses the greatest potential for seismic / fishing gear conflicts in those areas where the two marine activities might overlap.

Greenland halibut (often called turbot) represents about 6% of the Study Area catch by quantity, an average of just over 3,081 Mt between May and November between 2005 and 2010. Most (about 99%) of this harvest in the Study Area is taken using fixed gear gillnets. NAFO manages Greenland halibut in subarea 2 and Divisions 3KLMNO. The EA Report provides the quotas for 2006 to 2012 in the Study Area. The quotas for 2 and 3K are combined by NAFO.

There is potential for interaction between seismic operations (streamers) and fishing gear, especially fixed gear such as crab pots. The potential for impacts on fish harvesting will depend on the location of the surveying activities in relation to fishing areas in any given season. If the survey work is situated away from fishing areas, the likelihood of any effects on commercial harvesting will be greatly reduced.

MKI has indicated that a number of mitigations, consistent with those outlined in the *Geophysical, Geological, Environmental and Geotechnical Program Guidelines* (C-NLOPB 2012b), will be implemented. These include: avoidance of heavily fished areas; use of a Fisheries Liaison Officer (FLO) on the vessel to be a communication link between the two industries and to help ensure effective communication between petroleum operators and fishers at sea; communication with fishers (via a Notice to Mariners and a Notice to Fishers) and scheduling of surveys to reduce interference with DFO research vessels; single point of contact (SPOC), deployment of streamers only within project area assessed and a fishing gear damage compensation plan. A picket vessel will accompany the seismic survey vessel to provide advance warning of fishing activities in the area and for communications with other vessels, and this vessel will meet similar criteria as the survey vessel. MKI will also coordinate with the FFAW to avoid any potential conflicts with survey vessels.

To avoid potential conflict with DFO Research surveys, MKI will maintain communications with DFO personnel to keep up-to-date on the timing of planned research surveys. In addition, a temporal and spatial buffer zone will be implemented, in consultation with DFO, to reduce any potential interference with fish behavioural patterns. The impact of both noise and the seismic streamer on DFO research surveys will be negligible and **not significant**.

Given the application of mitigation measures, including the avoidance of fishery activity, it is predicted

that the effects of seismic activity, including vessel movement, will be low in magnitude, within an area of 10 to 50 km², over duration of less than two weeks. Therefore, effects to the commercial fishery are not likely and **not significant**.

5.2.3 Marine Mammals and Turtles

1

Pulsed sound from seismic exploration has the potential to affect marine mammals. The highest energy output is at relatively low frequencies of 10 to 200 Hz. These frequencies overlap with the low frequency sound produced by baleen whales (12 to 500 Hz). The airgun arrays can still produce high frequency sound energy (up to 22 kHz) within a few kilometres of the source. These frequencies overlap with sound frequencies to which small odontocete (toothed whales) species use and are sensitive to in the 0.5 to 20 kHz range. Therefore, both odontocete and mysticete species may potentially be adversely affected by airgun noise.

The potential effects from vessels on marine mammals include strikes, temporary behavioural (aversion or attraction) effects, and effects from vessel noise. The physical presence of the vessel during seismic surveys does not typically result in significant adverse effects such as collisions. Marine species, in particular marine mammals, are expected to easily avoid the vessel during seismic surveys due to exhibited avoidance behaviour to noise and the slow speed of the ship. The survey vessel will travel at an approximate average speed of 4.5 knots when the survey gear is deployed and will travel at approximately 10 knots while in transit. These speeds are within operational activities of fishing and commercial marine traffic.

Toothed whales and probably other marine mammals as well, have additional capabilities besides directional hearing that can facilitate detection of sounds in the presence of background sound. There is evidence that some toothed whales can shift the dominant frequencies of their echolocation signals from a frequency range with much ambient sound toward frequencies with less sound. A few marine mammal species are known to increase the source levels of their calls in the presence of elevated sound levels. It has been reported that fin whales and bowhead whales, respectively move away during seismic surveys. There are reports of whales altering vocalization patterns when exposed to industrial and seismic noise and there are reports of no alteration in vocalization during seismic exposure. Whether there is a consequence to any change in vocalization pattern is difficult to determine, but there is potential for reduced ability to communicate information about feeding, breeding, parental care, predator avoidance or maintenance of social grouping.

Masking effects of seismic pulses are expected to be negligible in the case of the smaller odontocete cetaceans, given the intermittent nature of seismic pulses and the fact that sounds important to them are predominantly at much higher frequencies than air gun sounds. Most of the energy in the sound pulses emitted by air source arrays is at low frequencies, with the strongest spectrum levels below 200 Hz, and considerably lower spectrum levels above 1,000 Hz.

Research has shown that marine mammals exposed to intense sounds may exhibit decreased hearing sensitivities (TTS) following cessation of the sound. TTS have been observed in captive marine mammals exposed to pulsed sounds in experimental conditions, but the likelihood of these effects occurring have not been evaluated under field operating conditions. There is currently no agreement as to what level of TTS and time to recovery would present unacceptable risk to a marine mammal.

Behavioural changes in whales resulting from seismic surveys will vary by species and even by individuals of the same species. Migrating humpback, grey, and bowhead whales have reacted to sound pulses from marine seismic exploration by deviating from their normal migration route and/or interrupting their feeding and moving away.

Baleen whales generally avoid an operating air gun, but the avoidance radii appear to be quite variable. Baleen whales, like the listed fin and blue whales, may deviate from a migratory route, suspend feeding or avoid the area. There are no uniquely significant habitats (feeding, nursery, mating) identified within the Study Area and there are alternate feeding areas.

Most pinnipeds produce sounds with dominant frequencies between 0.1 and 3 kHz. The individual calls of harp seals range from less than 0.1 second to greater than 1 second in duration. Very little information exists on the reactions of pinnipeds to sounds from seismic exploration in open water. Visual monitoring from seismic vessels has shown that pinnipeds frequently do not avoid the area within a few hundred metres of an operating airgun array. However, telemetry research suggests that reactions may be stronger than has been evident from visual studies.

Studies on sea turtle hearing are limited and the role in their ecological functioning is not well known. It has been suggested that sound may play a role in sea turtle navigation. However, recent studies suggest that visual, wave and magnetic cues are the principal navigational cues used by hatchling and juvenile sea turtles. Maximum hearing sensitivity in sea turtles has been observed in the 100 to 700 Hz range.

Sea turtles remain submerged for the majority of time and thus may be exposed to the highest sound levels as the vessel and towed equipment pass overhead. Temporary or permanent hearing impairment may occur at close range, but life-threatening injury or mortality is unlikely.

Research has shown that sea turtles modify their behavioural patterns when exposed to high-intensity sound. Marine turtles are expected to display behavioural changes at around two kilometres and avoidance around one kilometre from the seismic array in 100 to 120 m water depth

In summary, marine mammals and sea turtles will likely exhibit certain behavioural reactions, including displacement from an area and as stated above, the size of this displacement area will likely vary amongst species, during different times of the year, and amongst individuals within a given species. There are a number of mitigations (e.g. ramping up of airguns, use of observers, shut-down procedures) which, when applied, can reduce impacts to marine mammals and sea turtles in the vicinity of a seismic survey. The 2012 EA Report lists a number of mitigations that will be implemented during the seismic program, some of which are consistent with the mitigations recommended in Appendix 2 of *The Geophysical, Geological, Environmental and Geotechnical Program Guidelines* (C-NLOPB 2012b).

The effects on marine mammals are predicted to be of medium magnitude, within an area less than 500 m and over duration of less than two weeks. With the application of mitigation measures, the likelihood of effects occurring is low, and effects will be **not significant**.

The effects on sea turtles are predicted to be of low magnitude, within an area less than 500 m and over duration of less than 2 weeks. With the application of mitigation measures, the overall likelihood of effects occurring is low, and effects will be **not significant**.

5.2.4 Marine Birds

1

There have been few studies on the effects of air source-based seismic surveys on birds. However, there are no data showing that impacts exist. Offshore observers record seabird sightings relative to the vessel, yet they have not reported any mortalities or injuries associated with the surveys. Shearwaters have been observed within 30 m of seismic array with their heads underwater and demonstrating no response. Because seismic pulses are directed downward and highly attenuated at the surface, near surface feeding and diving marine birds would not likely be exposed to sound levels that would result in significant adverse effects on hearing or be life threatening. Above the water, the sound is reduced to a muffled shot that should have little or no effect on birds that have their heads above water or are in flight. It is possible

birds on the water at close range would be startled by the sound, however, the presence of the vessel should have already warned the bird. Birds from the Alcidae family (Common Murre, Thick-billed Murre, Razorbill, Dovekie, Black Guillemot, and Atlantic Puffin) may be affected at greater depths. These species dive from a resting position on the water in search of small fish and invertebrates and are capable of reaching great depths (20 to 60 m) and spending considerable time (25 to 40 seconds) underwater. The effects of underwater sound on Alcidae are not well known, but sound is probably not important to Alcidae in securing food. A seabird data collection program will be undertaken aboard the seismic vessel by experienced biologists. Survey methods will closely follow the ECSAS Standardized Protocol for Pelagic Seabird Surveys for Moving and Stationary Platforms (Wilhelm et al. 2010 unpublished). Seabird data will be provided to CWS and a seabird (and marine mammal) monitoring report will be submitted to the C-NLOPB in accordance with the “*Geophysical, Geological, Environmental and Geotechnical Program Guidelines*” (C-NLOPB 2012b).

The effect of noise on marine birds is predicted to be of negligible magnitude, within an area on the order of 10s of metres, and over duration of days. With the implementation of all mitigation measures outlined in the EA Report, the June 2012 and August 2012 responses and the *Geophysical, Geological, Environmental and Geotechnical Program Guidelines* (C-NLOPB 2012b), the effects of sound emissions on Marine Birds are deemed **not significant**.

Birds are attracted to vessel lighting at night, and birds such as storm-petrels, may fly into vessel lights and other equipment. Since lighting is required at night for safety purposes, mitigation will include routine checks for stranded birds and implementation of appropriate procedures for release that will minimize the effects of vessel lighting on birds in the Project Area. Deck lighting will be minimized (if safe and practical to do so) to reduce the likelihood of stranding. The effect of vessel lighting on marine birds is predicted to be of low magnitude, within an area 1-10 km², and over duration of days. Therefore, the effect of vessel lighting on Marine Birds is deemed **not significant**.

5.2.5 Species at Risk

1

Wolffish species at risk are known to occur in the Study Area. It is likely that fish would be driven away from the noise prior to coming close to the air guns, so the risk of physical injury would be greatest for those organisms that cannot swim away from the approaching sound source, especially eggs and larvae. If seismic operations are conducted in areas where larvae are aggregated then higher levels of mortality may occur. However, the level of mortality for marine fish is not regarded as having significant effects on recruitment to a stock. In the case of wolffish, adults and eggs are generally found on or near bottom at distances of 100-900 m away from the surface. Hence, direct physical impact on these life stages will likely be minimal or non-existent. Mitigation measures include a gradual increase in intensity of air gun discharge to allow fish to avoid the source of sound, and avoidance of seismic activities during known sensitive areas and timeframes. Effects on wolffish species at risk therefore are likely to be **not significant**.

The EA report indicates that leatherback sea turtles are not expected to occur regularly in the Study Area and the area contains no known critical habitat. A recovery strategy for leatherback sea turtles is available. With the implementation of mitigations as indicated above, effects on the leatherback sea turtle are not likely to be adverse and therefore **not significant**.

Blue and North Atlantic Right whales are not expected to occur regularly in the Study Area and thus, interaction with project activities is unlikely. The Fin whale is likely to be common in the Study Area. Nonetheless if these marine mammals were in the project area, the mitigations described above would reduce any impact. A dedicated Marine Mammal Observer will be onboard the seismic vessel. With the implementation of mitigations, including those outlined in the *Geophysical, Geological, Environmental*

and *Geotechnical Program Guidelines* (C-NLOPB 2012b), effects on marine mammal species at risk are likely to be **not significant**.

The Ivory Gull is unlikely to occur in the Study Area, particularly during the summer when seismic surveys are likely to be conducted. The Ivory Gull breeds in high-Arctic coastal areas with permanent pack ice and open water. There is no known nesting grounds for the Ivory Gull in the Study Area, and any presence in the area are expected to be incidental. As indicated above, effects on marine birds are likely to be not significant; therefore, effects on the marine bird species at risk are not likely to be adverse and therefore **not significant**.

5.2.6 Water Quality/Discharges

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Routine discharges, which are likely to occur during operation, are similar to those associated with many typical vessel operations. The vessels proposed for the survey will meet all Canadian regulations and standards to work in Canadian waters. Ship operations will adhere to Annex I of the *International Convention for the Prevention of Pollution from Ships* (MARPOL 73/78). Hydrocarbon concentrations associated with ship discharges are not generally associated with formation of a surface slick. They are therefore not likely to have a measurable effect on the marine environment. The waste generated by the survey vessels will be limited due to the length of the survey program. A licensed waste contractor will be used for any waste returned to shore. The effect of the seismic program operations on marine water quality should be undetectable and **not significant**.

5.3 Cumulative Environmental Effects

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Potential cumulative environmental effects external to the project include seismic program(s) by other operators, commercial and traditional fishing, marine transportation and tourism/recreation. The potential exists that other seismic survey(s) could occur concurrently, resulting in a temporal overlap with the Project. There would be no spatial overlap as there must be enough distance between survey programs (i.e., streamers) as to avoid interfering with data acquisition by individual vessels. In order to avoid acoustic interference with other seismic programs, seismic vessels should remain at least 40 km apart during surveying. Good coordination between programs to minimize potential acoustic interference will also be needed. MKI has committed to ongoing communication with other operators in the Study Area. Therefore, there is some potential for cumulative environmental effects with the seismic program in this context but vessels not associated with the seismic program are restricted from being close to the seismic vessel during the seismic survey. The residual cumulative environmental effect with noise and traffic external to the seismic program will be negligible. Compared to existing vessel traffic in the area, the incremental amount of vessel traffic, because of this seismic program, will be negligible. Cumulative environmental effects resulting from any of the seismic program activities will not be additive or cumulative because the seismic program activities are transitory. With the implementation of mitigative measures, the limited temporal scope, and overlap with other projects and activities, the cumulative environmental effect of the seismic program in conjunction with other projects and activities is predicted to be **not significant**.

5.4 Accidents and Malfunctions

Accidental discharge of oil into the marine environment may result from improper operational procedures (e.g., improper draining of streamer reel trunks), loss of streamer fluid due to breakage, or, as a worst case, as a result of total vessel loss.

The vessel is required to carry a "Shipboard Oil Pollution Emergency Plan" pursuant to MARPOL 73/78. The Plan contains a description of procedures and checklists which govern operations involving hydrocarbons, adherence to which should prevent unintended releases. The vessel will also carry a copy of MKI's "Spill Response Plan". Inspections of seismic equipment will be conducted regularly and where feasible, solid streamers will be used. Solid streamers will be deployed in the 2012 program.

Effects due to accidental spills associated with the proposed operation, therefore, are considered, overall, to be detectable if they occur, but neither significant nor likely.

5.5 Follow-up Program Required Yes No

The C-NLOPB does not require follow-up monitoring, as defined in the CEA Act, to be undertaken for this Project.

6. Other Considerations

The C-NLOPB is satisfied with the environmental information provided by MKI regarding the potential adverse environmental effects which may result from the proposed project, and are satisfied with the operator's proposed monitoring and mitigative measures.

The C-NLOPB is of the view that the environmental effects from the project, in combination with other projects or activities that have been or will be carried out, are **not likely** to cause significant adverse cumulative environmental effects.

7. Recommended Conditions and /or Mitigations

The C-NLOPB recommends that the following conditions be included in the authorization if the seismic survey program is approved:

- *The Operator shall implement or cause to be implemented, all the policies, practices, recommendations and procedures for the protection of the environment included in or referred to in the Application and in the "Environmental Assessment Northeast Newfoundland Slope 2D Seismic Survey Program 2012-2017" (April 2012), "Response to Comments from C-NLOPB dated 29th June 2012" (June 2012), and "Response to Comments from C-NLOPB dated 15th August 2012" (August 2012).*
- *The Operator, or its contractors, shall shut down the seismic airgun array if a marine mammal or sea turtle listed as **Endangered or Threatened** (as per Schedule 1 of SARA) is observed in the safety zone during ramp- up procedures and when the array is active. The safety zone shall have a radius of at least 500 m, as measured from the centre of the air source array(s).*
- *No later than January 31, 2013, the Operator shall submit a report to the C-NLOPB describing the progress and potential environmental effects of its 2012 2D seismic program. It shall include, but not be limited to, copies of the Fisheries Liaison Officer (FLO) reports and the marine mammal observer (MMO) reports that were produced during the program.*

Part D: Screening Decision

8.1 C-NLOPB Decision

The C-NLOPB is of the opinion that, taking into account the implementation of the proposed mitigation measures set out in the conditions above and those committed to by MKI, the Project is **not likely to cause significant adverse environmental effects**. This represents a determination pursuant to Section 20(1) (a) of the CEA Act.

Responsible Officer

Original signed by Elizabeth Young

Date: September 4, 2012

Elizabeth Young
Environmental Assessment Officer
Canada-Newfoundland and Labrador Offshore Petroleum Board

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