

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

PART A: GENERAL INFORMATION

Screening Date	December 16, 2011
EA Title	Chevron Canada Resources Offshore Labrador Seismic Program 2010-2017
Proponent	Chevron Canada Resources 500 – 5 th Avenue Calgary, AB T2P 0L7
Contact	Ms. Jennifer Wyatt Environmental and Regulatory Specialist
C-NLOPB File No.	7705 C3
CEAR No.	09-01-50533
Location	Labrador Shelf, Newfoundland and Labrador Offshore Area Exploration Licence (EL) 1109
Referral Date	October 19, 2009
EA Start Date	October 20, 2009
CEAA Law List Trigger	Paragraph 138(1) (b) <i>Canada Newfoundland Atlantic Accord Implementation Act</i> (Accord Act)

PART B: PROJECT INFORMATION

On 19 October 2009, Chevron Canada Resources (Chevron) submitted a project description “*Offshore Labrador Seismic Program, 2010-2017*” (LGL 2009) to the Canada-Newfoundland and Labrador Offshore Petroleum Board (C-NLOPB), describing its plans to conduct 2D and 3D seismic surveys and geohazard surveys on and around its exploration licence (EL) 1109 on the Labrador Shelf area of the Newfoundland and Labrador offshore. Project activities would comprise a multi-survey seismic program to be conducted in the period 2010 to 2017. Chevron submitted the “*Environmental Assessment of Chevron’s Offshore Labrador Seismic Program, 2010 –2017*” (LGL 2010a) on April 16, 2010. On August 6, 2010, the C-NLOPB requested additional information from Chevron in order to satisfy the requirements of the *Canadian Environmental Assessment Act* (CEAA) and to respond to review comments on the April submission. On November 3, 2010, Chevron responded to the review comments and provided the “*Addendum to the Environmental Assessment of Chevron’s Offshore Labrador Seismic Program, 2010 –2017*” (LGL 2010b). The remainder of Part B of this report summarizes the proposed project, the related environmental setting and existing human use of the area, based on the abovementioned information.

1 Description of Project

Chevron is proposing to conduct 2D and 3D seismic surveys in the Labrador Shelf area over an eight year (2010 to 2017) period. 2D seismic surveys were planned for 2010 followed by 3D seismic and geohazard surveys in 2011 to 2017. The Project Area includes EL 1109 plus a 25 km buffer area to accommodate the ships' turning radii.

Marine seismic airgun array sources for 2D and 3D typically have a total volume of 3000 in³ to 5000 in³ with airguns operating at 2000 to 2500 psi. The total pressure per source for those array source volumes will be between 100 to 150 Bar-meters. The peak-to-peak pressure output will be approximately 254 to 257.5 dB re 1 µPa zero to peak at 1 m. The proposed program consists of approximately 480 linear km of 2D survey data within and near EL 1109 in 2010 or 2011. A 2D seismic survey is proposed in the summer of 2010 or 2011, while other surveys, 2D, 3D, and geohazard may occur at various times between 2010 and 2017. Typical geohazard survey equipment will include a small airgun array to collect high-resolution multi-channel seismic data, side scan sonar, sub-bottom profiler, echo sounder, and magnetometer. The duration of the proposed 2010 2D survey is estimated at 14 days. In 2011 to 2017, it is estimated that seismic surveys may occur for approximately 30 to 75 days and that geohazard survey data may be collected during a two-week period.

The seismic program is scheduled to run between July 1 and November 30 each year between 2010 and 2017, within the Project Area. Geohazard surveys may be conducted at any time of the year.

2 Description of Environment

The following sections provide a summary of the environmental factors described in the Environmental Assessment (EA) Report and Addendum. A complete description of the biological and physical environment can be found in those reports.

2.1 Physical Environment

The bedrock geology of the Study Area is comprised primarily of Precambrian and Tertiary bedrock. The Precambrian bedrock dominates the seafloor on the inner shelf. Five surficial sedimentary formations are found in the Study Area and include till (Lower Till, Upper Till), proglacial and subglacial sediments (Qeovik Silt), and post glacial marine sediments (Makkaq Clay and Sioraq Silt and Gravel).

The bathymetry in the Study Area is relatively complex with depths ranging from approximately 100 m to depths over 2,500 m, including continental shelves, slopes, and the abyssal plain. Bounded on the northwest by Nain Bank and on the southeast by Harrison Bank, the Study Area contains the northeast portion of Makkovik Bank and the southeast side of Hopedale Saddle.

The atmosphere is coldest in January (-22°C) and warmest in July and August (17°C); similarly sea surface temperature is warmest in August (11°C) and coldest in January and February (5°C). The mean sea surface temperature is cooler than the mean air temperature from May to September, with the greatest difference occurring in the month of July. From October to April, sea surface temperatures are warmer than the mean air temperature.

Wind and wave climate statistics for the Study Area were extracted from the MSC50 North Atlantic wind and wave climatology database and grid point 13892, located at 56.0°N to 57.5°W. The Project Area experiences a predominately west-northwest to northwest flow during the winter months with wind speeds ranging from 9.4 to 11.0 m/s. West to northwest winds during the winter months begin to shift counter-clockwise as the track moves north resulting in a predominant southeast wind by the summer months. Wind speeds during spring gradually decrease from 9.1 m/s in March to 6.2 m/s in May and

further decrease during summer (June – 5.4 m/s, July – 4.6 m/s, August – 5.4 m/s). Wind speeds for October, November and December are 8.9 m/s, 10.0 m/s, and 11.0 m/s respectively.

There are two distinct southward transports of currents along the Labrador Coast, usually referred to as the inshore and offshore streams. The inshore stream is located inside the banks following the contours of the Labrador Marginal Trough and the offshore stream is located near the Shelf break and Continental Slope. The currents on the banks are weak and variable, while the currents in the saddles are strong and produce a cross-shelf transport (east/west directions).

The Study Area is affected by sea ice from the end of December until the beginning of July. 10% of the Study Area is covered with sea ice 1 to 10% of the time beginning in the week of December 04. By the week of January 29, 83.6% of the area is covered in sea ice between 91 to 100% of the time. By late June or early July, the median concentration over the Study Area is zero.

Between 1974 and 2009, 699 out of 23,570 icebergs in total have been sighted inside the area. Icebergs have been spotted within the region from December to August; however, they are most prominent during the month of June. With respect to size, the most prominent icebergs are medium sized, accounting for 31.0% of observed icebergs within the region. Large icebergs occur 12.9% of the time.

2.2 Biological Environment

2.2.1 Species at Risk

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

SPECIES	SARA Status	COSEWIC Status (Date of Most Recent Status Report)
Blue Whale (<i>Balenoptera musculus</i>)	Schedule 1 - Endangered	Endangered (May 2002)
Leatherback Sea Turtle (<i>Dermochelys coricea</i>)	Schedule 1 - Endangered	Endangered (May 2001)
Ivory Gull (<i>Pagophilia eburnean</i>)	Schedule 1 - Endangered	Endangered (April 2006)
Northern Wolffish (<i>Anarhichas denticulatis</i>)	Schedule 1 - Threatened	Threatened (May 2001)
Spotted Wolffish (<i>Anarhichas minor</i>)	Schedule 1 - Threatened	Threatened (May 2001)
Atlantic Wolffish (<i>Anarhichas lupus</i>)	Schedule 1 – Special Concern	Special Concern (November 2000)
Sowerby’s beaked whale (<i>Mesoplodon bidens</i>)	Schedule 1 – Special Concern	Special Concern (November 2006)
Fin Whale (Atlantic population) (<i>Balenoptera physalus</i>)	Schedule 1 – Special Concern	Special Concern (May 2005)
Atlantic cod (NL population) (<i>Gadus morhua</i>)		Endangered (April 2010)
Roundnose grenadier		Endangered (November 2008)

<i>(Coryphaenoides rupestris)</i>		
Beluga whale (Eastern Hudson and Ungava Bay populations) <i>(Delphinapterus leucas)</i>		Endangered (May 2004)
Cusk (<i>Brosme brosme</i>)		Threatened (May 2003)
American plaice (NL population) <i>(Hippoglossoides platessoides)</i>		Threatened (April 2009)
Northern bottlenose whale (Davis Strait-Baffin Bay-Labrador Sea population) <i>(Hyperoodon ampullatus)</i>		Special Concern (May 2011)
Harbour porpoise (<i>Phocoena phocoena</i>)		Special Concern (April 2006)
Killer whale (NW Atlantic and E Arctic populations) <i>(Orcinus orca)</i>		Special Concern (November 2008)
American eel (<i>Anguilla rostrata</i>)		Special Concern (April 2006)
Roughhead grenadier <i>(Macrourus berglax)</i>		Special Concern (April 2007)
Polar bear (<i>Ursus maritimus</i>)		Special Concern (April 2008)

The Blue Whale is the largest and one of the rarest marine mammals in the North Atlantic. 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. The EA Report notes that Blue whales have been sighted only sporadically off the Labrador coast. The Labrador Shelf SEA (Sikumiut 2008) suggests that blue whales are likely to occur on the Labrador Shelf in late winter and spring, but have been sighted in the region year-round.

Leatherback turtles may range as far as northern Labrador since they travel extensively during migration. They have been observed offshore Newfoundland and Labrador from May to December. No population estimates exist for the Northwest Atlantic. The Recovery Strategy (Atlantic Leatherback Turtle Recovery Team 2006) contains supporting objectives for the Leatherback Turtle.

The Ivory Gull is associated with polar pack ice at all time of the year. A recent survey (March 2004) conducted off the coast of Newfoundland and Labrador shows a decrease in Ivory Gull numbers, with sightings of 0.02 individuals per 10 minutes, compared to 0.69 individuals per 10 minutes observed in 1978. The abundance and seasonal use of the Labrador Sea by Ivory Gulls is unknown.

Three species of wolffish are found in the Labrador Shelf Area: northern wolffish, spotted wolffish; and Atlantic (striped) wolffish. They typically are found in highest concentrations over sand, but occur over all observed bottoms. There is a Recovery Strategy (Kulka *et al.* 2007) for northern and spotted wolffish and Management Plan for Atlantic wolffish to achieve long-term viability of the species.

Sowerby's beaked whales are common to the North Atlantic. However, their distribution, abundance, and biology are generally not well known. The northern limit of confirmed sightings and strandings in Canadian waters is Notre Dame, Newfoundland, however it is expected this species may extend further north into the Labrador Shelf area. Observations most frequently occur during the summer, but observer

effort is considerably increased during this season in offshore areas northeast of Newfoundland and Labrador. Their habitat is thought to be deep water and the Continental Shelf and slopes.

The best available population estimate for Fin Whales in the Project Area is between 2,269 and 2,814 individuals. Fin whales continue to be sighted in Newfoundland and Labrador waters, particularly during summer months. Based on the DFO cetacean sightings database, fin whales have been sighted throughout the Study Area from July to October. They feed on small schooling fish and krill and tend to be found in areas where these prey concentrate, such as areas of upwelling, shelf breaks, and banks. Fin whales may stay on the Labrador shelf year-round or migrate to warmer mid-latitude waters, but little information on winter habitat is currently available.

The Project Area is not known to contain any sensitive areas or critical habitats for species listed on Schedule 1 of *SARA*.

2.2.2 Fish and Fish Habitat

The spring bloom of phytoplankton in the southern Labrador Sea, which begins in March, is a continuation of the bloom that begins on the Grand Banks and spreads northward. In the northern Labrador Sea, the spring bloom starts in early April with the bloom occurring earlier in both the north and south Labrador Sea areas as compared to the central Labrador Sea. There also appears to be a fall bloom over shelf and slope regions in October for the Labrador Shelf area. Labrador Shelf waters display elevated chlorophyll biomass over most of the growing season from April through September – October.

Zooplankton reproduction either coincides or immediately follows phytoplankton blooms. Zooplankton reproduction would be expected to vary somewhat for the different portions of the Labrador Sea (zooplankton reproduction in the northern and southern Labrador Sea would be expected to occur in or around May with the central Labrador Sea lagging until sometime in June).

Benthic invertebrate communities can be spatially variable due to physical habitat characteristics such as water depth, substrate type, currents, and sedimentation. For Labrador, the mean macrobenthic biomass (depth: 5 to 63 m) was measured as 346 g/m².

There are three main types of marine fish present in the Project Area: pelagic fish are those that live and feed close to the surface; demersal or groundfish are those that live and feed close to the bottom; and shellfish, which include crustaceans and bivalves. A description of shellfish and finfish, other than those described below under commercial fisheries, can be found in the EA Report.

A variety of coral groups occur in Newfoundland and Labrador waters and include: scleractinians (solitary stony corals); antipatharians (black wire corals); alcyonaceans (large and small gorgonians, soft corals); and pennatulaceans (sea pens) (Wareham and Edinger 2007; Wareham 2009 in LGL 2010a). Congregations of coral in the Study Area are referred to as coral “forests” or “fields” and most grow on hard substrate. Others, such as small gorgonians, cup corals, and sea pens, prefer sand or mud substrates. There are approximately 12 species of corals occurring within or adjacent to the Study Area. The species identified include: large gorgonians (*Primnoa resedaeformis*, *Paragorgia arborea*, and *Paramuricea* spp.); small gorgonians (*Acanthogorgia armata*, *Acanella arbuscula*); and soft corals (*Anthomastus grandiflorus*, *Duva florida*, *Gersemia rubiformis*, and *Nephtheid* spp.). One scleractinian species (*Vaughanella margaritata*) and two pennatulacean species (*Anthoptilum grandiflorum* and unspecified sea pen species) are also noted to occur there. No antipatharian species were noted to occur within the Study Area.

2.2.3 Commercial Fisheries

The Study Area falls within Northwest Atlantic Fisheries Organization (NAFO) divisions 2H (Unit Areas 2Hb, Hc, He, and Hf) and 2J (Unit Area 2Jb). The EA Report identifies the main commercial species on the Labrador Shelf, including the Project Area. The principal fisheries, in terms of landed value, in and adjacent to the Study Area and Project Area are: northern shrimp (*Pandalus borealis*) (mobile trawl fishery); snow crab (*Chionoecetes opilio*) (fixed gear fishery); and Greenland halibut (*Reinhardtius hippoglossoides*) (gillnets).

Northern Shrimp is reported to be the most important commercial species in the Project and Study Areas over the last two decades. They are concentrated in the depression on the Labrador and Scotian shelves and off the Grand Banks, at depths ranging from 150 – 500 m. The EA Report indicates that spawning occurs during late summer and fall. The eggs remain attached to the female until spring, where they are hatched in inshore areas. Larvae remain in the surface water for a few months then descend to the deeper waters as they mature. Northern shrimp harvesting begins in May and ends in the fall with the bulk of the harvest occurring in June. Shrimp is harvested using mobile shrimp trawls.

Snow crab is the second most important commercial species in the Study Area. The EA Report notes that snow crab are more commonly found in the mud and sand-mud substrates at temperatures ranging from - 0.5 degrees to 4.5 degrees. Young crab, however, are found in substrate that has more gravel. Snow crabs mate in late winter and spring, and the females carry the egg masses for up to two years prior to larval hatch. Hatching typically occurs in May or June. Crab is harvested using fixed gear – crab pots – from July to September.

The most important groundfish fishery is Greenland halibut (*Reinhardtius hippoglossoides*). It is harvested primarily from August to September with both fixed (gill nest, longlines) and mobile gear (otter trawlers). It is commonly found at water depths of 500 to 1,200 m. Fishing may occur from 200 to 1,500 m depths but has also been caught at depths of 2,200 m. For the Labrador-eastern Newfoundland population, spawning is thought to occur during December to April in the north and August in the south. A great deal of variability exists in the maturation and spawning of Greenland halibut both temporally and geographically and this variability appears to be a feature common to all areas within its range.

2.2.4 Marine Mammals and Sea Turtles

A total of 21 marine mammals, including 14 cetaceans, six seals, and the polar bear occur in the Study Area. The more common species on the Labrador Shelf are: humpback (*Megaptera novaeangliae*), and pilot (*Globicephala melas*) whales; and white-beaked (*Lagenorhynchus albirostris*) dolphins. Information is available on these species in the EA Report.

The leatherback (*Dermochelys coriacea*), the loggerhead (*Caretta caretta*), and the Kemp's Ridley (*Lepidochelys kempii*) turtles may all be found in the Project Area but are considered uncommon. The loggerhead sea turtle is the most common sea turtle in North American waters, but rarely ventures as far north as Labrador. The Kemp's Ridley sea turtle is more restricted in distribution, primarily occurring only in the Gulf of Mexico, but some juveniles sometimes feed along the U.S. east coast and rarely range into eastern Canada waters.

2.2.5 Marine Birds

There are 26 species of seabirds occurring regularly on the mid Labrador coast from Black Tickle to Nain (LGL 2010a). Islands along the coast provide suitable nesting conditions for colonies of gulls, terns, Common Eider and auks (Razorbill, Thick-billed Murre, Common Murre, Atlantic Puffin and Black Guillemot). There are three main concentrations of nesting auks, along the mid Labrador coast: (1) offshore islands south east of Nain; (2) Quaker Hat Island near Cape Harrison; and (3) Gannet Islands and

Bird Island Groswater Bay/Table Bay. These three island groups support more than 160,000 pairs of breeding seabirds. More than 40% of the North American breeding population of Razorbill nests on this section of Labrador coast. The Gannet Islands (including the Gannet Cluster) off Hamilton Inlet, the largest breeding seabird nesting colony in Labrador, supports more than 91,000 pairs of nesting seabirds in the summer. Colonies of terns (Arctic and Common) and gulls (Herring, Great Black-backed, Ring-billed and Glaucous) and nesting Common Eider are scattered along the coast. A description of seabird species known to occur in the Study Area is included in the EA Report.

2.2.6 Sensitive and Special Areas

There are a variety of regulatory frameworks that deal directly or indirectly with sensitive areas in Newfoundland and Labrador however, there are currently no designated sensitive areas located within the Study Area. The Study and Project Areas are both located in Canada's NL-Labrador Shelves Marine Ecoregion. There are important areas within the Study Area, though not specifically designated, such as corals, spawning, nursing, rearing, and/or migratory areas, and areas of traditional harvesting activities. The Study Area is located immediately adjacent to "The Zone" and located between two Parks Canada Representative Marine Areas (NMCA candidate sites); Nain Bank and Hamilton Inlet.

There are a total of 16 IBAs bordering the Study Area along the Labrador coast, including the Gannett Islands. These areas, along with five IBAs located on the Newfoundland coast, are mapped in the EA Report. The IBAs on the Labrador coast are: Bird Island; Cape Porcupine; Galvano Island; Gannet Islands; Goose Brook; Nain Coastline; Northeast Groswater Bay; Offshore Islands, Southeast of Nain; Quaker Hat Island; Seven Islands Bay; South Groswater Bay; St. Peter Bay; Table Bay; The Backway; The Tumbledown Dick Islands; and Stag Islands. The IBAs on the Newfoundland coast are: Fischot Islands; Northern Groais Island; Bell Island; Wadham Islands; and Funk Island.

Currently, there is one Marine Protected Area found near the Study Area. Gilbert Bay Marine Protected Area, which has been protected under the *Oceans Act* since 2005, is 47 km² in size and located approximately 300 km from Happy Valley-Goose Bay on Labrador's southeast coast. The Bay is 20 km in length but less than 100 m deep with two narrow outlets to the sea.

The Torngat Mountains National Park is the sole National Park found adjacent to the Study Area. The park encompasses 9,700 km² of the Northern Labrador Mountains natural region, extending from Saglek Fjord in the south, including all islands and islets, to the very northern tip of Labrador. No exploration or production activities are allowed within the park boundaries, which includes Saglek Bay to Killinek Island near Cape Chidley in the marine environment. Battle Harbour is also managed by Parks Canada under the National Site Historic Program and is designated as a National Historic District because of its historic importance in the Labrador fishery.

The Gannet Islands Ecological Reserve is an archipelago of seven islands and surrounding marine component at the mouth of Sandwich Bay. The reserve is 22 km² in size, with 20 km² of that area being the marine waters surrounding the islands. It is the largest seabird colony in Labrador and has the largest Razorbill colony in North America. It also hosts important breeding populations of Atlantic Puffins and Common Murres, and is the largest known moulting site for Harlequin Ducks (listed under *SARA* as "special concern") in eastern North America. The reserve is located approximately west (inshore) of the Study Area and.

2.2.7 Research Surveys, Vessel Traffic, Recreation and Tourism

DOF carries out stock assessment surveys and research activities throughout the marine environment. The DFO Science Advisory Schedule can be accessed on-line to view activities scheduled in Canada at <http://www.isdm-gdsi.gc.ca/csas-sccs/applications/events-evenements/index-eng.asp>. DFO conducts spring and fall RV surveys in areas of NAFO Division 2H and 2J.

Shrimp are surveyed from water depths between 100 to 750 m by the Canadian Association of Prawn Producers (in conjunction with DFO) in NAFO Area 2G (outside the Project Area). This survey has been run annually since 2005 from July 15 through the first week of September and will continue for a minimum of five consecutive years (to 2010 as a minimum). The only portion of the Labrador Shelf Study Area currently surveyed as part of the multispecies survey (conducted annually between October and December) is NAFO Area 2J; surveys have not been conducted since 1999.

Marine transportation in the Study Area involves vessels travelling to and from Labrador ports and other ports in the province, and vessels that are travelling to and from ports in the Canadian High Arctic. Most marine transportation (including the coastal ferry service and fuel transportation) is dependent on the ice-free season (June to November), with the exceptions of offshore fishing activities, freighter traffic between Greenland and eastern North American ports and concentrated ore shipments from Voisey's Bay.

Tourism and recreation activities within the Study Area include cruise ships, tour boats, local and visitor personal boating, ecotourism and prehistoric and historic resources. None of these activities take place within the Project Area (for example, the prehistoric and historic resources are all land-based). Cruise ships would transit the Project Area between 10 ports of call along the Labrador Coast (Saglek Fjord, Nain, Hebron, Hopedale, Rigolet, Northwest River, Happy Valley-Goose Bay, Cartwright, Battle Harbour and Red Bay).

PART C: ENVIRONMENTAL ASSESSMENT PROCESS

3. Review Process

On October 19, 2009, Chevron submitted a project description to the C-NLOPB in support of its application to conduct 2D and 3D seismic, and geohazard surveys. The Project will require an authorization pursuant to Section 138(1) (b) of the *Canada-Newfoundland Atlantic Accord Implementation Act* and Section 134(1) (b) of the *Canada-Newfoundland and Labrador Atlantic Accord Implementation Newfoundland and Labrador Act*. The C-NLOPB, as Responsible Authority (RA), forwarded the Federal Coordination Regulations (FCR) Section 5 Notification on October 20, 2009 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; as well as the Nunatsiavut Government (NG). Responses to the proposed scope and identification of each department or agency's role with respect to the Project were to be received by 03 November 2009. Pursuant to Section 12.2 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 will be responsible for coordinating the review activities by the expert government departments and agencies that participate in the review.

On November 10, 2009, the C-NLOPB notified Chevron that a screening level of assessment was required and the proponent was provided with a Scoping Document.

On April 16, 2010, Chevron submitted the "*Environmental Assessment of Chevron's Offshore Labrador Seismic Program, 2010 - 2017*" (LGL 2010a). The C-NLOPB forwarded the EA Report to the DFO, EC, DND, NG and the provincial Departments of Environment and Conservation, Fisheries and Aquaculture, and Natural Resources. The Fish, Food and Allied Workers Union (FFAW) and One Ocean were provided a copy of the EA Report for review. Comments received up to and including 28 May 2010 were considered. The C-NLOPB received comments from NRCan, TC, Health Canada, NL Department of

Natural Resources, EC, DND, DFO and the NG. Chevron was provided with the EA Report review comments on August 6, 2010 and responded on November 3, 2010 with the “*Addendum to the Environmental Assessment of Chevron’s Offshore Labrador Seismic Program, 2010-2017*” (LGL 2010b). The C-NLOPB forwarded the response for reviewers’ consideration.

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 Chevron that is likely to be carried out in relation to their proposed Project.

3.1 Scope of Project

Chevron proposes 2D and 3D seismic surveys, and geohazard data collection on EL 1109 on the Labrador Shelf. The Project Area includes a 25-km buffer around the exploration lease to accommodate both streamer deployment and seismic vessel turning. Seismic survey operations will be carried out such that streamer deployment and end-of-survey line turning operations will not extend into the Labrador Inuit Settlement Area (known as the “Zone”).

Approximately 480 linear km of 2D seismic data will be collected within and near EL 1109 in 2010 or 2011. The 2D seismic survey vessel will tow a sound source, one air gun array 4,000 to 7,000 cubic inches in total volume and towed at depths of approximately 6 to 15 m. The air guns will be operated with compressed air at pressures of 2,000 to 2,500 psi and producing peak-to-peak pressures of approximately 140 to 165 bar-m (14 x 10¹² to 16.5 x 10¹² micro Pascal (µPa)). There will be one towed streamer, 6,000 to 10,000 m in length, which will be towed behind the vessel at depths of approximately 8 to 30 m. Additional 2D, 3D, and/or geohazard surveys may be undertaken in subsequent years up to and including 2017. The 3D sound source will consist of a larger air gun array and 8 to 10 streamers of hydrophones 75 to 100 m apart and 6,000 to 8,000 m long. The sound source array would have multiple air gun units, usually operating at 2,000 psi with individual source unit volumes ranging from 70 to 250 in³. The wellsite/geohazard survey will be collected using a closer survey line spacing (250 m) using smaller equipment and lower pressures. One geohazard survey per year may occur between 2011 to 2017.

The timing of survey activities will be between July 1 and November 30 of any given year. The duration of the initial 2D survey is estimated at 14 days and the duration of a typical geo-hazard (well site) survey is approximately four to six days. The estimated duration of a 3D program, depending on the area to be covered, is approximately 30 to 75 days.

3.2 Boundaries

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

<i>Boundary</i>	Description
<i>Temporal</i>	Between July 1 to November 30 2010-2017 for seismic surveys. Geohazard surveys may be conducted at any time of the year.
<i>Project Area</i>	Defined as EL 1109 plus a 25 km buffer to accommodate vessel turning.
<i>Affected Area</i>	The area that could potentially be affected by project activities beyond the Project Area. It includes the Project Area plus a 20 km

	buffer area.
<i>Regional Area</i>	NAFO Divisions 2H and 2J

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 “*Chevron Canada Resources Labrador Seismic Program 2009-2017 Scoping Document*” (C-NLOPB (2009)).

4. Consultation

4.1 Consultation carried out by Chevron

During the course of the assessment, Chevron consulted with stakeholders with an interest in the Project. In preparing the EA for its proposed 2010 to 2017 seismic survey program, Chevron, along with representatives from Canning & Pitt Associates, Inc. and LGL Limited, consulted with relevant government agencies, representatives of the fishing industry, and other interest groups. The purpose of these consultations was to describe the planned program, to identify any issues and concerns and to gather additional information relevant to the EA report.

Prior to consultations, in June 2009, Chevron made a presentation at EXPO Labrador Conference about Chevron, their interests in Atlantic Canada, and an overview of future plans within the newly acquired offshore Labrador ELs. Introductory sessions were also held with the Nunatsiavut Government in June. Chevron also visited Nain and Happy Valley-Goose Bay on 21-22 September 2009. Consultation meetings were held with residents and other interest groups in Labrador communities from 21-30 October 2009. The communities visited included Nain, Rigolet, Happy Valley-Goose Bay, Postville, Makkovik, Hopedale, and Cartwright where public meetings and quite often meetings with the town council were held. Meetings were also held with Torngat Fish Producers Co-operative Society Limited, Torngat Wildlife, Plants, and Fisheries Secretariat in Happy Valley-Goose Bay and with the FFAW, One Ocean, DFO, and Environment Canada in St. John’s. A joint meeting was held with Innu representatives in Sheshatshiu on 12 January 2010.

In early December 2009, other agencies and groups were e-mailed a brief description of the proposed 2010 2-D survey program and a map of the Study and Project areas. Each of these stakeholders was asked to review this information, provide any comments on the proposed activities and to let the proponent know if agency representatives would like to meet face-to-face to discuss the proposed program in more detail. Follow-up contacts were undertaken with all groups later in December, and a final request for comments was sent in the second week of January 2010. Groups consulted via email included:

- Natural History Society of Newfoundland and Labrador (NHS);
- Association of Seafood Producers;
- Ocean Choice International Inc. (OCI);
- Canadian Association of Prawn Producers (CAPP);
- Groundfish Enterprise Allocation Council (GEAC, Ottawa);
- Clearwater Seafoods; and
- Iceswater Seafoods.

The results of those consultations and key issues raised during the public meetings are documented in the EA Report, however the key issues raised included:

- the type of hydrocarbons that are present;
- how gas will be transported;
- the need for maximizing local opportunities for employment and supply of services and supplies;
- the effects of weather, ice and icebergs on operations;
- the possibility of other oil companies exploring in the area;
- compensation program for lost or damaged fishing gear;
- very recent fishing history is important for determining where the fishing effort is likely to occur in the near future (the exploration licenses are areas for fishing shrimp, crab and turbot, which areas change from year to year);
- fishers need to receive factual and scientifically sound information to alleviate fears of negative effects on the fishing industry;
- communication is critical if fishers and oil and gas activities are to work in harmony;
- the potential effects of the associated noise on whales and other marine mammals and shellfish;
- the use of Traditional Knowledge and the quality of information on ice, marine mammals and fishing activity;

The C-NLOPB is satisfied that the consultations carried out by Chevron and reported on in the EA Report, during the preparation of the EA included all elements of the Project, and that Chevron addressed substantive concerns about the proposed project.

4.2 Review of the March 2010 EA Report

The C-NLOPB forwarded the EA Report on April 16, 2010 to the DFO, EC, DND, NG, and the provincial Departments of Environment and Conservation, Fisheries and Aquaculture, and Natural Resources. The FFAW and One Ocean were provided a copy of the EA Report to review.

The FFAW provided comments on 2 August 2010. The key issues included the need for constant communication, recognition of a dynamic and important fishery in the area, uncertainties with long-term and cumulative effects, timing conflicts and the use of Fisheries Liaison Officers (FLOs) to maintain communication while the two industries work in the same geographic area. *On November 26, 2010, FFAW replied to the EA Addendum stating that their comments had been addressed.*

DFO provided comments on the EA Report on 14 June 2010. They suggested annual reevaluation of SAR, improved scientific referencing of some of the statements and conclusions, better data on commercial fisheries, identification of more recent studies on sound, raised the issue of special areas and commented on cumulative effects. *On November 16, 2010, DFO replied to the EA Addendum. They reiterated their expectations of the proponent to mitigate the effects of seismic activity on marine species.*

EC provided comments on the EA Report on 25 June 2010 and stated that the proponent should take advantage of the opportunity to collect seabird data and provided protocol and proper bird-handling advice. *On November 18, 2010, EC replied that the proponent has addressed their comments.*

Comments on the EA Report were received from the NG on 7 June 2010. They questioned the effects on Aboriginal fisheries, both from this project, as well as cumulative effects and uncertainties with respect to effects and data gaps. More information was requested on the location of seismic survey lines. They highlighted the lack of Traditional Ecological Knowledge, or Inuit Knowledge and recommended the use of Inuit observers and local resources where applicable. *On February 22, 2011, NG replied to the EA*

Addendum and again expressed concern with the effects to Aboriginal Fisheries and reiterated that a means of mitigation is to avoid peak fishing periods and the use of Inuit observers and local resources.

The consolidated review comments were provided to Chevron on 6 August 2010. Chevron responded on November 3, 2010 with the “*Addendum to the Environmental Assessment of Chevron’s Offshore Labrador Seismic Program, 2010-2017*” (LGL October 2010). This Addendum was provided to reviewers for assessment. 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 Chevron in the 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, Chevron presented information regarding the potential effects of seismic and wellsite/geohazard program activities on marine fish and fish habitat, marine mammals and sea turtles, marine birds, commercial fisheries, and species at risk. A summary of the effects assessment follows.

5.2 Valued Ecosystem Components/Potential Environmental Effects

5.2.1 Fish and Invertebrate

1

The potential effects of exposure to sound on fish and marine invertebrates can be either physical or behavioural. In the natural environment, fish show 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 2010 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 reported in LGL 2010a. While the research has not determined any direct mortality of fish or shellfish attributable to seismic activity, it needs to be recognized that there

may be behavioural changes that could affect migration and/or reproductive and spawning activities as well as movement of the exploitable biomass in an area.

Fish show startle response and change in direction and speed of swimming. The EA Report states that the temporary nature of these responses vary 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 LGL (2010a) hearing sensitivity recovered within 14 days of exposure. Mitigations consistent with those outlined in the *Geophysical, Geological, Environmental and Geotechnical Program Guidelines* (C-NLOPB 2011), will be implemented.

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 (LGL 2010a). The effects assessment concluded that physical effects on fish due to Project activities will be low to negligible in magnitude, in an area of less than 100 km², and of a duration of one to 12 months. The likelihood of effects (behavioural and physical) on fish 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 2010 EA Report indicated that available experimental data suggest that there may be physical and developmental 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.

In general, the limited studies done to date on the effects of acoustic exposure on marine invertebrates have not demonstrated any serious pathological and physiological effects. Some of the existing scientific literature is difficult to compare and draw concrete conclusions because of inadequate documentation on measurement methods and units. In general, marine animals with gas-filled organs are more vulnerable to acoustic impact because of the impedance difference between air and water. Most invertebrates do not have gas-filled organs and are therefore usually considered less vulnerable than fish. Rather than being sensitive to pressure changes, invertebrates appear to be more sensitive to particle displacement.

There is a variety of studies that show some effect of seismic sound on invertebrates and there are others that show little or no effect of seismic sound. Details of these studies are found in LGL 2010a. Any potential physical or behavioural impact to invertebrate species is considered to be low, somewhat immediate in geographic scope (11 to 100 km²), 1 to 12 months in duration, and reversible. The likelihood of effects (behavioural and physical) on invertebrates is low and therefore **not significant**.

5.2.2 Commercial Fishing and DFO Research Surveys **1**

While there is little fishing that occurs within EL 1109, species are harvested around the EL to the north and south. The predominant harvested species is shrimp, which are harvested using a trawl and accounts for more than 90 percent of the commercial catch in the Study Area. Snow crab is harvested (using fixed gear) to the south of EL 1109. Of the remaining principal commercial species, turbot is not harvested near the EL, and only sporadically in the Project Area.

The EA Report discusses studies where snow crab eggs were exposed at various decibel levels and at various distances. There were possible signs of retarded development; however, eggs in nature are

unlikely to be exposed to noise levels of range or intensity in nature as they are carried by the female on the seafloor (the same is true for shrimp). Results from a DFO study, in 2004, on the effects of seismic activity on adult snow crab indicated no acute or mid-term mortality; nor were embryo survival or mobility of hatched larvae affected. In some studies looking at the effects on commercial catch rates, the change in swimming direction of fishes accounted for a decrease catch rate. Some studies show that this effect was temporary, whereas other studies report that fish behaviour was altered for a number of days (LGL 2010a). While the research has not determined any direct mortality of fish or shellfish attributable to seismic activity it needs to be recognized that there may be behavioural changes that could affect migration and/or reproductive and spawning activities as well as movement of the exploitable biomass in an area.

Mitigation procedures, consistent with the *Geophysical, Geological, Environmental and Geotechnical Program Guidelines* (C-NLOPB 2011) for this activity, will include a FLO to facilitate information flow between the survey vessels and fishing vessels near the seismic survey. In addition, Chevron will use a picket (or guide vessel) and will provide Notices to Shipping and announce their activities on the CBC Radio program Fisheries Broadcast and the Okalakatiget Society radio. Chevron commits to consulting further with the Nunatsiavut Government regarding their recommendations regarding personnel in the role of MMO and FLO. In the event of gear damage, Chevron will implement a gear and vessel damage compensation contingency plan.

Chevron has committed to ongoing stakeholder relations, including the Torngat Joint Fisheries Board (TJFB). The timing of planned seismic activities will be communicated to those involved in the fishing industry and subsequent feedback will be considered during the planning process. Chevron will maintain regular communication with the FFAW to keep apprised of ongoing developments and changes in the fishing industry as they relate to the Study Area, including peak fishing times for various species and the gear types that will be used during the various fisheries. Seismic activities will be scheduled to avoid heavily fished areas, particularly fixed gear zones, when they are occupied by harvesters. Operational arrangements shall be implemented to ensure that the operator and/or its survey contractor and the local fishing interests are informed of each other's planned activities. Communication throughout survey operations with fishing interests in the area will be maintained. The use of a FLO on-board the seismic vessel would be considered an acceptable approach. The TJFB will be contacted after the seismic survey to discuss any concerns that may have arisen from the program. As well, Chevron will contact DFO regarding research survey timing and locations and coordinate with DFO to establish a temporal and spatial separation plan. Such planning will allow the seismic program to avoid overlap and interference.

Taking mitigations into account, any potential physical or behavioural impact to invertebrate species is considered to be low, somewhat immediate in geographic scope (11 to 100 km²), 1 to 12 months in duration, and reversible. The likelihood of effects (behavioural and physical) on commercial fisheries and research surveys is low and therefore **not significant**.

5.2.3 Marine Mammals and Turtles

1

A potential effect of the proposed operation upon marine mammals and sea turtles, which may be present in the area, is that of sound pulses from the survey equipment. The size of the displacement area will likely vary amongst species, during different times of the year, and even amongst individuals within a given species. There is also a risk that marine mammals and sea turtles that are very close to the seismic array may incur hearing impairment. The EA Report provides an assessment, based on available data on the effects of seismic sound on marine mammals and sea turtles. The EA Report describes in more detail the species of cetaceans that have been observed in, or which are considered likely, to frequent the project area.

The results from one program indicate that sighting rates of baleen whales were higher during seismic periods than during non-seismic periods. However, the sighting rate was lowest when the array was operating at full volume. The distance at which baleen whales were observed was closer when airguns were inactive. Overall, the EA report states that the analysis of the data suggests that there was no obvious behavioural effect of airgun operations on baleen whales. In another monitoring study, it was reported that dolphins were observed at a further distance when the airguns were active than when airguns were inactive, and this difference was statistically significant.

Sea turtles are likely to show avoidance behaviour during seismic surveys. An industrial sound source will reduce the effective communication or echolocation distance only if its frequency is close to that of the cetacean signal (LGL 2010a). If little or no overlap occurs between the industrial noise and the frequencies used, communication and echolocation are not expected to be disrupted. Furthermore, the discontinuous nature of sonar pulses makes significant masking effects unlikely. However, the extent of avoidance is unknown. The EA report states that turtles might experience temporary hearing loss if the turtles are close to the airguns. If sea turtles were present, the mitigation measures applied (as outlined in LGL 2010a) should reduce the effect.

There are several recommended mitigations, which when applied can reduce impacts to marine mammals in the vicinity of a seismic survey (e.g., ramping up of airguns, use of observers, startup and shutdown procedures). In addition, the EA Report and Addendum lists a number of mitigations consistent with the mitigations listed in the *Geophysical, Geological, Environmental and Geotechnical Program Guidelines* (C-NLOPB 2011). Chevron has indicated that these mitigations (including ramp up and shut down during ramp up if a marine mammal is spotted in the zone) will be implemented during the survey. In addition to the shutdown procedures during ramp up, the C-NLOPB requires that the airguns be shut down if a marine mammal or sea turtle, listed as Endangered or Threatened (as per Schedule 1 of SARA) is observed within 500 m of the airgun array. Chevron will collect observation data on marine mammals throughout the program.

The effects on marine mammals are predicted to be of negligible or low magnitude, less than 1 km² in extent, low frequency and short term (1 to 12 months). With the application of mitigation measures, the likelihood of effects will be **not significant**.

For sea turtles, the EA Report indicates that sea turtles may exhibit avoidance behaviour to noise within an unknown area around the array and that turtles might experience temporary hearing loss if the turtles are close to the airguns. While the impacts of the arrays would not be lethal, the impulses might disrupt foraging patterns and have other behavioural consequences. However, if sea turtles were present, the mitigation measures applied should reduce the impact. The effects on sea turtles are predicted to be of negligible or low magnitude, greater than 1 km² and less than 100 km² in extent, low frequency, short duration (1 to 12 months) and reversible. With the application of mitigation measures, in particular, the use of Marine Mammal Observers (MMOs), the overall likelihood of effects occurring is low, and the effects will be **not significant**.

5.2.4 Marine Birds

1

The sound created by airguns is focused downward below the surface of the water. 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. Most species of seabirds that may be present in the Project Area spend only a short time underwater during foraging so there would be minimal opportunity for exposure to noise from the seismic shooting associated with the seismic program. There are limited data available with respect to the effects of underwater sound on birds. However, the EA Report states that only the Alcidae (Dovekie, Common Murre, Thick-billed Murre, Razorbill, Black Guillemot and Atlantic Puffin) spend measureable time underwater during forage dives. They typically spend 25 to 40 seconds underwater during each dive,

reaching depths of 20 to 60 m, and have the potential to be exposed to the sounds produced by seismic shooting. However, some species have reached depths of 120 m and remained underwater for up to 202 seconds. The effects of seismic noise on Alcids are not well known. It also states that, from a variety of limited research, that diving behaviour, mortality or any ill effects were documented. The Northern Gannet can plunge to a depth of 10 m but tends to only spend a few seconds under water thus minimizing its exposure and as described in the EA Report, this species tends to be uncommon to the Project Area but may be present during spring and summer (April – September).

Seabirds may also be attracted to vessel lighting; they may become disoriented and fly into vessel lights or infrastructure, or continuously fly around the light, consuming energy and delaying foraging or migration. Studies cited in the EA Report state that during conditions of drizzle and fog, moisture droplets in the air refract the light and greatly increase the illuminated area; disorientation appears to occur most frequently during these periods. Since the Project operates on a 24-hour basis, lighting is required at night for safety purposes; therefore, mitigative measures will need to be applied (e.g., routine checks for stranded seabirds and implementation of appropriate release procedures, minimized deck lighting if safe and practical to do so).

The seismic vessel is usually supported by another vessel but helicopters are sometimes required to support the seismic vessel. A low flying helicopter could create a startle response in a seabird colony. Chevron will ensure that any helicopter supporting the seismic vessel will follow a flight path that avoids the IBAs. The seismic vessel itself (and the picket vessel) will also avoid any seabird colonies.

Chevron has indicated that mitigations (MMO on board, handling and release of birds as per CWS handling instructions, ramp up, shut down during ramp up if marine mammal spotted in the zone, avoidance of seabird colonies) will be implemented during the survey. The magnitude of effects, if likely, is negligible, with low (<1-10 km²) geographic extent, low frequency, and of short-term duration and reversible. Therefore, the effect on marine birds will be **not significant**.

5.2.5 Species at Risk

1

The EA Report indicates that the area for potential surveys has no unique habitat or spawning areas required by fish species at risk. 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. This lack of critical habitat, coupled with the analysis of seismic sound on fish and the conclusion that it has little or no effect, results in the conclusion that effects on the wolffish species at risk are not likely to be adverse and therefore **not significant**.

The EA Report indicates that leatherback sea turtles may be occasional or infrequent visitors to the Project Area. The area contains no known critical habitat. A recovery strategy for leatherback sea turtles is available. With the implementation of mitigations as indicated above, the effects on sea turtles are likely to be not significant. Therefore, effects on the Leatherback turtles are not likely to be adverse and therefore **not significant**.

Blue, Sowerby's beaked and Fin whales are reported by LGL 2010a to be uncommon in the Project Area and thus, the potential for interaction with project activities is unlikely. However, if this marine mammal were in the Project Area, the mitigations described above, including the use of a MMO, would reduce any effect. Therefore, effects will be **not significant**.

Most of the listed seabirds at risk are thought to be infrequent visitors to the Project Area (LGL 2010a). The Ivory Gull is rare in all areas and unlikely to be found in the survey zone as result of its association with ice-covered waters. The risk of hearing impairment to Ivory Gull from seismic activity is low as this species would not spend considerable amounts of time below the surface of the water (as it is a surface

feeder) or in close proximity to airgun pulses. 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

0

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. All domestic waste will be transported to shore and all routine discharges will meet the *Pollution Prevention Regulations* of the *Canada Shipping Act*. The effect of the seismic program operation on marine water quality should be undetectable and **not significant**.

5.3 Cumulative Environmental Effects

1

Potential cumulative environmental effects external to the seismic program include seismic program(s) by other operators, commercial and traditional fishing, marine transportation and tourism/recreation. The potential exists that the 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 streamers as to avoid interfering with data acquisition by individual vessels. As a general rule, vessels keep a distance of at least 40 km apart. Therefore, there is some potential for cumulative environmental effects with the seismic program in this context. Given the availability of seismic vessels, it is unlikely that more than one seismic vessel would be available to conduct more than one program at any given time. Vessels not associated with the seismic program will be restricted to distance 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 and the limited spatial, and potentially temporal, 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), accidental spills of fuel or lubricants, or as a worst case, because 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 this Plan should prevent unintended “operational” releases. The vessel will also carry a copy of Chevron’s “Spill Response Plan”. Inspections of seismic equipment will be conducted regularly.

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

5.5 Follow-up Monitoring

Required

Yes

No

The C-NLOPB does not require follow-up monitoring, as defined in the *CEAA*, and supporting guidance material, to be carried out for the seismic program.

6. Other Considerations

The C-NLOPB is satisfied with the environmental information provided by Chevron regarding the potential adverse environmental effects, which may result from the proposed seismic program 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.

The C-NLOPB is of the view that if the proposed environmental mitigative measures outlined in the EA Report and Addendum and those listed below are implemented, the seismic program is not likely to cause significant adverse environmental effects.

7. Recommended Conditions and /or Mitigations

The C-NLOPB recommends that the following conditions be included in the authorization if the seismic 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 of Chevron's Offshore Labrador Seismic Program, 2010 - 2017" (LGL March 2010) and the "Addendum to the Environmental Assessment of Chevron's Labrador Seismic Program, 2010 – 2017" (LGL October 2010).*
- *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 metres, as measured from the center of the air source array(s).*

PART D: SCREENING DECISION

8. C-NLOPB Decision

The C-NLOPB is of the opinion that, taking into account the implementation of the mitigations set out in the conditions above and those committed to by Chevron Canada Resources, the seismic program **is not likely to cause significant adverse environmental effects**. This represents a decision pursuant to Section 20(1) (a) of the *CEAA*.

Responsible Officer Original signed by Elizabeth Young
Elizabeth Young
Environmental Assessment Officer

Date: December 16, 2011

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