Offshore Labrador Seismic Program, 2010-2017
Project Description

Prepared by

LGL LIMITED
environmental research associates

for

Chevron

October 2009
Project No. SA1031-1

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1.0 Introduction

Chevron Canada Resources (CCR or the Proponent) is proposing to conduct 2-D and 3-D seismic surveys in and near its Exploration Licence (EL) 1109 offshore Labrador. CCR plans to conduct a 2-D seismic survey in 2010, or as soon as possible thereafter. CCR may also conduct 3-D seismic surveys and geohazard surveys in 2011-2017.

This document is a Project Description (PD) and is intended to allow the Canada-Newfoundland and Labrador Offshore Petroleum Board (C-NLOPB) to fulfill its responsibilities under the Federal Coordination Regulations pursuant to the *Canadian Environmental Assessment Act* (*CEAA*). This PD combined with the technical and scoping advice received from the C-NLOPB, other federal agencies, and stakeholders consulted by CCR will guide the preparation of a screening level Environmental Assessment (EA).

1.1 Relevant Legislation and Regulatory Approvals

An *Authorization to Conduct a Geophysical Program* will be required from the C-NLOPB. The C-NLOPB is mandated in this matter by the *Canada-Newfoundland and Labrador Atlantic Accord Implementation Act*. In addition, offshore geophysical surveys on federal lands are subject to screening under *CEAA*. The C-NLOPB will act as the Responsible Authority under the *CEAA* and take the lead as the Federal Environmental Assessment Coordinator (FEAC). Because seismic survey activities have the potential to affect biota such as seabirds, marine mammals, and fish, as well as commercial fisheries, Fisheries and Oceans Canada (DFO) and Environment Canada are the federal agencies primarily interested and involved as Federal Authorities under *CEAA*.

Legislation that is relevant to the environmental aspects of this project include:

- *Canada-Newfoundland Atlantic Accord Implementation Act*
- *Canadian Environmental Assessment Act (CEAA)*
- *Oceans Act*
- *Fisheries Act*
- *Navigable Waters Act*
- *Canada Shipping Act*
- *Migratory Bird Convention Act;* and
- *Species at Risk Act (SARA)*

One of the specific guidelines issued by the C-NLOPB, the Geophysical, Geological, Environmental and Geotechnical Program Guidelines (May 2008), is directly relevant to this undertaking.

Authorizations issued under the *Atlantic Accord Implementation Act* for the kinds of activities described in this PD may be valid for one to five years at the discretion of the C-NLOPB.

1.2 The Operator

The Operator is Chevron Canada Resources, which is headquartered in Calgary, Alberta and based in St. John's, Newfoundland and Labrador (NL).

CCR is a wholly owned subsidiary of Chevron Corporation and one of Canada's leading energy companies. Since 1938, CCR has been actively engaged in exploring, developing, producing and marketing crude oil, natural gas and natural gas liquids in Canada. CCR has a 100% working interest in EL1109, which was awarded by the C-NLOPB on 11 September 2008.

Chevron Corporation (NYSE: CVX), one of the world's largest integrated energy companies, is involved in every aspect of the energy industry, from oil and gas exploration and production to transportation, refining and retail marketing, as well as chemicals manufacturing and sales and power production. Active in more than 180 countries, Chevron employs more than 62,000 people worldwide (excluding service station personnel).

1.3 Canada-Newfoundland and Labrador Benefits

Consistent with the requirements of the *Canada–Newfoundland Atlantic Accord Implementation Act*, and the *Canada–Newfoundland Atlantic Accord Implementation (Newfoundland) Act* (the Accord Acts) CCR is committed to enhancing the opportunities for Canadian and, in particular, Newfoundland and Labrador, participation.

CCR maintains an office in St. John's, NL and manages most aspects of its East Coast Canada business from St. John's. CCR provides full and fair opportunity to Canadian individuals and organizations, and in particular those from NL, to participate in CCR's activities in NL. CCR supports the principle that first consideration be given to personnel, support and other services that can be provided within NL, and to goods manufactured in NL, where such goods and services can be delivered at a high standard of Health, Safety and Environmental competency, be of high quality and are competitive in terms of fair market price. Contractors and sub-contractors working for CCR in NL must also apply these principles in their operations.

1.4 Contacts

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2.0 Project Description

The official name of the Project is the Offshore Labrador Seismic Program, 2010 - 2017. It is located in an offshore area northeast of Makkovik, Labrador (Figure 1.1). In 2010, CCR is proposing to conduct a 2-D seismic survey of their leased offshore acreage during the summer months, starting as early as 1 July and concluding as late as 30 November. The timing of the survey is subject to the Proponent's priorities and circumstances, weather and ice conditions, contractor availability and regulatory approvals. Any potential seismic and geohazard surveys conducted during subsequent seasons in 2011-2017 will also occur during the same temporal window of 1 July - 30 November. The geographic extent of project activities includes EL 1109 and an additional 25 km buffer around the EL for turnarounds and to accommodate a possible 2-D line tying a well (see below for more details).

2.1 Spatial and Temporal Boundaries

In terms of spatial boundaries, the Project Area (Figure 1.1) includes EL 1109 plus a 25 km buffer area to accommodate the ships' turning radii and some anticipated data acquisition adjacent to EL 1109 which is required to achieve seismic imaging objectives. The Study Area includes the Project Area plus a 20 km buffer area around the Project Area (Figure 1.1) to account for the propagation of seismic survey sound that could potentially affect marine biota. The exact dimensions of the proposed 2010 seismic survey area will be determined in early 2010 as a function of geophysical priorities, vessel availability, and financial considerations.

The temporal boundaries of the proposed Project encompass the 1 July to 30 November period in each year from 2010-2017. In 2010, the duration of the proposed 2-D seismic survey is estimated at 14 – 60 days. In 2011-2017, it is estimated that seismic surveys may occur for 30 to 75 days and that geohazard survey data may be collected during a 2-week period.

2.2 Project Overview

The proposed Project is a ship-based seismic program which is designed to acquire 2-D data in an approximate 2300 km^2 survey area in 2010 (or as soon as possible thereafter). In 2011-2017, CCR may also conduct further seismic surveys, possibly 3-D. Survey design will be determined based on interpretation of the previous surveys and business requirements.

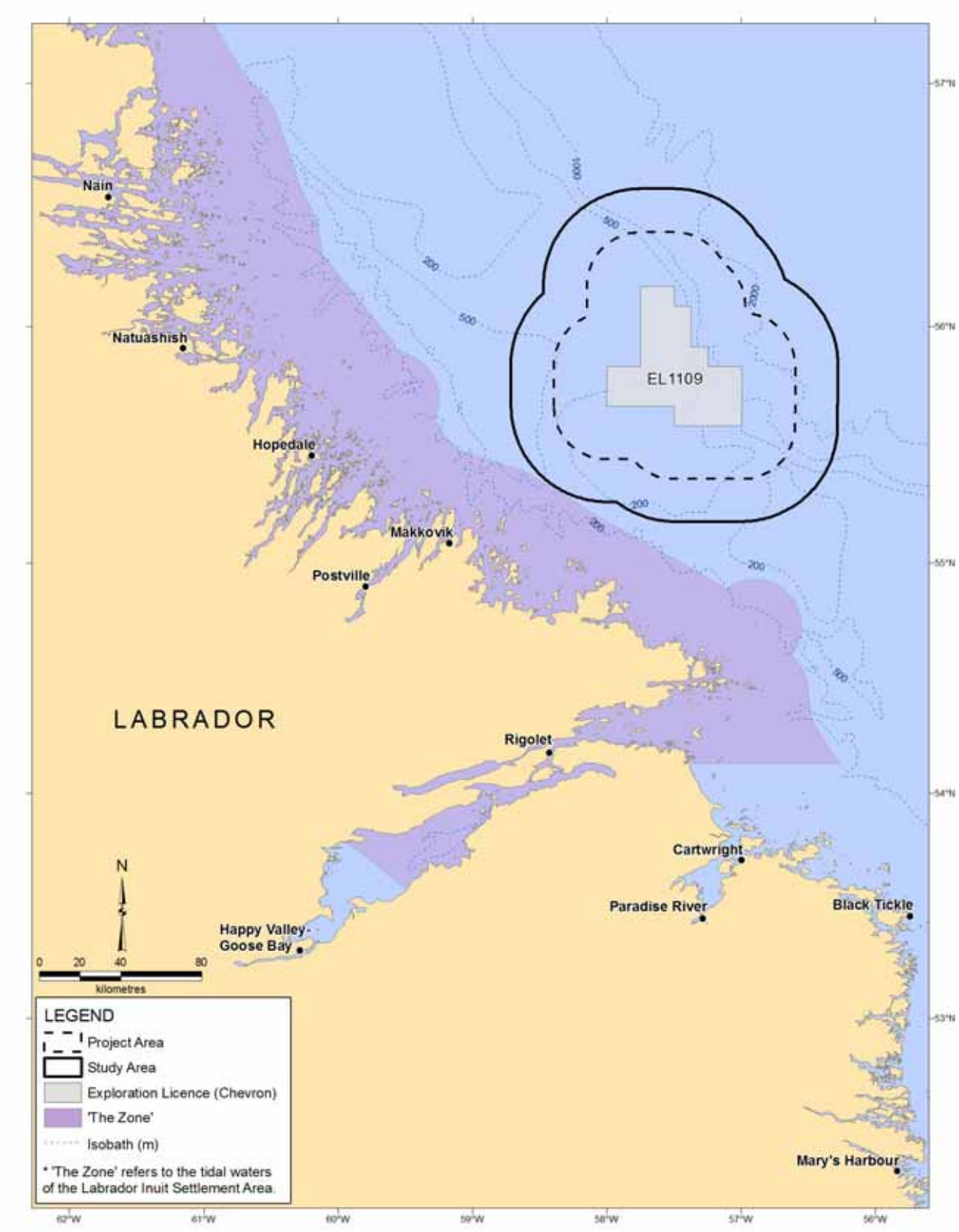

Figure 1.1. The locations of CCR's Project and Study Areas offshore Labrador.

The seismic survey vessel(s) used during the program will be approved for operation in Canadian waters and will be typical of the worldwide seismic fleet. A specific vessel for the proposed 2010 program has not yet been selected through the bidding process. The 2-D seismic survey ship will be configured in a fashion similar to a 3-D vessel (i.e., multiple streamers, two airgun arrays). The 3-D seismic survey ship used in subsequent years will have airgun arrays and multiple streamers (up to 10 km in length). If geohazard surveys are required, they will be conducted over a much reduced geographic and temporal scope using a combination of acoustic equipment including a much smaller airgun array (reduced number of airguns and volume), or sparkers, boomers, and sonars.

The C-NLOPB's geophysical guidelines (C-NLOPB 2008) will be used as the basis for CCR's marine mammal monitoring and mitigation program for the seismic surveys. Dedicated marine mammal observers (MMOs) will monitor for marine mammals (and sea turtles if present) and implement mitigation measures as appropriate. The airgun array will be ramped up, ramp ups will be delayed if a marine mammal is detected within the appropriate safety zone, and the airgun array will be shut down any time an Endangered or Threatened (as listed on Schedule 1 of *SARA*) marine mammal is detected within the safety zone. These measures are designed to minimize disturbance to marine life, particularly marine mammals and species considered at risk under the *SARA*. In addition, the MMOs will conduct a monitoring and release program for seabirds which may strand on board the seismic vessel. A fisheries liaison officer (FLO) will be on board, as required, to ensure implementation of communication procedures intended to minimize conflict with the commercial fishery.

2.2.1 Objectives and Rationale

The primary objective of the Project is to determine the presence and likely locations of geological structures that might contain hydrocarbon deposits. The 2-D seismic survey is a typical precursor to the more detailed 3-D survey, which may be conducted during subsequent years if the 2-D results are promising. Both types of surveys are used to define oil and gas prospects prior to exploratory drilling which may occur if the results from the seismic surveys suggest a potential for oil or gas. Subsequent geohazard surveys may also be required to detect hazards or potential hazards in the immediate vicinity of proposed well locations. The seismic and geohazard surveys are essential components of the modern offshore exploration process.

2.2.2 Alternatives to the Project/Alternative Means within the Project

The alternatives to the Project are

1. to not explore for oil and gas in the offshore Labrador area but to pursue opportunities elsewhere in the world in order to assist in meeting market demand for petroleum products, or
2. to not conduct seismic surveys prior to drilling.

The first alternative is inconsistent with CCR's awarded exploratory rights and associated commitments. If this alternative was selected, it would mean that the Proponent, government, and people of the province, East Coast region, and Canada would not benefit from the economic accruals of the Project in terms of wages, profits, taxes and royalties. The second alternative is contrary to current best practice in the industry and would potentially waste significant resources drilling in the wrong locations.

Alternatives within the Project include the different contractors' vessels and equipment as described in the following sections. These issues will be decided by the competitive bidding process.

2.2.3 Project Phases

The Project will have three phases. The actual timing of these activities within the temporal scope will be dependent on economic feasibility, vessel availability and the results of interpretation of survey work from preceding phases. The three phases are as follow:

1. Phase 1 may include a 2-D survey in 2010 or 2011 in the Project Area shown in Figure 1.1;
2. Phase 2 may include 3-D surveys of any areas that may be identified through analyses of existing and acquired data, in preparation for a potential drilling program; and
3. Phase 3 may include the collection of additional 3-D seismic data, including geohazard data, in anticipation of a potential ongoing drilling program.

Note that Phases 1 and 2 could potentially occur in the same year.

2.2.4 Project Scheduling

The surveys may occur between 1 July and 30 November of any given year. The estimated duration of the proposed 2-D survey is 14 to 60 days. Possible 3-D seismic surveys in 2011-2017 may occur over 30-75 days. A typical geohazard survey in support of a drilling program requires about 2 weeks of data acquisition.

2.2.5 Site Plans

The Project Area proposed for the 2010-2017 seismic program is shown in Figure 1.1. Water depths in the Project Area range from < 100 m to > 1000 m. The survey line orientation for the proposed 2-D seismic survey has not yet been determined.

2.2.6 Personnel

A typical seismic vessel can accommodate approximately 50-100 personnel. Personnel on a seismic vessel includes individuals representing the Operator (i.e., CCR), the vessel owner/operator (ship's officers and marine crew), and technical and scientific personnel from the main seismic contractor. The seismic vessel will have a FLO and MMO(s) on board, as well as a CCR representative(s) that serves as Client Quality Control, Navigation data Processing Quality Control, and HES oversight. All project personnel will have all of the required certifications as specified by relevant Canadian legislation and the C-NLOPB.

2.2.7 Seismic Vessel

Vessel specifics will be provided once the contractors are selected. Most survey vessels have diesel-electric propulsion systems (main and thrusters) and operate on marine diesel.

2.2.8 Seismic Energy Source Parameters

The proposed 2-D survey sound source will consist of two airgun arrays, 3000 to 5000 in^3 in total volume, which will operate at towed depths between 6 m and 15 m. The airguns will be operated with compressed air at pressures of 2000-2500 psi, and produce approximate peak-to-peak pressures 100 to 150 bar-m.

Detailed specifications of the airgun array will be provided once the seismic contractor is selected.

2.2.9 Seismic Streamers

The proposed 2-D seismic survey will use towed streamers with an approximate length of 8000 m and deployed at depths ranging from 5-25 m. Streamer flotation will be either solid or liquid (Isopar), depending upon availability from specific contractors.

Streamer equipment specifications will be provided when program design is complete.

2.2.10 Geohazard Survey Equipment

Geohazard surveys involve the acquisition of high resolution seismic, sub-bottom profile, side scan sonar, and bathymetric data over the proposed drill site(s). Seismic data collected during geohazard surveys are typically acquired over survey lines spaced closer together (250 m spacing) and data are acquired using smaller equipment with lower source levels and over a shorter time period (several days vs. months) relative to 2-D and 3-D seismic surveys.

Surficial data are collected using a broadband (i.e., 500 Hz to 6000 Hz) boomer or sparker as a sound source which provides information as deep as 100 m into the seabed. A single or multibeam echo sounder provides bathymetric data and a side scan sonar (dual frequency) is used to obtain seabed imagery. Seabed video and/or grab samples permit ground-truthing of the characteristics of the seabed and sediments.

2.2.11 Logistics/Support

Vessels

As noted above, primary support will be provided by a chartered seismic survey vessel. In order to mitigate any potentially adverse effects on marine animals, the commercial fisheries, and other vessel traffic, a mitigation plan will be developed as part of the Project. A standby or picket vessel may be required as a mitigation measure. This vessel would be used as an additional method of obtaining information on commercial fishing activity in the area and of warning other vessels in order to avoid gear losses for all parties involved. It would also be used to scout ahead for hazards including ice and floating debris.

Helicopters

The larger seismic vessels are usually equipped with a helicopter deck, in which case helicopters are often used for crew changes and light re-supply. In some cases, survey contractors may

prefer to come to shore for crew changes and re-supply. It is not known at this time whether helicopters will be used for crew changes during the proposed 2-D seismic program. Once the final extent of the 2-D program is determined, the necessity for and feasibility of helicopter support for crew changes, and the location of the base, will be determined.

Shore Base, Support and Staging

CCR and its contractors maintain offices and shore facilities in St. John's. However, some seismic contractors may prefer to crew change or re-supply in other existing NL ports. No new shore base facilities will be established as part of the Project.

2.2.12 Waste Management

Waste will be managed consistent with industry best practices in offshore NL.

2.2.13 Air Emissions

Air emissions will be those associated with standard operations for marine vessels, including the seismic vessel, any potential picket and/or supply vessel. There are no anticipated implications for the health and safety of workers on these vessels.

2.2.14 Accidental Events

In the unlikely event of the accidental release of hydrocarbons during the Project, CCR and its seismic survey contractor will implement the measures outlined in its oil spill response plan which will be filed with the C-NLOPB. In addition, CCR has emergency response plans in place which will be bridged with the seismic contractor's response plans prior to commencement of the seismic program.

2.3 Mitigations

Project mitigations will be detailed in the EA. They will include ramp-ups, implementation of ramp up delays and airgun array shutdowns for designated marine mammal species, use of dedicated MMOs and a FLO, and a fisheries compensation program. CCR recognizes that the fisheries have a long tradition off NL and that both industries are legitimate users of the sea and seabed.

2.4 Project Site Information

Project location is in the offshore Labrador area (see Figure 1.1).

2.4.1 Environmental Features

The physical and biological environments of the offshore Labrador Shelf have been described in recent EAs and the Labrador Shelf Offshore Area SEA (Sikumiut 2008). A summary of the physical and biological environments, based on the SEA as well as any new information, will be provided in the EA for this Project.

2.4.2 Physical Environment and Effects on the Project

A description of the physical environment is contained in the SEA (Sikumiut 2008) and is briefly summarized here. The survey will be conducted in water depths typically ranging from about 200 m to >1000 m. Offshore Labrador is heavily influenced by the Labrador Current and physical conditions (e.g., weather and ice conditions) from an operating perspective are not unlike those that would be encountered in Orphan Basin or on the Grand Banks. Extreme wind, wave and ice conditions can slow or even halt survey operations, and accidents (e.g., accidental releases of flotation fluids, if they are used) are more likely to occur than during calm conditions. The Project scheduling, during a period (July to November) when Northwest Atlantic operating conditions are typically relatively good compared to the late fall/winter/early spring period, should lessen any effects of the environment on the Project.

A summary of expected effects of the physical environment on the Project, based on information in the SEA as well as any new information, will be provided in the EA for this Project.

2.4.3 Fish and Fish Habitat

The fish species that inhabit the Project Area and the other species (e.g., invertebrates) and habitats that support them have been discussed in the recent SEA and other EAs for Orphan Basin and Jeanne d'Arc Basin. These components of the ecosystem will be summarized in the EA for this Project, based on the SEA and other relevant documents and any new information.

2.4.4 Species at Risk

The Project Area is not known to contain any sensitive areas or critical habitats for species listed on Schedule 1 of the *SARA* but this issue will be examined in the EA. Several species listed on

Schedule 1, including the blue whale, fin whale, Ivory Gull, and three wolfish species may occur in the Project Area. In addition, the potential environmental effects on species currently under assessment by the Committee on the Status of Endangered Species in Canada (COSEWIC) (such as Atlantic Cod) that occur within the Study Area will be included in the EA.

2.5 Other Users

2.5.1 Commercial Fisheries

The area of the offshore Labrador Shelf that includes the Project Area supports a variety of commercial fisheries that will be described in the EA based on latest available DFO catch landings data. Some of the most important fisheries in and adjacent to the Project Area include those for northern shrimp, Greenland halibut, and snow crab. The CCR Study Area is adjacent to a region called "The Zone" (see Figure 1.1). The Zone was established under the Labrador Inuit Land Claims Agreement (2005) and Labrador Inuit have the right to harvest fish and marine mammals for Inuit food, social and ceremonial purposes within this area. In addition, Inuit are guaranteed a percentage of new or additional commercial fishing licences for specified species within and in waters adjacent to The Zone (GNL 2008).

Plans will be developed to avoid or lessen any potential effects on the commercial fishery. These plans will include mitigations such as good communications (e.g., fishery broadcast notifications), the presence of a dedicated FLO on the vessel, avoidance of areas during times of heavy fixed gear use, and a fishing gear damage compensation program. Consultations with the fishing industry will be undertaken through the established ONE OCEAN mechanism and the Fish, Food and Allied Workers (FFAW) and directly with relevant fishing interests as necessary.

2.5.2 Navigable Waters

Other than fishery vessels, other users of the navigable waters in the offshore Labrador Shelf area include cargo and passenger vessels, other oil industry-related vessels, transport and military vessels and the occasional private yacht.

2.5.3 Consultations

During the course of the assessment, CCR will consult with stakeholders with an interest in the Project. Those consulted and the results of those consultations will be compiled in the EA report.

In order to assist in scoping the effects assessment and mitigation plan, and to aid in addressing any issues of concern, CCR will undertake a consultation program with the interested parties, which may include, but are not limited to:

- Nunatsiavut Government
- Representatives of the Innu Nation
- Residents of Nain, Rigolet, Postville, Makkovik, Hopedale, Happy Valley-Goose Bay, Cartwright, Natuashish, and Sheshatshiu
- Fisheries and Oceans Canada (DFO);
- Environment Canada;
- ONE OCEAN;
- FFAW;
- Study Area fishers;
- Newfoundland and Labrador Natural History Society;
- Various fish processors; and
- Other Newfoundland and Labrador fisheries industry stakeholders as identified.

2.6 Effects of the Project on the Environment

The proposed Project will be well within the range of other programs routinely conducted in the offshore Labrador area and elsewhere in eastern Canada, and is not expected to produce any adverse significant environmental effects on the marine environment in or adjacent to the Project Area. Nonetheless, potential environmental effects will be examined in detail with focus on the commercial fishery, *SARA* species, marine mammals, and cumulative environmental effects with other users of the area, particularly other seismic programs.

2.6.1 Spatial Boundaries

The regional scale study area boundaries will be addressed in the EA and will take into consideration the information compiled in recent seismic EAs and the SEA.

2.6.2 Temporal Boundaries

The temporal boundaries for the proposed project are 2010 to 2017 inclusive, with the timing of actual survey activities between 1 July and 30 November within any particular year.

2.6.3 Valued Ecosystem Components

The valued ecosystem components (VECs) will encompass, but may not be limited to fish and fish habitat, commercial fishery, marine birds, marine mammals, sea turtles, Species at Risk and sensitive areas.

Accidental events (such as an unplanned hydrocarbon release) associated with Project activities will also be assessed in the EA. The EA will also include an analysis of cumulative environmental effects.

2.6.4 Environmental Monitoring

As noted previously, MMO(s) will be on board the vessel(s) to provide proper identification of marine mammals and species at risk for mitigation purposes and to collect opportunistic data on marine mammal behaviour and distribution with and without airguns operating. Information on marine bird occurrence and distribution will also be collected during the seismic surveys.

3.0 References

C-NLOPB (Canada-Newfoundland and Labrador Offshore Petroleum Board). 2008. Geophysical, geological, environmental and geotechnical program guidelines May 2008. 30 p.

GNL (Government of Newfoundland and Labrador). 2008. Focusing Our Energy: Newfoundland and Labrador Energy Plan.

Sikumiut (Sikumiut Environmental Management Ltd.). 2008. Strategic Environmental Assessment Labrador Shelf Offshore Area. Canada-Newfoundland and Labrador Offshore Petroleum Board. Project No. P064.