Husky Energy

REPORT

REPORT TITLE

SEISMIC ENVIRONMENTAL ASSESSMENT

JEANNE D'ARC/FLEMISH PASS AREA

Project Description

22 November 2011

SUBMITTED TO

Canada-Newfoundland and Labrador Offshore Petroleum Board

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Project Description

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1.0 Introduction

Husky Energy (Husky or the Proponent) is proposing to conduct 2-D and/or 3-D seismic surveys offshore Newfoundland in the region of the Jeanne d'Arc Basin and Flemish Pass (Figure 1). Husky may conduct 2-D or 3-D seismic surveys, vertical seismic profiling (VSP), and geohazard well site surveys in one or more years within a 2012-2020 timeframe.

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 Husky 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 Newfoundland and Labrador Act* and the *Canada-Newfoundland Atlantic Accord Implementation Act*. In addition, offshore geophysical surveys on federal lands are subject to screening under the *CEAA*. The C-NLOPB will act as the Responsible Authority (RA) 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 the *CEAA*.

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

- *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* (February 2011), is directly relevant to this undertaking.

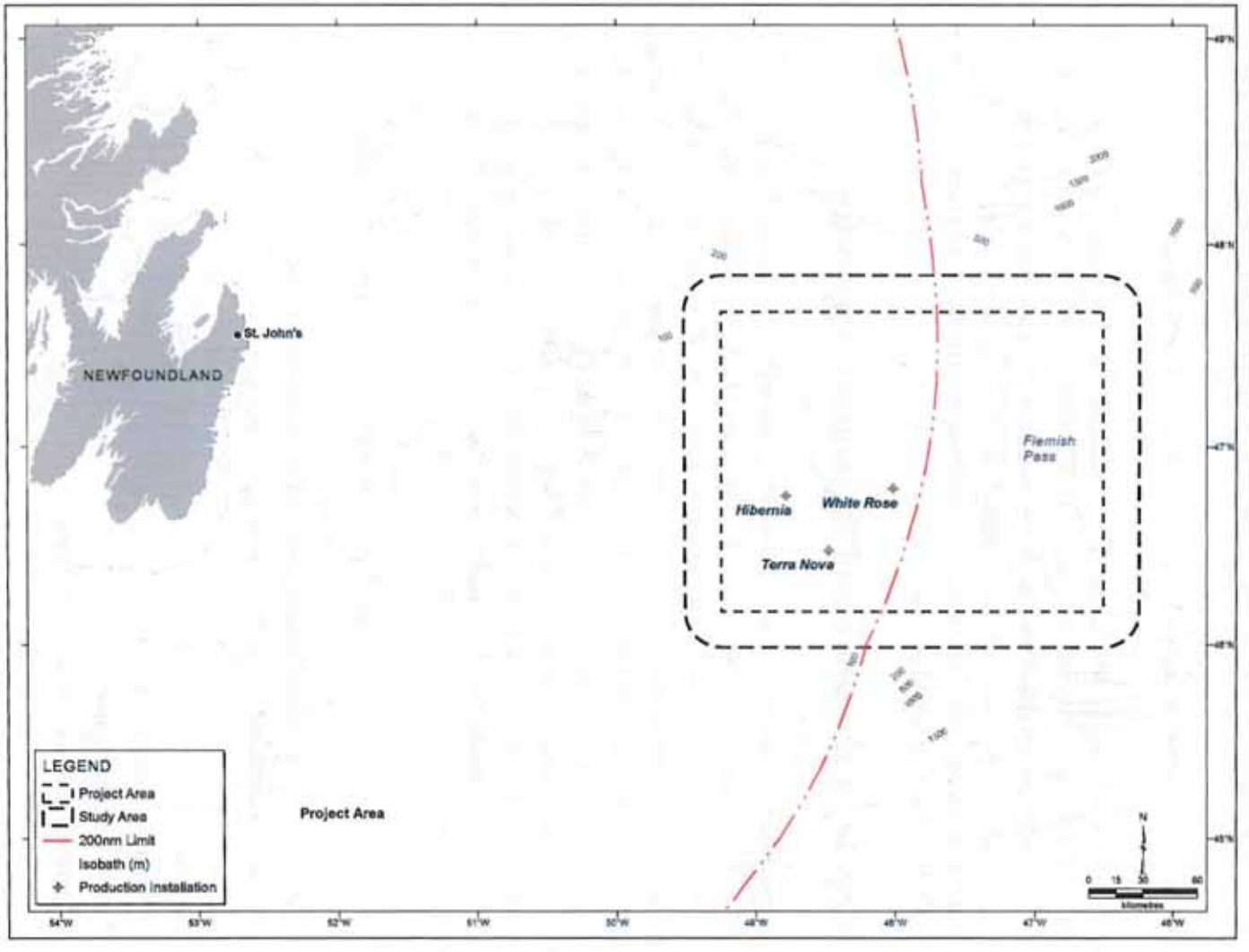

Figure 1. Project and Study Area Offshore Newfoundland.

Authorizations for the kinds of activities described in this PD will be issued under the *Atlantic Accord Implementation Act* at the discretion of the C-NLOPB.

1.2 The Operator

Headquartered in Calgary, Alberta and based in St. John's, Newfoundland and Labrador (NL), Husky Energy (Husky) is a Canadian-based integrated energy company serving global customers, committed to maximizing returns to its shareholders in an ethical and socially responsible way, through the dedicated effort of its people. Husky is involved in:

- Exploration and development of crude oil and natural gas;
- Production, purchase, transportation, refining and marketing of crude oil, natural gas and natural gas liquids and sulfur; and
- Transportation and marketing of refined products.

In the Grand Banks region, Husky is the management and operating company for 23 Significant Discovery Licenses (SDL) and 14 Exploration Licenses (EL). The White Rose field, the largest of the Operator's SDL holdings, is estimated to contain 200-250 million barrels of recoverable reserves.

1.3 Canada-Newfoundland and Labrador Benefits

Consistent with the requirements of the *Canada-Newfoundland and Labrador Atlantic Accord Implementation Newfoundland and Labrador Act* and the *Canada-Newfoundland Atlantic Accord Implementation Act*, Husky is committed to enhancing the opportunities for Canadian and in particular, Newfoundland and Labrador participation.

Husky maintains an office in St. John's, and manages most aspects of its East Coast Canada business from St. John's. Husky provides full and fair opportunity to Canadian individuals and organizations, in particular those from NL, to participate in Husky's activities in NL. Husky 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 Husky 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 Jeanne d'Arc Basin/Flemish Pass Regional Seismic Program, 2012 - 2020 It is located in an offshore area northeast of St. John's, Newfoundland and Labrador (Figure 1). In 2012, the Operator is proposing to conduct one or more 2-D and/or 3D seismic surveys during the spring through fall months, starting as early as 1 May 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 surveys conducted during subsequent seasons in 2013-2020 will also occur during the same temporal window of 1 May to 30 November while potential geohazard surveys could occur between 1 March and 30 November during 2012-2020. VSP surveys may potentially be conducted year-round.

2.1 Spatial and Temporal Boundaries

In terms of spatial boundaries, the Project Area (Figure 1) includes areas of interest plus a 10-km buffer area to accommodate the ships' turning radii. The Study Area includes the Project Area plus a 20-km buffer area around the Project Area (Figure 1) to account for the propagation of seismic survey sound that could potentially affect marine biota. The total area of the Study Area is 51,258 km^2. The exact location(s) of the proposed seismic survey area will be determined in early 2012 as a function of geophysical priorities, vessel availability, and financial considerations.

The temporal boundaries of the proposed Project encompass the 1 May to 30 November period in each year from 2012 to 2020 for 2D and 3D seismic surveys. The temporal boundaries for geohazard surveys and VSP surveys between 2012 and 2020 encompass the 1 March to 30 November period, and year-round period, respectively. In 2012, the duration of the proposed seismic survey is estimated at 30 to 90 days. In 2013 to 2020, it is estimated that seismic surveys may occur for 30 to 120 days and that geohazard survey data may be collected during a 2-week period. VSP surveys typically take a few days to a few weeks to complete.

2.2 Project Overview

The proposed Project is a ship-based seismic program which is designed to acquire 2-D and/or 3-D data within the White Rose field in 2012. In 2013 to 2020 the Operator may also conduct further seismic surveys, possibly 2-D and/or 3-D, VSP or geohazard surveys. Survey design will be determined based on interpretation of the previous surveys and business requirements.

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. In the case of either 2-D or 3-D surveys, the seismic survey ship will have airgun arrays and multiple streamers (approximately

8 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. VSP surveys would occur in close proximity to the drill rig.

The C-NLOPB's *Geophysical, Geological, Environmental and Geotechnical Program Guidelines* (C-NLOPB 2011) will be used as the basis for the 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, and ramp ups will be delayed if a marine mammal is detected within the appropriate safety zone (minimum of 500 m as noted in Fisheries and Oceans Canada *Statement of Canadian Practice*). The airgun array will be shut down any time an Endangered or Threatened (as listed on Schedule 1 of *SARA*) marine mammal (or sea turtle) 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 offshore Newfoundland but 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.

If the first alternative were 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 may have three or more 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. A likely phase progression follows:

1. Phase 1 may include a 2-D survey in 2012 within the Project Area shown in Figure 1;
2. Phase 2 may include further 2-D and/or 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. [VSP would potentially be conducted in support of drilling programs.]

Note that Phases 1 and 2 could potentially occur in the same year or that Phase 1 may not occur at all.

2.2.4 Project Scheduling

The 2-D/3-D seismic and geohazard surveys may occur between 1 May and 30 November of any given year from 2012 to 2020, geohazard surveys may occur between 1 March and 30 November of any given year from 2012 to 2010, and VSP surveys may occur at any time of the year during the 2012-2020 period. The estimated duration of any proposed survey, 2-D and 3-D combined, could be 30 to 120 days. A typical geohazard survey in support of a drilling program requires about two weeks of data acquisition. VSP surveys may take up to three days, depending on the complexity of the program.

2.2.5 Site Plans

The Project Area proposed for the 2012-2020 seismic program is shown in Figure 1. Water depths in the Project Area range from < 100 m to > 1000 m. The survey line orientations for the proposed 2-D and 3-D seismic surveys have 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, 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 Fisheries Liaison Officer (FLO) and MMO(s) on board, as well as an Operator 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. The crews on geohazard and VSP vessels are normally much smaller than those of the large seismic vessels.

2.2.7 Seismic Vessel

Vessel specifics will be provided in subsequent document submissions once the contractors are selected. The selected ship will be a fully equipped, modern vessel suited to the environment and task with diesel-electric propulsion systems (main and thrusters) and will operate on marine diesel.

2.2.8 Seismic Energy Source Parameters

The proposed 2-D or 3-D survey sound source will consist of one or two airgun arrays, 3,000 to 6,000 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 1,800 to 2,500 psi, and produce approximate peak-to-peak pressures 100 to 180 bar-m.

Detailed specifications of the airgun array will be provided once the project design is completed and parameters are selected.

2.2.9 Seismic Streamers

The initial 2-D and 3-D seismic surveys will use up to 12 towed streamers with an approximate length of 8,100 m and deployed at depths ranging from 5 to 30 m.

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 boomer or sparker as a sound source which provides information in the shallow sediments of 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 Vertical Seismic Profiling (VSP)

Vertical seismic profiling is normally conducted once some drilling has been completed. These programs use hydrophones suspended in the well at intervals (closer intervals than "checkshots") which receive signals from external sound sources, usually airgun (s) suspended from the drill rig or a nearby supply vessel. Data are used to aid in determining the structure of a particular petroleum-bearing zone.

2.2.12 Logistics/Support

Vessels

As noted above, primary support and supply will be provided by a chartered 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 seismic program(s). Once the final extent of the 2-D and 3-D programs is determined, the necessity for and feasibility of helicopter support for crew changes will be determined.

Shore Base, Support and Staging

The Operator and its contractors maintain offices and shore facilities in St. John's. No new shore base facilities will be established as part of the Project.

2.2.13 Waste Management

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

2.2.14 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.

2.2.15 Accidental Events

In the unlikely event of the accidental release of hydrocarbons during the Project, the Operator 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, the Operator 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 and will follow the guidelines outlined in the *Statement of Canadian Practice*. Mitigation procedures will include ramp-ups, implementation of ramp up delays and airgun array shutdowns for designated marine mammal and sea turtle species, use of dedicated MMOs and a FLO, and a fisheries compensation program. The Operator 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 Newfoundland area (see Figure 1).

2.4.1 Environmental Features

The physical and biological environments of the general area have been described in recent EAs for the northern Grand Banks and Flemish Pass (LGL 2011a,b). A summary of the physical and

biological environments, based on the previous EAs plus 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 general physical environment of the area is contained in recent EAs for the northern Grand Banks and Flemish Pass (e.g., LGL 2011a,b) and is briefly summarized here. The survey will be conducted in water depths ranging from < 100 m to > 1000 m. The northern Grand Banks are influenced by the Labrador Current and Gulf Stream, and physical conditions (e.g., weather and ice conditions) from an operating perspective are not unlike those that would be encountered in Orphan Basin. 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 scheduling of 2D/3D seismic surveys during a period (May 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 and previous EAs, 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 previous EAs for the Jeanne d'Arc Basin and Flemish Pass. These components of the ecosystem will be summarized in the EA for this Project, based on these EAs 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 *Species at Risk Act* (*SARA*) but this issue will be examined in the EA. Several species listed on Schedule 1, including the blue whale, fin whale, North Atlantic right whale, leatherback sea turtle, Ivory Gull, and three wolffish species may occur in the Project Area. In addition, the potential environmental effects on species currently listed as threatened or endangered by the Committee on the Status of Endangered Species in Canada (COSEWIC) that occur within the Study Area will be included in the EA.

2.5 Other Users

2.5.1 Commercial Fisheries

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, snow crab, and Greenland halibut.

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

In addition to fishery vessels, potential users of the navigable waters in the offshore North Grand Banks regional area may include cargo and passenger vessels, other oil industry-related vessels, transport and military vessels, or other commercial work.

2.5.3 Consultations

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

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

- 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 offshore Newfoundland 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 any other potential 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 2012 to 2020, with the timing of actual 2-D/3-D seismic survey activities between 1 May and 30 November within any particular year. Geohazard survey activities could occur between 1 March and 30 November of any particular year and VSP survey activities could occur at any time of 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). 2011. Geophysical, Geological, Environmental and Geotechnical Program Guidelines February 2011. 49 p.

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