

Part A: General Information

Screening Date	<u>December 12, 2006</u>
EA Title	Vertical Seismic Profiling Environmental Assessment Terra Nova Development
Proponent	Petro-Canada Scotia Centre 235 Water Street St. John's NL A1C 1B6
Contact	Mr. Urban Williams Team Lead, Environment, Emergency Response & Security
C-NLOPB File No.	7705 P28-4
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Location	Jeanne d'Arc Basin Area, North Eastern Grand Banks.

Part B: Project Information

In March 2006, Petro-Canada submitted a project description "*Project Description of Vertical Seismic Profiling at the Terra Nova Development*" (LGL 2006a) to the Canada-Newfoundland and Labrador Offshore Petroleum Board (C-NLOPB), in support of its application to conduct a Vertical Seismic Profiling (VSP) program in the Terra Nova Development area about 350 km east-southeast of St. John's in the Jeanne d'Arc Basin area. The "*Vertical Seismic Profiling Environmental Assessment Terra Nova Development*" (the 2006 EA Report) (LGL 2006b) provided an EA for VSP activities that may occur for the duration of the life of the Terra Nova Development. In response to comments on this EA report, a revised EA was submitted on November 1, 2006. The "*Environmental Assessment of Petro-Canada's Vertical Seismic Profiling Program at the Terra Nova Development*" (the 2006 revised EA Report) (LGL 2006c) addressed comments received from the Department of Fisheries and Oceans (DFO), Environment Canada (EC) and the C-NLOPB.

In completing this Screening Report, information from the 2006 EA Report, the 2006 revised EA Report, the original environmental assessment of VSP activities at Terra Nova (LGL 2004a), and wellsite geohazard survey EAs (LGL 2004b, 2005) was summarized and is included in the

following sections. In addition, detailed information on the Terra Nova Development and associated activities can be found in the Environmental Impact Statement (EIS) and associated documents (Petro-Canada 1996a, 1996b, 1997). They describe the biophysical environment and the effects assessment for activities other than VSP. Additional relevant information is also contained in the Terra Nova Baseline Environmental Characterization Data Report (Petro-Canada 1998).

1. Description of Project

In support of delineation and production wells, Petro-Canada is proposing to undertake VSP activities, as required, at the Terra Nova Development. The VSP surveys ground-truth the geological data with the geophysical data. Water depths in the Project Area range from 90 to 95 m. VSP surveys can occur at any time throughout the year and will be undertaken on an as-needed basis for the life of the Terra Nova Development project.

VSP surveys typically involve a four sleeve-gun tuned array sound source deployed at locations near the rig with receivers placed in the well. The guns used at Terra Nova will be charged with nitrogen or compressed air, suspended at a constant depth of four to seven metres, depending on sea-state and operated at 2,000 psi pressure. The VSP surveys may range from a zero-offset VSP with the source deployed from the rig to a walkaway VSP (uniform intervals up to 5.0 km from the rig). At each well, the survey will be a one-time event requiring eight to 36 hours per well, depending on the type of VSP and acquisition tool.

Prior to the commencement of VSP surveys beyond 2006, Petro-Canada will be required to provide documentation to the C-NLOPB. The documentation will outline the proposed VSP activities for that year, whether those activities and the timing of those activities fall within the scope of the 2006 EA reports, provide an update to existing environmental information, if applicable, and indicate if with this information, the EA predictions remain valid.

2. Description of Environment

2.1 Physical Environment

A detailed description of the physical environment for the Jeanne d'Arc Basin area can be found in recent EAs for the area (LGL 2004a, LGL 2004b, LGL 2005, LGL 2006d). Water depths in the Terra Nova area range from approximately 90 m to 95 m.

2.2 Biological Environment

2.2.1 Commercial Fisheries

The Terra Nova Development occurs in NAFO Unit Area (UA) 3Lt. The EA Report provides an update based on 2005 DFO catch and effort data. Since the collapse of the groundfish fisheries, formerly underutilized species such as shrimp and snow crab have become the principal harvest in the general region. Snow crab (*Chionoecetes opilio*) accounted for essentially all of the harvest in the vicinity of the Project Area. Most of the crab harvested in 3Lt was caught in the eastern part of the UA, east of the Project Area. Most 2005 crab harvesting occurred between May and July with peak harvest time in July. Snow crabs are harvested in 3Lt using bottom-fished crab pots/traps (fixed gear).

Snow Crab distribution occurs over a broad depth range (20 to >400 m). Distribution in waters off Newfoundland and southern Labrador is widespread but the stock structure remains unclear (DFO in 2006 EA Report). Commercial-sized snow crabs typically occur on mud or mud/sand substrate and smaller snow crabs can be found on harder substrates as well as softer ones. Snow crab prefer water with temperatures ranging from -1°C to 4°C. Crab generally mate in the spring, with the female carrying the fertilized eggs for 1 – 2 years prior to larval hatch.

2.2.2 Marine Mammals and Sea Turtles

At least 21 species of marine mammals may occur in the Project Area including 18 species of whales and dolphins and three species of seals (LGL 2006b). A brief description of each can be found in the EA Reports. Baleen whales most likely found in the Study Area include the blue (*Balaenoptera musculus*), fin (*B. physalus*), sei (*B. borealis*), humpback (*Megaptera novaeanliae*), minke (*B. acutorostrata*) and North Atlantic right whale (*Eubalaena glacialis*). Toothed whales include the sperm (*Physeter macrocephalus*), northern bottlenose (*Hyperoodon ampullatus*), Sowerby's beaked (*Mesoplodon bidens*), killer (*Orcinus orca*), and long-finned pilot (*Globicephala melas*) whales, the short-beaked common (*Delphinus delphis*), Atlantic White-sided (*Lagenorhynchus acutus*), white-beaked (*Lagenorhynchus albirostris*), Risso's (*Grampus griseus*), and striped (*Stenella coeruleoalba*) dolphins, and the harbour porpoise (*Phocoena phocoena*). Seal species likely in the area are the grey (*Halichoerus grypus*), harp (*Phoca groenlandica*) and hooded (*Cystophora cristata*) seals.

Population estimates of the Northwest Atlantic population of marine mammal species that may occur in the Project Area identify toothed whales as being the most numerous.

The three species of sea turtles that may occur in the Project area include: the Leatherback turtle (*Dermochelys coriacea*), which is listed as endangered under Schedule 1 of the *Species at Risk Act* (SARA); the loggerhead turtle (*Caretta caretta*), and the Kemp's Ridley turtle (*Lepidochelys kempii*). Adult Leatherback turtles are regularly sighted in the waters off Nova Scotia and Newfoundland from June to October. Loggerhead turtles are likely to occur in the Study Area during summer and fall months. The Kemp's Ridley turtle is rare within the Newfoundland area (2006 EA Report). Research is presently being conducted on the distribution and abundance of the leatherback. The northwest Atlantic population estimates of Kemp's ridley and loggerhead sea turtles is unknown.

2.2.3 Marine Birds

The Grand Banks of Newfoundland have been identified as important habitat for many species of marine birds (LGL 2006b). The avifauna community of the Terra Nova Development Area is composed mainly of true pelagic species. Over 27 marine birds have been identified as occurring in the Study Area. These include species of *Alcidae* (Dovekie, Murres – Common and Thick-billed, Atlantic puffin), *Laridae* (Skuas – Great and South polar; Jaegers – Pomarine, Parasitic, and Long-tailed; Gulls – Herring, Iceland, Glausous, Lesser Black-backed, Great Black-backed, Sabine's, and Ivory; Black-legged Kittiwake and Arctic Tern), *Sulidae* (Northern Gannet), *Hydrobatidae* (Wilson and Leach's Storm-Petrels); *Phalaropodinae* (Phalarope – Red and Red-necked), and *Procellariidae* (Northern Fulmar, Greater, Sooty and Manx Shearwaters).

Specific information can be found in the 2006 EA Reports.

The abundance and distribution of marine birds varies depending on the season. For instance, the Northern Fulmar (*Fulmaris glacialis*) is common throughout the year, whereas the Greater (*Puffinus gravis*) and Sooty (*Puffinus griseus*) Shearwater is common from June to October, and absent from January to March. Leach’s storm petrels (*Oceanites oceanicus*) are common from May to October. The Northern Gannet (*Morus bassanus*) may occur in the Terra Nova Development Area from May to October. Red (*Phalaropus fulicarius*) and Red-necked (*P. lobatus*) Phalarope and Skuas (*Stercorarius* spp.), although expected to be very scarce, may occur from May to September/October. Seven species of gull may occur in the Terra Nova Development Area during the winter months. Auks such as Dovekies (*Alle alle*) and Thick-billed Murre (*Uria lomvia*) are most numerous in Newfoundland waters during the winter and migration periods. Common Murre (*Uria aalge*) and Atlantic Puffin (*Fratercula arctica*) are abundant breeders in Newfoundland but winter mostly south of the Terra Nova Development Area.

2.2.4 Species at Risk

There are a number of Species at Risk, as defined under Schedule 1 of the *Species at Risk Act* (SARA) that could potentially occur in the Jeanne d’Arc Basin Area. The following identifies the species likely to be present and their SARA and COSEWIC status.

Species	SARA Status	COSEWIC Status
Blue Whale (<i>Balaenoptera musculus</i>)	Schedule 1 - Endangered	Endangered (May 2002)
North Atlantic Right Whale (<i>Eubalaena glacialis</i>)	Schedule 1 - Endangered	Endangered (May 2003)
Leatherback sea turtle (<i>Dermochelys coriacea</i>)	Schedule 1 - Endangered	Endangered (May 2001)
Atlantic Salmon (<i>Salmo salar</i>) (Bay of Fundy)	Schedule 1 - Endangered	Endangered (April 2006)
Northern Wolffish (<i>Anarhichas denticulatus</i>)	Schedule 1 – Threatened	Threatened (May 2001)
Spotted Wolffish (<i>Anarhichas minor</i>)	Schedule 1 - Threatened	Threatened (May 2001)
Atlantic (Striped) Wolffish (<i>Anarhichas lupus</i>)	Schedule 1 – Special Concern	Special Concern (November 2000)
Ivory Gull (<i>Pagophila eburnea</i>)	Schedule 1 – Special Concern	Endangered (April 2006)
Fin Whale (<i>Balaenoptera physalus</i>) (Atlantic Ocean)	Schedule 1 – Special Concern	Special Concern (May 2005)

Species	SARA Status	COSEWIC Status
Sowerby's beaked whale (<i>Mesoplodon bidens</i>)	Schedule 3 – Special Concern	Special Concern (April 1989)
Atlantic Cod (<i>Gadus morhua</i>) (Newfoundland & Labrador population)	Schedule 3 – Special Concern	Endangered (May 2003)
Harbour porpoise (<i>Phocoena phocoena</i>) (Northwest Atlantic population)	Pending Public Consultation for Addition to Schedule 1	Special Concern (April 2006)
Porbeagle shark (<i>Lamna nasus</i>)	Pending Public Consultation for Addition to Schedule 1	Endangered (May 2004)
White shark (<i>Carcharodon carcharias</i>)	None	Endangered (April 2006)
Shortfin Mako Shark (<i>Isurus oxyrinchus</i>)	Not on SARA website	Threatened (April 2006)
Cusk (<i>Brosme brosme</i>)	Pending Public Consultation for Addition to Schedule 1	Threatened (May 2003)
American eel (<i>Anguilla rostrata</i>)	None	Special Concern (April 2006)
Blue shark (<i>Prionace glauca</i>)	None	Special Concern (April 2006)

In the north Atlantic, the population of the Blue whale may range from 600 to 1500 individuals (2006 EA Reports). There have been no confirmed sightings of blue whales in or near the Petro-Canada Project Area based upon available data provided by DFO. A Blue Whale Recovery Strategy and Management Plan is being developed. The North Atlantic right whale northwestern Atlantic population numbers about 300 individuals. Off Atlantic Canada, right whales typically concentrate in the Bay of Fundy and off southwestern Nova Scotia but it is possible that it may occur in the Project Area. Population estimates of Leatherback turtles are between 26,000 and 43,000 species worldwide (LGL 2006b). Adult leatherback turtles are commonly sighted in the waters off Newfoundland from June to October, with peak abundance in August. Leatherback turtles have been caught incidentally during commercial fish harvesting in Newfoundland waters. Most of the captures occur near the 200 m isobath from June to November. There have been two confirmed sightings in the Jeanne d'Arc Basin during a seismic monitoring program in 2006. During the spring and summer, Atlantic salmon migrate from northeastern North America to waters off Labrador and Greenland to feed for one or more years. They return to coastal North America in the fall, possibly passing through the Grand Bank region during their migration from sea. It is possible that Atlantic salmon migrate through the Study Area during movements to and from the ocean feeding grounds.

The likelihood of wolffish occurring in the Study Area is unknown, but assumed to be likely. They are more abundant along the slope area in the fall. Northern wolffish spawn in September and the fish remain near their eggs to guard them. They are known to be located at depths ranging from 150 to 600 m, but have been found in the shallower areas. The spotted and striped wolffish are regarded as commercial species in Newfoundland waters as they are captured in fisheries directed at other commercial species, particularly Greenland halibut and snow crab. They occur in deep water (>475 m) where water temperatures normally range between 3 and 4°C. They are thought to spawn during the late fall/early winter months. DFO is presently preparing a Wolffish Recovery Strategy and Management Plan.

The Ivory Gull may appear in low numbers in the Study Area when pack ice reaches the northern Grand Banks in late winter (February to April). The presence of sea ice is the condition most favourable for Ivory Gull occurrence.

The fin whale is commonly found on the Grand Banks during summer months with sightings in both the shallower (<400 m) and deeper (>400 m) areas of the study Area. The number of fin whales in the northwest Atlantic was recently estimated at approximately 2,800. The Study Area lies within the known range of the Sowerby's beaked whale. Few Sowerby's beaked whales are expected to occur on the relatively shallow Grand Banks.

Atlantic cod are distributed over the Grand Banks. In the Jeanne d'Arc Basin area, the cod can be found on the continental slope. In the summer, cod are usually found in the shallower parts of the Bank, and move to the slopes of the Bank in the winter. Spawning occurs both inshore and offshore. Spawning times for cod in the Grand Banks peaks in May, with highest abundances in 3L.

2.3 Research and Industry Surveys

Information regarding DFO research vessel surveys is provided in the 2006 EA Reports. A DFO research vessel survey in 3KL was proposed in 2006 and had the potential for overlap. Fish, Food & Allied Workers Union (FFAWU) were scheduled to conduct an industry survey for crab in various offshore harvesting locations. This relatively short (24 hour) survey typically takes place in September. Petro-Canada will be required to communicate with DFO and the FFAWU to avoid any potential conflict with research surveys that may be operating in the area.

Part C: Environmental Assessment Process

3. Procedures

On March 24, 2006, Petro-Canada submitted to the C-NLOPB a project description for a proposed VSP program in association with ongoing delineation and production drilling operations in the Terra Nova field of the Northeast Grand Banks. The VSP program is to be conducted as required over the life of the Terra Nova development. The C-NLOPB determined that the Project would require an authorization pursuant to Section 138(1)(a) of the *Canada-Newfoundland Atlantic Accord Implementation Act* and Section 134(1)(a) of the *Canada-Newfoundland and Labrador Atlantic Accord Implementation Newfoundland and Labrador Act*.

In accordance with paragraph 3(1)(a) of the *Regulations Respecting the Coordination by Federal Authorities of Environmental Assessment Procedures and Requirements* (FCR), the C-NLOPB determined that an EA of the project under Section 5 of the *Canadian Environmental Assessment Act* (CEAA) was required. On June 27, 2006, Petro-Canada submitted to the C-NLOPB an EA report “*Vertical Seismic Profiling Environmental Assessment Terra Nova Development*”. The EA report was completed in accordance with the scoping document prepared by the C-NLOPB on May 02, 2006. The C-NLOPB, as Responsibility Authority (RA), forwarded the 2006 EA Report on 10 July 2006 to the DFO, EC, and provincial Departments of Fisheries and Aquaculture, Natural Resources, and Environment and Conservation. Comments were received from DFO and EC. In response to comments received on the EA report, Petro-Canada submitted a revised EA report “*Environmental Assessment of Petro-Canada’s Vertical Seismic Profiling Program at the Terra Nova Development*” on 01 November 2006. This report was forwarded to DFO and Environment Canada on 07 November 2006 for comment. Comments received up to December 12, 2006 were considered by the C-NLOPB in completing this Screening Report.

It is the obligation of the C-NLOPB to consider which physical works and undertakings in relation to the proposed project fall within the scope of the Project. First, there are no physical works that should be included in the scope of the Project. Second, if the Project were to proceed, as set out in the application, supporting EA reports, and supporting information, it would constitute a single project for the purposes of Section 15(2) of CEAA. For the purposes of Subsection 15(3) of CEAA, the C-NLOPB’s scoping exercise is complete because an assessment was conducted in respect of every construction, operation, modification, decommissioning, abandonment, or other undertaking proposed by Petro-Canada that is likely to be carried out in relation to their proposed Project.

3.1 Scope of Project

Petro-Canada is proposing to conduct VSP activities at its Terra Nova Development in the Jeanne d’Arc Basin for the life of the Terra Nova Development project (15 to 17 years). In the current program there are six more wells to be drilled although this may change as more wells are drilled. This screening report therefore considers the activities associated with VSP surveys within this timeframe.

Vertical seismic profiling consists of an airgun array sound source, typically less powerful than those used during routine seismic surveys, deployed at locations near the rig with receivers placed in the well. The sound source to be used will include a four sleeve-gun tuned array comprised of 2x 100 in³ and 2x 150 in³ guns for a total volume of 500 in³. The guns will be charged with nitrogen or compressed air, suspended at a constant depth of four to seven metres, depending on sea-state and operated at 2,000 psi pressure. The 0-to-peak source level is 8.45 Bar-m which converts to 238.5 dB re 1 µPa 0-P @ 1 m; maximum output occurs between 20 and 140 Hz.

The VSP surveys may range from a zero-offset VSP (i.e., fixed distance from the wellhead) with the source deployed from the rig to a walkaway VSP (uniform intervals up to 5.0 km from the rig).

The VSP surveys will be conducted from the drill rig with the assistance of a typical standby supply vessel.

At each well, the survey would be a one-time event potentially occurring as early as December 2006 (and occurring over the life of the Project) and extend for eight to 36 hours per survey. VSP surveys typically occur during the summer season but can occur at any time throughout the year.

At the time of application for VSP surveys to be undertaken beyond 2006 in the Project Area, the Operator will be required to provide information to the C-NLOPB which outlines the proposed activities, confirms that the proposed program activities falls within the scope of the previously assessed program, and indicates if with this information, the EA predictions remain valid. In addition, the Operator will be required to provide information regarding the adaptive management of requirements of the SARA into program activities (e.g., introduction of new species or critical habitat to Schedule 1; additional mitigations; implementation of recovery strategies and/or monitoring plans). If there are any changes in the scope or information available which may alter the EA conclusions, then a revised EA will be required at the time of authorization renewal. The Canadian Environmental Assessment Registry will be updated as required.

3.2 Boundaries

The boundaries of the Project are defined in the 2006 revised EA Report as follows.

<i>Boundary</i>	Description
<i>Temporal</i>	The estimated remainder of the life of the Terra Nova Development (15-17 years) with each VSP acquisition period lasting from 8-36 hours. Within a given year, there would be a maximum of two VSP surveys.
<i>Project Area</i>	Defined as the Terra Nova Development area, including all of Petro-Canada's production licenses.
<i>Affected Area</i>	Varies according to the specific vertical and horizontal distributions and sensitivities of the VECs of interest and is defined as that area within which effects (physical or important behavioural ones) have been reported to occur.
<i>Regional Area</i>	The boundary of the Grand Banks as defined in the Hibernia, Terra Nova, White Rose, and other EAs.

There would 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 and the "Geophysical, Geological,

Environmental and Geotechnical Program Guidelines” (C-NLOPB 2004), the factors that were considered to be within the scope of an EA are those set out in subsection 16(1) of the CEEA and those listed in the “*Petro-Canada Vertical Seismic Profiling – Terra Nova Development Scoping Document*” (C-NLOPB 2006).

4. Consultation

4.1 Consultation carried out by Petro-Canada

Petro-Canada, as reported in the 2006 revised EA Report, consulted by e-mail or telephone with government agencies, the fishing industry and other interest groups. Consultations were held with the DFO, Environment Canada, One Ocean, Fishery Products International, the Association of Seafood Producers, and the Natural History Society. The purpose of these consultations was to describe the proposed program, gather any additional information relevant to the EA, and identify any issues or concerns. There were no concerns or issues raised by the stakeholders concerning the conduct of the VSP seismic program, nor the environmental assessment process.

The C-NLOPB is satisfied that the consultations carried out by Petro-Canada and reported on in the 2006 revised EA Report during the preparation of the environmental assessment included all elements of the Project. The C-NLOPB is not aware of any public concerns with respect to the environmental effects of the project, and does not require that further consultations be undertaken for the 2006 field season.

4.2 Consultations with other Federal Authorities and Other Government Departments

In accordance with the *CEA Act* and the *Regulations Respecting the Coordination by Federal Authorities of Environmental Assessment Procedures and Requirements* and the Board’s EA procedures, various federal and provincial government departments were notified on 10 July 2006 regarding Petro-Canada’s proposed program. The following agencies were provided with the EA report for review:

- DFO;
- Environment Canada;
- Newfoundland and Labrador Department of Environment and Conservation;
- Newfoundland and Labrador Department of Fisheries and Aquaculture; and
- Newfoundland and Labrador Department of Natural Resources.

DFO provided comments on July 31, 2006. They recommended that the effects assessment, mitigations, and effects significance sections of the report be revised to provide more information. DFO indicated that comments previously provided by DFO on similar programs were not addressed provided these comments again. These comments were forwarded to the Proponent for their response. With regard to the revised EA report, DFO provided comments on 07 November and indicated most of their comments were addressed. One issue regarding the assessment of Species at Risk as a VEC was not addressed to the satisfaction the Department. It is the opinion of the C-NLOPB that SAR were adequately assessed in the EA report. However, the C-NLOPB will ensure that future EA report address SAR as a separate VEC within the overall environmental assessment analysis.

Environment Canada provided comments on the EA report on 25 August 2006 . These comments were provided to the proponent for their response. Environment Canada responded on 12 December 2006 that they had no further comments on the revised EA report.

The NL Department of Fisheries and Aquaculture responded on 22 August 2006 stating that it did not have concerns with this project and that VECs of concern to their department were adequately addressed.

The NL Department of Natural Resources responded on 12 September 2006 that it did not have any concerns upon review of the 2006 EA Report.

5. Environmental Effects Analysis

5.1 Methodology

The C-NLOPB reviewed the environmental effects analysis presented by Petro-Canada in the 2006 revised EA Report. The EA approach was consistent with that used in all of the EAs conducted for Petro-Canada and Husky since 1996 and provided an update to the VEC based assessment in consideration of new information that was available. The environmental assessment methodology and approach used by the Proponent is acceptable to the C-NLOPB. The following environmental effects analysis uses the information presented by the Proponent (in LGL 2006b, 2006c) and takes into consideration mitigation proposed by the Proponent and those required by the C-NLOPB, to assess the potential for residual environmental effects.

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

- magnitude of impact;
- geographic extent;
- duration and frequency;
- reversibility;
- ecological, socio-cultural and economic context; and

after taking mitigation measures into account;

- significance of residual effect.

The potential effect significance of residual effects, including cumulative effect, for each VEC is 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*

In the 2006 EA Reports, Petro-Canada discussed updated information regarding the potential effects of seismic activity on marine mammals and sea turtles, fish, commercial fisheries,

seabirds, and species at risk. Scoping for the effects assessment was conducted by reviewing the results of previous documents produced for the Project Area. Information was reviewed regarding hearing effects in fish, and behavioural and disturbance effects in marine mammals. Where appropriate, the new information is presented in the following sections. Upon review of the information, and a review of the mitigations proposed by Petro-Canada, the following effects assessment, remains unchanged.

5.2 Valued Ecosystem Components/Potential Environmental Effects

5.2.1 Fish and Commercial Fisheries

1

There do not appear to be any unique biological features at Terra Nova. The recent study by LGL Limited on the effects of seismic airguns on snow crab found no physical or behavioural effects on commercial-size snow crab. Given the reduced duration, much smaller area covered and lower number of shotpoints, as well as the smaller seismic source compared to surface-towed seismic surveys, any impacts from VSP surveys would be much less relative to full-scale 2-D or 3-D seismic surveys. Any potential physical or behavioural impact to fish is considered to be negligible to low, immediate to sub-local in geographic extent, immediate in duration, and would have a low likelihood of occurrence. The likelihood of effects (behavioural and physical) is low and therefore **not significant**.

There is typically minimal commercial harvesting within the proposed Project Area. Given the small spatial and temporal footprint of the proposed Project, there will be minimal conflict between the commercial fisheries and the Project. The likelihood of effects is low given mitigations such as advisories and a compensation program for gear loss. Therefore, the effects of the Project on the commercial fishery would be **not significant**.

5.2.2 Marine Mammals and Sea 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 2006 revised EA Report (LGL 2006c) identified a number of studies that were reviewed for the EA. These documents did not predict any significant impacts on VECs from full-scale seismic surveys provided certain mitigation and monitoring measures were in place.

There are a number of mitigations which, when applied, can reduce impacts to marine mammals and sea turtles in the vicinity of a seismic survey (e.g. ramping up of airguns, use of observers, shut-down procedures). The 2006 EA Report lists a number of mitigations that will be implemented during the VSP program, some of which are consistent with the mitigations recommended in Appendix 2 of "*The Geophysical, Geological, Environmental and Geotechnical Program Guidelines*" (C-NLOPB 2004). In addition to those mitigations listed in the 2006 revised EA Report, the following mitigations will be required:

- *Monitoring for marine mammals and sea turtles shall be consistent with the approach outlined in the Geophysical, Geological, Environmental and Geotechnical Program Guidelines (C-NLOPB 2004), and includes monitoring during ramp-up and at all times when the airgun(s) are active;*

- *During ramp-up, and when the airgun array is active, airgun(s) shall be shut down, if a marine mammal or sea turtle, listed as **Endangered** or **Threatened** (as per Schedule 1 of SARA), including the North Atlantic right whale, Blue whale, and leatherback turtle, is observed within 500 m of the airgun array; and*
- *During line changes, the seismic airgun array shall be reduced to a single airgun and the airgun shall remain active during the line change. If for any reason, the airgun is shut down for a period greater than 30 minutes, then ramp-up procedures shall be implemented as per the Geophysical, Geological, Environmental and Geotechnical Program Guidelines.*

The effects on marine mammals and sea turtles are predicted to be of low magnitude, short duration (<1 month), medium geographic extent (up to 1000 km²), low frequency and reversible. With the application of mitigation measures, the likelihood of effects occurring is low, and effects will be **not significant**.

5.2.3 Marine Birds

1

Seabirds do not appear to be particularly sensitive to underwater sound. Murres are potentially the most sensitive group to underwater sound because of their time spent underwater. Also, Petrels have been known to be attracted to lights on the survey vessel and rig. Most effects of the Project on seabirds will be negligible because available information suggests that birds are not particularly sensitive to underwater sound and mitigation (handling methods for stranded birds) should reduce or eliminate mortalities. The effects on seabirds are predicted to be of low magnitude, short duration (<1 month), small geographic extent (up to 100 km²), low frequency and reversible. With the application of mitigation measures, the likelihood of effects occurring is low, and effects will be **not significant**.

5.2.4 Species at Risk

LGL reports that the Terra Nova area does not appear to be critical habitat for the SARA-listed species. Northern and spotted wolffish normally occur in much deeper water than the Project Area and thus there is little or no chance of interaction. Few turtles are expected in the Project Area and there is evidence to suggest that sea turtles avoid seismic arrays. There are no seabirds on SARA Schedule 1 that are likely to occur in the Project Area. If the Ivory Gull is listed in the future, it would be considered extremely rare in the Project Area due to the absence of sea ice. The blue whale is considered uncommon in the Project Area. Therefore, effects on species at risk are not likely to be adverse and therefore **not significant**.

5.3 Follow-up Monitoring Required Yes No

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

6. Other Considerations

The C-NLOPB is satisfied with the environmental information provided by Petro-Canada regarding the potential adverse environmental effects which may result from the proposed VSP surveys, and 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 2006 EA Reports and those listed below are implemented, the Project is not likely to cause significant adverse environmental effects.

6.1 Recommended Conditions and/or Mitigations

The C-NLOPB recommends that the following conditions be included in the authorization if the Project is approved.

- *Petro-Canada 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 “Vertical Seismic Profiling Environmental Assessment Terra Nova Development” (LGL 2006b) and the “Environmental Assessment of Petro-Canada’s Vertical Seismic Profiling Program at the Terra Nova Development” (LGL 2006c).*
- *Petro-Canada shall implement or cause to be implemented the mitigation measures outlined in Appendix 2 of the Geophysical, Geological, Environmental and Geotechnical Program Guidelines (C-NLOPB 2004) respecting VSP surveys.*
- *The “safety zone” defined for marine mammal protection is designated to be 500 m.*
- *Monitoring for marine mammals and sea turtles shall be consistent with the approach outlined in the Geophysical, Geological, Environmental and Geotechnical Program Guidelines (C-NLOPB 2004), and includes monitoring during ramp-up and at all times when the airgun(s) are active.*
- *During ramp-up, and/or when the airgun array is active, airgun(s) shall be shut down, if a marine mammal or sea turtle, listed as **Endangered** or **Threatened** (as per Schedule 1 of SARA), including the North Atlantic right whale, Blue whale, and leatherback turtle, is observed within 500 m of the airgun array.*
- *During line changes, the seismic airgun array shall be reduced to a single airgun and the airgun shall remain active during the line change. If for any reason, the airgun is shut down for a period greater than 30 minutes, then ramp-up procedures shall be implemented as per the Geophysical, Geological, Environmental and Geotechnical Program Guidelines.*

Part D: Screening Decision

7. Decision/Decision Date

The Canada-Newfoundland and Labrador Offshore Petroleum Board is of the opinion that, taking into account the implementation of proposed mitigation measures set out in the conditions

above and those committed to by Petro-Canada, the Project **is not likely to cause significant adverse environmental effects**. This represents a decision pursuant to Section 20(1)(a) of the CEA Act.

Responsible Officer

Original Signed by K. Coady

Kimberly A. Coady

Environmental Assessment Officer

Date: December 12, 2006

References:

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- LGL. 2006d. Husky delineation/exploration drilling program for Jeanne d'Arc Area environmental assessment update. Rep. by LGL Limited, St. John's, NL for Husky Oil Operations Limited, St. John's, NL.
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Canada, Mobil Oil Canada Properties, Husky Oil Operations Limited, Murphy Oil Company Ltd., and Mosbacher Operating Limited. 84 p + App.

Petro-Canada. 1998. Terra Nova baseline environmental characterization data report. Prepared by Petro-Canada on behalf of Terra ova Proponents: Petro-Canada, Mobil Oil Canada Properties, Husky Oil Operations Limited, Murphy Oil Company Ltd., and Mosbacher Operating Limited.