

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

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**Part A: General Information**

<b>Screening Date</b>	<b><u>June 11, 2007</u></b>
<b>EA Title</b>	Jeanne d'Arc Basin 3-D Seismic Program Environmental Assessment, 2007 - 2010
<b>Proponent</b>	Petro-Canada 235 Water Street St. John's NL A1C 1B6
<b>Contact</b>	Mr. Urban Williams Team Lead Environment, Emergency Response & Security
<b>C-NLOPB File No.</b>	7705 P28-3
<b>CEAR No.</b>	06-01-17492
<b>Referral Date</b>	January 25, 2006
<b>EA Start Date</b>	February 09, 2006
<b>Location</b>	Jeanne d'Arc Basin Area NW Corner: 47.143° N, 48.995° W NE Corner: 47.121° N, 47.994° W SW Corner: 46.432° N, 49.022° W SE Corner: 46.411° N, 48.033° W

**Part B: Project Information**

In January 2006, Petro-Canada submitted a project description "*3-D Marine Seismic Program in and near EL 1092 Project Description*" (LGL 2006) to the C-NLOPB, in support of its application to conduct a 3-D seismic program on exploration licences held by the operator in the Jeanne d'Arc Basin area. The "*Environmental Assessment of Petro-Canada's Jeanne d'Arc Basin 3-D Seismic Program*" (LGL 2007a), submitted on March 21, 2007, provided an environmental assessment for a four year 3D seismic program on acreage held by Petro-Canada in the Jeanne d'Arc Basin. The "*Addendum to the Environmental Assessment of Petro-Canada's Jeanne d'Arc Basin 3-D Seismic Program*" (LGL 2007b) provided an assessment of the potential environmental effects of wellsite geohazard surveys for the same area to be undertaken as required in 2007 through to 2010.

In completing this Screening Report, information from the 2007 EA Report, the 2007

Wellsite survey EA Addendum and Petro-Canada's response to EA review comments, is summarized and included in the following sections.

## **1. Description of Project**

In support of exploration activities on acreage held by Petro-Canada in the Jeanne d'Arc Basin area (EL 1092), Petro-Canada is proposing to conduct 3-D seismic surveys the Jeanne d'Arc Basin area. The Project Area is bounded by NW Corner: 47.143° N, 48.995° W; NE Corner: 47.121° N, 47.994° W; SW Corner: 46.432° N, 49.022° W; and SE Corner: 46.411° N, 48.033° W (the Project Area). Seismic activities will be undertaken in this area as required from 2007 through to 2010. In addition, Petro-Canada proposes to undertake wellsite geohazard surveys within the Project Area from 2007 to 2010. Water depths in the Project Area range from 50 to 200 m. In 2007, up to 520 km<sup>2</sup> of seismic data may be acquired within the Project Area. Additional seismic surveys may be conducted within and near EL 1092 in 2008, 2009, or 2010. Seismic surveys are to be undertaken from May to December with the duration of the survey estimated at 22-75 days in a given year. In 2007, it is estimated that the survey duration will be 25 days.

The wellsite surveys include the acquisition of geotechnical and geophysical data. WSS typically involve a four sleeve-gun array and a single streamer, side scan sonar, Huntec DTS sub bottom profiler, single-beam echo sounder, and, if required a magnetometer. Water depths in the area range from 50 to 200 m. The temporal scope of the environmental assessment is to include any wellsite surveys that may be required in the Project Area from 1 July to 31 December of 2007, and between 1 May and 31 December of 2008, 2009, or 2010. In 2007, it is estimated that the survey duration will be 9 – 11 days and that additional geohazard surveys may occur in 2008, 2009, or 2010.

## **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 the "*Environmental Assessment of Petro-Canada's Jeanne d-Arc Basin 3-D Seismic Program*" (LGL 2007a). Water depths range from <100 m on the shelf to approximately 200 m on the upper continental slope. Average wind directions in the project area are from the west to west-southwest during the winter season and southwesterly during the summer months. Average maximum significant wave heights ranged from near 6 m in July and August to 13 to 14 m in the winter months.

### **2.2 Biological Environment**

#### **2.2.1 Fish and Commercial Fisheries**

The Study, Project and Survey Areas are within North Atlantic Fisheries Organization (NAFO) Management Division 3L, and the proposed Survey Area is within Unit Area 3Lt, a sub-unit of the Division. There are a number of fish species in the Jeanne d'Arc Basin area, of which a large number are fished commercially. A detailed description of

these species is provided in the 2007 EA Report and is summarized below.

Fish species in the area include snow crab (*Chionoecetes opilio*), northern shrimp (*Pandalus borealis*), and Greenland halibut (*Reinhardtius hippoglossoides*), with snow crab and shrimp accounting for the majority of the landed catch.

Snow Crab distribution on the Grand Banks has shifted in the last few years, as determined by the Department of Fisheries and Oceans (DFO) research survey trawls. 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. Based on recent DFO multispecies bottom trawl survey data, fishery logbook data, and observer sampling data, there are indications that the exploitable biomass and recruitment stock in NAFO divisions 2J, 3KLNOP, and 4R may be in decline.

Distribution of northern shrimp occurs from Davis Strait to the Gulf of Maine, typically where bottom water temperatures range from 2° to 6°C and where the substrate is soft mud. In the Newfoundland and Labrador Offshore Area, these conditions occur in water depths ranging from 150 to 600 m. Northern shrimp spawn once per year, in late June or early July (LGL 2007a). The eggs remain attached to the females until the following spring or summer. Recent spring and fall DFO research surveys indicate that in the 3L area, the greatest concentrations of shrimp occur along the outer areas and slopes of the Grand Bank, including the inshore areas of the bays along the east coast of Newfoundland and areas within both the Study Area and Project Area. Over 90% of the 3LNO northern shrimp biomass has been found within the 3L area (LGL 2007a).

Greenland halibut can be found in water temperatures ranging from -0.5 to 6°C and are typically harvested in the water depths greater than 450 m. Spawning is thought to occur in the Davis Strait in the winter and early spring at depths ranging from 650 to 1,000 m, and in the Laurentian Channel and the Gulf of St. Lawrence during the winter. The 2003-2005 domestic harvest catch statistics show that the landed weight of Greenland halibut in the Study Area is very low.

Commercial fishing activity in the Study Area consists primarily of snow crab and northern shrimp, with these two fisheries accounting for over 99% of the domestic harvest in recent years. DFO datasets indicate, for the last three years there was no harvesting recorded within the proposed 2007 Survey Area for any time of the year. Most of the domestic fish harvesting tends to occur at depths between 100 and 200 m in the eastern Grand Bank, both inside and outside the 200-mile EEZ (almost exclusively snow crab), and to the north in depths between 200 m and 1000 m (northern shrimp). Crab are harvested with fixed gear – crab pots, whereas shrimp are harvested using a mobile shrimp trawls.

### **2.2.2 Marine Mammals and Sea Turtles**

There are 18 species of cetaceans and three species of seals that are known to occur in the area (LGL 2007a). Baleen whales most likely found in the Study area include the

blue (likely rare) (*Balaenoptera musculus*), fin (*B. physalus*), sei (*B. borealis*), humpback (*Megaptera novaeangliae*), minke (*B. acutorostrata*) and North Atlantic right whale (*Eubalaena glacialis*). Toothed whales include the sperm (*Physeter catodon*), northern bottlenose (*Hyperoodon ampullatus*), Sowerby's beaked (*Mesoplodon bidens*), killer (*Orcinus orca*), and long-finned pilot whales (*Globicephala melaena*), the bottlenose dolphin (*Tursiops truncatus*), short-beaked common (*Delphinus delphis*), Atlantic white-sided (*Lagenorhynchus acutus*), white-beaked (*Lagenorhynchus albirostris*), Risso's (*Grampus griseus*) and striped dolphins (*Stenella coeruleoalba*) and the harbour porpoise (*Phocoena phocoena*). Seals species likely in the area are the grey (*Halichoerus grypus*), harp (*Phoca groenlandica*) and hooded (*Cystophora cristata*) seals.

There are three species of sea turtles known to occur near or on the Grand Banks: leatherback turtle (*Dermochelys coriacea*); the loggerhead turtle (*Caretta caretta*); and the Kemp's Ridley turtle (*Lepidochelys kempii*). The leatherback turtle is listed as Endangered under the *Species at Risk Act*. The northwest Atlantic population estimates of Kemp's Ridley and loggerhead sea turtles is unknown.

Preliminary data from the marine mammal observations undertaken during Husky's 2005 3D seismic program in October and November 2005 is summarized in the 2007 EA. The data indicate that baleen whales were the most numerous marine mammals observed, including humpback whales, minke whales and fin whales. Humpback whales were the most commonly sighted whales during the 2005 Husky seismic monitoring program with 27 sightings accounting for 65.9% of all confirmed baleen whale sightings. In the DFO database (DFO 2007), humpback whales ranked first in the Study Area, with 100 sightings recorded. Husky Energy reported that few dolphins and harbour porpoise were observed in the Study Area. Of the 23 sightings of dolphins, there were two sightings of white-sided dolphins, one sighting of white-beaked dolphin, one sighting of common dolphins and two sightings of unidentified dolphins. Two harbour porpoises were also observed in the project area.

### **2.2.3 Marine Birds**

The Grand Banks of Newfoundland have been identified as important habitat for many species of marine birds (LGL 2007a). Over 25 marine birds have been identified as occurring in the Study Area. These include species of *Alcidae* (Dovekie, Murres – Common and Thick-billed, Razorbill and Atlantic puffin); *Laridae* (Skuas – Great and South polar; Jaegers – Polmarine, Parasitic, and Long-tailed; Gulls – Herring, Iceland, Lesser Black-backed, Glaucous, Great Black-backed, 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 and Greater, Sooty and Manx Shearwaters). Specific information can be found in the 2007 EA Report.

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 Shearwater (*Puffinus spp.*) is common from June to October, and

absent from January to April. Leach's storm petrels (*Oceanites oceanicus*) are uncommon to common from April to October, whereas the Black-legged Kittiwake (*Rissa tridactyla*) is most abundant in the fall and winter. Dovekies (*Alle alle*) while uncommon to common in the winter are absent in the summer.

The 2007 EA provides a summary of the data from bird observations undertaken during the 2005 3D seismic program.

#### 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 are likely to be in the project area. The following table identifies the species likely to be present and their SARA and COSEWIC listing.

Species	SARA Status	COSEWIC Status (Date of most recent status report)
Blue whale ( <i>Balaenoptera musculus</i> )	Schedule 1 - Endangered	Endangered (May 2006)
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> ) (Inner 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)
Fin whale ( <i>B. physalus</i> )	Schedule 1 – Special Concern	Special Concern (May 2005)
Atlantic (Striped) wolffish ( <i>A. lupus</i> )	Schedule 1 – Special Concern	Special Concern (November 2000)
Ivory Gull ( <i>Pagophila eburnea</i> )	Schedule 1 – Special Concern	Endangered (April 2006)
Sowerby's beaked whale ( <i>Mesoplodon bidens</i> )	Schedule 3 – Special Concern	Special Concern (November 2006)
Atlantic cod ( <i>Gadus morhua</i> )	Schedule 3 – Special Concern	Endangered (May 2003)
Porbeagle shark ( <i>Lamna nasus</i> )		Endangered (May 2004)
White shark ( <i>Carcharodon carcharias</i> )		Endangered (April 2006)
Shortfin Mako shark ( <i>Isurus</i> )		Threatened (April 2006)

Species	SARA Status	COSEWIC Status (Date of most recent status report)
<i>oxyrinchus</i> )		
Cusk ( <i>Brosme brosme</i> )		Threatened (May 2003)
Harbour porpoise ( <i>Phocoena phocoena</i> ) (Northwest Atlantic population)		Special Concern (April 2006)
Blue shark ( <i>Prionace glauca</i> )		Special Concern (April 2006)
American eel ( <i>Anguilla rostrata</i> )		Special Concern (April 2006)

LGL (2007a) reports that there is insufficient data to determine population trends of the Blue whale in the northwest Atlantic. It is listed as a Schedule 1 Endangered Species under the SARA, and a recovery strategy is being developed. In the north Atlantic, the population of the Blue whale may range from 600 to 1500 individuals. One known area of blue whale concentration, as reported by LGL (2007) is the Gulf of St. Lawrence where 350 individuals have been photographically catalogued. In the waters off Newfoundland, very little is known regarding their presence or distribution. LGL (2007a) report that the blue whale is rarely sighted on the Grand Banks.

The North Atlantic right whale is the most endangered species in the northwest Atlantic. The 1996 population estimates indicate that there are approximately 284 individuals.

Population estimates of Leatherback turtles are between 26,000 and 43,000 species worldwide (LGL 2007a). Adult leatherback turtles are commonly sighted in the waters off Newfoundland from June to October, with peak abundance in August. A Recovery Strategy was released by DFO in June 2006 and finalized in December 2006. 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.

The likelihood of wolffish occurring in the Study Area is unknown, but assumed to be likely. 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. Spotted wolffish occur at depths greater than 450 m and spawn during late-summer and early autumn. They are more abundant along the slope area of the Study Area in the fall, than in the spring. Atlantic wolffish can be found at depths up to 350 m, but is typically found further south than the northern or striped species. Atlantic wolffish, like striped wolffish, is more abundant in the fall along the slope adjacent to the Study Area.

Fin whale abundance in the western North Atlantic is currently thought to be 2,814 individuals. There are no reliable estimates for the number of fin whales in the Newfoundland stock. On the Grand Banks, distribution is in the offshore waters of northwest Atlantic, including the Study Area (LGL 2007a). Ten fin whale sightings have been recorded within the Study Area based upon the DFO sighting database (LGL 2007a). Fin whales were commonly sighted in the Study Area during a monitoring program in October and November 2005 in water depths ranging from 73 to 140 m. It is likely that fin whales commonly occur in the Study Area at least during late spring to fall.

The Ivory Gull may appear in low numbers in the Study Area. They are typically found on the edge of pack ice on the northern Grand Banks in late winter.

The Study Area lies within the known range of the Sowerby's beaked whale. However, they are known as deep-sea divers that occur mainly in areas where the water depth is 1000 m or more. No Sowerby's beaked whales were observed during the 2004 monitoring program in the Orphan Basin or the fall 2005 seismic monitoring program in the Jeanne d'Arc Basin (LGL 2007a). During the 2005 seismic monitoring program in the Orphan Basin, there was one sighting of four Sowerby's beaked whale in September in 2500 m of water.

Atlantic cod are distributed over the Grand Banks. In the Jeanne d'Arc Basin area, 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. Peak spawning times for cod in the Grand Banks is May and June along the northeast shelf edge of the Grand Banks (Ollerhead *et al.* 2004). In recent years, DFO research surveys have failed to show substantial numbers of cod in the 2J3KL area. In May 2003, COSEWIC listed the Newfoundland and Labrador population of cod as endangered (COSEWIC 2003) and is listed as special concern on Schedule 3 of the SARA. DFO is reviewing whether Atlantic Cod should be placed on Schedule 1 of the SARA.

### **2.2.5 Research Surveys, Vessel Traffic, Recreation and Tourism**

The 2007 EA Report does not provide any information regarding recreation use or tourism. Vessel traffic with respect to fishing vessels is discussed in terms of amount of commercial fishing activity. Information regarding DFO vessel research surveys is provided in the 2007 EA Report. For the 2007 survey season, research surveys will occur in the 3L area, but the timing of those surveys is yet to be finalized. However, the 2007 EA indicates that the surveys will likely be similar to those carried out in 2006. Therefore, it is estimated that in the 3L area, multi-species surveys will likely be undertaken from mid May to the end of June and during October to December 2007. The Fish, Food and Allied Workers Union (FFAWU) crab trapping survey is likely to occur in September. Petro-Canada will be required to communicate with Fisheries and Oceans to avoid any potential conflict with research surveys that may be operating in the area.

## **Part C: Environmental Assessment Process**

### **3. Procedures**

In January 2006, Petro-Canada submitted a project description “*3-D Marine Seismic Program in and near EL 1092 Project Description*” (LGL 2006) to the C-NLOPB, in support of its application to conduct a 3-D seismic program. Pursuant to Section 12.2(2) of the 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. Input was sought from federal and provincial regulatory agencies and interested stakeholder respecting the scope of project and environmental assessment review.

A FCR notification was sent on February 7, 2006 regarding Petro-Canada’s proposed program. DFO and Environment Canada responded that they would participate as FAs in the EA review. In addition, the Dept. of Fisheries and Aquaculture responded that they would provide comments on the EA report. The FFAWU and One Ocean indicated that they would participate in the EA review.

On March 22, 2006, the C-NLOPB notified Petro-Canada that a screening level of assessment was required and the proponent was provided with a Scoping Document.

Petro-Canada submitted the 2007 EA Report to the C-NLOPB on 21 March 2007. The C-NLOPB, as Responsibility Authority (RA), forwarded the 2007 EA on 21 March 2007 to the DFO, Environment Canada, the provincial Departments of Fisheries and Aquaculture, Natural Resources, and Environment and Conservation. The FFAWU and One Ocean were provide a copy of the EA report to review. Comments were received from DFO, EC, NL Dept. of Fisheries and Aquaculture, and the FFAWU.

On 16 May 2007, the C-NLOPB requested additional information from Petro-Canada in order to satisfy the requirements of the CEAA and to complete the Screening Report. Petro-Canada was request to provide additional information on the following: the potential for behavioural disturbance and displacement of marine animals due to seismic activity in the cumulative effects assessment; clarification on when program activities will commence; confirmation that spawning times of some species were considered in the effects assessment; confirmation that communication will be ongoing during project activities; and future contingency plans to respond to leakage from streamers. Petro-Canada provided a response to this request on 22 May 2007.

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 and supporting EA report 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.

#### **4. Environmental Assessment Review**

Comments on the EA report were received from DFO, Environment Canada, Department of Fisheries and Aquaculture and the FFAWU.

DFO provided comments on 7 May 2007 and questioned the survey timing for 2007 as well as ramp-up procedures and what constitutes a “prolonged period”. They also stated that with the amount of activity in the area, the potential for behavioural disturbance and displacement of marine animals due to seismic activity should be better addressed in the assessment of cumulative effects. *Petro-Canada stated that the anticipated sailing date from St. John’s is 16 June with an anticipated completion date of 14 July. Regarding ramp-up procedures, Petro-Canada stated that any time the airgun array has been inactive for a period greater than 30 minutes, the airgun array will be ramped up as per the Geophysical, Geological, Environmental and Geotechnical Program Guidelines. Petro-Canada also provided a description of all the oil and gas activities in the area and their location and timing in relation to the proposed project and concluded that the potential for cumulative effects on marine mammals are limited. However, they concluded that if disturbance effects did occur, they may be localized.*

Environment Canada responded on 3 May 2007 and focused on the need for a contingency plan in the event of leakage from streamers. It also reminded Petro-Canada that a pelagic monitoring protocol should be in place. *Petro-Canada has an oil spill response plan in effect for its operations on the east coast and this plan would be implemented in the event of a spill.*

The NL Department of Fisheries and Aquaculture responded on 18 May 2007 stating that the 2007 EA addressed concerns related to fish health, commercial species, sensitive habitat, species at risk and residual and cumulative effects. They stated that information on seismic effects to fish species is available for Norway, Scotland and the North Sea and that these studies are more relevant to Newfoundland and Labrador waters than the information provided in the EA report for Australian waters and tropical species. They also stated that pelagics should have been considered for effects from seismic activity as well as resilient species such as Atlantic cod, snow crab and American plaice.

The FFAWU provided comments on 3 May 2007 and focused on the timing of the seismic program given that spring and summer months are the best time of year for various species to be harvested. They also stated that Fisheries Liaison Officers (FLOs) are key in avoidance of fishing gear damage. Specific comments were also provided on the EA document that were provided to Petro-Canada.

*Comments were provided to Petro-Canada on 16 May 2007 for a response before the Screening Report could be issued. All other comments were provided to Petro-Canada for consideration in future programs*

## 5. Scope of Project

Petro-Canada is proposing to conduct 3D seismic and geohazard surveys in an area of the Jeanne d'Arc Basin bounded by NW Corner: 47.143° N, 48.995° W; NE Corner: 47.121° N, 47.994° W; SW Corner: 46.432° N, 49.022° W; and SE Corner: 46.411° N, 48.033° W (the Project Area) from 2007 through to 2010. In 2007, up to 520 km<sup>2</sup> of seismic data may be acquired in EL 1092 approximately 8 km east of Hibernia. Additional seismic surveys may be conducted within and near EL 1092 in 2008, 2009, or 2010. Geohazard surveys will be undertaken as required in 2007 through to 2010. This screening report therefore considers the activities associated with 3D and geohazard surveys within the 2007 to 2010 timeframe and the transit of the seismic vessel on the Grand Banks in 2007. Seismic surveys will be undertaken from May to December with the duration of the survey estimated at 22-75 days in a given year. In 2007, it is estimated that the survey duration will be 25 days. Geohazard surveys will be undertaken from 1 July to 31 December of 2007, and between 1 May and 31 December of 2008, 2009, or 2010. In 2007, it is estimated that the survey duration will be 9 – 11 days and that additional surveys may occur in 2008, 2009, or 2010

For the 2007 3D seismic program, a single seismic vessel will collect data using a multiple streamer configuration with eight 5000 m streamers towed behind the vessel. Two 5085 in<sup>3</sup> airgun arrays (3 sub-arrays each at 1695 in<sup>3</sup>) will be towed at a depth of approximately 7 m below surface. Each sub-array is composed of eight airguns with a source level of 109.9 bar-m (or approximately 255 dB re 1 µPa (0-peak)).

During the review of the Environmental Assessment report, Petro-Canada informed the C-NLOPB that it wanted to undertake wellsite/geohazard surveys in the Project Area, within the same temporal scope of the 3D seismic project. Upon review of the project information respecting the proposed wellsite surveys, the C-NLOPB determined that the two projects were linked temporally and spatially and have similar project-environment interactions as with conventional 3D seismic program. The C-NLOPB determined that the proposed wellsite surveys fall within the scope of project for the 3D survey, and therefore, are considered within the scope of the assessment. No further environmental assessment was required. The wellsite surveys include the acquisition of geotechnical and geophysical data. WSS typically involve a four sleeve-gun array and a single streamer, side scan sonar, Hunttec Deep Tow System (DTS) sub bottom profiler, single-beam echo sounder, and, if required a magnetometer.

At the time of application for seismic and wellsite surveys to be undertaken beyond 2007 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.

## 5.1 Boundaries

The boundaries of the Project are defined in the 2007 EA and Addendum Reports as follows.

<b>Boundary</b>	<b>Description</b>
<i>Temporal</i>	Seismic Surveys - May to December each year up to 2010; The 2007 survey is estimated at 25 days with the duration estimated at 22-75 days in a given year.  Geohazard Surveys – Between 1 July and 31 December of 2007 and between 1 May and 31 December of 2008, 2009, or 2010. The 2007 survey is estimated at 9-11 days.
<i>Project Area</i>	Defined as the area bounded by: NW Corner: 47.143° N, 48.995° W NE Corner: 47.121° N, 47.994° W SW Corner: 46.432° N, 49.022° W SE Corner: 46.411° N, 48.033° W  Includes space to accommodate a seismic vessel turning radius.
<i>Study Area</i>	The Project Area and a 25 km buffer zone around the Project Area to account for potential environmental effects on VECs.

There would 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.

## 6. Consultation carried out by Petro-Canada

Petro-Canada, as reported in the 2007 EA met with or discussed the proposed project with government agencies, the fishing industry and other interest groups. Consultations were held with the DFO, Environment Canada, One Ocean, the Fish, Food and Allied Workers Union (FFAWU), the Natural History Society, the Association of Seafood Producers, Fishery Products International, Clearwater Seafoods, and the Groundfish Enterprise Allocation Council. All consultations were held to inform the stakeholders about the survey, to identify issues or concerns that should be considered in the EA, and to gather additional information relevant to the EA report. Representatives of the fish harvesting sector suggested that details about the proposed program should be included in the FFAWU's regular publication the "Union Forum. This, however, was not done because details of the seismic survey were not finalized before publication of the May issue. There were no concerns or issues raised by the stakeholders concerning the conduct of the 3D 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 2007 EA 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 2007 field season

## **7. Environmental Effects Analysis**

### **7.1 Scope of Assessment**

For the purpose of meeting the requirements of the CEEA and the “*Geophysical, Geological, Environmental and Geotechnical Program Guidelines*” (C-NLOPB 2004), the factors that were considered to be within the scope of an environmental assessment are those set out in subsection 16(1) of the CEEA and those listed in the “*Petro-Canada Seismic Program - Jeanne d’Arc Basin Area Scoping Document*” (C-NLOPB 2006).

### **7.2 Methodology**

The C-NLOPB reviewed the environmental effects analysis presented by Petro-Canada in the 2007 EA. 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 2007a) 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;
- scale 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 2007 EAs, Petro-Canada presented information regarding the potential effects of seismic and wellsite geohazard activities on the ecosystem, marine mammals and sea turtles, fish and invertebrate species, commercial fisheries, seabirds, and Species at Risk. Information regarding hearing effects in fish, sound detection and behavioural

changes in invertebrates, behavioural and disturbance effects in marine mammals, and discussion of marine mammal monitoring results from recent seismic programs in the Newfoundland and Labrador offshore area and Gulf of Mexico, were presented. Upon review of the information and review of the mitigations proposed by Petro-Canada, the effects assessment is as follows.

### 7.3 Valued Ecosystem Components/Potential Environmental Effects

#### 7.3.1 Impacts on Fish

1

In the natural environment, fish show avoidance responses and swim away as the array ramps up or as the survey slowly approaches. The airgun will be ramped-up, thereby allowing fish in the area to leave. Other studies referenced in the 2007 EA Report and Addendum 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. Behavioural responses to seismic have been documented in a number of studies and reported by Christian *et al.* (2004). In general, fish show startle response and change in direction and speed of swimming. In some studies looking at the effects on commercial catch rates, the change in swimming direction accounted for a decrease catch rate. However, some studies show that this effect was temporary, whereas other studies report that fish behaviour was altered for a number of days (LGL 2007a). LGL (2007a) reports 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 the Temporary Threshold Shift (TTS) can occur in fish exposed to seismic, under certain conditions. However, in the studies referenced by LGL (2007a) hearing sensitivity recovered within 14 days of exposure.

LGL (2007a) reports that physical effects on fish will be negligible to low magnitude, in an immediate area (<1 km<sup>2</sup>), of low frequency and medium duration (1 -12 months, but not continuous throughout duration). Taking avoidance behaviour into account, any potential physical impact to finfish is considered to be negligible, immediate to sub-local in geographic extent, immediate in duration, would have a low likelihood of occurrence. Disturbance effects are likely to be negligible to low but not constant duration (1 - 12 months) with a geographic extent of 11-100 or 101-1,000 km<sup>2</sup>. The likelihood of effects (behavioural and physical) is low and therefore **not significant**.

#### 7.3.2 Invertebrates (Commercial Species)

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The results from an ESRF sponsored study (Christian *et al.* 2004), indicate that there was no pathological (acute or chronic mortality) effects on caged male or female snow crab from an airgun array passing over at close range. However, there was a significant difference in development rates between exposed and unexposed fertilized eggs from a single female. Christian *et al.* (2004, as reported in LGL 2007a) reported that there was no significant difference in stress indicators between exposed and non-exposed adult male snow crab. The 2007 EA reports on a study conducted by DFO in 2003 on caged egg-bearing female snow crabs exposed to a commercial seismic survey. LGL (2007a) reports that the observations from the study show that there were no acute or chronic mortality to the crab or to feeding activity of treated crabs held in a laboratory; for egg-

bearing females exposed to seismic energy; the survival of the embryos being carried by the female; nor the locomotion of the larvae after hatch were affected. In the Christian *et al.* (2004) study, a decrease in catch rate of the snow crab was not observed after seismic shooting commenced. LGL (2007a) also report that another experiment where caged snow crab were exposed to an airgun array showed that there were no startle behaviours observed.

Results of a study on shrimp, as summarized by LGL (2007a), exposed to a noisy environment show that there were significant differences in growth and reproduction rates between two groups. The noisier environment shrimp showed lower rates than the shrimp in the quieter environment. LGL (2007a) reports that a study on behavioural effects on commercial shrimp in shallow water off the coast of Brazil indicate that there was a slight decrease in the mean mass and number of shrimp but the difference was not significant.

Any potential physical or behavioural impact to invertebrate species is considered to be negligible to low, with a geographic extent between <1 to 1,000 km<sup>2</sup>, immediate in duration, and would have a low likelihood of occurrence. The likelihood of effects (behavioural and physical) is low and therefore **not significant**.

### **7.3.3 Commercial Fishing and DFO Vessel Research Surveys 1**

Potential interactions with this VEC include potential for a decrease in catch rates, interference with fishing gear and potential impact on DFO research survey trawls. As indicated above, seismic activity has resulted in a dispersion of fish species, and subsequently reduced catch rates for a short duration in the studies referenced by LGL (2007a). Section 2.2.1 above indicates that there has been no recorded harvesting activity over the past three years, and there has been very little fishing in the Project Area. There has, however, been fishing (almost entirely for snow crab) in the Study Area well north of the Survey Area and to the east, beyond the 200 nmi. There is potential therefore for interaction between seismic operations (streamers) and fishing gear, especially fixed gear such as crab pots.

Petro-Canada indicated that a number of mitigations, consistent with those outlined in the “*Geophysical, Geological, Environmental and Geotechnical Program Guidelines*” (C-NLOPB 2004), will be implemented. These include: avoidance of heavily fished areas; use of a Fisheries Liaison Officer (FLO) at sea; communication with fishers (notice to mariners) and DFO research vessels; single point of contact (SPOC), and a fish gear compensation plan.

During vessel transit there is potential for interference with the towed streamers and fixed gear in fishing area 3L. Based on 2004, 2005 and 2006 fish data reported in the 2007 EA, it is estimated that commercial crab fisheries may be occurring in the area where the seismic vessel will transit between locations. To avoid these fishing locations, Petro-Canada has indicated that the following measures will be undertaken to avoid conflict with potential fishing enterprises. A FLO will be onboard at all times, Canning & Pitt Associates, Inc. will act as the onshore Single Point of Contact to provide

guidance on route selection during the survey and transit, a Canadian Coast Guard (CCG) Notice to Mariners will be issued, and Petro-Canada will provide the C-NLOPB with a transit map that will aim at minimizing any potential interaction with known fixed gear concentrations at the time.

To avoid potential conflict with DFO Research surveys, Petro-Canada will maintain communications with DFO personnel to keep up-to-date on the timing of planned research surveys. In addition, a temporal and spatial buffer zone will be implemented, in consultation with DFO, to reduce any potential interference with fish behavioural patterns.

LGL predicts 3-D seismic and wellsite activity, including vessel movement, will be negligible, of short duration (< 1 to 12 months), and with a geographic extent not greater than 100 km<sup>2</sup>. Therefore, taking mitigations into account, effects to the commercial fishery are not likely and **not significant**.

#### **7.3.4 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 2007 EA Report (LGL 2007a) describe in more detail the numbers and the species of cetaceans which have been observed in, or which are considered likely to frequent, the Study Area. The 2007 EA Report and Addendum provides an impact assessment, based on available data on the effects of seismic and geohazard surveys on marine mammals. Data is lacking concerning the potential for sub-lethal effects, with the exception of avoidance behaviour. Several different surveys in other marine areas indicate that avoidance behaviour usually is exhibited in response to airgun seismic surveying (as reported in LGL 2007a). For instance, in one study referenced by LGL (2007) baleen whales remained significantly further from active airguns than when the airgun were inactive. Median distances were reported at 1.6 km away from the array during shooting, whereas they were approximately 1 km from the array when it was inactive. LGL also reports that fin/sei whales are less likely to remain underwater when airguns are active. There is a risk that auditory damage may occur, including temporary hearing impairment, at close range to the array. However, as LGL (2007a) reports, there is uncertainty in predicting these effects because of the data gaps.

The 2007 EA Report and Addendum summarizes the results from recent marine mammal monitoring programs undertaken in association with 2D and 3D seismic programs and geohazard surveys. 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, LGL reports that the analysis of the data suggests that there was no obvious behavioural effect of airgun operations on baleen whales. In another monitoring study, LGL (2007) reports 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 and geohazard 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 2007b). 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 (LGL 2007a). LGL (2007a) reports 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 the 2007 EA Report) should reduce impact.

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 2007 EA Report lists a number of mitigations that will be implemented during the seismic program, some of which are consistent with the mitigations recommended in Appendix 2 of “*The Geophysical, Geological, Environmental and Geotechnical Program Guidelines*” (C-NLOPB 2004). In addition to those mitigations listed in the 2007 EA Report and Addendum, 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 are predicted to be of low magnitude, short duration (<1-12 months), low to medium geographic extent (up to 1000 km<sup>2</sup> during seismic activities) (11-100 km<sup>2</sup> for geohazard surveys), low frequency and reversible. With the application of mitigation measures, the likelihood of effects occurring is low, and effects will be **not significant**.

The effects on sea turtles are predicted to be of negligible to low magnitude, low to medium geographic extent (up to 100 km<sup>2</sup>), low frequency and reversible. With the application of mitigation measures, the overall likelihood of effects occurring is low, and effects will be **not significant**.



### 7.3.5 Marine Birds

1

The 2007 EA Report indicates that the effects of seismic sound on seabirds is unknown. They may be affected by underwater sound from airgun arrays, leakage of petroleum product from streamers, and attraction to ship lights at night. The 2007 EA Report indicates that murre and shearwaters may potentially be the most sensitive group due to their time spent underwater diving for food. They can reach depths of up to 120 m below water. Shearwaters and fulmars are likely to be present in large numbers in the project area in June. Sound from the array, above the water, is similar to a muffled shot and should have little or no effect on birds that do not have their heads in the water. Storm-petrels may be attracted to vessel lighting and become stranded on the survey vessel. However, if birds do become stranded on the vessel, Petro-Canada or its contractor will release the birds in a manner consistent with the Canadian Wildlife Service (CWS) bird handling procedures.

The effects are predicted to be of low magnitude, with a small geographic extent, and of short duration. Therefore, an environmental effect is not likely and **not significant**.

### 7.3.6 Species at Risk

LGL reports that leatherback turtle may occur in the Project Area. As indicated above, effects on turtles are likely to be not significant, therefore effects on the Leatherback turtles are not likely to be adverse and therefore **not significant**.

Blue whales are reported by LGL to be rare in the project area, therefore the potential for interaction with project activities is unlikely. LGL reports that the North Atlantic right whale may be extremely rare in the Project Area, but occurs in and near the Bay of Fundy.

The following mitigations will be required to reduce or prevent impacts to SAR.

- ◆ *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.*

With the implementation of these mitigations, and with the rare likelihood of these marine mammals occurring, effects therefore will be **not significant**.

Two species of wolffish, the northern and spotted, are likely to occur. As indicated above, effects on wolffish are likely to be not significant, therefore effects on wolffish are not likely to be adverse and therefore **not significant**.

### 7.3.7 Water Quality/Discharges

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Routine discharges, which are likely to occur during operation, are similar to those associated with many typical vessel operations. The vessels proposed for the survey are equipped with on-board environmental protection equipment, and a sewage treatment system for wastewater. The effect of the seismic operation and geohazard surveys on marine water quality will be negligible and **not significant**.

### 7.4 Accidents and Malfunctions

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

The vessel is required to carry a "Shipboard Oil Pollution Emergency Plan" pursuant to MARPOL 73/78. The Plan contains a description of procedures and checklists which govern operations involving hydrocarbons, adherence to which should prevent unintended "operational" releases. The vessel will also carry a copy of Petro-Canada's "Oil Spill Response Plan".

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

### 7.5 Cumulative Environmental Effects

Within the 2007 Project Area, there are three existing offshore production developments (Hibernia, Terra Nova, and White Rose) on the northeastern part of the Grand Banks. Husky Energy may be undertaking a 3-D seismic program in the Jeanne d'Arc Basin and ExxonMobil Canada may be conducting a controlled source electromagnetic (CSEM) program in the Orphan Basin. 2-D seismic programs will likely be ongoing off the coast of Labrador and Greenland until late November. Commercial fishing may be occurring in the Study Area. Therefore, the 2007 activities that may overlap in time and space with the seismic program are likely to be commercial fishing, DFO/Industry research surveys, marine transportation, offshore oil and gas production and drilling activities. Temporal overlap of activities includes 3D seismic, wellsite geohazard, and drilling programs within the Project Area. The seismic and geohazard programs will be scheduled to such an extent to avoid spatial overlap in areas of concentrated fishing and to reduce interference with research surveys. Loss of access to fishing areas will occur with the seismic and geohazard survey activities (<1 month per area), however, there has been no recorded harvesting activity over the past three years in the 2007 geohazard survey area and very little fishing in the Project Area (an average of 36 tonnes of snow crab annually). The cumulative effects may be additive, however the geographic extent is small and represents a very small portion of the overall 3L fishing area. Any effects on fish or marine mammals, therefore may be additive, but **not significant**.

### 7.6 Follow-up Monitoring

Required Yes

No

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

## **8. 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 3D seismic and wellsite geohazard 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 2007 EA Report and Addendum and those listed below are implemented, the Project is not likely to cause significant adverse environmental effects.

## **9. 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 “Environmental Assessment of Petro-Canada’s Jeanne d’Arc Basin 3D Seismic Program” (March 2007) and “Addendum to the Environmental Assessment of Petro-Canada’s Jeanne d’Arc Basin 3-D Seismic Program” (May 2007).*
- *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 3D seismic programs.*
- *For any wellsite surveys undertaken, 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 wellsite 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, 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**

### **10. 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 Date: June 11, 2007  
Kimberly A. Coady  
Environmental Assessment Officer

## References:

- C-NLOPB. 2006. Petro-Canada Seismic Program – Jeanne d’Arc Basin Area Scoping Document. 10 p.
- Christian, J.R., A. Mathieu, D. h. Thomson, D. White and R.A. Buchanan. 2004. Effects of Seismic Energy on Snow Crab (*Chionoecetes opilio*). Environmental Research Funds Report No. 144.
- LGL. 2006. 3-D Marine Seismic Program in and near EL 1092 Project Description. 11 p.
- LGL. 2007a. Environmental Assessment of Petro-Canada’s Jeanne d’Arc Basin 3-D Seismic Program. LGL Rep. SA882. Rep. by LGL Limited, Canning & Pitt Associates Inc., and Oceans Ltd., St. John’s, NL, for Petro-Canada, St. John’s, NL. 264 p. + appendices.
- LGL. 2007b. Addendum to the Environmental Assessment of Petro-Canada’s Jeanne d’Arc Basin 3-D Seismic Program. LGL Rep. SA940-2. Rep. by LGL Limited, St. John’s, NL, for Petro-Canada, St. John’s, NLO. 42 p. + appendices.