

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

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**Part A: General Information**

<b>Screening Date</b>	<b><u>May 18, 2006</u></b>
<b>EA Title</b>	Northern Jeanne d’Arc Basin Seismic Program Environmental Assessment  Jeanne d’Arc Basin 3D Seismic Program, Environmental Assessment Update, 2006-2010
<b>Proponent</b>	Husky Oil Suite 901, Scotia Centre 235 Water Street St. John’s NL A1C 1B6
<b>Contact</b>	Mr. Don Williams Manager, HSEQ
<b>C-NLOPB File No.</b>	7705-H61
<b>CEAR No.</b>	05-01-8783
<b>Referral Date</b>	January 11, 2005 Update – April 07, 2006
<b>EA Start Date</b>	January 19, 2005 Update - April 07, 2006
<b>Location</b>	Jeanne d’Arc Basin Area, North Eastern Grand Banks – 46°15’ - 47°50’ N; 47°15’ - 49°15’W.

**Part B: Project Information**

In January 2005, Husky Energy submitted a project description “*Northern Jeanne d’Arc Basin Seismic Program Draft Project Description*” (LGL 2005) to the C-NLOPB, in support of its application to conduct a 3D seismic program on exploration licences held by the operator in the Jeanne d’Arc Basin area. A screening level environmental assessment was completed on 21 September 2006. The “*Northern Jeanne d’Arc Basin Seismic Program Environmental Assessment*” (LGL 2005) and the addendum “*Northern Jeanne d’Arc Basin Seismic Program Environmental Assessment Addendum* (LGL 2005) provided an environmental assessment for a three year 3D seismic program on acreage held by Husky Energy in the Jeanne d’Arc Basin.

In early 2006, Husky Energy informed the C-NLOPB that it would like to modify the project area previously assessed in 2005. To address the changes to the project scope, Husky Energy was required to submit an update to the environmental assessment report. The “*Jeanne d’Arc*

*Basin 3D Seismic Program, Environmental Assessment Update, 2006-2010*” (LGL 2006) (herein referred to as the 2006EA Update) was submitted on 07 April 2006. The 2006 EA Update describes seismic and geohazard program activities for a portion of the Jeanne d’Arc Basin area bounded by 46°15’ - 47°50’ N; 47°15’ - 49°15’W (see Figure 2.1 in the EA Update (2006)). Program activities may occur from 2006 through to 2010.

In completing this Screening Report, information from the 2005 EA Report, EA addendum, and 2006 EA Update was summarized and is included in the following sections.

## **1. Description of Project**

In support of exploration activities on acreage held by Husky Energy in the Jeanne d’Arc Basin area, Husky Energy is proposing to conduct 3D seismic surveys and wellsite/geohazard surveys in an area of the Jeanne d’Arc Basin bounded by 46°15’ - 47°50’ N; 47°15’ - 49°15’W (the Project Area) from 2006 through to 2010. Water depths in the Project Area range from 80 to 300 m. In 2006, up to 1170 km<sup>2</sup> of seismic data may be acquired in two areas within the Project Area and up to four geohazard surveys may be undertaken. In subsequent years, up to 2500 km<sup>2</sup> of seismic data may be acquired, and up to four geohazard surveys may be undertaken in the Project Area. Seismic surveys will be undertaken from May to November in any one year and typically take up to two months to complete.

The Wellsite Surveys (WWS) 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. Geohazard surveys will be undertaken as required, commencing in May 2006 up to December 2010. Each survey will require four to 14 days to complete.

Prior to the commencement of 3D and geohazard surveys beyond 2006, Husky-Energy will be required to provide documentation to the C-NLOPB. The documentation will outline the proposed WWS activities for that year, whether those activities and the timing of those activities fall within the scope of the 2005 EA report, 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 the “*Northern Jeanne d’Arc Basin Seismic Program Environmental Assessment*” (LGL 2005). Water depths range from approximately 80 m on the Grand Banks to 400 m on the slope area. Predominant wind speeds are from the west to south west in the project area. Average maximum significant wave heights during September and October are between 10 – 11 m.

### **2.2 Biological Environment**

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

The Study Area includes portions of NAFO Unit Areas 3Lh, 3Li, 3Lr and 3Lt. 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 2005 EA Report and the 2006 EA Update 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 2J3KL 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 2005). 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 slope region between 185 and 255 m water depths. Over 90% of the 3LNO northern shrimp biomass has been found within the 3L area (LGL 2005).

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, and in the Laurentian Channel and the Gulf of St. Lawrence.

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. Commercial harvesting of shrimp and snow crab tends to occur at depths between 100 and 500 m, and is concentrated in the northeast section of the Study Area within the EEZ, and at the southeast section outside the EEZ. Crab are harvested with fixed gear – crab pots, whereas shrimp are harvested using a mobile shrimp trawls. Within the Project Area, the shrimp fishery is concentrated in the northeastern region, and the crab fishery is concentrated in the northwestern and southeastern sections.

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

There are 16 species of cetaceans and three species of seals that are known to occur in the area (LGL 2005). 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 common (*Delphinus delphis*), white-beaked

(*Lagenorhynchus acutus*), Risso's (*Grampus griseus*) and striped dolphins (*Stenella coeruleoalba*) 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.

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 2006 EA Update. The data indicate that baleen whales were the most numerous marine mammal observed, including humpback whales, fin whales and minke whales. Husky Energy reports that few dolphins were observed. 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. There was one sighting of a beaked whale species. Husky indicates that this was likely Sowerby's beaked whale. 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 2005). Over 25 marine birds have been identified as occurring in the Study Area. These include species of *Alcidae* (Dovekie, Murres – Common and Thick-billed, Razor Bill and Atlantic puffin), *Laridae* (Skuas – Great and South polar; Jaegers – Polmarine, Parasitic, and Long-tailed; Gulls – Herring, Iceland, 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, Cory's, Greater, Sooty and Manx Shearwaters). Specific information can be found in the 2005 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 March. Leach's storm petrels (*Oceanites oceanicus*) are common from May to October, whereas the Black-legged Kittiwake (*Rissa tridactyla*) is most abundant in the fall and winter. Dovekies (*Alle alle*) while abundant in the winter are absent in the summer. Birds that are common throughout the year include murres and gulls.

The 2006 EA Update 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. The following table identifies the species likely to be present and their SARA listing.

Species	SARA Status
Blue Whale ( <i>Balaenoptera musculus</i> )	Schedule I - endangered
North Atlantic Right Whale ( <i>Eubalaena glacialis</i> )	Schedule I - endangered
Leatherback sea turtle ( <i>Dermochelys coriacea</i> )	Schedule I - endangered
Northern Wolffish ( <i>Anarhichas denticulatus</i> )	Schedule I – threatened
Spotted wolffish ( <i>Anarhichas minor</i> )	Schedule I - threatened
Atlantic (Striped) Wolffish ( <i>A. lupus</i> )	Schedule I – special concern
Ivory Gull ( <i>Pagophila eburnea</i> )	Schedule I – special concern
Harbour porpoise ( <i>Phocoena phocoena</i> ) (Northwest Atlantic population)	Schedule II - Threatened
Fin Whale ( <i>B. physalus</i> )	Schedule III – special concern
Northern bottlenose whale ( <i>Hyperoodon ampulatus</i> ) (Scotian Shelf population)	Schedule III – special concern
Sowerby’s beaked whale ( <i>Mesoplodon bidens</i> )	Schedule III – special concern
Atlantic Cod ( <i>Gadus morhua</i> )	Schedule III – special concern

LGL (2006) reports that there is insufficient data to determine population trends of the Blue whale in the northwest Atlantic. It is listed as a Schedule I 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 (2006) 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 (2005) 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. 1996 population estimates indicate that there are approximately 284 individuals.

Atlantic cod (*Gadus morhua*) are distributed over the Grand Banks. In the Jeanne d’Arc Basin area, the cod can be found on the continental slope to the east and northeast of the Project Area.

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 peaks in May, with highest abundances in 3L, near the Study Area (Ollerhead *et al.* 2004). In recent years, DFO research surveys have failed to show substantial numbers of cod in the 2J3KL areas. In May 2003, COSEWIC listed the Newfoundland and Labrador population of cod (includes 3NO) as endangered (COSEWIC 2003) and is listed as

special concern on Schedule III of the *SARA*. DFO is reviewing whether Atlantic Cod should be placed on Schedule I of the *SARA*.

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 along the slope area in the 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.

Population estimates of Leatherback turtles are between 26,000 and 43,000 species worldwide (LGL 2005). 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.

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

The 2005 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 2006 EA Update Report. For the 2006 survey season, research surveys will occur in the 3L area, but the timing of those surveys is yet to be finalized. However, the 2006 EA Update indicates that the surveys will likely be similar to those carried out in 2005. Therefore, it is estimated that in the 3L area, multi-species surveys will likely be undertaken from mid May to end of June and during October to December 2006. A crab trapping survey is likely to occur from mid to late May. Husky Energy 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 2005, the C-NLOPB completed an environmental Screening report, pursuant to the *Canadian Environmental Assessment Act* (CEA Act) for a 3D seismic survey as proposed by Husky Energy and described in the 2005 EA Report. A portion of the seismic survey was completed in 2005. Husky Energy indicated to the C-NLOPB in early 2006 that it was planning to complete the remainder of the 2005 survey area in 2006, undertake an additional survey and that it wished to expand the project area. The C-NLOPB informed Husky Energy that an update to the 2005 EA Report was required to incorporate the expanded project area and the additional 3D program.

The C-NLOPB, as Responsibility Authority (RA), forwarded the 2006 EA Update on 07 April

2006 to the DFO, Environment Canada, and provincial Departments of Fisheries and Aquaculture, Natural Resources, and Environment and Conservation. Comments received up to May 18, 2006 were considered by the C-NLOPB in completing this Screening Report Update. Comments were received from DFO and EC.

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 reports and supporting information, it would constitute a single project for the purposes of Section 15(2) of CEEA. For the purposes of Subsection 15(3) of CEEA, 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 Husky Energy that is likely to be carried out in relation to their proposed Project.

### **3.1 Scope of Project**

Husky Energy is proposing to conduct 3D seismic surveys and wellsite/geohazard surveys in an area of the Jeanne d'Arc Basin bounded by 46°15' - 47°50' N; 47°15' - 49°15' W (the Project Area) from 2006 through to 2010. In 2006, up to 1170 km<sup>2</sup> of seismic data may be acquired in two areas within the Project Area and up to four geohazard surveys may be undertaken. In subsequent years, up to 2500 km<sup>2</sup> of seismic data may be acquired, and up to four geohazard surveys may be undertaken in the Project Area. This screening report therefore considers the activities associated with 3D and geohazard surveys within 2006 to 2010 timeframe. Seismic surveys may be conducted between May to November in each year and geohazard may be conducted as needed through December of any one year.

For the 2006 3D seismic program, a single seismic vessel will collect data using a multiple streamer configuration with 10 streamers towed behind the vessel. Two 5085 in<sup>3</sup> airgun arrays (3 sub-arrays each at 1695 cu. in) 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 106.4 bar-m (or approximately 255 dB re 1 µPa (0-peak)). 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 or wellsite 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 I; 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 EA Update Report as follows.

<i>Boundary</i>	<b>Description</b>
<i>Temporal</i>	Seismic Surveys - May to November 31 each year up to 2010; Wellsite/geohazard – any time during the year from 2006 to 2010; duration up to 14 days each survey.
<i>Project Area</i>	Defined as the area bounded by 46°15' - 47°50' N; 47°15' - 49°15' W.
<i>Study Area</i>	The Project Area and a 20 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.

### 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 environmental assessment are those set out in subsection 16(1) of the CEAA and those listed in the “*Husky Energy Seismic Program - Jeanne d’Arc Basin Area Scoping Document*” (C-NLOPB 2005).

## 4. Consultation

### 4.1 Consultation carried out by Husky Energy

Husky Energy, as reported in the 2006 EA Update met with or discussed the proposed project with government agencies, fishing industry and other interest groups. Consultations were held with the DFO, Environment Canada, One Ocean and the Fish, Food and Allied Workers Union (FFAWU), the Natural History Society, the Association of Seafood Producers; Fishery Products International, Clearwater Seafood’s Limited Partnership; and Icwater Harvesting. All consultations were held to inform the stakeholders about the survey and to identify issues or concerns which should be considered in the EA. Representatives of the fish harvesting sector informed the Operator of planned fishing activities in the 3L area and the timing of those activities. There were no concerns or issues raised by the stakeholders concerning the conduct of the 3D seismic program, wellsite/geohazard surveys nor the environmental assessment process.

The C-NLOPB is satisfied that the consultations carried out by Husky Energy and reported on in the 2006 EA Update 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 environmental assessment procedures, various federal and provincial government departments were notified on 07 April 2006 regarding Husky Energy's proposed program. Prospective Federal Authorities were provided with the 2006 EA Update for review and comment. The following agencies were notified:

- 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 May 15, 2006 and focused on the need for in-field measurements of acoustic transmission and attenuation, and clarification on mitigation to be implemented. *Regarding in-field acoustic measurements and modelling, the C-NLOPB has pursued this through with the Environmental Studies Research Fund (ESRF) Management Board. With regard to mitigations for marine mammals, Husky Energy has committed to implementing mitigations that are consistent with the Geophysical, Geological, Environmental and Geotechnical Program Guidelines. The C-NLOPB, through its condition of authorization, will require additional mitigations to reduce impact on marine mammals, sea turtles and species at risk, and mitigations regarding line changes. All other comments will be provided to Husky Energy for consideration in future program.*

Environment Canada responded on 18 May 2006 and indicated that it did not have any concerns with the proposed program.

The NL Department of Natural Resources responded on 08 May 2006 that it did not have any comments to offer on the 2006 EA Update.

## **5. Environmental Effects Analysis**

### **5.1 Methodology**

The C-NLOPB reviewed the environmental effects analysis presented by Husky Energy in the 2006 EA Update. The EA approach was consistent with that used in the 2005 EA report (LGL 2005) 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 2006) 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 2006 EA Update, Husky Energy presented updated information regarding the potential effects of seismic activity on marine mammals, fish and invertebrate species, and sea turtles. 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. Where appropriate, the new information is presented in the following sections. Upon review of the information, and a review of the mitigations proposed by Husky Energy, the following effects assessment, as completed in 2005 remains unchanged.

## **5.2 Valued Ecosystem Components/Potential Environmental Effects**

### **5.2.1 Eggs, Larvae and Planktons**

**0**

The 2005 EA Report indicates that studies to date on the effects on eggs, larvae and plankton indicate that the damage is minimal and the effects were not different than the experimental controls. Mathematical modelling by Saetre and Ona (1996, as reported in LGL 2005) indicate that mortality effects on eggs and larvae are comparable to natural mortality, and can be considered insignificant. No specific mitigation is indicated. Impacts are predicted to be negligible and **not significant**.

### **5.2.2 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 2005 EA Report indicated that fish mortality did not result from exposure to seismic sound sources. Stress responses (physiological effects) to

seismic exposure occur in fish but are temporary. 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 2005). LGL (2005) 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 (2005) hearing sensitivity recovered within 14 days of exposure. In a recent study by Popper *et al* (as reported in LGL 2006) on northern pike, TTS were found in exposed fish and recovered within 24 hours.

LGL (2005 and 2006) reports that physical effects on fish will be of 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 low, of medium, but not constant duration (1 - 12 months) with a geographic extent of <1000 km<sup>2</sup>. The likelihood of effects (behavioural and physical) is low and therefore **not significant**.

### 5.2.3 Invertebrates (Commercial Species)

1

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 2005) reported that there was no significant difference in stress indicators between exposed and non-exposed adult male snow crab. The 2005 EA Report (LGL 2005) reports on a study conducted by DFO in 2003 on caged egg-bearing female snow crabs exposed to a commercial seismic survey. LGL (2005) 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 (2005) 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 (2005), 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.

In studies on squid species, as summarized in the 2005 EA Report, startle responses were observed such as movement towards the water surface, and an increase in swimming speed. If

the airgun was not ramped-up the squid fired ink sacs. This did not occur if the array was ramped up. LGL (2006) 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, 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**.

#### **5.2.4 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 in the studies referenced by LGL (2005, 2006) for a short duration. Section 2.2.1 above indicates that there is likely to be some fishing in the Project Area. There is potential therefore for interaction between seismic operations (streamers) and fishing gear, especially fixed gear such as crab pots. Husky Energy 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 fisheries (notice to mariners) and DFO research vessels; and a fish gear compensation plan.

In 2006, seismic data acquisition may occur in two separate areas within the Project Area. During vessel transit from one area to the next, there is potential for interference with the towed streamers and fixed gear in fishing area 3L. Based on 2005 fish data reported in the 2006 EA Update, 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, Husky Energy has indicated that the following measures will be undertaken to avoid conflict with potential fishing enterprises: a FLO will be aboard at all times; Canning and Pitt will provide single point of contact services during the survey and transit; a Canadian Coast Guard (CCG) Notice to Mariners will be issued; Husky Energy 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; and, the survey will have a support vessel in attendance throughout the survey that will precede the seismic spread during both operations and transit.

To avoid potential conflict with DFO Research surveys, Husky Energy 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 seismic activity, including 3D seismic surveys and wellsite surveys, will have a negligible to low effect, be of short duration (< 1 month) with a geographic extent not greater than 1000 km<sup>2</sup>. Therefore, taking mitigations into account, impacts to the commercial fishery are not likely and **not significant**.

### 5.2.5 Marine Mammals and Sea Turtles

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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 EA Update (LGL 2006) and the 2005 EA Report (LGL 2005) 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 2005 EA Report (LGL 2005) provides an impact assessment, based on available data on the effects of seismic 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 2005). For instance, in one study referenced by LGL (2005) baleen whales remained significantly further from active airguns than when the airguns 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 (2005) reports, there is uncertainty in predicting these effects because of the data gaps.

In the 2006 EA Update, LGL (2006) summarizes the results from recent marine mammal monitoring programs undertaken in association with 2D and 3D seismic programs. 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 (2006) 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 surveys. However the extent of avoidance is unknown (LGL 2005). LGL (2005) 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 2005 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 2006 EA Update 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 2006 EA Update, 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 month), medium geographic extent (up to 1000 km<sup>2</sup>), 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, medium geographic extent (up to 1000 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**.

#### 5.2.6 Marine Birds

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The 2005 EA Report indicates that the effects of seismic sound on seabirds is unknown. The 2005 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 100 m below water. Shearwaters 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, Husky Energy 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, the environmental effect is not likely and **not significant**.

#### 5.2.7 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. Effects therefore will be **not significant**.

LGL reports that the North Atlantic right whale may be rare in the project area, but do occur further to the south. As indicated above, the effects on whales, including baleen whales is predicted to be not significant, therefore the effect on the North Atlantic Right whale will be **not significant**.

### 5.2.8 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 on marine water quality will be negligible and **not significant**.

### 5.3 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.

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.

### 5.4 Cumulative Environmental Effects

Within the Project Area, production and drilling operations are ongoing at the Hibernia platform. At the Terra Nova field, development drilling is ongoing, however production operations are suspended until mid-September. Development drilling and production activities are ongoing at the White Rose field. Exploratory/delineation drilling is likely to be ongoing with up to four wells drilled by November 2006. An exploration well will also be drilled in the Orphan Basin, to the north of the Study Area. An exploratory drilling program and a 2D seismic program will likely be ongoing off the coast of Labrador until late November. Commercial fishing will be occurring in the Study Area. Therefore, the 2006 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 include 3D seismic program and drilling programs within the Project Area. The seismic 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 activities (<1 month per area) and proposed drilling program (<3 months). 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**.

### 5.5 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 Husky Energy regarding the potential adverse environmental effects which may result from the proposed 3D

seismic and wellsite 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 Update and as outlined in the email correspondence from D. Taylor to K. Coady (May 17, 2006), 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.

- *Husky Energy 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 “Jeanne d’Arc Basin 3D Seismic Program, Environmental Assessment Update, 2006-2010” (March 2006) and in email correspondence – D. Taylor to K. Coady (May 17, 2006; Approach to transit of 3D seismic vessel from the Wild Rose survey area to the Fortune area).*
- *Husky Energy 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 and 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, 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 I 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 Husky Energy, 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: May 18, 2006

Kimberly A. Coady

Environmental Assessment Officer

**References:**

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. 2005. Northern Jeanne d'Arc Basin Seismic Program Environmental Assessment. Prepared for Husky Energy.

LGL 2006. Jeanne d'Arc Basin 3D Seismic Program, Environmental Assessment Update, 2006-2010. Prepared for Husky Energy.