

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

Part A: General Information

Screening Date	<u>July 10, 2008</u>
EA Title	Environmental Assessment of StatoilHydro Canada Ltd. Exploration and Appraisal/Delineation Drilling Program for Offshore Newfoundland, 2008-2016
Proponent	StatoilHydro Canada Ltd. Suite 600, Scotia Centre 235 Water Street St. John's NL A1C 1B6
Contact	Mr. Dag Storegjerde Drilling Superintendent
C-NLOPB File No.	7705 N54-3
CEAR No.	07-01-32083
Referral Date	July 11, 2007
EA Start Date	July 17, 2007
Location	Jeanne d'Arc Basin Area, Northeastern Grand Banks

Part B: Project Information

On July 11 2007, StatoilHydro Canada Ltd. (StatoilHydro) submitted a project description "*Project Description Exploration/Appraisal/Delineation Drilling Program for Jeanne d'Arc Basin Area, 2008-2016*" (Norsk Hydro Canada Oil & Gas Inc. 2007) to the C-NLOPB, in support of its application to drill up to 27 exploration and appraisal/delineation wells on acreage held by the operator in the Jeanne d'Arc Basin and Flemish Pass areas over a nine year period. A screening level environmental assessment was completed on March 28, 2008. The "*Environmental Assessment of StatoilHydro Canada Ltd. Exploration and Appraisal/Delineation Drilling Program for Offshore Newfoundland, 2008-2016*" (LGL 2008) (herein referred to as the 2008 EA Report) provided an environmental assessment of a multi-well drilling program over a nine year period. StatoilHydro is proposing to drill up to 27 wells from 2008 through to 2016.

In completing this Screening Report, information from the 2008 EA Report was summarized and is included in the following sections.

1. Description of Project

StatoilHydro proposes to drill up to 27 oil and gas targets with a combination of

vertical/slightly deviated and deviated (twin) wells between 2008 and the end of 2016. StatoilHydro operates four licences; SDL 1040 (West Bonne Bay), EL 1100 (River of Ponds), EL 1101 (L'Anse Aux Meadows), and EL 1049 (Mizzen). The current list of licenses held by StatoilHydro, either exclusively or in partnership with others is provided in Table 3.1 of the 2008 EA Report. It is proposed that drilling operations commence in late summer/fall of 2008. The wells will be drilled using a drillship, semi-submersible, or a jack-up mobile operating drilling unit (MODU), depending on the time of year. The project includes marine support vessels – for shipping goods and personnel to the MODU, helicopter support, shorebase facilities – using existing facilities in St. John's, and abandonment. Vertical Seismic Profiling (VSP) and testing, and geohazard/well site surveys may be required for any of the 27 wells drilled. An onsite Environmental Observer (EO) will be onboard the drilling unit to record and report weather, oceanographic and ice parameters. The EO will also conduct seabird and marine mammal observations on a daily basis in accordance with established protocols.

If a jack-up rig is to be used, the Board will only authorize the rig to operate in a pre-determined operating window. The operating window will be determined annually by the Board and will depend on the 'ice free period'¹ and weather conditions. StatoilHydro indicates that the wells will be drilled over a nine-year period year-round. Other Project activities associated with the proposed drilling program include geohazard surveys, vertical seismic profiling (VSP), potential geotechnical testing if jack-up rig is used, and seabed sampling associated with setting of MODU anchors.

Water depths in the Project Area range from <100 m to between 1,000 and 2,000 m, maximum depths in the Study Area exceed 4,000 m. Water based muds (WBM) will be used for vertical wells, where practicable. However, for deviated wells, synthetic based muds (SBM) may be used.

Drilling is scheduled to commence late 2008 or early 2009. It is anticipated that it will take approximately 150 days to drill, complete, test and abandon each well.

2. Description of Environment

2.1 Physical Environment

The 2008 EA Report (LGL 2008) provides a detailed description of the physical environment for the Jeanne d'Arc Basin and Flemish Pass areas. Physical environment information can also be found in the White Rose Oilfield Comprehensive Study and Supplement documents (Husky 2000 and 2001) and the Husky White Rose Development Project: New Drill Centre Construction and Operations Program documents (LGL 2006 and 2007).

¹ Ice free season will be defined by the C-NLOPB annually, based on actual ice conditions, and will take into consideration ice data analysis provided in the "Characterization of Ice-Free Season for Offshore Newfoundland" (C-CORE 2005), commissioned by the C-NLOPB.

The Project Area is located on the Northeastern Grand Banks, offshore Newfoundland, in water depths ranging from <100 m to more than 400 m. Physical environmental conditions considered in the environmental assessment include geochemical, wind, wave and currents; air and sea temperatures; visibility (fog); and sea ice and icebergs.

2.1.1 Wind, Waves and Currents

On average, in the Project Area, winter winds are west to northwest and summer winds are southwesterly. Mean wind speeds are notably higher during the winter months, with the highest mean wind speeds occurring in the months of December, January and February (10.5 to 11.3 m/s) and the lowest in July (6.0 to 6.3 m/s).

Wave data presented in the 2008 EA Report show that the highest sea states occur in the Project Area during severe storm systems, which typically occur from December to February. The lowest significant wave height in the area ranges from 1.7 m (monthly mean) in July to 4.0 to 4.5 m (monthly mean) in January. The maximum monthly mean significant wave heights measured are 6.0 to 7.1 m in July to 13.9 to 15.3 m in January/February.

Current data was described for four sub-areas in the Project Area. Results show that the maximum near-surface current measured 79.9 cm/sec. At mid-depth, the highest current was 73.6 cm/sec. At bottom, the maximum current measured 45.1 cm/sec. The data for Sub-area 1 (Terra Nova and L'Anse aux Meadows), Sub-area 2 (White Rose and River of Ponds), Sub-area 3 (northeast of the White Rose field where the water depth is between 200 m and 400 m), and Sub-area 4 (Slope region offshore the northeast Newfoundland Shelf and Flemish Pass) is included in the 2008 EA Report.

2.1.2 Air and Sea Temperatures

Mean air temperatures range from around the freezing point in January and February to over 14°C in August. Mean sea surface temperatures range from near 0.4°C in February and March to over 13°C in August.

2.1.3 Visibility

Reduced visibility on the Grand Banks occur primarily due to mist and fog in the warmer months, whereas snow reduces visibility in the winter months. On average, reduced visibility occurs most often in the month of July with fair to poor visibility reported in 67% of observations. The lowest incidence of reduced visibility occurs during October with fair to poor visibility reported in just 28% of observations.

2.1.4 Sea Ice and Icebergs

The pack ice at the Project Area generally reaches annual peak coverage in March. Sea ice covers part of the Grand Banks about one in every three years. The duration of these incursions varies from a low of one week to a high of five weeks, with an average duration of three weeks. Ice coverage thickness within 15 km of the Project Area typically ranges from 30 to 100 cm.

The number of icebergs reaching the Grand Banks each year varied from one in 1966 and 2006 to a high of 2,202 in 1984. The average annual number of icebergs to reach the Grand Banks during the last ten years is 474. Of these, only a small proportion would have passed through the Project Area. On the Grand Banks, the long-term average number of icebergs peak in April with a major flux from March to June.

2.2 Biological Environment

A summary of information presented in the 2008 EA Report is presented below.

2.2.1 Plankton

Planktons are found in the Study Area. Phytoplanktons generally undergo explosions in populations, commonly referred to as blooms. These usually occur in the spring (April/May) and, for some species, again in the fall-early winter (October/January) of the year. There may be areas of enhanced production in the Study Area, similar to other slope areas that have been studied. Copepods are the dominant zooplankton species in the waters of Newfoundland; they feed on phytoplankton, but are prey for larger zooplankton and fish. A Labrador Current-associated boreal-arctic zooplankton community dominated by the copepod *Calanum finmarchius* in fall and winter months occurs in the Flemish Pass.

2.2.2 Benthos

The benthic community is very diverse and includes a number of invertebrate species such as polychaete worms, molluscs, and crustaceans. Substrate type and water depth determine the composition of benthic community structures. Marine worms (polychaetes, oligochaetes, and nematodes) dominated the fauna found in a fines-dominated sediment sample collected at a depth of 1,025 m in the Flemish Pass for Petro-Canada.

Datasets from DFO Newfoundland Region indicated the occurrence of corals along the eastern slope region of the Grand Bank, the slope region proximate to the Bonavista Cod Box, and along the northern slope of the Flemish Cap. Most of the corals found in the vicinity of the Flemish Cap were non-gorgonian soft corals. DFO RV surveys in 2007 collected deep-water coral data within the proposed Project Area. Both large gorgonian (*Paragorgia arborea*) and antipatharians (*Stauropathes arctica*) were collected within 50 km to the east and southeast of the proposed northern Flemish Pass drilling site at Mizzen. Corals collected most proximate to the Mizzen site (~10 km to the southeast) were sea pens, scleractinians (*Flabellum alabastrum*), and soft corals (e.g., *Anthomastus grandiflorus*). Large gorgonians and antipatharians appeared to be most closely associated with slope areas while numerous small gorgonians were collected in the deepest portions of the Flemish Pass.

2.2.3 Fish and Invertebrates

Proposed drilling activities in the Project Area will occur in the North Atlantic Fisheries Organization (NAFO) Unit Areas (UAs) 3Ma, 3Mc, 3Ld, 3Li, 3Lh, 3Le, 3Lt, and 3Lr and 3L, 3M, and 3N UAs in the Study Area. There are a number of fish species that are

commercially harvested within these areas. A detailed description of these species is provided in the 2008 EA report.

Fish species in the Study Area include snow crab (*Chionoieetes opilio*), Northern shrimp (*Pandalus borealis*), Stimpson's (Arctic) surf clam (*Mactromeris polynyma*), Greenland cockle (*Serripes groenlandicus*), ocean quahaugs (*Arctica islandica*), northern propeller clam (*Cyrtodaria siliqua*), Iceland scallop (*Chlamys islandica*), Atlantic halibut (*Hippoglossus hippoglossus*), Greenland halibut (*Reinhardtius hippoglossoides*), and yellowtail flounder (*Limanda ferruginea*). Species relevant to the Flemish Cap include American plaice (*Hippoglossoides platessoides*), redfish (*Sebastes spp.*), and roughhead grenadier (*Macrourus berglax*).

Snow Crab prefer water temperatures ranging from -1°C to 4°C. Soft bottom substrates and water depths over 70 m are primarily habitat for larger snow crabs. Smaller crabs prefer hard substrates. Mating occurs in early spring with the females carrying the fertilized eggs for two years. Hatching occurs in early spring, with larvae remaining in the water column for up to 15 weeks before settling on the bottom.

Northern shrimp spawn in the shallower inshore waters in late summer. Eggs remain attached to the female for one year.

Stimpson's surf clams spawn during the late summer/fall months. They have been found in benthic communities that also include Greenland cockles and northern propeller clams - two bivalve species also known to occur in the Study Area.

Greenland Halibut (turbot) is a deepwater flatfish preferring water temperatures from -0.5 to 6.0°C, and are typically harvested at water depths greater than 450 m. Spawning is likely to occur in the Davis Strait in the winter and early spring. Spawning may also occur in the Laurentian Channel and Gulf of St. Lawrence in the winter months. Turbot are widely distributed along the deep slopes of the shelf and in the deep channels, primarily in NAFO areas 2GH and 2J3K.

The American plaice typically inhabits depths ranging from 70 to 275 m, although it also occurs in shallower and deeper areas. Spawning occurs in spring, often in early April on the Flemish Cap. Fertilization is external and the developing eggs occur near the water's surface. The larvae are planktonic during development until settling to the bottom occurs. During bottom trawl surveys on the Flemish Cap in June and July 2006, the densest American plaice distribution was found at the shallowest portion of the Flemish Cap where water depth was less than 150 m. However, they were also caught in areas where depth ranged up to 1,000 m.

Three species of redfish occur in the Flemish Cap part of the Study Area. They include the Atlantic golden redfish (*Sebastes marinus*), the deepwater beaked redfish (*Sebastes mentella*), and the Acadian beaked redfish (*Sebastes fasciatus*). Redfish eggs are

fertilized internally. Mating usually occurs in late fall/early winter, followed by larval extrusion during the following spring/summer. During bottom trawl surveys on the Flemish Cap in June and July 2006, the distribution of redfish varied by species. Golden redfish catches were highest in areas of the Flemish Cap where water depths ranged from 180 to 250 m. The deepwater beaked redfish catches were highest in areas of the Flemish Cap where water depths ranged from 250 to 365 m, particularly on the southern and southwestern parts of the Cap. The Acadian beaked redfish catches were highest in areas of the Flemish Cap where water depths ranged from 181 to 365 m.

The roughhead grenadier typically inhabits depths ranging from 200 to 600 m. Spawning occurs in winter/early spring and fertilization is external. Bottom trawl survey results on the Flemish Cap from 1991 to 2005 had the highest estimated biomass of roughhead grenadier occurring in areas where water depth exceeded 540 m.

2.2.4 Commercial Fisheries

The principal fisheries (by quantity of harvest) in the Study Area are for snow crab (37.5%), northern shrimp (31%), and various deep sea clam species (21.5%). Groundfish, mainly yellowtail flounder, make up the remaining 10%. Northern shrimp, Atlantic cod, and Greenland halibut represent some of the main commercial species caught during surveys on the Flemish cap. The harvest in the Project Area is almost entirely northern shrimp (59.5%) and snow crab (39.1%) by quantity.

Most of the fish harvested within and near the Study and Project Areas is concentrated on the Shelf slope in depths between 200 and 500 m. During 2004-2006, the harvesting effort in the Study and Project Areas was highest in May to July and lowest during the fall. In the Study Area, crab pots for snow crab and shrimp trawls for northern shrimp made up nearly 70% of the harvesting gear by quantity of harvest. A further 22% of the catch was with dredges, which are used to harvest deep-sea clams. Ground fish were taken almost entirely by stern otter trawls, though a relatively small amount was taken with gillnets and longlines. In the Project Area, shrimp trawling predominated, taking nearly 60% of the harvest, followed by snow crab pots (39%). The limited groundfish harvest in this area was primarily (more than 90%) with fixed gill nets.

2.2.5 Marine Mammals and Sea Turtles

There are at least 18 species of cetaceans and three species of phocids (seals) that are known to occur in the area (LGL 2008). Baleen whales most likely found in the Study Area include the blue (*Balaenoptera musculus*), fin (*B. physalus*), sei (*B. borealis*), humpback (*Megaptera novaeangliae*), minke (*B. acutorostrata*) and North Atlantic right (*Eubalaena glacialis*). Toothed whales include the sperm (*Physeter macrocephalus*), northern bottlenose (*Hyperoodon ampullatus*), Sowerby's beaked (*Mesoplodon bidens*), killer (*Orcinus orca*), long-finned pilot (*Globicephala melas*) whales, the short-beaked common (*Delphinus delphis*), bottlenose (*Tursiops truncatus*), Atlantic white-sided (*Lagenorhynchus acutus*), white-beaked (*Lagenorhynchus albirostris*), Risso's (*Grampus griseus*), striped (*Stenella coeruleoalba*) dolphins, and the harbour porpoise (*Phocoena phocoena*). Seal species likely in the area are the grey (*Halichoerus grypus*), harp (*Phoca*

groenlandica) and hooded (*Cystophora cristata*).

There are three species of sea turtles known to occur in the Study Area. These include the 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*. Leatherback and Loggerhead turtles are likely to occur in the Study Area; however, the Kemp's Ridley turtle is rare in Canadian waters.

In the DFO database, humpback whales ranked first in the Study Area with 704 sightings recorded. Data from the marine mammal observations undertaken during Husky's 2005 and 2006 3D seismic monitoring programs in October and November indicates that baleen whales were the most numerous marine mammal observed, including humpback whales, fin whales and minke whales. Of the 23 sightings of dolphins, there were two sightings of white-sided dolphins, one sighting each of white-beaked dolphin and common dolphin and two sightings of unidentified dolphins. There was one sighting of a beaked whale species. Two harbour porpoises were also observed. The DFO cetacean sightings database confirmed that most sightings of whales were humpback followed by long-finned pilot, fin and minke.

2.2.6 Marine Birds

The Grand Banks shelf and slope have been identified as areas rich in abundance and diversity of marine birds (LGL 2008). Over 27 marine birds have been identified as occurring in the Study Area. These include species of *Alcidae* (Dovekie, Murre – Common and Thick-billed, Razorbill and Atlantic puffin), *Sulidae* (Northern Gannet); *Laridae* (Skuas – Great and South polar; Jaegers – Pomarine, Parasitic, and Long-tailed, Gulls – Herring, Lesser Black-backed, Iceland, Glaucous, Great Black-backed, and Ivory; Black-legged Kittiwake and Arctic Tern), *Sulidae* (Northern Gannet), *Hydrobatidae* (Wilson's and Leach's Storm Petrels); *Phalaropodinae* (Phalarope – Red and Red-necked), and *Procellariidae* (Northern Fulmar and Greater, Sooty and Manx Shearwater). Specific information can be found in the 2008 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 except in July and August, whereas the Greater Shearwater (*Puffinus* spp.) is common from June to October, and absent from December to April. Leach's storm petrels are only present in October and November, whereas the Black-legged Kittiwake is uncommon to common from April to October. Of all the species present, the Northern Fulmar and Black-legged Kittiwake are the most common throughout the year.

2.2.7 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 SARA Schedule 1 and COSEWIC listed species that could potentially occur in the Study Area.

Species	SARA Status	COSEWIC Status
Blue Whale (<i>Balaenoptera musculus</i>) (Atlantic population)	Schedule 1 - Endangered	Endangered (May 2002)
North Atlantic Right Whale (<i>Eubalaena glacialis</i>)	Schedule 1 - Endangered	Endangered (May 2003)
Leatherback Seaturtle (<i>Dermochelys coriacea</i>)	Schedule 1 - Endangered	Endangered (May 2001)
Northern Wolffish (<i>Anarhichas denticulatus</i>)	Schedule 1 - Threatened	Threatened (May 2001)
Spotted Wolffish (<i>Anarhichas minor</i>)	Schedule 1 - Threatened	Threatened (May 2001)
Atlantic (Striped) Wolffish (<i>Anarhichas lupus</i>)	Schedule 1 - Special Concern	Special Concern (November 2000)
Ivory Gull (<i>Pagophila eburnea</i>)	Schedule 1 - Special Concern	Special Concern (April 2006)
Fin Whale (<i>Balaenoptera physalus</i>) (Atlantic population)	Schedule 1 - Special Concern	Special Concern (May 2005)
Atlantic cod (NL population) (<i>Gadus morhua</i>)		Endangered (May 2003)
Porbeagle shark (<i>Lamna nasus</i>)		Endangered (May 2004)
White Shark (<i>Carcharodon carcharias</i>)		Endangered (April 2006)
Cusk (<i>Brosme brosme</i>)		Threatened (May 2003)
Shortfin mako (<i>Isurus oxyrinchus</i>)		Threatened (April 2006)
Sowerby's beaked whale (<i>Mesoplodon bidens</i>)		Special Concern (November 2006)
Harbour porpoise (<i>Phocoena phocoena</i>)		Special Concern (April 2006)
Blue Shark (<i>Prionace glauca</i>)		Special Concern (April 2006)

LGL (2008) reports that there have been two blue whale sightings in the Orphan Basin within the Study Area in water depths of 2,366 and 2,551 metres. One possible blue whale was sighted in the Jeanne d'Arc Basin within the Project Area during the 2006 Husky seismic monitoring program. According to the DFO sightings database, most sightings of blue whales in Newfoundland have occurred near the coast. It is possible

that blue whales may occur in the Jeanne d'Arc Basin but numbers are expected to be low. A Recovery Strategy is in place for the blue whale.

The North Atlantic right whale is the most endangered species in the northwest Atlantic. Population estimates indicate that there are approximately 300 individuals. Off Atlantic Canada, right whales typically concentrate in the Bay of Fundy and off southwestern Nova Scotia. Right whales were only recorded once in the Study Area on 27 June 2003 north of the Project Area.

Population estimates of Leatherback seaturtles are between 26,000 and 43,000 species worldwide (LGL 2005b). 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. Two leatherbacks were sighted in mid-August 2006 in the Study Area during Husky's seismic program. A Recovery Strategy was finalized by DFO in December 2006.

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. A Recovery Strategy for northern and spotted wolffishes and a Management Plan for Atlantic wolffish was recently published.

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. Recent surveys in 2002 and 2003 of historic breeding sites in the Canadian Arctic showed an 80% decline in the numbers of nesting Ivory Gulls.

There were 187 sightings of the fin whale within the Study Area based upon the DFO sightings database (DFO 2007). It was the second most abundant mysticete observed. Fin whales were commonly sighted in the Study Area during Husky's seismic monitoring programs in 2005 and 2006.

2.3 Research Surveys and Vessel Traffic

In any year, there will be overlap with parts of the Study Area and Project Area and DFO research surveys. Typically, DFO conducts a spring survey within NAFO Division 3LNO in May or June, and a fall survey from early October to mid December. The fall survey may employ two vessels. StatoilHydro will be required to communicate with DFO to avoid any potential conflict with research surveys that may be operating in the

area. Vessel traffic with respect to fishing vessels is discussed in terms of amount of commercial fishing activity (see Section 2.2.4).

Part C: Environmental Assessment Process

3. Procedures

On July 11, 2007, StatoilHydro submitted a project description “*Norsk Hydro Canada Oil & Gas Inc. Project Description Exploration/Appraisal/Delineation Drilling Program for Jeanne d’Arc Basin Area, 2008-2016*” to the C-NLOPB, in support of its application to conduct an exploration/appraisal/delineation drilling 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 stakeholders respecting the scope of project and environmental assessment review.

A Federal Coordination Regulations (FCR) notification was sent on 17 July 2007 regarding StatoilHydro’s proposed program. Environmental Canada (EC) and Fisheries and Oceans Canada (DFO) responded that they would participate as FAs in the EA review.

On 01 August 2007, the C-NLOPB notified StatoilHydro that a screening level of assessment was required and the proponent was provided with a Scoping Document. On 11 December 2007, StatoilHydro provided the C-NLOPB with an addendum to the July 11 Project Description “*Addendum to Project Description for StatoilHydro Exploration/Appraisal/Delineation Drilling Activities for Jeanne d’Arc Basin Area, 2008-2016*”. The basis for the addendum was to modify/expand the Project Activity Area and increase the number and type of planned wells to be drilled. The temporal scope of the program remained the same as the previously submitted Project Description, from 2008-2016. With this new information, the C-NLOPB revised the August 01, 2007 Scoping Document to include the new information and provided it to StatoilHydro on December 18, 2007.

StatoilHydro submitted the 2008 EA Report to the C-NLOPB on 28 March 2008. The C-NLOPB, as Responsible Authority (RA), forwarded the report on March 31, 2008 to the DFO, EC and the provincial Departments of Environment & Conservation, Fisheries & Aquaculture, and Natural Resources. The FFAW and One Ocean were provided a copy of the EA report to review. 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 report, 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 StatoilHydro 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 and EC.

Comments from DFO, which were submitted on May 12, 2008, focused on annual project updates, marine mammal monitoring-safety zones, and editorial comments.

Environment Canada responded on May 14, 2008 and focused on the description of the physical environment and its effects on the project as well as contingency planning in the event of oil spills. *StatoilHydro has an "Oil Spill Response Plan-Offshore Newfoundland" in effect for its operations on the east coast and this plan would be implemented in the event of a spill.*

Comments were provided to StatoilHydro for consideration in planning project activities and future programs.

5. Scope of Project

The operator, StatoilHydro, proposes to drill up to 27 exploration and appraisal/delineation wells at various locations in the Jeanne d'Arc Basin. There will be a combination of vertical/slightly deviated and deviated (twin) wells in the Project, including as many as nine targets in the Flemish Pass Basin. Typical well designs will be used for depths of between 2,000 and 3,500 m true vertical depth (TVD). Wells in the order of 7,000 m TVD are also considered. The temporal scope of the project is from 2008 through to the end of 2016.

Either a drill ship or semi-submersible operating year round, or a jack-up rig operating within the designated ice-free period will drill the wells. The drilling of a well will require approximately 150 days to drill, complete, test and abandon. The scheduling window for drilling will be year-round. The drilling program includes all ancillary activities in support of a drilling program, such as the use of a MODU (jack-up or semi-submersible), transportation of goods via supply boats, helicopter support, operation of shore-based facilities, and the conduct of vertical seismic profiling (VSP), geotechnical programs and geohazard/wellsite survey programs.

At the time of application for drilling activities to be undertaken beyond 2008 in the Project Area, StatoilHydro will be required to provide information to the C-NLOPB that 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, StatoilHydro 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 2008 EA Report are as follows and are acceptable to the C-NLOPB.

<i>Boundary</i>	Description
<i>Temporal</i>	Year-round from 2008 to 2016
<i>Project Area</i>	Where project activities could occur during the 2008 to 2016 period
<i>Study Area</i>	Based on the oil spill trajectory modeling using three release points; one inside and one outside the 200 m isobath and one at Mizzen
<i>Affected Area</i>	Geographic extent of a specific potential effect on a species or species group
<i>Regional Area</i>	The Study Area and the Grand Banks

For seismic programs (VSPs, geohazard surveys) undertaken, 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 StatoilHydro

StatoilHydro undertook consultations with relevant government agencies, representatives of the fishing industry and other interest groups. Copies of the Project Description describing the proposed drilling program, including a map of the Study Area and Project Area, were sent to all agencies and groups. Consultations were undertaken with DFO, EC, Natural History Society, One Ocean, Fish, Food and Allied Workers Union (FFAW), Association of Seafood Producers (ASP), Fishery Products International (FPI), Groundfish Enterprise Allocation Council (GEAC), Clearwater Seafoods, and Iceswater Seafoods. All consultations were held to inform the stakeholders about the proposed drilling program, to identify issues or concerns which should be considered in the EA and to gather additional information relevant to the EA report. The results of those consultations, and issues identified are documented in the 2008 EA Report. In future years, StatoilHydro will notify fishers of significant planned operations or relevant

changes to operations that may impact fishing activity (LGL 2008). There were no major concerns or issues about the proposed drilling program.

The C-NLOPB is satisfied that the consultations carried out by StatoilHydro, and reported on in the EA Report included all elements of the Project. The RA 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 2008 field season.

7. Environmental Effects Analysis

7.1 Scope of Assessment

For the purpose of meeting the requirements of the CEAA, the factors that were considered to be within the scope of the environmental assessment are those set out in subsection 16(1) of the CEAA, and those listed in the “*StatoilHydro Canada E & P Inc. Revised Scoping Document Exploration/Appraisal/Delineation Drilling Activities Offshore NL 2008-2016*” (C-NLOPB 2007).

7.2 Methodology

The C-NLOPB reviewed the environmental effects analysis presented by StatoilHydro in the 2008 EA Report. A VEC based assessment based on the interaction of project activities on those VECs was used in assessing environmental effects, including cumulative effects and accidental events. The environmental assessment methodology and approach used by the Proponent is acceptable to the RAs. The following environmental effects analysis uses the information presented by the operator and takes into consideration mitigation proposed by the Proponent to assess the potential for residual environmental effects.

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

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

after taking mitigation measures into account,

- significance of residual effect.

The potential effect significance of residual effects, including cumulative effect, for each VEC is rated in this environmental screening report as follows.

0 = No Detectable Adverse Effect

1 = Detectable Effect, Not Significant

2 = Detectable Effect, Significant

3 = Detectable Effect, Unknown

These ratings, along with the likelihood of the effect, are considered in determining overall significance of residual effects.

7.3 Effects of the Environment on the Project

Effects of the physical environment on the Project include those caused by wind, ice, waves, and currents. The variable and sometimes harsh climate on the Grand Banks and the potential for sea ice and icebergs during the winter and spring months can pose significant challenges to drilling operations. As described in the 2008 EA Report, sea ice covers part of the Grand Banks about one in every three years and icebergs are sighted between the months of March and June with the 10-year average number of icebergs observed in the White Rose block reduced to 41 icebergs. As part of its monitoring program, StatoilHydro will have environmental observers on board the rig, observing weather and ice conditions on a 24 hour basis. An Ice Management Plan will be submitted to the C-NLOPB as part of the DPA process and includes mitigations to prevent impacts from sea ice and icebergs during drilling activities. The jack-rig will only operate during the ice-free season (as described in Section 1 above), and will be demobilized from site prior to the onset of heavy weather events. All these should ensure that impacts from the environment can be minimized. Therefore the effects of the environment on the project will be **not significant**.

7.4 Presence of Structures

The drill rig will be the only surface structure. Either a drillship, semi-submersible or a jack-up rig will be used. Subsea structures include drill string and riser. StatoilHydro will establish a safety zone around the rig. The proposed safety zone could extend as much as 1.65 km from the drill centre for the semi-submersible rig (*i.e.*, 50 m beyond the anchor locations of a new type of semi-submersible with a larger anchorage area) or approximately 500 m from the platform of the jack-up rig. The maximum areas of the semi-submersible and jack-up rig safety zones would be about 8.6 km² and 1 km², respectively. Under the scenario of two MODUs concurrently drilling exploration and appraisal/delineation wells in the Project Area, the maximum safety zone area at any one time due to this type of drilling would be approximately 17.2 km².

7.4.1 Fish and Fish Habitat

1

The presence of the structures and a safety zone may alter the local abundance and distribution of fish in the area; however it will be for a short duration (approximately 150 days to drill, complete, test and abandon). Alternatively, the safety zone and presence of the rig may create a reef effect, whereby local populations of fish and benthos are attracted to the structures and become concentrated. For jack-up rigs, there is also the covering of the seafloor associated with the spud cans. The reef effect, the exclusion zone and the temporary alteration of habitat would have an overall duration of >72 months, low magnitude and small (1-100 km²) geographic extent effect on fish populations and fish habitat. Therefore, the overall effect on fish and fish habitat is **not**

significant. It is unlikely that routine activities associated with other marine exploration, marine transportation and existing production areas will have a direct effect on marine invertebrates and fish, therefore cumulative effects are predicted to be **not significant.**

7.4.2 Marine Birds

0

The effect due to the presence of structures on marine birds is most likely associated with lights and flares. See Section 7.5.2 for a discussion on the effects of lights and flares on marine birds.

7.4.3 Marine Mammals and Sea Turtles

1

The physical presence of structures in the marine environment will have a negligible and **not significant** effect on marine mammals and sea turtles. Noise, however, from the drill unit, supply boats and VSP surveys may have an effect. See Section 7.6.3 for a discussion of the effects of noise on marine mammals and sea turtles. Given the predicted minimal effects of other projects/activities, the large size of the Project Area and the prediction that the residual effects of the proposed Project's routine activities on marine mammals and sea turtles are not significant, the cumulative effects are predicted to be **not significant.**

7.4.4 Commercial Fisheries

1

The presence of structures and the corresponding safety zone (approximately 6.6 km² – semi submersible and 1 km² – jack-up) would prohibit commercial fishing activities in the drilling area. The exclusion zone around each well is very small compared to the entire fishing areas of the affected NAFO Unit Area. As previously stated, the principal fisheries in the Study Area are for snow crab, northern shrimp, and various deep sea clam species. The harvest in the Project Area is almost entirely northern shrimp and snow crab.

Only a very small proportion of the available grounds would be potentially affected by structures in any given year. Assuming a 1.65 km radius safety zone (6.6 km² in total), a no-fishing area would occupy approximately 0.01% of the Project Area. The artificial reef effect would likely have positive effects on the commercial fishery. Based on possible mitigations identified in the 2008 EA Report to minimize negative effects of the physical presence of structures, the residual effects of the physical presence of structures on the commercial fishery would be of low magnitude, 11-100 km² geographic extent and therefore **not significant.**

The approximate areas of the White Rose safety zone (including the proposed new drill centres), the Terra Nova exclusion zone and safety zone, and the Hibernia safety zone are 95 km², 14 km² and 255 km² (269 km²) and 6 km², respectively. This amounts to a total of 370 km². The total area of Safety/Exclusion Zones relative to both the Project Area and the traditional fishing ground areas within the Study Area is small. The actual area from which fishers are excluded is smaller; both within- and between-project cumulative effects associated with fishing grounds availability are predicted to be not significant. In addition, given that the residual effects of the presence of structures on the commercial

fishery are predicted to be not significant, the cumulative effects on the commercial fisheries will be **not significant**.

7.4.5 Species at Risk

0

As indicated above, the presence of structures is predicted to be not significant for fish, marine birds, marine mammals, and sea turtles. Therefore, the impact on fish, marine bird, marine mammal, and sea turtle species at risk will be **not significant**.

7.5 Lights and Flares

Lights are used on the drill rig and supply/support vessels for navigation aids and work area illumination. Light and heat could also be emitted for short periods by flaring during well testing.

7.5.1 Fish and Fish Habitat

0

Fish and squid may be attracted to illuminated surface waters, due to the use of floodlights in working areas on the drill rig and supply vessels. The effect would be negligible in magnitude and **not significant** due to the small area affected (1-10 km²) and the short duration (13-72 months) of the project. There would be no cumulative effect.

7.5.2 Marine Birds

1

The illumination of rigs and supply vessels on the Grand Banks may attract marine birds to the structures. In particular, nocturnal seabirds, such as Leach's Storm-petrels, may be at risk of attraction to offshore lights, particularly during their fall migration to offshore wintering grounds. The attraction of birds may result in some strandings on the rig.

The drilling program according to the schedule will be run for a period of approximately 150 days per well. StatoilHydro reports the presence of lights on the rig and supply boats would have a low effect within a 10 km² radius for the entire duration of the drilling program. There is continuous use of lights at night, but at daylight, there would be no such effect. Flaring will only occur if a well test has to be run. It has the potential to have a low effect within a 10 km² area for a short period of time during testing.

In terms of stranded birds, StatoilHydro has committed to a recovery and release program for the rig and supply boats, consistent with the requirements of the Canadian Wildlife Service. StatoilHydro has indicated that the environmental observer on board the drilling rig will also be responsible for monitoring and observing seabirds and marine mammals in the area, using established protocols and overseeing mitigations such as seabird handling and documentation. During the October-November 2005 and July-August 2006 Husky seismic programs in the Jeanne d'Arc Basin, the percentages of stranded Leach's Storm-Petrels released and believed to survive were 69% and 55%, respectively (LGL 2008).

The effects on birds from lights and flares are low and likely. However, given the mitigation of recovery and release, the short period of flare operation, and the short time frame for a drilling operation, effects on seabirds will be **not significant**.

The presence of three production facilities (White Rose, Hibernia and Terra Nova), marine exploration (Husky Energy is proposing an 18 well exploratory drilling program with the same spatial and temporal scope), commercial fishery activity, and marine transportation all have the potential to interact. If the 18 wells are considered from the perspective of between-project cumulative effects, the worst-case scenario cumulative affect area would equal approximately 35.6 km². The estimated between-project cumulative effect area represents less than 0.035% of the total area of the proposed StatoilHydro Project Area. Cumulatively, the effects may be additive and overlap however with the implementation of mitigations; the cumulative effect will be **not significant**.

7.5.3 Marine Mammals and Sea Turtles 0

There should be no interaction between lights and flares and marine mammals and sea turtles. Therefore, there should be no environmental effect.

7.5.4 Commercial Fisheries 0

There should be no impact on commercial fisheries due to lights and flares.

7.5.5 Species at Risk 0

As indicated above, the light from structures is predicted to be not significant for fish, marine birds, marine mammals, and sea turtles. Therefore, the impact on fish, marine birds, and marine mammal and sea turtle species at risk will be **not significant**.

7.6 Noise

Underwater noise may be caused by supply/support vessels, drill rig machinery and thrusters, echo sounders, VSP seismic array, and wellhead severance using chemical explosives. Air-borne noise is normally associated with helicopters servicing the drill rig.

7.6.1 Fish and Fish Habitat 1

In general most fish show avoidance reaction to underwater noise from vessels, and the avoidance reaction varies depending on the species, life history stage, behaviour, time of day, whether the fish have eaten, and the water's sound propagation characteristics. Given the ambient noise in the area from commercial fishing activities, the addition of noise from supply vessels should be negligible. Mitigation such as minimization of VSP source level and ramp up of VSP air gun array will be in place during project activities. Based on predictions in other Environmental Assessments for projects in the Study Area that the residual effects of noise on fish and fish habitat would be not significant, the residual effects of the 9-year exploration and appraisal/delineation drilling program on fish and fish habitat will be **not significant**.

Noise is produced by all activities occurring on the Grand Banks, however, given the fact that most fish are able to move away from any noise source, it is likely that the cumulative effects of exposure to noise is negligible. Eggs and larvae do not have the capability of avoiding a noise source but exposure to very high sound energy levels

would be required before damage is done. Cumulative effects of noise on fish and fish habitat will be **not significant**.

7.6.2 Marine Birds

0

There is concern of aircraft flying over colonies of seabirds, which may cause a panic response and result in eggs and flightless young being pushed off cliff edges. Helicopters, stationed in St. John's, will fly a direct path from the airport in St. John's to the rig, and generally will not come in contact with seabird colonies. As mitigation, aircraft will be directed to avoid colonies of seabirds, and will be instructed to avoid repeated overflights of concentrations of birds and their habitat. In addition, aircraft will not come within eight km seaward and 3 km landward of major seabird colonies from April 1 to November 1. Therefore, effects of noise from helicopters will be negligible and **not significant**.

The effects of seismic activity on marine birds are predicted to be negligible. Birds, which spend time underwater foraging, may be affected if they dive within a few metres of the airgun. Murres and shearwaters may be potentially the most sensitive group due to their time spent underwater diving for food. The effects are predicted to be of low magnitude, with a small (11-100 km²) geographic extent and of short duration. Therefore, the environmental effect is not likely and **not significant**. Given the predicted minimal effects of other projects/activities, the large size of the Project Area, and the prediction that the residual effects of the proposed Project's routine activities on marine birds are not significant, the cumulative effects on marine birds are predicted to be **not significant**.

7.6.3 Marine Mammals and Sea Turtles

1

There is a concern with the noise produced by ships and drill rigs on marine mammals, as they depend on the underwater acoustic environment. The zone of influence of underwater noise, in addition to the drill sites, includes the zones produced by a VSP survey, and those around the shipping routes and helicopter flight paths. Effects of noise from drilling operations may be negligible to low and continuous throughout the drilling period, for a period of up to 100 days per well. Overall, the effects of noise on marine mammals and sea turtles from drilling operations will be **not significant**.

The passage of marine vessels may also affect marine mammals. Approximately three to four supply boat transits will occur every week and one supply vessel will remain at the drilling location on standby. For the duration of the drilling program (approximately 150 days total), the effects from vessels are likely to be negligible to low. Effects may be reduced as supply boats maintain a steady course, speed, and avoid areas with large numbers of whales. Overall, the effects are **not significant**.

Low flying aircraft could cause low magnitude effects on marine mammals and sea turtles in the water. These effects would occur intermittently throughout the drilling program. There will be approximately six helicopter flights per week. Helicopters will maximize flying altitude. They are prohibited from flying over wildlife for passengers to

view. Therefore, the effects will be negligible and **not significant**.

In order to reduce impacts to marine mammals and sea turtles, StatoilHydro will implement the following mitigation measures during the conduct of geohazard survey and VSPs:

- ramp up of geohazard survey and VSP air gun array;
- minimization of geohazard survey and VSP source level;
- Geohazard survey and VSP temporal avoidance;
- Geohazard survey and VSP delay start/shut down/safety zone; and
- an Environmental Observer will monitor for marine mammals and sea turtles.

In addition, during the conduct of VSP surveys, the Board will require that the Operator implement the mitigations outlined in the *Geophysical, Geological, Environmental and Geotechnical Program Guidelines* (2008) and implement a 500 m monitoring zone.

Based on the information presented above, and the mitigations proposed, effects will be negligible to low. Therefore, the effects on marine mammals or sea turtles will be **not significant**.

The addition of the drill rig and supply vessels for the drilling program will not contribute to an increase in overall noise in the marine environment. Locally there may be an incremental increase in noise levels; however, the cumulative effects will be **not significant**.

7.6.4 Commercial Fisheries

0

As indicated above, there will be no significant impact on fish populations; therefore the effect of noise on commercial fisheries will be **not significant**. Cumulative impacts will be **not significant**.

7.6.5 Species at Risk

0

As indicated above, the effects of noise from drilling operations and VSP surveys is predicted to be not significant for fish, marine birds, and marine mammals and sea turtles. Therefore, the effect on fish, marine birds, and marine mammal and sea turtle species at risk will be **not significant**.

7.7 Atmospheric Emissions

The potential emissions from offshore drilling include:

- burning of diesel fuel for power generation on the drill rig;
- flaring during any required well testing; and
- fugitive emissions.

Fugitive emissions of methane from valves, seals and open-ended piping on the drill rig with diesel engines are not expected to be significant and will be minimized through

implementation of best management practices and preventative maintenance measures. This source is typically less than 1-2% of overall greenhouse gas emissions.

7.7.1 Fish and Fish Habitat 0

Effects on fish and fish habitat from atmospheric emissions will be negligible and **not significant**. It is unlikely that routine activities associated with other marine exploration, marine transportation and existing production areas will have adverse direct effects on fish and fish habitat, therefore the cumulative effects on fish and fish habitat will be **not significant**.

7.7.2 Marine Birds 0

Effects on marine birds from atmospheric emissions will be negligible and **not significant**. Cumulative effects will be negligible and **not significant**.

7.7.3 Marine Mammals and Sea Turtles 0

There should be no interaction between marine mammals and sea turtles and atmospheric emissions.

7.7.4 Commercial Fisheries 0

There should be no interaction between commercial fisheries and atmospheric emissions.

7.7.5 Species at Risk 0

As indicated above, emissions from drilling operations is predicted to be not significant for fish, marine birds, marine mammals and sea turtles. Therefore, the impact on fish, marine birds, marine mammal and sea turtles species at risk will be **not significant**.

7.8 Discharge of Drilling Muds and Cuttings

StatoilHydro is proposing to use water based (WBM) and synthetic based muds (SBM) for its drilling program. WBM will be directly discharged to the seafloor when drilling the initial sections of the hole, after that cuttings will be discharged from the rig just below surface. When SBMs are used, all cuttings are treated in accordance with the *Offshore Waste Treatment Guidelines* (NEB 2002) prior to discharge. The muds are recycled and returned to shore for on-land disposal. For typical 3,500 m TVD (Jeanne d'Arc Basin) and 3,800 m TVD (Flemish Pass) wells drilled with WBM, up to 473 m³ of cuttings and 3,474 m³ of WBM would be discharged over the course of a well. For wells drilled with SBM, up to 109 m³ of cuttings and 183.7 m³ of SBM. In the case of three exploratory wells being drilled concurrently in the Project Area; two by StatoilHydro using two MODUs and one by Husky using one MODU, it would be assumed that mud and cuttings would cover an area of the seabed of about 0.8 km² to a thickness of at least one centimetre per well. Approximately 2.4 km² of fish habitat will be smothered at the same time within the Project Area. The 2.4 km² of seabed represents about 0.0021% of the total area of the Project Area.

7.8.1 Fish and Fish Habitat

1

The primary effects associated with the discharge of muds and cuttings is the smothering of benthos, toxicity (based on chemical constituents of the mud) and bioaccumulation. In modeling exercises conducted by Husky for the White Rose Comprehensive Study, whereby the fate of cuttings and muds were estimated from a discharge point at the center of the drill location, the zone of influence (ZOI) is generally confined within approximately 500 m of the drilling area. The modeling results for the Mizzen well had the maximum thickness of discharged material (treated well cuttings, centrifuge barite and SBM) deposited to the seafloor at <0.25 mm. Virtually all of the fine particles (diameter <0.1 mm), which comprise about 92% of the discharged particle mass, will be transported by ocean currents outside of a 10 km radius from the Mizzen well site. The remaining 8% of the discharged particle mass is predicted to settle on the seafloor inside of a 6 km radius from the Mizzen well site (113 km²). Within this area, all deposition is predicted to be <0.13 mm thick, with an area of any discharge deposition thickness exceeding 0.1 mm equal to only 0.1 km². Study results show that smothering of benthos will occur if the thickness of the deposition layer is greater than 1 cm and that benthos would recover within months to years once drilling stops.

Water based muds are generally non-toxic. The primary additives are bentonite (clay), barite and potassium chloride, with seawater the main component. Chemicals, such as caustic soda, viscosifiers and shale inhibitors are added to control mud properties. StatoilHydro reports that many of the metals present in WBM are not in a bioavailable form and there have been few, if any, biological effects associated with the metals from these discharges. The SBMs to be used by StatoilHydro are non-toxic and have the potential to biodegrade rapidly (under certain conditions of oxygen, depth and temperature). SBMs typically require less mud for the same distance drilled and the discharged cuttings tend to clump together, resulting in less dispersion from the drill hole.

It is predicted that the area of impact for WBM, SBM, and cuttings depositions would be less than 1 km² for two MODUs concurrently drilling exploration/delineation wells in the Project Area, based on analysis used during the White Rose Comprehensive Review. Based on a ZOI radius from the well centre of 500 m, a thickness of one centimeter or greater would cover approximately 0.8 km² of the seabed. For two wells, an area of 1.6 km² could be smothered within the Project Area due to delineation/exploration drilling. The 1.6 km² of seabed represents about 0.0014% of the total area of the Project Area. All SBM cuttings will be treated in accordance with the OWTG prior to discharge.

Based on mitigations indicated in the EA (e.g., treatment of mud and discharge cuttings, mud recycling, chemical screening, compliance with 2002 OWTG), the predicted recolonization of benthic species in the cuttings deposition area, and the short duration of the program, the effects of drilling muds and cuttings on fish and fish habitat will be **not significant**.

Currently there are three oil fields in production on the northeast Grand Banks. Drilling

activities are ongoing in association with these programs. There is potential for cumulative effects from drilling activities at Terra Nova and White Rose; however, cuttings are re-injected at Hibernia. Between 2008 and 2017, as many as 45 exploration and appraisal/delineation wells could be drilled in the proposed Project Area, 27 by StatoilHydro and 18 by Husky. The total area of seabed that could potentially be covered by at least one centimeter of mud and cuttings approximates $45 \times 0.8 \text{ km}^2$ or 36 km^2 (~0.034% of the Project Area). Based on an average of 3 wells/year for StatoilHydro and 2 wells/year for Husky, and a maximum 2 year effects period associated with smothering, as many as 10 well site areas could be affected by smothering during any two year period between 2008 and 2017. This translates to 8 km^2 or 0.0074% of the Project Area. If two wells are drilled concurrently with two MODUs by both StatoilHydro and Husky, then 3.2 km^2 of bottom substrate could be smothered at the same time (0.003% of the Project Area). Commercial fisheries within the Project Area that employ mobile gear (e.g., trawls) are conducted primarily in the northeast area of the Project Area beyond the 200 m isobath. Given the predicted minimal effects of other projects/activities, the larger Project Area and the prediction that the residual effects of the proposed Project's routine activities on the fish habitat VEC are not significant, both within- and between-project cumulative effects associated with the deposition of drilling mud and cuttings on the seafloor are predicted to be additive, with low magnitude, small geographic extent and **not significant**.

7.8.2 Marine Birds

0

There is concern that the discharge of cuttings will produce a sheen on the water, thereby creating the potential for oiling of marine birds. The drilling program will be using WBM and SBM, where required. Sheens are not likely associated with the discharge of WBM. For SBM, if they are used, mitigations such as treatment prior to release, and release of cuttings below surface, will reduce the likelihood of sheens on the water surface. Therefore, the discharge of drill muds and cuttings will have a negligible and **not significant** effect on marine birds.

Cumulative effects, associated with other offshore facilities, will be negligible and **not significant**.

7.8.3 Marine Mammals and Sea Turtles

0

The deposition of muds and cuttings on the seafloor may have increased concentrations of heavy metals. Drilling activities are unlikely to produce concentrations of heavy metals in muds and cuttings that are harmful to marine mammals and sea turtles given mitigations identified in the 2008 EA Report (e.g. treatment, total fluids management). Therefore, effects from deposition of drill muds and cuttings on marine mammals and sea turtles will be negligible and **not significant**. Given the predicted minimal effects of other projects/activities, the large size of the Project Area and the prediction that the residual effects of the proposed Project's routine activities on marine mammal and sea turtles are not significant, the cumulative effects will be negligible and **not significant**.

7.8.4 Commercial Fisheries

0

Mitigations identified in the 2008 EA Report and as indicated above, the effect of fish and fish habitat from drill cuttings deposition is not significant, therefore the effect on commercial fisheries will be **not significant**. The cumulative effect will be negligible and **not significant**.

7.8.5 Species at Risk

0

As indicated above, the discharge of drill cuttings is predicted to be not significant for fish, marine birds, and marine mammals and sea turtles. This is based on the ratings of magnitude, geographic extent and duration for each routine activity that could interact with species at risk and the reversible residual effects of the routine activities of the proposed 9-year exploration and appraisal/delineation drilling program. Therefore, the impact on fish, marine birds, and marine mammal and sea turtle species at risk will be **not significant**. The cumulative effect will be negligible and **not significant**.

7.9 Operational Discharges

Discharges associated with drilling include cement slurry and blowout preventer (BOP) fluid. However, BOP fluid is not discharged from a jack-up rig. Wastes and discharges from the rig include deck drainage, cooling water, sanitary and domestic waste, garbage and other solid waste, ballast water, bilge water, and produced fluids. All wastes will be treated in accordance with the *Offshore Waste Treatment Guidelines* (OWTG) (NEB et al. 2002) prior to discharge. Solid wastes, such as garbage, will be containerized and shipped to shore for disposal in an approved manner or recycling. StatoilHydro indicated in the EA that it currently utilizes an Offshore Chemical Management System (OCMS), similar to that in use by White Rose, Terra Nova and Hibernia, whereby all chemicals used in the offshore that have the potential to reach the environment are screened.

In exploration drilling programs, produced water would only be discharged once the well is tested for production. However, if any produced water is encountered during the well test, it is likely that it will be atomized with hydrocarbons and flared. If the flare capacity is exceeded, then small amounts of treated produced water will be brought ashore for disposal. If produced water must be disposed of at sea, it will be treated in accordance with the OWTG prior to discharge at sea.

7.9.1 Fish and Fish Habitat

0

It is predicted that for each well, approximately 26.4 m³ of excess cement will be released to the marine environment. The discharge will result in the local smothering of benthos. If the cement remains in a pile, it may act as an artificial reef, be colonized by epifaunal animals, and attract fish. The effect, while negative, is negligible with the residual effect of cement on fish habitat of **not significant**.

The blowout preventer is required to undergo periodic testing, during which approximately 1 m³ of BOP fluid is released by semi-submersible rigs per test. StatoilHydro indicated that glycol-water mixes with low toxicity will be used and will quickly disperse. The effect of periodic releases of this small amount of glycol on fish

and fish habitat would be negligible in magnitude. The residual effects of BOP fluid on fish and fish habitat will be **not significant**.

A rig will discharge approximately 50 m³ of grey water and 19 m³ of black water (sewage) per day. Black water will be macerated to 6 mm particle size or less and discharged as per the OWTG. As indicated above, all chemicals will be screened through StatoilHydro's OCMS, and all discharges will be treated in accordance with the 2002 OWTG prior to discharge. Therefore, overall, the effect of operational discharges on fish and fish habitat will be **not significant**. Effects will be additive with other projects but the cumulative effect will be **not significant**.

7.9.2 Marine Birds

1

In compliance with the OWTG, sanitary waste from the rig will be macerated to 6 mm particle size or less and released at depth. StatoilHydro predicts that the effects of discharge of sanitary waste will be negligible, <1 km² geographic extent and of short duration. Other discharges, particularly oily waste and bilge water may cause sheening on the water surface. However, all discharges are treated prior to release and discharged at-depth, thereby reducing potential for sheening. The overall effect of operational discharges on seabirds will be negligible and **not significant**.

All rigs, production platforms, supply vessels and seismic vessels, treat operational discharges prior to discharge in compliance with regulations and guidelines. Each production operation is separated geographically from each other and do not overlap. Given the short duration of the drilling program, the cumulative effect of operational discharges on marine birds will be **not significant**.

7.9.3 Marine Mammals and Sea Turtles

0

Operational discharges from the rig should have a negligible and **not significant** effect on marine mammals and sea turtles. Cooling water discharges will be chlorinated and discharged overboard in accordance with OWTG. A low volume of water will be discharged and the area of thermal effects will be small. Therefore, the effects of the discharge of these small amounts of cooling water on marine mammals and sea turtles would be negligible resulting in a rating of the residual effects of cooling water on marine mammals and sea turtles of **not significant**. Treatment of all discharges for all production facilities and rigs operating on the Grand Banks will result in a **not significant** cumulative effect on marine mammals and sea turtles. The cumulative effects of operational discharges on marine mammals and sea turtles will be **not significant**.

7.9.4 Commercial Fisheries

0

As indicated above, any effects on fish and fish habitat will be of short duration, and low magnitude, and therefore not significant. Subsequently, effects on commercial fisheries will be negligible and **not significant**. The cumulative effects of operational discharges on the commercial fisheries will be **not significant**.

7.9.5 Species at Risk

0

As indicated above, operational discharges from drilling activities are predicted to be not significant for fish, marine birds, and marine mammals and sea turtles. Therefore, the impact on fish, marine birds, and marine mammal and sea turtle species at risk will be **not significant**.

7.10 Well Abandonment

Upon completion of its drilling program, it is StatoilHydro's intent to abandon and remove all wells, in accordance with the C-NLOPB regulations, using mechanical separation. In the event that mechanical separation fails, StatoilHydro will use directed chemical charges to sever the wellhead. An authorization will be required and in the event that chemical explosives are required for well abandonment, the C-NLOPB will require StatoilHydro to undertake a marine mammal observation program during the abandonment program. On some occasions, the wells may be suspended for future re-entry. This is similar to the abandonment process but the wellhead is not removed. A suspension cap is installed to protect the wellhead connector. Proper notification will be made if the well is to be suspended instead of abandoned.

7.10.1 Fish and Fish Habitat

1

The effects of using directed chemical charges underwater are dependent on the magnitude and timing of the explosion. In previous EAs reviewed by the C-NLOPB, it is noted that fish and invertebrates nearest the explosion will be affected. For fish, those nearest the blast center might sustain damage to their sensory epithelia. In a study cited in the previous EAs, surface observations of killed fish were noted in three of 15 blasts in a wellhead severance program in the North Sea. In the event chemical explosives are required in the well abandonment program, the C-NLOPB will implement a monitoring program and investigate, in consultation with StatoilHydro, possible mitigations to reduce effects to fish and fish habitat. The effects on fish and fish habitat, will be of short (<1 month) duration, negligible to low magnitude and low (<11 events/year) frequency, and therefore **not significant**. The cumulative effects of well abandonment on fish and fish habitat will be **not significant**.

7.10.2 Marine Birds

0

There should be no interaction between marine birds and well abandonment (mechanical or directed charges), and therefore no environmental effect.

7.10.3 Marine Mammals and Sea Turtles

1

Mechanical severance using chemical explosives may result in injury to marine mammals present in the area. Explosives have rapid rise times, which are related to the extent of biological injury. Previous EAs report that a 2 kg TNT charge has a source level of 271 dB re $1\mu\text{Pa}\cdot\text{m}$ $_{0\text{-peak}}$ and that a 20 kg charge has an equivalent source level of 279 dB re $1\mu\text{Pa}\cdot\text{m}$ $_{0\text{-peak}}$ in water depths of 60 m. There is little information available regarding the effects of underwater explosions on marine mammals. If chemical wellhead severance is required, mitigation measures such as marine mammal observations within a set radius around the rig installation prior to wellhead severance will be required. With the

implementation of mitigations and the negligible magnitude and short (<1 month) duration of the activity, well severance using chemical explosives will have a **not significant** effect on marine mammals and sea turtles. The cumulative effects of well abandonment on marine mammals and sea turtles will be **not significant**.

7.10.4 Commercial Fisheries

0

There should be no impact on commercial fisheries associated with well abandonment. As indicated above, impacts on fish and fish habitat are predicted to be not significant, therefore, it can be expected that effects on the commercial fisheries would be negligible and **not significant**. The cumulative effects of well abandonment on the commercial fisheries will be **not significant**.

7.10.5 Species at Risk

0

The impact on fish, marine birds, and marine mammal and sea turtle species at risk resulting from well abandonment operations will be **not significant**.

7.11 Accidental Events

During exploration drilling programs, the possible accidental events which may affect the environment include blowouts and batch spills. For the proposed drilling program, the probability of a blowout for spills greater than 150,000 bbl during a Project nine-year spill is 1 in 1,300 and an annual spill probability of one in 11,696, a Project nine-year spill probability of 1 in 432 and an annual spill probability of one in 3,890 for spills greater than 10,000 bbls, and an annual spill probability of 1 in 6,667 and Project nine-year spill probability of 1 in 741 for spills greater than 1000 bbl (LGL 2008). The probability of platform-based spills has been estimated to be 1 in 0.75 for spills 49 bbl or less.

Three oil spill fate and behaviour modeling exercises were used in the 2008 EA report. They included: the StatoilHydro 2008 Mizzen drilling program; Husky's 2007 drilling program; and Petro-Canada's Flemish Pass exploration project. New historical wind and water current data were used in the analysis. Surface blowouts were modeled using oil flows of 5000 m³/day and a gas flow of 80 m³ per m³ of oil. Data from spill trajectory modeling conducted for the 2008 EA Report, showed that of the 19,032 trajectories modeled there was no shoreline contacts from any of the spill trajectories. None of the spill trajectory modeling results for the Mizzen release location indicated any oil contact for the Newfoundland coast. Generally, surface releases at Mizzen resulted in easterly movement of the oil in summer and more southerly movement of oil in winter. Blowout modeling was conducted using various crude flow rates during both summer and winter, and batch spill modeling was conducted using various diesel and crude volumes in both summer and winter. While the trajectory analysis predicts the track of oil, it cannot predict the state of the oil (e.g. consistency, particle size, patch). Wind and water currents will affect the ultimate distribution of the oil on the water surface in the fallout zone. Estimates for the geographic extent of a batch spill are presented in the 2008 EA Report (LGL 2008). Maps of monthly trajectory plots are included in the 2008 EA Report.

7.11.1 Fish and Fish Habitat

1

Fish eggs and larvae are more likely to be affected by oil spills. Eggs and larvae present in the area will be exposed to hydrocarbons from spill events. In the Husky White Rose Development Project (LGL 2006), Husky evaluated the potential effects of exposure to hydrocarbons on various life stages of fish habitat and fish (i.e., plankton, benthos, eggs/larvae, juveniles, adult pelagic fish, adult groundfish) and determined that the effects of an oil spill would be *adverse* due to the potential lethal and sublethal effects to the sensitive life stages but reversible with mitigative measures. However, the residual effect of an accidental event on fish eggs and larvae would be negligible to low in each blowout/spill scenario. The geographic extents for oil blowout and diesel spill scenarios are between 1,001 and 10,000 km², respectively. The predicted frequency of large spills is much less than one event/year and predicted duration is one to 12 months. Geographic extent and duration for the batch spill scenarios are predicted to be 11 to 100 to 101 to 1,000 km² and <1 month, respectively. Mitigation measures such as spill prevention and remediation would reduce overall effects. Therefore, in all scenario-life stage component interactions, the residual effects of accidental events on fish and fish habitat would be **not significant**.

7.11.2 Marine Birds

2

Oil on water is a threat and potential impact to marine birds. Significant numbers and concentration of birds occur on the Grand Banks as an important feeding and migration area. Any oil spill could cause bird mortality. The waxy nature of the White Rose crude slows evaporation and dispersion. As a result, the oil maintains its volume and persists on the water's surface, and may last for months at a time. It is unlikely, based on the spill trajectory predictions, that oil will affect seabird colonies. However, birds in the area of the rig would be at risk.

Although all potential interactions between an accidental event and seabirds are likely to result in negative effects, appropriate mitigative measures (e.g., spill prevention measures, proper spill response plan) would reduce the effects. Depending on the time of the year and the extent of the spill, the magnitude of the effects will range from low to high. Blowouts will have a larger geographic extent (1,001 to 10,000 km²) than batch spills (11 to 100 to 101 to 1,000 km²) with a duration from one to 12 months for blowouts and <1 month for batch spills. While the likelihood of an event occurring is **low** (less than 1 event per year) the effects would be **significant and adverse**. Countermeasures such as bird scaring devices would reduce some birds from oiling. Overall, however, oil spill countermeasures would more than likely be ineffective at reducing the effect. Note, however, that even though there would be a significant effect on birds, the likelihood of a spill is very small, as there are mitigations in place to prevent spills from occurring. Although the residual effects on individual birds are likely irreversible, the residual effects on seabirds at the population level are deemed reversible in all scenarios.

7.11.3 Marine Mammals and Sea Turtles

1

Marine mammals and sea turtles exposed to oil from a spill could suffer sublethal effects through oiling of mucus membranes or the eyes if they swim through a slick. These

effects are reversible and would not cause permanent damage to the animals. Based on available marine mammal data for the Jeanne d'Arc Basin area and the biology of marine mammals known to occur in the area, the Project Area is not likely an exclusive feeding area or breeding area. Some species are likely present in the Jeanne d'Arc Basin area year round, but most species likely just occur there during summer months. Whales are present in the area in low numbers and at certain times of the year. Seals are present on or near Jeanne d'Arc Basin for at least part of the year. The majority of the Project Area falls outside of the area where pack ice typically occurs. Sea turtles are likely uncommon in the Study Area and are even less likely to occur in the proposed Project Area. Although all potential interactions between an accidental event and marine mammals and sea turtles are likely to result in negative effects, appropriate mitigative measures (e.g., spill prevention measures, proper spill response plan) would reduce the effects. Depending on the time of year, location of marine mammals and sea turtles within the affected area, and type of oil spilled, effects could range from low to high magnitude. A geographic extent of 1,001 to 10,000 km² is predicted for all subsea and above-surface blowout scenarios which were modeled with a duration of 1 to 12 months. A geographic extent of 11 to 100 to 101 to 1,000 km² is predicted for all modeled batch spill releases, with a duration of <1 month for batch spill scenarios. Oil spill countermeasures may reduce the number of marine mammals and sea turtles exposed to oil. Therefore, this will result in a **not significant** effect from accidental events on marine mammals and sea turtles.

7.11.4 Commercial Fisheries

1

Commercial fisheries could be impacted if there is an effect on eggs and larvae. In the event of a large (greater than 10,000 bbls) oil spill or blowout on the eastern Grand Banks, effects on fish and fish habitat would not cause significant effects and would not result in fish tainting. Gear may be damaged, but compensation to fishers would reduce that impact. However, the marketability and the perceived commercial value of the fish may be impacted. Such an impact would be considered significant in economic terms. However, the application of appropriate mitigative measures (e.g., compensation to fishers) would reduce the effect to not significant. Overall, the effects on the commercial fisheries are **not significant**.

7.11.5 Species at Risk

1

It is predicted that accidental events will not have significant effects on fish, marine birds, and marine mammal and sea turtle species. In the case of an accidental event, appropriate response measures, as outlined in StatoilHydro's Emergency Response Plan – Offshore Newfoundland and Labrador, will be implemented. Effects would range in magnitude from negligible to low (high for marine birds), with a geographic extent of 1,001 to >10,000 km² and a duration of 1 to 12 months. For fish, marine birds, and marine mammal and sea turtle species at risk likely to be present in the area, the effects from accidental events therefore, will be **not significant**.

7.12 Follow-up Monitoring Required Yes No

The C-NLOPB does not require StatoilHydro Canada Ltd. to undertake follow-up monitoring, as defined in the CEA Act.

8. Other Considerations

Mitigations presented by StatoilHydro Canada Ltd. in its environmental assessment for the Jeanne d’Arc Basin and Flemish Pass Exploration and Appraisal/Delineation Drilling Program (LGL 2008) are sufficient to prevent or reduce environmental impacts. This includes site selection and minimization of contact with the bottom substrate during geohazard/site surveys and geotechnical testing and ROV surveying, especially with respect to deep water corals. If chemical explosives are required during wellhead abandonment, a biological observation program will be required. Specific details of the monitoring program will be discussed with StatoilHydro at the time of application for the well abandonment program. Depending on the timing of the well abandonment program, additional mitigations or monitoring protocols may be required.

The C-NLOPB is satisfied with the environmental information provided by StatoilHydro regarding the potential adverse environmental effects, which may result from the proposed drilling program, and is 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 2008 EA Report, and those listed below are implemented, the Project is not likely to cause significant adverse environmental effects.

8.1 Recommended Conditions and/or Mitigations

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

For drilling/geotechnical programs:

- *StatoilHydro Canada Ltd. 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 StatoilHydro Canada Ltd. Exploration and Appraisal/Delineation Drilling Program for Offshore Newfoundland, 2008-2016 (LGL 2008).*
- *A marine mammal monitoring protocol shall be developed in consultation with the C-NLOPB at the time of application for approval to terminate the well(s) with the use of chemical explosives.*

- *Drilling activities, including moorings, shall not occur within 100 m of coral colonies without the prior approval of the Chief Conservation Officer. A coral colony is defined as:*
 - *Lophelia pertusa reef complex; or*
 - *5 or more large corals (larger than 30 centimeters in height or width) within a 100 square metre area.*

For VSP and/or Wellsite Surveys

- *StatoilHydro Canada Ltd. 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 StatoilHydro Canada Ltd. Exploration and Appraisal/Delineation Drilling Program for Offshore Newfoundland, 2008-2016 (LGL 2008).*
- *StatoilHydro Canada Ltd. shall implement or cause to be implemented the mitigation measures outlined in the Geophysical, Geological, Environmental and Geotechnical Program Guidelines (C-NLOPB 2008), respecting VSP and wellsite surveys.*
- *During ramp-up, and/or when the airgun array is active, the 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.*

Part D: Screening Decision

9. 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 StatoilHydro Canada Ltd., the Project **is not likely to cause significant adverse environmental effects.** This represents a decision pursuant to Section 20(1)(a) of the CEA Act.

Responsible Officer Original signed by K. Coady
 Kimberly A. Coady
 Environmental Assessment Officer

Date: July 10, 2008

References:

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- Norsk Hydro Canada Oil & Gas Inc. 2007. Project Description Exploration/Appraisal/Delineation Drilling Program for Jeanne d'Arc Basin Area, 2008-2016. 25 p.