Canadian Environmental Assessment Act Screening Report

Part A: General Information

Screening Date	**July 20, 2006**
EA Title	Chevron Exploration Drilling Program for Orphan Basin Environmental Assessment
Proponent	Chevron Canada Limited 500 – 5th Avenue SW Calgary, Alberta T2P 0L7
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C-NLOPB File No.	7705-C41
CEAR No.	04-01-7972
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EA Start Date	November 22, 2004
Location	Orphan Basin Area, North of Grand Banks (ELs 1073/1074/1075/1076/1077/1078/1079/1080

Part B: Project Information

On 19 November 2004, Chevron Canada Limited (Chevron), on behalf of its co-venturers ExxonMobil Canada Ltd., Imperial Oil Resources Ventures Limited and Shell Canada submitted a project description *"Orphan Basin Exploration Drilling Program Project Description"* (LGL 2004) to the C-NLOPB, in support of its application for a drilling program in the Orphan Basin area. The project description describes a multi-well exploratory drilling program, and all ancillary features (the Project) to be conducted on ELs 1073/1074/1075/1076/1077/1078/1079/1080 in the Orphan Basin area of the Newfoundland and Labrador offshore area.

The "*Orphan Basin Exploration Drilling Program Environmental Assessment*" (LGL 2005) (herein referred to as the EA Report) was submitted on 26 October 2005. It provides an environmental assessment of the Project, commencing in 2006 with the potential for drilling to occur until 2013. In order to address deficiencies in the EA report identified through regulatory and public review, Chevron was required to submit an environmental assessment update "*Orphan Basin Exploration Drilling Program Environmental Assessment Addendum*" (LGL 2006) (herein referred to as the Addendum). The Addendum was submitted on March 30, 2006.

At the time, exploratory drilling programs in new areas[1] were to be assessed at a Comprehensive Study Level of assessment, pursuant to the *Comprehensive Study List*

[1] Prior to November 2005, a new area was defined as study areas in the offshore that were not the subject of environmental assessment at the comprehensive study or Panel level of assessment.

Regulations (CSL) in force in 2004. However, in November 2005, the CSL Regulations were amended and exploratory drilling programs in new areas were to be assessed at a Screening Level of assessment. From submission of the project description to the submission of the EA report in October 2005, the environmental assessment proceeded as a Comprehensive Study Review. The C-NLOPB provided the public the opportunity to review the scoping document and prepared the Environmental Track Decision Report for the Minister of Environment in which it recommended that the assessment proceed as a comprehensive study. The Operator, Chevron, prepared the environmental assessment report pursuant to the CEA Act requirements for a comprehensive study. While the EA report was submitted in October 2005 in fulfilment of the requirements for a comprehensive study, the subsequent amendments to the CSL changed the level of assessment to a screening level of assessment. Therefore, the Orphan Basin Exploratory Drilling program was reviewed in accordance with the requirements of the CEA Act respecting screening level environmental assessments.

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

1. Description of Project

Chevron proposes to drill up to 12 exploration wells in the Orphan Basin area from 2006 through to the life of the licenses. In 2006, at least one well will be drilled on EL 1076. Depending on the success of the initial well, additional wells may be drilled in 2007 through to 2013. The wells will be drilled on a year-round basis, using one or two dynamically positioned drill rigs (semi-submersible or drill ship) mobile operating drilling unit (MODU). The project includes marine support vessels, helicopter support, and existing shore based facilities. Vertical seismic profiling (VSP), and wellsite surveys may be required for any of the 12 wells drilled. An onsite Environmental Observer (EO) will be onboard the MODU to record and report weather and oceanographic and ice conditions. The EO or an alternate will also conduct seabird and marine mammal observations on a daily basis.

Chevron indicates that the first well is tentatively planned for the second half of 2006 and the project may extend for the life of the licenses on a year-round basis (for semi-submersible rigs or drill ships). Drilling will occur in water depths ranging from 500 to 3,000 m with most depths between 2,000 and 3,000 m. It is anticipated that it will take approximately 50 to 100 days to drill each well. The exploration wells will likely be drilled using a combination of both water-based muds (WBM) and synthetic-based muds (SBM), depending on the hole section.

For 2006, drilling is scheduled to commence in the second half of 2006.

2. Description of Environment

2.1 Physical Environment

The Project Area is located in an area north of the Grand Banks known as the Orphan Basin, about 300 km northeast of St. John's, Newfoundland and Labrador, in water depths ranging from 500 to 3,000 m. Physical environmental conditions considered in the environmental assessment include wind, wave and currents; air and sea temperatures; visibility (fog); and, sea ice and icebergs.

2.1.1 Wind, Waves and Currents

On average, winter winds are from the west in the project area. A prevailing southwest wind occurs in the summer months. The highest wind of 32 m/s occurred in December from the west at the southern grid point. With the exception of July, gale force winds (17.2 to 24.4 m/s) occurred in any month. Storm force winds (24.5 to 32.6 m/s) occurred in January, February, March, November and December at the northwestern grid point. In addition to these months, storm force winds also occurred in October at the southern grid point. Hurricane force winds (greater or equal to 32.7 m/s) did not occur at either location although a maximum of 31.91 m/s occurred at the southern location in December.

Wave data presented in the EA Report show that the highest sea states occur in the Project Area during storm events, which typically occur from October to March. The lowest significant wave height in the area ranges from 1.7 m (monthly mean) in July to 4.1 m (monthly mean) in January. The maximum monthly mean significant wave heights measured are 6 m in July to 14 m in February. In its review of the EA Report, Environment Canada requested a joint frequency distribution of significant wave height and peak wave period, on an annual and monthly basis. The Addendum presented additional information regarding the difference in extreme wave height results using the top 50 storms and the top 250 storms. In addition, information regarding extreme winds adjusted to shorter averaging intervals and environmental contour extremal analysis of wave height and period was provided in the Addendum.

Current data was obtained at various locations (67 to 900 m depth) on the Northeast Newfoundland Slope and one location (2,738 m) in the Orphan Basin. At approximately 80 m, the current speed reaches a maximum value between 54 cm/s and 70 cm/s during January and 45 cm/s during the summer period from June to August. The mean speed ranges from 15 cm/s to 19.5 cm/s with high standard deviations of approximately 10 cm/s. Seasonal variability for wind speed and significant wave height is greater during the winter than during the summer months (LGL 2006). Additional information regarding undercurrents and mean circulation is presented in the Addendum (LGL 2006).

2.1.2 Air and Sea Temperatures

Mean sea surface temperatures range from 2.8^{o}C (mean) in March to a 12.2^{o}C in August. Mean air temperatures range from a low of -0.7^{o}C in January and February to 12.9 in August.

2.1.3 Visibility

Reduced visibility in the Orphan Basin occur primarily to fog, both advection fog and frontal fog. Visibility is best in the autumn and winter months between September and February. During this period, the visibility is less than two nautical miles for 11.9 to 16.8 percent of observations, whereas in July the visibility is less than two nautical miles for 44.7 percent of observations.

2.1.4 Sea Ice and Icebergs

The project area can expect to see sea ice cover once every three years and can vary in duration from one week to eleven weeks (LGL 2005). Sea ice can vary in thickness from 30 to 100 cm. Sea ice reaches peak coverage in the Project area in March (42%) but can remain at high levels through April before retreating rapidly northward (LGL 2005).

There is clearly a west to east reduction in iceberg distributions caused by moving out of the main flow of the Labrador Current. The iceberg data indicate that the Orphan Basin exploratory

license areas are subject to much lighter iceberg distributions than those found on the northeastern Grand Banks, which currently stand at a maximum annual distribution of 217 and a mean of 44 (PAL 2003).

2.2 Biological Environment

2.2.1 Plankton

Phytoplanktons generally undergo explosions in populations, commonly referred to as blooms. These usually occur in the spring (April/May) and, for some species, and again in the fall-early winter (October/January) of the year. In the Study Area, there is a south to north progression in the onset of the spring bloom and phytoplankton concentrations were found to be greatest in the upper 50 m of the water in the area of the continental slope where the Labrador Current is strongest (LGL 2005).

Data on nutrients, phytoplankton, zooplankton, icthyoplankton, or production rates are not extensive within or adjacent to the Orphan Basin. However, studies have shown that at least 60 species of phytoplankton, 160 species of zooplankton, and 30 species of ichthyoplankton can be expected in the Study Area (LGL 2005). Phytoplankton is likely dominated by microflagellates and diatoms, at least during summer. Zooplanktons are likely dominated by calanoid copepods, at least in terms of biomass. The Study Area has not been studied intensively enough to definitively identify special areas of enhanced plankton production. However, there has been suggestions that production may be highest along the northern edge of the northern Grand Bank and at the outer edge of the Labrador Current, including Orphan Knoll and Basin. In 1999, the highest total zooplankton biomass was on the northeast Newfoundland Shelf.

2.2.2 Benthos

Benthic invertebrates living on the seafloor form an important link to higher trophic levels such as fish, seabirds and marine mammals (LGL 2005). There does not appear to be any published studies on benthic communities in the Orphan Basin. It is assumed that they are similar to other areas of the northwest Atlantic for equivalent depths and substrates. The Study Area encompasses continental slope environments as well as abyssal habitats with depths that range from 500 to 3,000+m. This area is influenced by cold arctic and subarctic waters as well as by warmer North Atlantic waters that also influence the eastern and southern edges of the Grand Banks. Substrate and water depth determine the composition of benthic community structures. Box core samples were collected by LGL at four locations in very deep (>2,000 m) water within the Project Area. The samples included a number of invertebrate species such as polychaete worms, protozoans, polychaetes and crustaceans including cumaceans, isopods, and amphipods. No corals were collected in the four samples.

Deep-water corals generally occur on the ocean bottom at depths exceeding 150 m (often >200 m in Atlantic Canada). Some of these filter-feeding animals form “fields” or “forests,” while others are much smaller and remain solitary. Research trawl surveys conducted off Nova Scotia, Newfoundland and Labrador, and in the Arctic region between 1999 and 2001 collected 57 deep-water coral specimens. The following coral specimens were collected in Newfoundland and Labrador waters.

- *Acanella arbuscula*
- *Acanthogorgia armata*

- *Paragorgia arborea* (Bubblegum coral)
- *Paramuricea* spp. (Black coral)
- *Primnoa resedaeformis* (Sea corn).

The coral was collected at average depths ranging from 319 to 622 m.

Recently, coral distributions in Newfoundland and Labrador waters were mapped using coral samples and records from DFO research vessel survey trawls between fall 2003 to winter 2005, and fisheries observers aboard commercial fishing vessels during April 2004 to March 2005 (Edinger et al., in draft 2005). Nineteen species of corals were recorded, including seven horny corals (gorgonians), three soft corals (alcyonareans), six seapens (pennatulaceans), two cup corals (scleractinians), and one black coral (antipathians). The corals were broadly distributed along the edge of the continental shelf, mostly at depths exceeding 300 m. Locations of multi-coral species assemblages in Newfoundland waters included the northeast and eastern edges of the Northeast Newfoundland Shelf (most immediately west of Orphan Basin Study Area, with one hotspot of multiple species of *Bathypathes* indicated within the Study Area near the southern part of the Project Area. In its review of the EA Report, the Natural History Society indicates that the southern part of the Project Area, an area known as the Sackville Spur, has habitat conditions that would most likely contribute to presence of corals. Records from Fisheries Observer Programs indicate this area has a low to moderate diversity and abundance of seep-sea corals (Natural History Society, 2006).

2.2.3 Marine Fish Species

The Project Area is within North Atlantic Fisheries Organization (NAFO) Management Division 3L and 3K and includes portions of Unit Areas 3Kg, 3Kk and 3Le. The Study Area encompasses all or part of six Unit Areas in 3K, 3L and 3M. A detailed description of three principal commercial fishery target species (northern shrimp (*Pandalus borealis*), snow crab (*Chionoecetes opilio*), Greenland halibut (*Reinhardtius hippoglossoides*)) and the four SARA-listed species (Atlantic cod (*Gadus morhua*), striped wolffish *Anarhichas lupus*), spotted wolffish (*A. minor*), northern wolffish (*A. denticulatus*)) are provided in the EA Report and the Addendum.

Northern shrimp occur primarily in areas where the substrate is soft mud and bottom water temperatures range from 2 to 6°C. These environmental conditions occur in waters offshore of Newfoundland and Labrador where depths range between 150 and 600 m. Northern shrimp spawn once a year, typically in late summer - early fall. Eggs remain attached to the female for one year. Most of the large spring survey catches between 1995 and 2003 occurred in the warm water along the slopes of Divisions 3LN, while in the fall, the largest catches occurred in most areas of 3L, including the inshore areas of the bays along the east coast of Newfoundland (Colbourne and Orr, 2004). Since fall of 2002, fall and spring research surveys in NAFO Divisions 3LNO indicated the greatest concentrations of northern shrimp occur along the 3L slope region between 185 m and 550 m (LGL 2005).

Snow Crab in the northwest Atlantic occurs over a broad depth range (20 to >400 m). 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. LGL reports that the exploitable

biomass and recruitment in NAFO Divisions 2J3KL are declining.

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. In 2001 and 2002, Canadian Greenland halibut catches were reported along the slope regions on the western side of Orphan Basin and to the south within EL 1080 (LGL 2005). However, in 2003, Canadian catches only occurred on the western Orphan Basin slope area, not along the southern slope area. In 2004, there were relatively small domestic catches on the SW slope in Unit Area 3Le.

Other species of potential ecological importance, as determined by an examination of commercial logbooks, DFO research survey, and observer data, as well as making up a substantial proportion of the DFO 2002-2004 survey catches within and proximate to the Orphan Basin Study Area, include: capelin (*Mallotus villosus*); American plaice (*Hippoglossoides platessoides*); deepwater redfish (*Sebastes mentella*); roughhead grenadier (*Macrourus berglax*); blue hake (*Antimora rostrata*); thorny skate (*raja radiata*); and sand lance (*Ammodytes* spp.). The Addendum provides additional information regarding species profiles and distribution for these species. The spatial distributions of the 2002-2004 DFO research survey catch numbers and catch weights of snow crab, Greenland halibut, wolffishes, and Atlantic cod are also summarized in the Addendum (LGL 2006). .

2.2.4 Commercial Fisheries

As previously stated, the Project Area is within NAFO management Division 3L and 3K and includes portions of Unit Areas 3Kg, 3Kk and 3Le. The Study Area encompasses all or part of six Unit Areas in 3K, 3L and 3M. The majority of the Project Area falls east of (beyond) Canada's 200-mile Exclusive Economic Zone (EEZ), where foreign fishing might be encountered. Within the EEZ**,** fisheries would be expected to be primarily domestic. Commercial fisheries in the Project Area were almost exclusively for northern shrimp and turbot. These two species composed more than 98% of the domestic harvest in the area over the past three years. Roughhead grenadier (bycatch) and snow crab make up the balance. Domestic fishing harvesting in the general area of the Project occurs between the 100m and 1,000 m contours of the eastern Grand Bank and slope, both inside and outside (to the south) of the 200-mile EEZ. The closest concentration of fish harvesting activity to the Study area is to the south, and much of the Project Area is relatively distant (>60 km) from important harvesting grounds. The first four months of the year have the greatest part of the harvest by quantity, and there was no recorded harvest within the Project Area in November and December during these years, and very little in October.

2.2.5 Marine Mammals and Sea Turtles

At least twenty-one species of marine mammals may occur in the region of the Orphan Basin including 16 species of cetaceans and five species of seals (LGL 2005). Baleen whales most likely to be found in the Study Area include the humpback (*Megaptera novaeanliae*), blue (*Balaenoptera musculus*), fin (*B. physalus*), sei (*B. borealis*), and minke (*B. acutorostrata*). Toothed whales include the sperm (*Physeter catadon*), northern bottlenose (*Hyperoodon ampullatus*), Sowerby's beaked (*Mesoplodon bidens*), killer (*Orcinus orca*), and long-finned pilot whales (*Globicephala melaena*), the common bottlenose (*Tursiops truncates*), short-beaked common (*Delphinus delphis*), Atlantic white-sided (*Lagenorhynchus acutus*), white-beaked (*L.*

albirostris), Risso's (*Grampus griseus*) and striped (*Stenella coeruleoalba*) dolphins and the harbour porpoise (*Phocoena phocoena*). Seal species likely in the area are the harp (*Phoca groenlandica*), hooded (*Cystophora cristata*), grey (*Halichoerus grypus*), ringed (*Phoca hispida*), and bearded seals (*Erignathus barbatus*).

Three species of sea turtles may occur in the Orphan Basin Regional Area. These include the Leatherback turtle *(Dermochelys coriacea)*, which is listed as endangered under SARA; the loggerhead turtle *(Caretta caretta)*, and the Kemp's Ridley turtle (*Lepidochelys kempii*). The northwest Atlantic population estimates of Kemp's Ridley and loggerhead sea turtles is unknown.

2.2.6 Marine Birds

The Grand Banks of Newfoundland have been identified as important habitat for many species of marine birds. The avifauna community of the Orphan Basin is composed mainly of true pelagic species. A large portion of the Project Area lies beyond two hundred nautical miles from the coast. This is beyond the range of most species not fully adapted for prolonged periods on the open sea. The main species groups that occur in the Project Area include *Alcidae* (Dovekie, Murres – Common and Thick-billed, Razor Bill and Atlantic puffin) *Laridae* (Skuas – Great and South Polar, Jaegers – Pomarine, Parasitic, and Long-tailed; Gulls – Herring, Iceland, Glausous, Great Black-backed, and Ivory; Black-legged Kittiwake and Arctic Tern)*, Sulidae* (Northern Gannet), *Hydrobatidae* (Wilson's and Leach's Storm Petrels); *Phalaropodinae* (Pharlarope – Red and Red-necked), and *Procellariidae* (Northern Fulmar; Cory's, Greater, Sooty and Manx Shearwaters). Specific information specific can be found in the EA Report (LGL).

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 May to October, and absent from December to April. Leach's storm petrels (*Oceanodroma leucorhoa*) are common from April to October, whereas the Black-legged Kittiwake (*Rissa tridactyla*) is most abundant in the fall and winter. The Northern Fulmar is the only bird that is common throughout the year. In its review of the EA Report, Environment Canada provided a list of updated scientific references for the operator to consult in preparing the Addendum. Chevron reviewed the literature and provided an update on the status of a number of species for the Study Area. They are presented in the Addendum.

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 the species likely to be present and their SARA listing.

Species	SARA Status
Blue Whale (*Balaenoptera musculus*) (Atlantic population)	Schedule 1 - Endangered
North Atlantic Right Whale (*Eubalaena glacialis*)	Schedule 1 - Endangered
Leatherback sea turtle (*Dermochelys coriacea)*	Schedule 1 - Endangered
Northern bottlenose whale (*Hyperoodon ampullatus)* (Scotian Shelf population)	Schedule 1 – Endangered
Northern Wolffish (*Anarhichas denticulatus)*	Schedule 1 – Threatened
Spotted Wolffish (*Anarhichas minor)*	Schedule 1 - Threatened
Atlantic (Striped) Wolffish (A*narhichas lupus)*	Schedule 1 – Special Concern
Ivory Gull (*Pagophila eburnea)*	Schedule 1 – Special Concern
Harbour Porpoise (*Phocoena phocoena)* (Northwest Atlantic population)	Schedule 2 - Threatened
Fin Whale (*Balaenoptera physalus*) (Atlantic population)	Schedule 3 – Special Concern
Sowerby's Beaked Whale (*Mesoplodon bidens*)	Schedule 3 – Special Concern
Atlantic Cod (*Gadus morhua)* (Newfoundland and Labrador population)	Schedule 3 – Special Concern

Atlantic cod (*Gadus morhua*) (also know as northern cod) have historically been distributed throughout Newfoundland and Labrador waters. Spawning historically occurred on the northeast Newfoundland shelf in late winter and spring. The fish then migrated shoreward across the shelf to the inshore feeding grounds, annually traversing distances of 500 km and more. Most cod are found in waters shallower than the 900 m depth. Maps for the 1992-2000 period indicate that Atlantic cod were more abundant in the vicinity of the southern part of the Project Area during spring compared to fall. The most recent assessment of the status of the northern (2J+3KL) cod stock was conducted in February 2003. The 2003 research bottom-trawl surveys during both spring and fall indicated that the biomass of cod in the offshore remains extremely low (1% of the average during the 1980s) (LGL 2005). A substantial portion of the cod stock once typically overwintered on the northeastern slope of the Grand Bank and the Nose of the Bank, prior to the collapse of the stock. There have not been any recent winter surveys in these areas so present day cod concentrations are unknown.

In the northwest Atlantic, there are three wolffish species (*Anarhichus* spp.). Kulka et al. (2004),

as reported in the Addendum (LGL 2006) examined changes in distribution and habitat associations of three species of wolffish on the Grand Banks and Labrador Shelf using data collected during the DFO RV surveys in the spring and fall between 1971 and 2003. The three wolffish species are at the center of their distributions, reaching highest density and covering the largest areas on the northeast Newfoundland and Labrador Shelf. On the Shelf, they distribute over a wide range of depths (25 to 1,400 m) with the northern wolffish exhibiting the widest distribution of the three species, and the Atlantic or striped wolffish exhibiting the narrowest. All three wolffish species appear to be associated with an extremely narrow range of bottom water temperature (1.5 to 4.5 ^{o}C). These fish appear to avoid areas where water temperature is <0°C. Atlantic wolffish and spotted wolffish were widely distributed on various sediment types while northern wolffish appear to prefer areas with sediments consisting of sand/shell hash, gravely sand and/or rock. Atlantic wolffish occurring in near-shore areas appear to avoid areas where there is potential for the substrate to get stirred up (e.g., mud). The distributions of both northern and spotted wolffish indicated by 1995-2003 trawl data are concentrated towards the Shelf edge, including areas that occur within the Orphan Basin Study Area. They are thought to spawn during the late fall/early winter months. The juvenile stages of all three wolffish species appear to be semi-pelagic. The spotted wolffish and striped wolffish are regarded as commercial species in Newfoundland waters while the northern wolffish is not.

Ivory Gulls breed in high Arctic Canada, Greenland and northern Eurasia. It winters within its breeding range and farther south on sea ice. The 2002 and 2003 surveys of historic breeding sites in the Canadian Arctic showed an 80% decline in the numbers of nesting Ivory Gulls (Gilchrist and Malory 2005). The Ivory Gull may occasionally occur in the Orphan Basin when pack ice reaches the annual southern extremity in February and March. Ivory Gulls were observed at the same latitude as the Orphan Basin during aerial surveys suggesting that they could occur in the Orphan Basin during years of sufficient ice cover.

LGL (2005) report that the blue whale is rarely sighted on the Grand Banks and is probably relatively uncommon within the Study Area. Information on their abundance is limited. Blue whale abundance in the North Atlantic is currently thought to range from 600 to 1,500 individuals, however little is known about the distribution and abundance of blue whales in the northwest Atlantic – especially the waters off eastern Newfoundland (LGL 2006).

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

Population estimates of Leatherback sea turtles are between 26,000 and 43,000 species worldwide (LGL 2005). Adult leatherback sea turtles are commonly sighted in the waters off Newfoundland from June to October, with peak abundance in August. Leatherback sea 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.

Chevron has indicated that they will continue to monitor the listings and assess their activities relative to any future relevant SARA listings, Recovery Strategies Action Plans.

2.3 Industry and DFO Science Surveys and Experimental Fisheries

DFO research surveys in 2006 are expected to be similar to those undertaken in the Study Area in 2005. The following surveys are anticipated within the Study Area in 2006. In the 3K area,

six multi-species surveys will likely be undertaken from the 01 October to the end of December, each taking 11-14 days to complete. In the 3L area, three multi-species surveys will likely be undertaken from mid-May to mid-June, each taking between 7-14 days to complete. In the Grand Banks area, up to six multi-species surveys will likely be undertaken from 01 October to the end of December, each taking between 7-14 days to complete. There will be an exploratory/experimental fishery for hagfish conduced in late summer/early fall in the northern two-thirds of NAFO Division 3L. This could potentially overlap with a substantial portion of the Orphan Basin Study Area (i.e., NAFO Unit Areas 3Le, 3Li). Chevron will be required to communicate with DFO to avoid any potential conflict with research surveys that may be operating in the area. The Fish, Food and Allied Workers Union (FFAW) has stated that they are not presently conducting any exploratory/experimental fisheries in the Orphan Basin Study Area.

Part C: Environmental Assessment Process

3. Procedures

The C-NLOPB has carried out an environmental screening for the proposed exploratory drilling program based on the Drilling Program Application, public concerns and specialist advice.

On November 19, 2004, Chevron Canada submitted a project description *"Orphan Basin Exploration Drilling Program Project Description"* (LGL 2004) to the C-NLOPB, in support of its application to drill up to 12 exploration or delineation wells on acreage held by the operator in the Orphan Basin area over the life of the licenses. The proposed project was described in the *Comprehensive Study List Regulations* (2004) and therefore was subject to a comprehensive study level of assessment under the *Canadian Environmental Assessment Act* (*CEA Act)*. The C-NLOPB prepared a Scoping Document. The Scoping Document underwent a regulatory and public review period commencing on 10 December 2004. Comments were received from the Natural History Society, the Alder Institute, a private citizen, the CEA Agency, Natural Resources Canada, Department of Fisheries and Oceans (DFO) and Environment Canada.

Pursuant to the CEA Act requirements for a comprehensive study level of assessment, the C-NLOPB prepared an environmental assessment track report. The Track Report describes the scope of the project, the scope of the factors to be considered in the environmental assessment, public concerns in relation to the project, the potential of the project to cause adverse environmental effects, and the ability of the comprehensive study to address issues related to the project. In consideration of all these factors, the C-NLOPB recommended to the Minister of Environment on February 2, 2005 that the environmental assessment continue as a Comprehensive Study. On February 18, 2005, the Minister of Environment referred the project back to the C-NLOPB to continue as a Comprehensive Study.

On October 26, 2005, Chevron submitted to C-NLOPB a draft Comprehensive Study Report "*Orphan Basin Exploration Drilling Program Environmental Assessment*". The draft document was prepared pursuant to the "*Orphan Basin Exploration Drilling Program Scoping Document*" that the C-NLOPB issued to Chevron on February 21, 2005. Pursuant to the *CEA Act*, C-NLOPB, as the Responsible Authority (RA), sought input into the review of the EA Report.

As described in Section 1 above, amendments were made to Comprehensive Study List regulations whereby offshore oil and gas exploratory drilling projects would be subject to a

screening type environmental assessment rather than a comprehensive study type of assessment. This amendment to the *Comprehensive Study List Regulations* was published in the Canada Gazette on November 30, 2005. Therefore, the environment assessment review of the exploratory drilling program in the Orphan Basin changed from a Comprehensive Level of assessment to a Screening Level. Under a comprehensive study review process, the public would have two opportunities to review the environmental assessment report but at a screening level of assessment, a second public review period is not required. Therefore, the C-NLOPB extended the public comment period by one month to give the public and regulatory agencies additional time to review the environmental assessment report. Comments were then requested by 13 January 2006. Comments were received from the Natural History Society, the Alder Institute, the CEA Agency, Natural Resources Canada, DFO and Environment Canada.

On 07 February 2006 Chevron was provided with a consolidations of all comments received during the public comment period that were directly related to the requirements of a screening level of environmental assessment and the scoping document (C-NLOPB 2005) Comments were received from federal and provincial fisheries and environmental agencies, the Natural History Society, FFAW, and the Alder Institute. An addendum to address those comments was requested from Chevron. Chevron submitted the Addendum (LGL 2006) on 29 March 2006. The report was forwarded on 30 March 2006 to federal and provincial fisheries and environmental agencies for review and comment. Comments were received from the CEA Agency, DFO, Environment Canada and Natural Resources Canada. Each of the regulatory agencies were asked to review the Addenda to determine if their comments were addressed satisfactorily. DFO, EC and NRCan responded that most of their comments were addressed to their satisfaction, while some required further clarification or revision. It is the opinion of the C-NLOPB that the EA report and Addendum provide sufficient information to complete its environmental assessment and that no further information is required from the proponent.

At the time of application for subsequent drilling program authorizations in the Study 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.

3.1 Scope of Project

The operator, Chevron, proposes to drill up to 12 delineation/exploratory wells on lands held by them in the Orphan Basin area, encompassing ELs 1073, 1074, 1075, 1076, 1077, 1078, 1079 and 1080. Typically each well requires 50 to 100 days to complete. The drilling program includes all ancillary activities in support of a drilling program, such as the use of a MODU (one or two dynamically positioned drill rigs (semi-submersible or drill ship)), transportation of goods via supply boats, helicopter support, operation of shore-based facilities, and the possible conduct of VSP activities.

The initial exploration program will consist of three wells in which specific drilling site locations will depend upon the results of ongoing 3-D seismic surveys. In 2006, one well will be drilled on EL 1076. Also included in this EA is the potential for an additional nine exploration or delineation wells, if the initial program proves successful. Drilling may be conducted at any time of the year throughout the life of the licenses.

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 Chevron that is likely to be carried out in relation to their proposed Project.

3.2 Boundaries

The boundaries of the Project, as defined in the EA Report, are as follows and are acceptable to the C-NLOPB.

Boundary	**Description**
Temporal	Year-round (semi-submersible or drill ship) from 2006 to the end of the licenses; at 50 to 100 days per well.
Project Area	Defined to encompass all of the ELs (1073 to 1080).
Study Area	Comprising all the ELs (1073 to 1080) and all of the trajectory probabilities greater than 1% for all months. It is defined by 50°N 49°W, 50°N 45°W, 47°N 49°W, 47°N 45°W.
Affected Area	Varies according to specific vertical and horizontal distributions and sensitivities of each VEC of interest and is defined as the area within which effects (physical or important behavioural ones) have been reported to occur.
Regional Area	Is the boundary used for the Orphan Basin Strategic Environmental Assessment

3.3 Scope of Assessment

For the purpose of meeting the requirements of the *CEA Act* and the Drilling Program Authorization, the factors that were considered to be within the scope of an environmental assessment are those set out in subsection 16(1) and 16(2) of the CEA Act and those listed in the "*Orphan Basin Exploration Drilling Program Scoping Document*" (C-NLOPB 2005).

4. Consultation

4.1 Consultation carried out by Chevron

Chevron, as reported in the EA Report, undertook consultations with representatives of government departments, fishing industry, and non-governmental organizations. The purpose

of the consultations was to inform the representatives about the Project and to identify issues or concerns which should be considered in the EA. The following organizations were contacted:

- DFO – St. John's
- Environment Canada – St. John's
- One Ocean – St. John's
- Fish Food and Allied Workers Union (FFAWU)
- Natural History Society – St. John's
- Association of Seafood Producers – St. John's
- Fishery Products International – St. John's, Burin
- Clearwater Seafoods Limited Partnership – Halifax
- Icewater Harvesting – Halifax
- Groundfish Enterprise Allocation Council – Ottawa.

A summary of the issues/observations from these consultations can be found in the EA Report. Concerns raised in follow-up conversations with the FFAW through the review process are addressed in the Addendum.

The C-NLOPB is satisfied that the consultations carried out by Chevron and reported on in the EA Report and supplemental information, during the preparation of the environmental assessment included all elements of the Project. The C-NLOPB does not require that further consultations be undertaken for the drilling program.

4.2 Consultations with other Federal Authorities, Other Government Departments, and Interest Groups

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 regulators and interest groups were notified on 22 November 2004 regarding Chevron's proposed program. Prospective Authorities and stakeholders were provided with a draft scope of project, and scope of assessment and factors to be assessed (Scoping Document). The following agencies were notified:

- DFO
- Environment Canada
- Canadian Environmental Assessment Agency
- Natural Resources Canada
- Newfoundland and Labrador Department of Environment and Conservation
- Newfoundland and Labrador Department of Fisheries and Aquaculture
- Newfoundland and Labrador Department of Natural Resources

In accordance with the requirements of the CEA Act respecting a Comprehensive Study level of assessments, and as described above, the C-NLOPB invited the public to provide comments on the scoping document. Comments were received from the following:

- Natural History Society
- Alder Institute

- One Ocean Board
- FFAWU
- A private citizen

A summary of the comments received from regulatory agencies and the pubic are provided in the Orphan Basin Track Report (C-NLOPB 2005).

The C-NLOPB provided regulatory agencies and the public an opportunity to submit comments on the EA report. The comment period, initially set for eight weeks was extended to 13 weeks. Comments were received from the Natural History Society, the Alder Institute, the FFAWU, the CEA Agency, Natural Resources Canada, DFO and Environment Canada. All comments which were directly related to the scope of the assessment and scope of the project, and those that were within the jurisdiction of the C-NLOPB were provided to the proponent for their review and response. Chevron Canada responded by submitting an Addendum (LGL 2006) on 29 March 2006. the Addendum was forwarded to provincial and federal regulatory agencies for review to determine if their concerns were addressed satisfactorily. See Section 3, above, regarding comments received on the Addendum.

5. Environmental Effects Analysis

5.1 Methodology

The C-NLOPB reviewed the environmental effects analysis presented by Chevron in the EA Report. A VEC based assessment based on the interaction of project activities on the identified 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 C-NLOPB. The following environmental effects analysis uses the information presented by the proponent (in LGL 2005) 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; and

3 = Detectable Effect, Unknown.

5.2 Effects of the Environment on the Project

The variable and sometimes harsh climate on the Orphan Basin, including sea ice, poses some environmental and safety concerns affecting oil and gas operations in the Orphan Basin, at least in the southwestern and western portions of the Project Area (i.e., ELs 1078, 1079 and 1080). As described in the EA Report (LGL 2005), iceberg and sea ice densities decrease from west to east in the Project Area and are considerably lower in the Orphan Basin compared to the northeastern Grand Banks. As part of its monitoring program, Chevron will have marine weather observers on board the rig, observing weather on a 24 hour basis. An ice management plan will be submitted to the C-NLOPB as part of the DPA process and will include mitigations to prevent impacts from sea ice and icebergs during drilling activities. All rigs are constrained by ice but most can disconnect and move away albeit using different procedures and different environmental criteria. All these should ensure that impacts from the environment can be minimized keeping in mind that most of the Project Area is often free of sea ice and subject to relatively few icebergs. Therefore the effects of the environment on the project will be **not significant**.

5.3 Presence of Structures

The drill rig will be the only surface structure. The installation of seabed or near-seabed components would be restricted to the wellhead, blowout prevention stack and riser. The diameter of the structural hole will be approximately 1,066 mm. The wellhead would protrude a maximum of five metres above the seabed. Chevron will establish a safety zone of 500 m radius around the rig (area of about 0.8 km).

5.3.1 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 (generally 50-100 days per well). 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. Davis et al. (1982), as reported by LGL, indicate that the presence of these structures may modify seabed substrate characteristics, which may modify benthic communities. Increased predation by fish, which are attracted to the structures, and by invertebrate predators (such as starfish), which are attracted by the presence of epifaunal prey, may also causes changes in the benthic communities.

Upon abandonment, the wells will be mechanically plugged and cemented over and thus there will be no structures left protruding above the seabed. The reef effect, the exclusion zone and the temporary alteration of habitat would have an overall short term (duration 50-100 days), low magnitude and small geographic extent effect on fish populations. Therefore, the overall effect on fish and fish habitat is **not significant**.

5.3.2 Marine Birds 0

The effect due to presence of structures on marine birds is most likely associated with lights and flares. See Section 5.4.2 for a discussion on the effects of lights and flares on marine birds.

5.3.3 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 5.4.3 for a discussion of the effects of noise on marine mammals and sea turtles.

5.3.4 Commercial Fisheries 1

The presence of structures and the corresponding safety zone (approximately 0.8 km) would prohibit commercial fishing activities in the drilling area. It is expected that this will result in 50-100 days on-site when the rig is drilling or testing. Assuming rigs at three sites in a given year, this is potentially 300 days when fishing might be excluded from some area within the Project Area. Considering that there is relatively little fishing activity within the Project Area throughout the year (LGL 2005), the likelihood that fish harvesting success will be affected by an exclusion zone is very low. Even if a rig were positioned in one of the few areas where harvesting normally occurs in the zone (such as the southern portion of EL 1080), the area could be easily avoided by harvesters. Chevron has indicated that all reasonable efforts will be made to accommodate fishing in the licence areas when drilling is not occurring. Chevron will also provide notices to mariners via Coast Guard Radio and CBC Fisheries Broadcast program regarding the location of the drill rig prior to the commencement of project activities.

Cumulative effects on fisheries could occur from operations at Hibernia, Terra Nova and White Rose, other offshore oil exploration activities (seismic surveys and exploratory drilling), and commercial fisheries. The EA Report indicates that the safety zone for a semi-submersible rig is approximately 500 m radius (0.8 km^2) for each well drilled. Taken together with Terra Nova's exclusion zone (13.8 km^2), Hibernia's (5.2 km^2) and White Rose (15.4 km^2) they represent at most 34.4 km^2. In addition, given the short time frame for exploration drilling, Chevron predicts there would be no cumulative effect on commercial fisheries. With regard to the three supply vessels per rig, the number of trips to be made by Chevron supply ships will be very small (on average, two trips per week between the base and the platform).

Chevron predicts that the effect of presence of structures on commercial fisheries will be of low magnitude, low geographic extent (<10 km^2) and of short duration. Overall, taking mitigation measures into consideration, Chevron predicts the effects will be **not significant**.

5.3.5 Species at Risk 0

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

5.4 Lights and Flares

Lights are used on the drill rig and supply vessels for navigation purposes and to illuminate work areas. Light and heat could also be emitted from flaring during testing if hydrocarbons are discovered.

5.4.1 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 and **not**

significant due to the small area affected and the short duration of the project. There would be no cumulative effect.

5.4.2 Marine Birds 1

The illumination of rigs and supply vessels in the Orphan Basin 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 50-100 days per well, with up to three wells drilled in 2006. Chevron reports the presence of lights on the rig and supply boats would have a low effect within a 10 km^2 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 is run. It has the potential to have a low effect within an 10 km^2 area for a short period of time during testing.

In terms of stranded birds, Chevron has committed to a recovery and release program for the rig and supply boats, consistent with the requirements of the Canadian Wildlife Service. Chevron has indicated that the Environmental Officer on board the rig will also be responsible for monitoring and observing seabirds and marine mammals in the area using established protocols.

The effects on birds from lights and flares is 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 the rig and support vessels for these operations should not increase the amount of illumination at night in the Orphan Basin. The effects on seabirds regarding lights and flares for other production facilities were determined to be not significant in each of the projects environmental assessments. Cumulatively, the effects may be additive, and may overlap. The implementation of mitigations at production facilities, as well as on seismic vessels operating in the area would reduce any cumulative effects associated with strandings. Also, there is presently no hunting of murres (turres) in the Project Area (LGL 2005). Cumulative effects, therefore, are **not significant.**

5.4.3 Marine Mammals and Sea Turtles 0

Although it is possible that lights associated with the drilling platform and associated supply vessels may attract prey for marine mammals and sea turtles, there should be no interaction between lights and flares and marine mammals and sea turtles due to the small areas where they may occur. Therefore, there should be no environmental effect.

5.4.4 Commercial Fisheries 0

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

5.4.5 Species at Risk 0

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

5.5 Noise

Underwater noise may be caused by supply boats, drilling operations, seismic energy associated with the conduct of VSP surveys and wellhead severance using chemical explosives. Air-borne noise is normally associated with helicopters servicing the drill rig.

5.5.1 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 (LGL 2005). It is also reported by LGL that effects of noise from supply ships on fish is transitory and similar to fishing vessels. The effects of sound from the passage of a supply vessel will be transitory and no greater than that of the passage of a fishing vessel. The addition of noise from supply vessels should be negligible.

Impacts from VSP surveys, using a typical 500-760 in^3 array as the seismic source, would be expected to be less than impacts from a standard 2D or 3D seismic survey. VSPs usually take 8-36 hours to complete with minimal shotpoints compared to a 2D/3D survey. Any effects of VSPs are mitigated by safety zones and ramp-ups. Given the smaller seismic source, reduced duration, area covered and number of shotpoints, Chevron predicts that the effect of VSP on fish populations will be **not significant**.

Cumulative impacts of noise on fish associated with commercial fishing activity and other drilling operations offshore should be not significant. Drilling operations are short term – up to 50-100 days to drill each well. The increase in vessel traffic in the area from supply boats, will be minimal, compared to commercial vessel traffic and international vessel traffic, thus the increase in noise would be negligible and should not impact fish. With regard to seismic activity, the impact on fish larvae would be minor, sub-local, short-term and likely to occur. While it is recognized that seismic activity may have an impact on fish eggs and larvae, estimate of effects on population mortality on fish larvae are less than 1%, whereas natural mortality is between 5-15% per day. Therefore, the interaction of seismic activity with exploration drilling should not have a cumulative impact on fish and fish habitat.

5.5.2 Marine Birds 0

Noise and disturbance from ships and rigs are unlikely to affect birds in the area. There is concern with 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. During all flights, the helicopters and aircraft will fly at minimum altitudes of 600 m whenever possible. In addition, aircraft will not come within eight km seaward and 3 km landward of major seabird colonies from April 1 to November 1. Each aircraft will carry maps indicating the location of colonies. Therefore, effects of noise from helicopters will be negligible and **not significant**.

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. Most species of seabirds that are expected to occur in the Project Area feed at the surface or at less

than one metre below the surface of the ocean with the exception of the Northern Gannett, which typically dives as deep as 10 m. However, these marine birds are typically below surface for only a few seconds per dive. 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**.

Cumulative effects of the routine activities from exploratory drilling are predicted to be **not significant** for marine birds.

5.5.3 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 within a 100 km^2 area, and will be continuous throughout the drilling period, for a period of 50-100 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 impact marine mammals and sea turtles. For the duration of the drilling program (approximately 50-100 days per well) the effects from ships are likely to be negligible to low and within an area of 1-100 km^2. Effects may be reduced if supply boats maintain a steady course and speed, and avoid areas with large numbers of whales. Overall the effects are **not significant**.

Low flying aircraft could cause negligible to low magnitude effects on marine mammals and sea turtles in the water. These effects would be within a 10 km^2 area and occur intermittently throughout the drilling program. Helicopters will fly at an altitude of 600 m. They are prohibited from flying over wildlife for passengers to view. Therefore, the effects will be negligible.

For seismic surveys, (VSP and geohazard surveys) it is predicted that the overall effect on marine mammals and sea turtles will be less than that from a typical 2D or 3D seismic survey, given the smaller array, reduced duration, and area covered.. In order to further reduce impacts to marine mammals and sea turtles, Chevron will implement the following mitigation measures during the conduct of VSPs:

- ramp up of air guns (increasing the volume of the array over a 20-40 minute period before VSP work begins) prior to conduct of survey
- use of trained observers aboard the rig or supply vessel to monitor for marine mammals and sea turtles 30 minutes prior to ramp-up
- if marine mammals/sea turtles are observed within 500 m of the array prior to ramp up, ramp-up will not commence until the animal has moved outside the 500 m zone
- during surveying, the airgun(s) will be shut down if an endangered marine mammal or sea turtle is sighted within 500 m of the airgun(s)
- the observer will monitor for marine mammals and turtles when the source is active and note location and behaviour.

In addition, during the conduct of VSP surveys, the Board will require the following

- implement the mitigations outlined in the *Geophysical, Geological, Environmental and Geotechnical Program Guidelines* (2004) respecting VSPs and wellsite surveys
- the monitoring zone for marine mammals and sea turtles be set at 500 m from the centre of the array
- reduce the airgun array to a single airgun during line changes. If during line changes the airgun must be shut down for a period exceeding 30 minutes, ramp-up procedures, as per the *Geophysical, Geological, Environmental and Geotechnical Program Guidelines* (2004) shall be implemented
- at any time the airgun array is active, shut down of the array if a marine mammal or sea turtle listed as **Threatened or Endangered,** is observed within the monitoring zone

Based on the information presented above, and the mitigations proposed, effects will be negligible to low, for a limited duration (up to 36 hours for each VSP; and up to 7 days for a geohazard/wellsite survey), in an area up to 10 km^2. Therefore, the effects on marine mammals or sea turtles will be **not significant.**

At present, marine mammals in and adjacent to the Orphan Basin are potentially affected by the activities of shipping, naval manoeuvres, hunting (inshore and shelf), commercial fishing (gill nets, trawls, long lines, and pots), oil and gas industry activities such as seismic surveys (including well site geohazard and VSP surveys), supply vessels, helicopters, glory hole excavation, drilling, production, supply vessel and shuttle tanker traffic. Commercial traffic (tankers, cargo ships, bulk carriers, and container ships) in Newfoundland waters account for approximately 3300 transits per year. Fishing vessel trips to NAFO area 3L account for approximately 20,000 transits per year. Therefore, there is considerable noise in the underwater environment. The addition of the drill rig and supply vessels from the drilling program will not contribute to an increase in overall noise in the marine environment. However, locally, there may be an incremental increase in noise levels. However, the cumulative effects will be **not significant**.

5.5.4 Commercial Fisheries 0

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

5.5.5 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 and marine mammals. Therefore, the impact on fish, marine mammal and sea turtles, and marine bird species at risk will be **not significant**.

5.6 Atmospheric Emissions

The potential emissions from offshore drilling include:

- burning of well fluids during production tests (if they occur) and well completions (burner boom emissions)
- engine, generator and heating exhausts from the rig, helicopters and supply vessels
- mud, degassing and other mudroom exhausts
- fugitive emissions.

Fugitive emissions are not expected to be significant and will be minimized through implementation of best management practices and preventative maintenance measures.

5.6.1 Fish and Fish Habitat 0

Effects on fish and fish habitat from atmospheric emissions will be negligible and **not significant**. Cumulative effects will be negligible.

5.6.2 Marine Birds 0

Effects on marine birds from atmospheric emissions will be negligible. Cumulative effects will be negligible.

5.6.3 Marine Mammals and Sea Turtles 0

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

5.6.4 Commercial Fisheries 0

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

5.6.5 Species at Risk 0

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

5.7 Discharge of Drilling Muds and Cuttings

Chevron is proposing to use water based (WBM) and synthetic based muds (SBM) for its drilling program, depending on the hole section. 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 at surface. When SBMs are used, all cuttings are treated in accordance with the *Offshore Waste Treatment Guidelines (OWTG)* (NEB 2002) prior to discharge. The muds are recycled and returned to shore for on-land disposal. For this project, it is estimated that 1655 m^3 of WBM and 423 m^3 of cuttings will be discharged directly to the seafloor when drilling the initial sections of the hole. Approximately 555 m^3 of SBM and 398 m^3 of cuttings will be discharged.

5.7.1 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 modelling exercises conducted by Chevron for the Project the fate of cuttings and muds are estimated from two discharge points in the project area, (Lorax, 2005). The area covered by cuttings discharged in simulations run from May to July and August to October timeframes were less than 1km^2. The EA indicates that smothering of benthos will occur if the thickness of the deposition layer is greater than 1 cm. In general, deeper waters result in thinner deposits over a larger area especially with WBM cuttings (SBM cuttings tend to fall closer to the hole than WBM cuttings). Based on the modeling and the literature, it is predicted that less than 300 m^2 would be covered to a depth of 1.0 cm.

Water based muds are generally non-toxic. The primary additives are bentonite, barite and potassium chloride, with seawater as the main component. Chemicals, such as caustic soda, viscosifers and shale inhibitors, may be added to control mud properties. Chevron 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 Chevron are non-toxic, and they have the potential to biodegrade rapidly under certain conditions (LGL 2005). 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 from SBM and cuttings depositions would be less than 1 km^2 for a multi-well program from a single drill centre (as stated above). Thus for a single well (one well drilled per location) exploration program, the predicted impact would affect a much smaller area. All SBM cuttings will be treated in accordance the OWTG prior to discharge.

Chevron Canada has committed to undertake pre-drill survey of the drill site with a Remotely Operated Vehicle (ROV). If deep sea corals are present, Chevron has indicated that it would shift the wellsite location to avoid the corals. This could result in a shift of between 50 to 100 m. In addition, Chevron Canada has entered a cooperative agreement with the SERPENT project to undertake a monitoring program in association with the drilling of the well in 2006. The SERPENT study is a multi-tiered survey that includes collection of benthic and sediment samples, video surveillance for the presence of deep-water corals.

Currently there are 3 oil fields in production on the northeast Grand Banks. Drilling activities are ongoing in association with these programs. However, cuttings are re-injected at Hibernia. Thus, there is potential for cumulative effects from drilling activities at Terra Nova and White Rose. Cumulative effects are predicted to be additive, with low magnitude, small geographic extent and **not significant**.

Based on mitigations indicated in the EA Report (e.g., cuttings treatment, chemical screening, compliance with 2004 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.**

5.7.2 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 is using WBM and where required, SBM. 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. Present guidelines for synthetic fluids have been reduced to 6.9% from 15% fluid on cuttings, further lessening any potential for sheen. Therefore, the discharge of drill muds and cuttings will have a negligible and **not significant** effect on marine birds.

There is little chance seabirds will interact with muds and cuttings and because there is no likely pathway for significant exposure and there is little chance that heavy metals bioaccumulate to harmful levels (LGL 2005). Cumulative effects, associated with other offshore facilities, will be negligible and **not significant**.

5.7.3 Marine Mammals and Sea Turtles 0

The deposition of muds and cuttings on the seafloor may have increased concentrations of heavy metals. However, their concentration will not be harmful to marine mammals as they are

not bioavailable. None of the marine mammals that regularly occur in the Project Area are known to feed on benthos in the area (LGL 2006). The bearded seal, which may occasionally occur in the Project Area would not feed at the deep water depths there. Therefore, effects from deposition of drill muds and cuttings will be negligible and **not significant**. Cumulative effects will be negligible.

5.7.4 Commercial Fisheries 0

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**. There will be no cumulative impact.

5.7.5 Species at Risk 0

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

5.8 Operational Discharges

Discharges associated with drilling include cement slurry and blowout preventer (BOP) fluid. 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 OWTG prior to discharge. Solid wastes, such as garbage, will be transferred to shore for proper disposal or recycling. Sludges from oil-water separators, spent lubricants, all plastic material, glass and metal wastes will be transferred to shore for appropriate handling, including reuse ad recycling where possible. Chevron indicated in the EA that an Offshore Chemical Management System (OCMS) will be in place as part of the drilling operational procedures to screen all chemicals intended for use on the rig. Excess chemicals or chemicals in damaged containers will not be discharged into the sea. They will be returned to shore by supply vessel. Spent or excess acid will be disposed of in accordance with the Waste Management Plan.

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 and flared during testing. If produced water must be disposed of at sea, it will be treated in accordance with the OWTG prior to discharge at sea. Additional summary information regarding estimated quantities and rates of all discharges and emissions, contaminant concentrations and whether the discharge is intermittent or continuous is presented in the Addendum. The Addendum also provides a description of processes to be employed on the rig to reduce, reuse and recover wastes beyond those specified in the OWTG.

5.8.1 Fish and Fish Habitat 0

Based on experience with previous exploratory wells, excess cement will be released to the marine environment per well and will smother some benthos locally. Literature suggests that the cement will act as an artificial reef, and be colonized by epifaunal animals and attract fish (LGL 2005). The effect, either positive or negative, is negligible.

The blowout preventer (BOP) is required to undergo periodic testing, during which approximately 1 m^3 of BOP fluid is released per test. Chevron indicated that the fluids will be low toxicity composed of glycol-water mixes and screened in accordance with the Chemical

Selection Guidelines. The release of the BOP fluid will have a negligible effect.

As indicated above, all chemicals will be screened through Chevron's OCMS, and all discharges will be treated in accordance with the 2002 OWTG prior to discharge. Therefore, overall, the effect on fish and fish habitat will be **not significant**.

5.8.2 Marine Birds 1

In compliance with the OWTG, sanitary waste from the rig (85-120 person crew) will be macerated to 6 mm before subsurface discharge at a depth about 14.5 m at normal operating ballast. There is concern that seabirds, particularly gulls, will be attracted to the particles. Chevron indicates that seabirds (mostly gulls) may be attracted to the sanitary waste, but the short duration of the drilling program should not increase the gull population offshore. Associated with an increase in gull population is the possibility of increase in gull predation on Leach's Storm Petrels. However, as indicated, there should not be an increase in offshore gull populations, therefore the impact on Leach's Storm Petrels should be minimal. Chevron predicts that the effects of discharge of sanitary waste will be low and of short duration. The effects from other operational discharges are negligible (LGL 2005). Drilling will require seawater, most of which will be used as cooling water. Effects on marine birds will be negligible because the volume of entrainment will be low and the area of thermal effects will be small. Cooling water will be chlorinated to a level of one or two mg/L chlorine and discharged at temperatures of approximately 30°C above ambient. The effect on marine birds will be negligible because the volume will be low and the area of thermal effects will be small. Other discharges, particularly oily waste and bilge water may cause sheening on the water surface. However, as indicated previously, 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 **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 and drilling program is separated geographically from each other and do not overlap. Given the short duration of the drilling program, the cumulative effect of operation discharges on seabirds will be **not significant**.

5.8.3 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 to a level of 1-2 mg/L chlorine and discharged at 30°C above ambient. A low volume of water will be discharged and the area of thermal effects will be small. Therefore, cooling water discharge effects will be negligible. 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.

5.8.4 Commercial Fisheries 0

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

5.8.5 Species at Risk 0

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

5.9 Well Abandonment

Upon completion of its drilling program, it is Chevron's intent to abandon and remove all wells, using mechanical separation, in accordance with the C-NLOPB regulations. For deep water wells, Chevron may apply to leave the wellheads in place. The C-NLOPB will assess each application and make a determination at that time regarding the abandonment of wellheads on the seafloor. In the event that mechanical separation fails, Chevron will use directed chemical charges to sever the wellhead. In the event that chemical explosives are required for well abandonment, the C-NLOPB will require Chevron to undertake a marine mammal observation program during the abandonment program. An authorization will also be required.

5.9.1 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 Chevron, possible mitigations to reduce impacts to fish and fish habitat. The effects on fish and fish habitat, will be of short duration, low magnitude and low frequency, and therefore **not significant**.

5.9.2 Marine Birds 0

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

5.9.3 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 1µPa-m $_{0\text{-peak}}$ and that a 20 kg charges has an equivalent source level of 279 dB re 1µPa-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. The very short duration of the activity, the low frequency (< 2 events/year) and the medium geographic extent (up to 100 km^2), and with the implementation of mitigations, well severance using chemical explosives will have a **not significant** impact on marine mammals or sea turtles.

5.9.4 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 fisheries would be negligible and **not significant.**

5.9.5 Species at Risk 0

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

5.10 Accidental Events

During exploration drilling programs the possible accidental events, which may impact the environment, include blowouts and batch spills. Based on three wells drilled, the highest frequencies are for the smaller, platform-based spills. Spills in the one to 49 bbl range have a 23% chance of occurring during a three-well drilling program, although their average size can be expected to be less than 10 barrels. There is a one in 90 chance that a platform-based spill larger than 50 barrels might occur over the course of the three well drilling program. The chances of an extremely large (>150,000 bbl) and very large (>10,000 bbl) oil well blowout from exploration drilling is very small: about 0.0086% (1 in 11,700) and 0.026% (1 in 3,900). There could be about a two percent chance of having a blowout involving gas only, and a one-in-1,700 chance of having a blowout involving a spill larger than one barrel.

The movements of hypothetical oil spills from two sites (Basin and Slope) off Newfoundland's east coast were modeled. The characteristics of Terra Nova crude, a waxy and persistent Grand Banks crude oil, were used for the modelling. A total of 14,600 trajectories were run for each of the two locations. None of the 14,600 slicks modeled for each location contacted the shores of Newfoundland and Labrador. Modeling of the behaviour and fate of oil from subsea and surface blowouts was conducted for hypothetical blowouts at the exploration platforms and diesel fuel discharges from the vicinity of the platform. The results of this modeling exercise are presented in the EA Report (LGL 2005). In summary, surface blowouts from the two platforms will result in small but relatively thick slicks. The oil will initially form slicks of about 100 m in diameter and 1.0 to 1.8 mm thick. These slicks will quickly emulsify and be very persistent. They will produce a maximum coverage after 10 days of 597 (summer) to 600 km^2 (winter). Deep-water blowouts from these platforms will generate a range of initial oil conditions, from relatively thick to very thin, due to the nature of the release. The oil that rises nearest the source will be the thickest. The slicks near the spill source will be very similar to the slicks from the surface blowout scenarios (50 to 120 m wide and 2.0 to 5.0 mm thick). The persistence of these slicks will also be similar to those from surface blowouts and the surface oil will survive, in some form, on the surface for an extended period. Subsurface blowouts produce a maximum coverage after 10 days of 604 (Slope) to 622 km^2 (Basin). The diesel spills modeled will be less persistent and will disperse within 13 to 33 hours (10 and 100 barrel spills, respectively). About 28% of the diesel will evaporate in the winter and 35% in the summer. Peak in-water oil concentrations (1.0 to 3.9 ppm) will be higher than for the crude oil blowouts but the dispersed oil clouds will quickly diffuse to below 0.1 ppm. Batch diesel spills will produce a maximum of 0.1 ppm water with near-surface area of 82 km^2 (summer) to 96 km^2 (winter) in the Basin and 194 km^2 (summer) to 218 km^2 (winter) on the Slope.

In its review of the EA Report, the Alder Institute requested the accidental spill history of oil and oil-like wastes discharged by the offshore oil and gas industry in the region. The Addendum provides two tables – the first, a summary of offshore Newfoundland hydrocarbon spills for 1997-2004, subdivided by crude and other hydrocarbon spill types and the second table

presents a summary of offshore Newfoundland hydrocarbon spills for 1997-2004, subdivided by exploration drilling vs. development drilling and production.

5.10.1 Fish and Fish Habitat 1

Fish eggs and larvae are more likely to be affected by oil spills because they are not physiologically equipped to either detoxify them or actively avoid them. Although the chance of an accidental event is extremely low, eggs and larvae present in the area will be exposed to hydrocarbons from spill events. Chevron evaluated the impact on the eggs and larvae of 6 species 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. However, the effects would be negligible to low magnitude with a geographic extent less than 10,000 km^2. Mitigation measures such as spill prevention and remediation would reduce overall impacts. Effects on juvenile and adult fish are predicted to be negligible and thus **not significant** because these life stages can, and probably will, avoid the spill by swimming away from it. Effects of spills on fish habitat during the proposed exploratory drilling program are also predicted to be **not significant**. Therefore, the impact on fish and fish habitat would be **not significant**.

5.10.2 Marine Birds 2

Oil on water is a threat and potential impact to marine birds. The Grand Banks region is a very important area for large numbers of seabirds and the Orphan Basin is no exception, at least in terms of the truly pelagic species. Any oil spill could cause bird mortality. As indicated above, the waxy nature of the Terra Nova's 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. The modeling exercise determined that none of the 29,200 (14,600 for each the Slope and Basin) slicks modeled contacted the shores of Newfoundland and Labrador, and therefore it is extremely unlikely that crude oil accidentally spilled at the drilling sites will reach any seabird colonies. However, birds in the area of the rig would be at risk. During the summer, shearwaters, fulmars, gulls, terns, storm-petrels, gannets, phalaropes, skuas, auks, and jaegers would be the species most likely to be in the area and exposed to oil near the surface.

Depending on the time of year, location of seabirds within the Study Area, type of oil spill or blow-out, and the extent of the spill, the magnitude of the effects will range from low to high. Blowouts will have a larger geographic extent (>10,000 km^2) than batch spills (<10,000 km^2) with a duration from one to 12 months. While the likelihood of an event occurring is **low** (less than 1 event per year) the effects would be **significant and adverse**. However, any effects at the population level would be reversible over time. Countermeasures described in the spill response plan such as bird scaring devices would reduce some birds from oiling. However, overall, 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.

5.10.3 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, but would be reversible. However, whales may be present in the Orphan Basin area year round, but most species probably just occur there during summer months. Seals are present on or near the Orphan Basin area for at least part of the year. The majority of those present are associated with the edge of the pack ice. Pack ice in the Orphan Basin peaks in March but can remain through April until it retreats northwards. Sea turtles are

rare on the Grand Banks and are even less likely to occur in the proposed Orphan Basin drilling area. Depending on the time of year, location of whales, seals, and sea turtles in the study area, and volume of oil spilled, effects could range from negligible to low magnitude, extend between 11 to 1,000 km^2 for batch spills, and greater than 10,000 km^2 for blowouts, with a duration of 1-12 months. Oil spill countermeasures, may reduce the number of marine mammals exposed to oil. Therefore this will result in a **not significant** effect.

5.10.4 Commercial Fisheries 1

The primary potential for effects is in the southern portion of the Study Area where there is some fixed gear activity (turbot) and trawling (shrimp) as encountered during the 2005 3-D seismic program. Commercial fisheries could be impacted if there is an effect on eggs and larvae. However, it is predicted that significant effects on the fishery from a spill or blowout will not occur because a large spill or blowout is very unlikely to occur. There is little fishing activity within the Study Area, with the exception of the southernmost part. Most of the fishery in the Study Area is pursued with mobile trawlers that can avoid surface slicks; and economic losses directly attributable to the Project will be financially compensated. In the event of a large spill (greater than 10,000 bbls), while an oil spill would not cause significant environmental effects on fish or result in fish taint, there may be an economic impact on commercial fisheries. Gear may be damaged, and the marketability and the perceived commercial value of the fish may be impacted. However, compensation for gear damage and loss of commercial value would mitigate the effect. Overall, the effects on commercial fisheries is **not significant**.

5.10.5 Species at Risk 1

It is predicted that accidental events will not have significant impact on fish, birds, or marine mammal and sea turtle species. For marine bird, marine fish 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**.

5.11 Follow-up Monitoring Required Yes☐ No☒

Chevron will undertake marine mammal and seabird observations during drilling activities and will report on the findings. In addition, Chevron has entered voluntarily into a cooperative agreement with the SERPENT project (Scientific and Environmental ROV Partnership using Existing iNdustrial Technology - www.serpentproject.com) to undertake a deep water research and monitoring program in association with the drilling of its first well in 2006. The SERPENT study is a multi-tiered survey that includes collection of benthic and sediment samples, and video surveillance for the presence fish and benthic organisms including deep-water corals. Reports from this study will be publicly available.

In consideration of the results of the environmental assessment and the foregoing, the C-NLOPB does not require Chevron to undertake follow-up monitoring, as defined in the *CEA Act.*

6. Other Considerations

Mitigations presented by Chevron in its environmental assessment for the *Orphan Basin Exploration Drilling Program Environmental Assessment* (LGL 2005) and *Orphan Basin Exploration Drilling Program Environmental Assessment Addendum* (LGL 2006) are sufficient to prevent or reduce environmental impacts. 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 Chevron 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 Chevron 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 EA Report and Addendum, 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 any authorization(s) if the Project is approved.

For Drilling Activities

- *The Operator 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 "Orphan Basin Exploration Drilling Program Environmental Assessment (LGL. 2005) and Addendum (LGL 2006) respecting drilling programs.*
- *A marine mammal monitoring protocol shall be developed in consultation with the C-NLOPB at the time of any application for approval to terminate the well(s) with the use of chemical explosives.*
- *Drilling shall not occur within 200 m of deep-sea coral colonies without the prior approval of the Chief Conservation Officer.*

For VSP and Geohazard Surveys

- *The Operator 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 "Orphan Basin Exploration Drilling Program Environmental Assessment (LGL. 2005) and Addendum (LGL 2006) respecting VSP surveys and/or geohazard programs.*
- *The Operator shall implement or cause to be implemented the mitigation measures outlined in Appendix 2 of the Geophysical, Geological, Environmental and Geotechnical Program Guidelines (C-NLOPB 2004) respecting VSP surveys and/or wellsite surveys.*
- *The "safety zone" defined for marine mammal and sea turtles is designated to be 500 m.*

- *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 I of SARA), including the North Atlantic right whale, Blue whale, and leatherback turtle, is observed within 500 m of the airgun array.*
- *In the conduct of geohazard surveys, during line changes the airgun array shall be reduced to a single airgun and the airgun shall remain active. If at anytime the airgun is shut down for a period of time exceeding 30 minutes, then ramp-up procedures as outlined in Appendix 2 of the Geophysical, Geological, Environmental and Geotechnical Program Guidelines (C-NLOPB 2004) shall be implemented.*

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 Chevron and its co-venturers, 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: July 20, 2006
Kimberly A. Coady
Environmental Assessment Officer

References:

Canada-Newfoundland Offshore Petroleum Board. 2004. Geophysical, Geological, Environmental and Geotechnical Program Guidelines.

Colbourne, E.B. and D.C. Orr. 2004. The distribution and abundance of northern shrimp (*Pandalus borealis*) in relation to bottom temperatures in NAFO Divisions 3LNO based on multi-species surveys form 1995-2004. NAFO SCR Doc. 04/85.

Davis, N., G. R. VanBlaricon and P.K. Dayton. 1982. Man-made structures on marine sediments: effects on adjacent benthic communities. Marine Biology. 70: 295-303.

Edinger, E., V.E. Wareham and R. Haedrich. In draft. Mapping distributions of deep-sea corals in Newfoundland and Labrador waters. Contract Report to DFO, Oceans and Habitat Management Division, Newfoundland Region.

Gilchrist, H.G. and M.L. Mallory. 2005. Declines in abundance and distribution of the Ivory Gull (*Pagophila eburnean*) in Arctic Canada. Biological Conservation 121: 303-309.

Husky. 2000. White Rose Oilfield Comprehensive Study. Submitted by Husky oil Operations Limited, St. John's, NF.

Kulka, D.W., M.R. Simpson and R.G. Hooper. 2004. Changes in Distribution and Habitat Associations of Wolffish (*Anarhichidae*) in the Grand Banks and Labrador Shelf. Atl. Fish. Res. Doc. 04/113 44 pp.

LGL Limited. 2005. Orphan Basin Exploration Drilling Program Environmental Assessment. LGL Rep. SA825. Rep. by LGL Limited, St. John's, NL, Canning & Pitt Associates, Inc., St. John's, NL, SL Ross Environmental Research Limited, Ottawa, ON, Oceans Limited, St. John's, NL, Lorax Environmental, Vancouver, BC, and PAL Environmental Services, St. John's, NL, for Chevron Canada Limited, Calgary, AB, ExxonMobil Canada Ltd., St. John's, NL, Imperial Oil Resources Ventures Limited, Calgary, AB and Shell Canada Limited. 353 p.

LGL Limited. 2006. Orphan Basin Exploration Drilling Program Environmental Assessment Addendum. LGL Rep. SA825. Rep. by LGL Limited, St. John's, NL, Canning & Pitt Associates, Inc., St. John's, NL, SL Ross Environmental Research Limited, Ottawa, ON, Oceans Limited, St. John's, NL, Lorax Environmental, Vancouver, BC, and PAL Environmental Services, St. John's, NL, for Chevron Canada Limited, Calgary, AB, ExxonMobil Canada Ltd., St. John's, NL, Imperial Oil Resources Ventures Limited, Calgary, AB and Shell Canada Limited. 142 p. + Appendices.

Natural History Society of Newfoundland and Labrador. 2006. Review of the Orphan Basin Exploration Drilling Program Environmental Assessment. January 2006. 22 p.

NEB, C-NOPB and C-NSOPB. 2002. Offshore Waste Treatment Guidelines. Prepared by National Energy Board, Canada-Newfoundland Offshore Petroleum Board and the Canada-Nova Scotia Offshore Petroleum Board. 11 p + App.

Provincial Airlines Limited (PAL). Iceberg Sightings Database, 1985-1999.