Comment	Response
Section 5.2.1 (Physical Environment)	
Evidence for and consequences of climate change for meteorology and oceanography	**The following text will be inserted as new Section 4.3**: It is generally accepted that a warming world will result in a rise in the global sea level and that sea surface temperatures will increase by 1°C to 2°C over the next several decades if global warming continues. Meteorological drivers of the long-term trends in global sea level rise were examined (Kolker and Hameed 2007) and a major fraction of the variability and trend since 1900 at five Atlantic Ocean tide gauges can be explained by atmospheric indices like the North Atlantic Oscillation. Kolker and Hameed (2007) state that "debate has centred on the relative contribution of fresh water fluxes, thermal expansion and anomalies in Earth's rotation". When factors such as the North Atlantic Oscillation were subtracted out from their analysis of the long-term rise, the "residual" sea level rise was between 0.49±0.25 and 0.93±0.39 mm per year, which could be due to rising global temperatures (Kolker and Hameed 2007). Between 1961 and 2003, the global average sea level rose at an average rate of 1.8 (1.3 to 2.3) mm per year (Intergovernmental Panel on Climate Control (IPCC) 2007); a worldwide increase of 18 to 58 cm is predicted by 2100 (IPCC 2007). Based on emission scenarios from the 2007 IPCC assessment, Vermeer and Rahmstorf (2009) estimated sea-level rise projections over the next century using a semi-empirical model to a relationship between historical global temperature and sea-level rise. This semi-empirical method implicitly accounts for the effects of the recent rapid glacial melt. Sea levels off the northeast coast of North America could rise by 30 to 51 cm more than other coastal areas due to moderate to high rates of ice melt from Greenland (Hu et al. 2009). Since ocean dynamics would push water in different directions, oceans will not rise uniformly as the Earth warms (Hu et al. 2009). Estimates of the global sea level rise over the next 100 years due to global warming alone are from 5 cm to as much as 190 cm. Based on a rate of 1.7 cm per year (as per Vermeer and Rahmstorf (2009)), the expected total rise has a central estimate of 45 cm and an upper limit of approximately 70 cm over the time period of 2010 to 2050. **The following references have been added**: Hu, A., G.A. Meehl, W. Han and J. Yin. 2009. Transient response of the MOC and climate to potential melting of the Greenland Ice Sheet in the 21st century. Geophysical Research Letters, 36, L10707, doi:10.1029/2009GL037998. IPCC 2007 Kolker, A.S. and S. Hameed. 2007. Meteorologically driven trends in sea level rise. Geophysical Research Letters, 34, L23616, doi:10.1029/2007GL031814. Vermeer, M. and S. Rahmstorf. 2009. Global sea level linked to global temperature. Proceedings of the National Academy of Science. USA 106, 21527-21532. Available at URL: http://www.pnas.org/content/early/2009/12/04/0907765106.full.pdf+html
Summary of natural hazards affecting the seafloor (e.g., submarine landsliding) including events occurring outside the affected area that may affect the affected area.	See Attachment A. This text has been incorporated as **new** Section 4.1.4 of the environmental report.

Comment	Response
Section 5.2.2 (Marine and/or Migratory Birds using the Affected Area)	
Means by which bird mortalities associated with project operations may be documented and assessed.	**The following text has been added to Section 7.5.3 (bullet list)**: Corridor will have a Bird Handling Permit and will comply with the requirements for documenting and reporting any stranded birds (or bird mortalities) to the CWS during the 20 to 50 day drilling program.
Section 5.2.11 (Air Quality)	
Implications for health and safety of workers that may be exposed to them [air emissions].	**The following text has been added to Section 2.11.13:** Typical emissions produced during a 20- to 50-day exploration drilling program would meet the stipulated air quality criteria in the short-term and in near-field and far-field locations. There will likely be no exceedances of the NAAQ Objectives. Air emissions will be reported in accordance with the guidelines and the National Pollution Release Inventory. Sulfur dioxide, nitrogen oxides, hydrogen sulphide, particulate matter (PM), PM2.5, PM10 and volatile organic compounds are Criteria Air Contaminants, emissions of which must be reported to Environment Canada under the National Pollutant Release Inventory (NPRI) by June 1 annually. This reporting is required for production operations but drilling operations are exempt from NPRI reporting. Greenhouse gas emissions for development drilling are reported to the C-NLOPB annually on March 31. **The following sentence has been added to the end of the paragraph immediately preceding Table 2.8:** There will be minimal effect on the health and safety of workers on the drill rig.
Implications for health and safety of coastal communities.	**The following text has been added to Section 2.11.13:** Typical emissions produced during a 20- to 50-day exploration drilling program would meet the stipulated air quality criteria in the short-term and in near-field and far-field locations. There will likely be no exceedances of the NAAQ Objectives. Air emissions will be reported in accordance with the guidelines and the National Pollution Release Inventory. Sulfur dioxide, nitrogen oxides, hydrogen sulphide, particulate matter (PM), PM2.5, PM10 and volatile organic compounds are Criteria Air Contaminants, emissions of which must be reported to Environment Canada under the National Pollutant Release Inventory (NPRI) by June 1 annually. This reporting is required for production operations but drilling operations are exempt from NPRI reporting. Greenhouse gas emissions for development drilling are reported to the C-NLOPB annually on March 31. **The following text has been added to the paragraph immediately following Table 2.8:** As the drill rig will be more than 50 km from the nearest coastal community, there will be no effect on the coastal communities from the Project.
Section 5.2.12 (Commercial Fisheries)	
A description of fishery activities (**including traditional**, potential commercial, **recreational and aboriginal / subsistence and foreign fisheries**) in the Affected Area [added emphasis to indicate information deficiency].	See Attachment B. This text has been incorporated into Section 5.8.2 of the environmental report. **The following text has been added to Section 5.8.1**: The Gulf is commercially fished by fleets from Québec and all four Atlantic provinces; there has been no foreign fleet since they were excluded after the first cod collapse in the 1970s (DFO 2005e).

Comment	Response
Consideration of underutilized species and species under moratoria that may be found in the Affected Area as determined by analyses of past DFO research surveys and Industry GEAC survey data, with emphasis on those species being considered for future potential fisheries, and species under moratoria.	See Attachment C. This text has been incorporated into the end of Section 5.8.1 of the environmental report.
An analysis of the effects of Project operations and accidental events upon the foregoing.	**The following Text has been added to Section 7.8 (new text in bold):** Historically, the fishery has played an important role in the economy **and social fabric** of various communities that border the Gulf including those in Newfoundland and Labrador, and has helped to define much of the region's character. The fishery remains an integral component of the economy of the region as well as Newfoundland and Labrador. **Research and sentinel fisheries are undertaken to monitor the status and health of underutilized species, species under moratoria and listed species at risk and for the purpose of this environmental assessment as considered part of commercial fisheries.** Commercial fisheries was selected as a VEC because of the potential for direct interaction with the Project. Specifically, commercial fisheries was selected as a VEC because of: **The following text has been added to Section 7.8.1.2:** Other users include Aboriginal fisheries, recreational fisheries, aquaculture, seal and bird hunting, military use, marine traffic and tourism and recreation. Marine traffic and military use is the primary other user that could interact with the Project. Aboriginal and recreational fisheries, aquaculture, sealing and bird hunting and tourism and recreational are activities that normally occur Nearshore and are not expected to interact with the Project Area. Therefore, the focus with be on marine traffic and military use in this section. Other users are discussed under accidental events (Section 8.6.7). **Text in other places in Section 7.8 was revised to include examples of fisheries research or other users as warranted and Table 7.14 was also edited.** **Section 8.6.7 was revised to include the additional research fisheries and other users.**
Section 5.2.13 (Accidental Events)	
Modelled physical fate of hydrocarbon spills, **including descriptions of models** and/or analyses that are employed and the physical data (e.g. circulation) upon which they are based [added emphasis to indicate information deficiency].	Sections 2.1 and 2.3 of SL Ross (2011) have been inserted into the main environmental assessment report as Sections 2.12.2.1 and 2.12.2.2, respectively. **The following text has been added to the first paragraph in Section 2.12.2:** As well, a detailed description of the SL Ross Oil Spill Model (SLROSM) is available at www.slross.com/publications/SLR/Description_of_SLROSM.pdf. Additional details are provided in Attachment D. The information provides details on algorithms employed in the SLROSM spill model used in the simulations. The modeling parameters provided in Table 2 of SL Ross (2011) were used in the oil property change relationships shown below.

Comment	Response
Contingency plans, including relief wells and subsea intervention to shut in or cap well, to be implemented in the event of an accidental release.	**The following Text has been added as new Sections 8.1 (Relief Well Planning) and 8.2 (Well Cap and Containment System)**: 8.1 Relief Well Planning Corridor will prepare a relief well strategy that will ensure the following items are addressed in the Approval to Drill process with the C-NLOPB: • a relief well drilling rig contracting plan; • suitable quantity and type of tangible items are readily available for deployment (i.e., wellheads, tubular); and • suitable relief well locations will be pre-determined prior to initiation of operations at Old Harry; these locations will consider expected wind, wave and current directions as well as maintaining a safe distance from the blowing well. 8.2 Well Cap and Containment System Corridor will adhere to industry standards as well as the C-NLOPB's Guidelines and Regulations in place at the time of operations at Old Harry. In conjunction with the Canadian Association of Petroleum Producers (CAPP), the C-NLOPB, other Newfoundland operators and industry companies, Corridor will continue work to ensure that the most suitable cap and containment system available in Eastern Canada is also available for use on this well should the need arise.
Description of activities associated with emergency response (e.g., dispersant use, burning or cleaning operations).	**The following Text has been added as new Section 8.3**: 8.3 Spill Response Technologies The general awareness of drill rig personnel will be increased through training and safety meetings. Personnel will be encouraged to report potential problems and 'near miss' incidents in an attempt to avoid an occurrence that could result in a loss of containment or other release of petroleum or other hydrocarbons. Standard Operating Procedures to reduce or eliminate the chance of a spill, even in the case of equipment failure, will be instituted for all hydrocarbon handling operations. Prior to drilling, practices for operating in poor weather and/or high sea state conditions will be established. Good communications and sound marine practices for all vessels will also improve the ability to prevent spills. The emergency oil spill program should consider a range of offshore spill response options as well as training and Standard Operating Procedures. The decision when to use each of these is based on an evaluation of operating conditions, the anticipated characteristics of the hydrocarbon, the effectiveness of the option and effects on the environment. There are environmental and technological constraints to response and cleanup. High sea states and visibility are examples of typical environmental constraints, while technological constraints include pumping capacity of oil recovery devices and effectiveness of chemical dispersants. These kinds of limitations apply in all environments and jurisdictions. Cleanup and recovery from an oil spill is difficult and depends upon many factors, including the type of oil spilled, the temperature of the water (affecting evaporation and biodegradation) and the types of shorelines and beaches that may be involved. Some examples of methods for cleanup and recovery include the

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	following: • Surveillance, tracking and detection are critical. Information about the location, movement and characteristics of the oil spill must be considered. Selection and application of response technologies depends on the location and movement of the oil, surface layer thickness and the nature and extent of weathering. Technologies for surveillance, tracking and detection include tracking buoys (used to follow the movement of the oil slick in response to winds, surface currents and ice movements), satellite imagery, airborne reconnaissance, vessel reconnaissance, trajectory modelling and optical tracking. • Mechanical recovery involves the physical containment of the oil within natural or artificial barriers and the subsequent removal of the oil from the surface. Containment barriers are used to intercept, control, contain and concentrate spreading oil. Recovery of oil contained or concentrated with boom or natural barriers is accomplished using a skimming or recovery system that removes oil and water from the surface. • Natural dispersion and/or degradation is the natural weathering of hydrocarbon as it breaks into small droplets by wave action that are metabolized by micro-organisms. • Mechanical dispersion is the mechanical breakup of small spills by the use of readily available tools such as vessels (propeller wash) and sprayed water. • Chemical dispersion or dispersants are a group of chemicals sprayed or applied onto oil slicks to accelerate the process of natural dispersion. They are usually used in oil spill response when it is desirable to reduce the amount of floating oil to minimize damage to shorelines, wildlife, and other sensitive resources. These must be authorized by the C-NLOPB before application. • Controlled burning can effectively reduce the amount of oil in water, if done properly, but it can only be done in low wind, and can cause air pollution. In situ burning is undertaken by collecting and thickening the oil with a fire resistant boom, ignite it burning the oil in place in the water. • Blowout control is an important response strategy, as it would be the primary method to control and minimize the environmental effects of a well blowout. An Oil Spill Response Plan will be developed in advance of operations and submitted to the C-NLOPB for review and approval as part of the Operations Authorization application. This Plan will describe in detail the oil spill response strategies to be utilized in the unlikely event of an accidental release.
Section 5.3 (Significance of Adverse Environmental Effects)	
"The effects assessment methodology should clearly describe how data gaps are considered in the determination of significance of effects."	**The following has been added as the final paragraph in Section 6.3.9:** Data gaps with respect to our current scientific knowledge regarding biological, physical and scientific processes can and do occur. The data gaps are considered when conducting the environmental effects assessment and will influence the level of confidence applied to an assessment. The means by which the data gaps are incorporated into the assessment is to consider the effect that the activity can potentially have on the environment (such as the duration, extent, seasonality,

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	vector), consider the level or degree of effect on the environment (lethal, chronic, minimal, no effect, short term, long term) and the available scientific knowledge about the effects of the activity (such as can cause smothering of benthos in 500 m of discharge, results in potential bioaccumulation of metals to a harmful level in an organism, cause mortality from toxic response). Once these types of information have been considered, then the level of confidence of the environmental effects assessment can be assigned. Ultimately the assignment of the level of confidence incorporates professional judgment and experience of both the assessor and from similar undertakings while considering the data gaps.
Section 5.4 (Cumulative Effects)	
"The assessment of environmental effects ... should include a consideration of environmental effects that are likely to result from the proposed project in combination with other projects or activities that have been or will be carried out." The "other projects or activities" that are considered in the cumulative effects assessment are not fully and explicitly described in the EA report.	Section 6.3.8 indicated that the cumulative effects assessment considers the cumulative environmental effects of the proposed single exploration well in combination with: • marine transportation [described in Section 5.8.2.7]; • fishing activities [described in Section 5.8.1]; • research surveys [described in Sections 5.8.1.4 and 5.8.1.5]; • military exercises [described in Section 5.8.2.6]; and • other oil and gas exploration programs (including seismic and geohazard programs) [described in the first paragraph of Chapter 9]. **The first paragraph in Chapter 9 has been revised as follows (new text in bold):** Potential cumulative environmental effects external to the Project include marine transportation **(see Section 5.8.2.7)**, commercial fishing **(see Section 5.8.1**), oil and gas exploration including seismic activity and research surveys **(see Sections 5.8.1.4 and 5.8.1.5)**. There is little potential for environmental effects resulting from the proposed exploration well to overlap with other existing exploration drilling programs either temporally or spatially. There is potential for seismic surveys to be conducted along western Newfoundland between 2012 and 2014. **The recent (November 16, 2011) land sale resulted in the sale of the two parcels in Western Newfoundland (NL-11-01-01 (west of EL 1120) and NL-11-01-02 (west of EL 1097, EL 1098 and EL 1103)).** DFO conducts annual multi-species research surveys in the Gulf, usually in August and September. During the exploration drilling program, it is expected that some commercial traffic will be passing in the vicinity of the Project Area. As well, commercial fishing vessels may be transiting in the vicinity of the Project Area. **The increase in vessel traffic resulting from supply vessels will be minimal with respect to the traffic currently associated with marine traffic and fishing activities.**
In addition to the foregoing, the following items should be addressed:	
The dispersion of mud and cuttings in the water column, which is described in AMEC (May 2011l), does not appear to be considered in the environmental effects analyses described in Section 7 of the EA Report.	A description of water column modelling results and potential environmental effects of cuttings in the water column are provided as the final (new) section in Section 7.1.2.1 (immediately preceding Section 7.1.2.2) (see Attachment E).
Given the crucial importance of representative	See Attachment F. This text replaces the existing Section 2.3 of the

Comment	Response
crude oil selection to the validity of spill modeling results described in the EA report and in S.L. Ross Environmental Research Ltd. (October 20 II), the greatest detail practicable should be provided to justify this selection. Therefore, the report entitled Genesis of Reservoir Hydrocarbons and Migration of Oil and Gas within Old Harry Prospect: Two Dimensional Petroleum System Modelling Using 2-D Seismic Lines (98-23-K50 and 98-32) (Mukhopadhyay, P.K. 2011) should be provided.	environmental assessment report.
Provide detail on the description of the drill cuttings model (Comment provided verbally)	Sections of AMEC (2011) have been inserted into the main environmental assessment report as new Sections 2.12.1.1 to 2.12.2.3.

Attachments

A New Section 4.1.4 (Natural Hazards)

B Additional Text for Section 5.8.2 (Other Users)

C Additional Text for Section 5.8.1 (Commercial Fisheries)

D Details on Algorithms Employed in the SLROSM Spill Model used in the Oil Spill Trajectory Simulations

E Water Column Modelling Results

F Section 2.3 Replacement