Environment Canada

Chapter 2 Project Description

2.3.2.2 Evaluation of Material Disposal Options

Will there be any discharges of deleterious substances to receiving waters?

2.6.2 On-Land Construction

What will be the standards used for sewage treatment?

2.6.3.1 Excavation

Quote: "Site surface water and groundwater from any dewatering of the graving dock will be collected, assessed and, if necessary, held in an engineered lined settling pond onsite to satisfy all regulatory requirements before being discharged into the marine environment."

Are the regulatory standards both federal and provincial?

2.6.3.4 Site Dewatering and Disposal

Quote: "Water will be treated with a mobile treatment unit as required prior to discharge to ensure compliance with provincial and federal requirements."

Confirm that these standards will be used for site surface water and groundwater as above.

Chapter 3 Summary of White Rose Extension Project Specific Models

General:

The document did not reference the regular tanker traffic associated with the Come-by-Chance refinery. Nearshore Project Area will transect the shipping lanes for these oil tankers. What protocols will be developed to allow the safe coordination of project activities with tanker traffic in the dredging, module mating, and transportation to White Rose drilling site phases? Given weather conditions, navigational challenges, length of time required for project phases and the nature of all the vessels involved, there could be potential for close manoeuvring between vessels, which should be considered in the context of the assessment**.**

Nearshore work could involve the use of heavy lift vessels, supply vessels, tugs, as well as on-shore large construction equipment. The nearshore spill modeling considered fuel spills ranging from 100 to 350 m^3. Supply vessels can have a capacity of over 1100 m^3 of fuel and, in the event of collision, could lose more than 350 m^3. It may be useful to run nearshore scenarios with expanded fuel capacity reflecting what is carried in larger vessels.

Again, for nearshore work, it may be useful to examine the potential for spills in the land-water interface (e.g., heavy equipment upset into a water body; puncturing of an onshore fuel tank that could spill into a water body). Planning could include placing in local inventory the material and equipment needed to deploy a boom from land to contain a water-borne slick, as well as having appropriately trained personnel.

3.6 Hydrocarbon Spill Probabilities

In general, this section is difficult to follow. Some of the sources and information used are fairly dated (e.g., NAS 2000; Scandpower 2000). It might also be useful to change the format of the section so that calculations are done in an equation format with corresponding data tables reflecting the results of those calculations. In the discussion, it would also be useful to indicate which calculations were used to derive the spill probability for the White Rose Expansion Project.

3.6.1.1 Blowouts During Drilling

Quote: "Up to 2011, four development-drilling blowouts have produced spills in the very large spill category (Table 3-48, including the recent incident in Australia, and including the spill in the extremely large category)."

Unclear. The description could be reworded to something like, "From Table 3-48, there are four large spills from development well blowouts, giving a spill frequency of (4/67,703) x 5.9 x 10^{-5} / well drilled = 1 spill / 17,000 wells drilled."

3.6.1.2 Blowouts During Production and Workovers

Quote: "…it is estimated that the total oil produced offshore on a worldwide basis up to 2011 has been approximately 210 billion bbl, and that the total producing oil well-years has been 350,000 well-years… On this basis, the world-wide frequency of extremely large hydrocarbon spills from oil-well blowouts that occurred during production or workovers is 5.7 X 10^{-6} blowouts/well-year. For very large, the number is 1.4X10^{-5} blowouts/well-year."

In recent decades, there has been an increasing move to explore and exploit hydrocarbon reserves that had been previously less accessible, or even inaccessible, given technologies available at the time. With the move to exploration in less hospitable frontiers, there would seem to be greater risk for spills from blowouts posed by environmental and geological conditions. These differences could be statistically smoothed by looking at the longer term drilling record. Perhaps the reference cited (Deloitte Petroleum Services. 2012. *List of Offshore Petroleum Wells to December 31, 2011*. Report generated on request from Deloitte LLP. London, England) discussed this aspect -- it would be informative if this was addressed in looking at exploration that has occurred in more challenging environments, which could have an impact on the calculated probabilities.

3.6.1.3 Summary of Extremely Large and Very Large Oil Spills from Blowouts

Quote: "…the *Ixtoc l* oil-well blowout ... was caused by drilling procedures (used by PEMEX, …) that are not practised in US or Canadian waters and that are contrary to US or Canadian regulations and to the accepted practices within the international oil and gas industry. Therefore, extremely large spill frequencies in North America are expected to be even lower."

A few points to consider:

- Mexico is part of North America;
- the Macondo blow-out in the Gulf of Mexico occurred partly due to "… BP, Transocean, and Halliburton's conduct violated federal offshore safety regulations

under BOEMRE's jurisdiction… " and poor risk management (*Oil and Gas Journal*, Sept. 14, 2011);

- there are different regulations in the US and Canada (e.g., 3.6.2.1 Shallow Gas versus Deep-well Blowout, Page 3-63 indicates that Canada requires two barriers in exploration and development, while only one is required in the US); and
- *Quote:* "…extremely large spill frequencies in North America are expected to be even lower" is a conclusion that could be modified based on the above.

3.6.2.1 Shallow Gas versus Deep-well Blowout

Blowout stats are derived from Scandpower (Scandpower A/S 2000. *Blowout Frequencies 2000, BlowFAM Edition*. Report No. 27.20.01/R3.). While very informative, it would be good to have stats up to 2013, given the significant blowouts that have occurred since 2000 (e.g., Deep Water Horizon in the Gulf of Mexico (2010) and the Montara spill off the west coast of Australia (2009)). These occurrences would not have been included in the other document cited (IAOGP 2010) since statistics quoted are up to 2005.

Quote: "Finally, it is worth noting (Table 3-52) that shallow gas blowout frequencies in the North Sea and in the US GOM have been on the decline in the most recent years of the record."

This is based on a period up to 1997 – 16 years ago. It would be good to determine if data are available to the present to indicate whether that trend has changed.

3.6.3 Large Platform Spills

Quote (P. 3-65, para. 2): "BOEMRE statisticians … have decreased the estimate gradually over the past 15 years, mostly in recognition of a statistical trend towards a lower spill frequency."

What is the lower value? For what year?

Quote (P. 3-65, para. 4): "Note that the above statistic for spills >10,000 bbl (i.e. 5.5×10^{-6} spills/well-year) is almost four times smaller than the statistic derived earlier for production blowout spills >10,000 bbl (i.e. 2.0×10^{-5}). This is impossible because the first category includes blowout spills. The reason for the anomaly is that the US record was used for the former and the world-wide record was used for the latter. The world-wide statistic is higher than the US-derived one because the former was developed on a very conservative basis, which considered an exposure of only oil wells and not gas wells."

This paragraph is unclear, please clarify which probability is going to be used and why.

Quote: "It is noted that there has been … Given the limited statistical database of Newfoundland and Labrador production operations, the US statistics are used in this frequency calculation."

Is it because of similar geologic and marine conditions? Are there greater similarities with North Sea operations?

3.6.6 Summary of Blowout and Spill Frequencies
Quote (P. 3-68, last para.): "…0.5 and 0.2, respectively."

Are those values percentages?

3.7 Fate and Behavior of Hydrocarbon Spills in the Nearshore Study Area (Trajectory Modelling) and 3.8 Fate and Behavior of Hydrocarbon Spills from a Platform or Seafloor Blow-out in the Offshore Study Area (Trajectory Modelling)
Please see the attached report "Review of Husky Energy Proposal for The White Rose Extension Project Oil Spill Aspects" by Dr. Merv Fingas.

In general, Environment Canada is in agreement with the proponent's findings with some differences in direction due to differences in winds and currents utilized (the EC modelling was done in stochastic mode with winds from CMC and currents from DFO). The persistence of the oils differed somewhat, with the proponent overestimating dispersion. In the EC modelling, there were a few cases where oil impacted the shorelines in Placentia Bay and the movement was consistently to the south, driven by NE winds. In contrast, the proponent had the oil moving further into the bay.

3.7.1 Model Inputs and Scenarios
Quote (P. 3-69, para. 1): "The only potential sources of marine spills from the WREP nearshore operations are batch spills of fuel as a result of ship accidents or groundings during tow-out activities from the graving dock to the deep-water mating site and the support vessel activities during the topsides installation."

Could add dredging operations here.

P. 3-69, para. 2:
If supply vessels are in the nearshore, they can have fuel capacities of around 1150 m^3, so the batch spills could range from 100 to 1150 m^3 rather than the 350 m^3 suggested.

P. 3-69, para. 3:
Why not include current maps for the autumn (Oct – Dec) as well?

3.8.22 Surface (Platform) Spill
Quote (last para.): "…the oil will be broken into small tar-balls spread over a large area, with the oil particles separated by large expanses of water."

Where would the tar-balls end up? Are there potential impacts for Greenland, Iceland and further east?

<u>Chapter 4 Socio-Economic Terrestrial and Physical Environment Setting</u>
4.2.1.1 Climate Overview and 4.2.1.3 Wind Climatology
The stations used to describe the nearshore climate of Placentia Bay did not include St. Lawrence, located near the mouth of the bay on the west side, with a record of hourly and

daily weather reports nearly as long as that of Argentia. It is more exposed to open water conditions than the other three land stations with hourly data.

EC recommends that hourly wind reports from St Lawrence be analyzed to improve the wind climatology near the mouth of the bay, and could be compared to the southernmost MSC50 grid point.

4.2.1.3 Wind Climatology

Winds from the MSC50 grid point locations and the SmartBay buoys are compared in Tables 4-8 and 4-9. The differences in wind statistics are attributed to the much shorter record of the buoys, but the low buoy anemometer heights, compared to the 10 m MSC50 winds, would also contribute to an apparent low bias.

The wind climatology describes only the hourly-reported sustained (mean) wind speeds. Analysis of gust wind speeds, available from the hourly automatic stations, would be important for planning and design.

4.2.2.2 Waves

The MSC50 dataset was not intended for use very nearshore. The model resolution, representation of the coastline and islands, and the bathymetry, are not optimized for nearshore applications, such as well into the Placentia Bay. EC suggests that this limitation be acknowledged.

4.2.2.5 Tides, Storm Surges

The text gives an estimate of 0.8 m for probable maximum storm surge from 40-year return period hindcast values (from Bernier and Thompson (2006), Figure 4-64), however the storm surge model used by Bernier and Thompson does not include wave set-up or wave run-up or seiche effects, which can contribute significantly to extreme water levels. EC recommends that the EIS include an extremal analysis of water levels based on long time series tide gauge data at Argentia.

4.2.4 Sea Ice and Icebergs

Page 4-112, Figure 4-75:

Typo – The x and y axes are labelled identically as ”Annual Total Number of Icebergs Observed South of 48N”. The label is correct for the x-axis, but the y-axis should simply be labelled “Year”.

4.2.4.1 Sea Ice Conditions in Placentia Bay

Page 4-112, Sentence 3:

Two errors

The ice that enters the Bay in February is generally grey or grey-white ice (less than 30cm thick), and is not first-year ice (>30cm thick). First-year ice incursions into Placentia Bay only take place from March onwards.

- First-year ice is >30 cm thick. Contrary to indicated, it can be >120cm thick. First-year ice that is >120 cm is called “thick first-year” ice. Ice that is 30-70cm is thin first-year ice, and ice that is 70-120cm is medium first-year ice.

Page 4-114, Paragraph 2, Sentence 2 and *Page 4-115, Figure 4-78*:
Error with respect to the upper limit for the standard ice types – In Figure 4-78, the thickness of thin first-year ice (e.g., Mar 19, Mar 26, Apr 02) is given as 50 cm. This is the average thickness for this ice type, not the upper limit as indicated. The upper limit for this ice type is 70 cm.

Page 4-115, Sentence 1:
Typo – It appears that "(Figure 4-4)" should be "(Figure 4-78)".

4.3 Offshore
Page 4-201:
Figure caption is missing – The sea ice chart on this page has no figure number (it should be Figure 4-121). There should also be a reference to the Canadian Ice Service in the caption, as the chart was obtained from its archives.

4.3.1.2 Wind Climatology
The caption for Table 4-44 has the word "anemometer", which should be replaced by MSC50.

4.3.1.5 Icing
This section includes only potential sea spray icing. EC recommends that the EIS include analysis of observed freezing spray and icing accumulation measured on the platforms.

4.3.4.1 Sea Ice
Spatial Distribution:

Page 4-204, Paragraph 3, last sentence:
Clarity – This sentence could easily be misunderstood as written. To make it clearer, it is suggested that it be rewritten as two sentences: "**Thin** first-year or white ice becomes the dominant ice form in areas off Newfoundland beginning in March, just before water temperatures rise above the freezing level. **In April and May, during years when ice lingers in the area, medium to thick first-year ice are the dominant ice forms.**"

Page 4-204, Paragraph 4, first sentence:
Clarity + Typo – For clarity, it is suggested that this sentence be rewritten as: "By the end of July, the ice pack **has retreated** northward, with substantial ice concentrations confined north of Labrador."
Page 4-205, Paragraph 1, Sentence 1 and Figure 4-122:
Slight error – In the first sentence, it says the mid-month Frequency of Presence of Sea Ice charts (taken from the CIS atlas) are shown January through May. All the charts shown are indeed for the middle of the months, except for the one for January. The chart shown for January is that of the week of January 08, when really, to be consistent with the statement and the other months, it should be that for January 15.

Page 4-209, Paragraph 1, Sentence 1:
Clarity – For greater clarity, it is suggested that the phrase "annual timing of all ice incursions" in the first sentence of this paragraph be replaced, since that is not exactly what

the bar graph in Figure 4-127 shows. The sentence should rewritten as: "The **average ice coverage during the initial period of** ice incursions near the White Rose field, **between end of November and mid-February**, from 1980 to 2012, is shown in Figure 4-127."

Page 4-209, Paragraph 1, Sentence 2:
Clarity, as in Sentence 1 – Suggested revision of this sentence: "These data show the years of higher-than-average **ice coverage during the initial period of ice** incursions (1983 to 1995, 2000 and 2008)."

Page 4-209, Paragraph 1, Sentence 3:
Clarity – as in Sentences 1 and 2
Inconsistency – The incursion period shown in Figure 4-127 spans Nov 26 – Feb 19. But the representative chart shown for 1993 is for March 01.

Suggested revision of sentence 3: "The maximum recorded **amount of ice during the initial period of** incursion of sea ice for east Newfoundland waters occurred in 1993 **(Figure 4-127). The 1993 ice coverage chart for the second week following the incursion period** is illustrated in Figure 4-128."

Concentrations:
Page 4-212, Paragraph 2, Sentence 1:
Illustration or example required – When talking about the "seasonal ice tongue", it would be helpful if the reader were pointed to a visual example of this. A bracket could be added to the end of the first sentence, such as "(e.g. see Figure 4-124)".

4.3.4.2 Icebergs
Origins and Controlling Factors:
Page 4-217, Paragraph 1, Sentence 4:
Correction – Since the Humboldt Glacier and Jacobshavn Isbrae are two of the major sources of icebergs, the sentence should read, "…primarily from 20 major glaciers between **and including** the Jacobshavn and Humboldt glaciers". Also, note that there is no "e" in Jacobshaven.

Page 4-217, Paragraph 4:
Additional explanation could be added here – It could be explained that the reason why there is a positive correlation between iceberg numbers and pack ice extent is that the pack ice protects the icebergs from melt and wave-induced deterioration during their trip southwards. Because of this, many more bergs survive the trip to Newfoundland during winters with extensive pack ice.

Page 4-217, Paragraph 5, Sentence 1:
Inconsistency – It is stated that according to the data (Figure 4-133) **iceberg counts of zero occurred in 1966**, 2006 and 2011, **however the bar chart in Figure 4-133 only goes back to 1981**. If a low of zero bergs did occur in 1966, a bracket after this year saying "(not shown)" should be added to the sentence.

Variations in Local and Regional Iceberg Numbers:

Page 4-219, Paragraph 1, Sentence 2:

Inconsistency – Here it is stated that iceberg distributions between March and May of 2009 and 2010 are illustrated in Figures 4-134 and 4-135. However, the two charts shown for 2009 are for March and April, while those shown for 2010 are for March and May. While April does fall "between March and May", it would be better to compare the same months for the two years (i.e., either use a May chart for 2009 or an April chart for 2010).

Page 4-223, Figure 4-137:

Chart does not make sense and needs more explanation – According to this chart, which is said to be based on the PAL database, zero bergs were sighted everywhere over the last decade except in the vicinity of the White Rose platform (smack in the middle of the highest observation densities) and along the Northern Peninsula of Newfoundland. Clearly this is not the case (see Figures 4-134 and 4-135). I suspect that what this chart is showing is a subset of the PAL sightings, based around or made from either the White Rose or Hibernia platforms. What exactly this chart is showing needs to be better explained here.

Size Distributions:

Page 4-226, Table 4-80:

Slight errors in quoted height and length values, and in quoted mass values

- Height / Length – The ranges of heights and lengths for each category should begin one increment higher than that of the previous category. So if a Bergy Bit has a length range of 5-15 m, then a Small Iceberg has a length range of 16-60 m (not 15-60 m). Ditto for height. This needs to be corrected for the small, medium and large iceberg categories in the table. See MANICE, Tables 2.3 and 4.8.
- Approximate Mass – Although ranges for the masses of medium and large icebergs are given in Table 4-80, the cited source of information does not give ranges for these categories. According to MANICE (Table 2.3), a Medium berg has an approximate mass of 2,000,000 tons and a Large berg has a mass of 10,000,000 tons.

Iceberg Length:

Pages 4-227 to 4-228, Figure 4-140:

Figure is split across 2 pages – This is a little confusing because the Figure has two panels. The panels should either be labelled "a)" and "b)" with descriptions of these in the Figure caption so that it is clear these panels both belong to "Figure 4-140", or the Figure should be published on a single page and not split across pages.

Page 4-227, Paragraph 3, Last Sentence:

Clarification – It should be stated that the Petermann Glacier is in northwest Greenland, north of the 20 greatest sources of icebergs noted earlier, which lie between and include Jacobshavn Isbrae and the Humboldt Glacier. It could also be noted that the Petermann Glacier has a history of calving large tabular ice islands as opposed to hundreds of smaller bergs, the way the other glaciers do.

Iceberg Draft:
Pages 4-228 to 4-229, Figure 4-141:
Figure is split across 2 pages – This is a little confusing because the Figure has two panels. The panels should either be labelled "a)" and "b)" with descriptions of these in the Figure caption so that it is clear these panels both belong to "Figure 4-141", or the Figure should be published on a single page and not split across pages.

Page 4-227, Paragraph 4, First Sentence:
Inconsistency – It is stated here that the data used in Figure 4-141 were derived from observations and measurements made from **2000 to 2012**, but the source under Figure 4-141 says the PAL data span **2000-2011**. According to our iceberg expert here at CIS, the 2012 data are not yet available.

Iceberg Height:
Page 4-229, Paragraph 2:
Reference to Figure 4-141 missing – The reader should be directed to Figure 4-142 somewhere in this paragraph.

4.3.9 Climate Change,
The proponents discuss the impacts of NAO on climate and storminess of the region as well as on the path of hurricanes over the 20th century. Although confidence in projections is generally low (see IPCC SREX), they should provide some general discussion of projected future changes in these climate phenomena as well as extratropical storm tracks, frequency and intensity.

Page 4-264:
MSC50 is mistakenly used in the sentence citing Swail et al 1999. It should be AES40, the earlier hindcast.

4.3.9.1 Sea Level Rise
The proponents cite the IPCC AR4 which gives projections of global sea level rise of 18-59 cm by 2100 across the range of scenarios and models (the proponents cite an increase of 22-44 cm for the A1B scenario). These estimates are derived from process-based models and exclude possible effects of accelerated ice sheet dynamics. More recent studies based on process-based models give an estimated rise of 20-80 cm by 2100 (e.g. Church et al., 2011). Semi-empirical models yield estimates in excess of 100 cm. As such, the proponents may want to consider a wider range of possible change than they have presented here and discuss local (as opposed to global) sea level changes.

4.3.9.2 Waves
Projections of wind-driven ocean wave heights are not available from current global climate models. As such, future projections of wave height have been based on either: (1) dynamical models that use wind speed projections to drive wave models, or (2) statistical downscaling based on relationships with variables related to wave height (e.g., sea level pressure projections). Wave height projections are considered uncertain (see IPCC SREX) in part because there are few studies but also because of limitations with GCM estimates of wind

speed (used to drive wave models). The proponents rely on wind speed projections from a single scenario from a single climate model (CGCM2, B2) to make inferences about changes in wave height. This approach is inadequate to capture the range of uncertainty. They note increased wind speed is projected from this run. Recent studies project decreased wave height in this area (e.g., Hemer et al. 2012).

4.3.9.3 Sea Surface Temperatures

It is not clear exactly which gridpoints the SST anomalies plotted in Figures 4-163 and 4-165 are from.

Why are trends in SSTs only discussed over the period 1981-2010? Much longer records are available and would be more appropriate for trend analysis

What are future SST projections for the region?

Chapter 10 Marine Birds

General:

The species "Greater Shearwater" should be changed to updated common name of "Great Shearwater" throughout the text.

10.3.1 Nearshore Overview

Quote: "It contains the largest Northern Gannet nesting colony (14,696 pairs (2011) (CWS unpublished data)), the largest Thick-billed Murre colony and third largest Common Murre colony (14,789 pairs (2009) (CWS unpublished data)) in Newfoundland and Labrador (Table 10-2)."

The largest Thick-billed Murre colonies are located in Labrador. The colony mentioned above is the largest colony on the Island of Newfoundland, but is also the most southerly colony of the Thick-billed Murre's breeding range.

Quote: "The only sustained breeding site for Manx Shearwater in eastern North America is located at the Middle Lawn Islands, Burin Peninsula (Figure 10-1) (Roul 2011)."

It should be noted here that Middle Lawn Island, along with two adjacent islands, which are collectively known as the Lawn Islands Archipelago, are now established as a Provisional Ecological Reserve by the Government of Newfoundland and Labrador, Parks and Natural Areas Division.

Figure 10-1 Locations of Seabird Nesting Colonies at Important Bird Areas in Relation to the Study Areas

The Cape Freels Important Bird Area (IBA) should highlight Cabot Island as an important nesting area for migratory birds. Cabot Island supports approximately 10,000 pairs of nesting Common Murre (Canadian Wildlife Service, unpublished data). Gull Island should be removed from the list of important bird areas. This information should be updated in this section and in subsequent maps.

Table 10-2 Numbers of Pairs of Marine Birds Nesting at Marine Bird Colonies in Eastern Newfoundland
Cabot Island should be added to this table.

10.3.5 Marine Bird Nesting Colonies Along Southeastern Newfoundland
Quote: "More than 4.6 million pairs nest at these three locations alone (Table 10-2; Figure 10-1). This number includes the largest Atlantic Canada colonies of Leach's Storm-Petrel (3,336,000 pairs on Baccalieu Island), Black-legged Kittiwake (23,606 pairs on Witless Bay Islands), Thick-billed Murre (1,000 pairs at Cape St. Mary's) and Atlantic Puffin (272,729 pairs on Witless Bay Islands) (Cairns et al. 1989; Rodway et al. 2003; Robertson et al. 2004)."

It should be noted here that two of the three Northern Gannet colonies in the province of Newfoundland and Labrador are on the Avalon Peninsula.

Quote: "The Offshore Study Area is well beyond the foraging range of breeding birds during the breeding season (approximately May to August)."

Murres will feed close to their breeding colonies when spawning inshore capelin are available (late June/early July), but prior to the capelin spawning period will feed further from the colonies. Gannets and storm-petrels are known to feed considerable distances away from the colonies and may forage within the offshore study area (as noted on page 10-28 of the EIS).

10.3.6.8 Alcidae (Atlantic Puffin)
Quote: "Grand Colombier in St. Pierre et Miquelon is the only breeding colony near Placentia Bay; approximately 400 pairs nest there."

The number of pairs breeding at the Grand Colombier colony should be updated to 9,543 pairs breeding pairs (Lormee et al. unpublished data).

Chapter 13 Sensitive Areas
Figure 13-3 Ecological Reserves and Special Places Identified in Placentia Bay
The Lawn Islands Archipelago Provisional Ecological Reserve should be added to this section. The Lawn Islands Archipelago Provisional Ecological Reserve is also an Important Bird Area, and should be identified as such where Important Bird Areas are discussed.

Table 13-2 Number of Pairs of Marine Birds Characteristic of Placentia Bay Colonies
Columns should be added here regarding the Lawn Islands Archipelago IBA and the Corbin Island IBA.

Additionally, data for population numbers of Northern Gannet and Common Murre at the Cape St. Mary's IBA are incorrect. Numbers reported in Chapter 10 of this EIS should instead be used.

Figure 13-4 Areas Identified as Important for Birds and Whales in Placentia Bay
The Lawn Islands Archipelago IBA and the Corbin Island IBA should be identified on this map.

13.3.1.5 Bird Habitat
The Lawn Islands Archipelago IBA and the Corbin Island IBA should be added to this list.

13.5.1 Effects Analysis and Mitigation – Nearshore
It should be noted that eelgrass beds are wetlands.

The proponent should be aware that as part of its commitment to wetlands conservation, the Federal Government has adopted *The Federal Policy on Wetland Conservation* (FPWC) with its objective to "promote the conservation of Canada's wetlands to sustain their ecological and socio-economic functions, now and in the future." In support of this objective, the Federal Government strives for the goal of No Net Loss of wetland function on federal lands or when federal funding is provided. EC-CWS therefore recommends that the goals of the policy be considered in wetland areas, and EC-CWS recommends that that the hierarchical sequence of mitigation alternatives (avoidance, minimization, and as a last resort, compensation) recommended in FPWC is followed. Avoidance refers to elimination of adverse effects on wetland functions, by altering the siting or modifying the design of a project, and is the preferred option. In the event that avoidance is not possible, the reasons why elimination of adverse effects on wetland functions were not possible should be clearly demonstrated in environmental assessment documents, and EC-CWS should be contacted for advice on next steps to follow for compliance with the FPWC.

A copy of the FPWC can be found at: http://dsp-psd.communication.gc.ca/Collection/CW66-116-1991E.pdf

13.5.2.1 Nearshore (Important Bird Areas)
The Lawn Islands Archipelago IBA and the Corbin Island IBA should be added to this list.

Chapter 14 Effects of the Environment on the White Rose Extension Project
14.4 Nearshore Potential Marine Effects
The text gives an estimate of an extreme storm surge of 0.8 m occurring at the time of a large high tide, based on a model that does not include wave run up or set up, or seiche effects. As noted on the comments in 4.2.2.5, EC recommends an extremal analysis of water levels of long term tide gauge at Argentia would give better results for this location.

14.4.6 Sea Ice and Iceberg
Sentence 2:
Same comments as in Section 4.2.4.1
Two errors

- The ice that enters the Bay in February is generally grey or greywhite ice (less than 30cm thick), and is not first-year ice (>30cm thick). First-year ice incursions into Placentia Bay only take place from March onwards.
- First-year ice is >30 cm thick. Contrary to indicated, it can be >120cm thick. First-year ice that is >120 cm is called "thick first-year" ice. Ice that is 30-70cm is thin first-year ice, and ice that is 70-120cm is medium first-year ice.

Chapter 16 Environmental Management

16.8 Emergency Response

As emergency response is covered in the *Incident Coordination Plan (EC-M-99-X-PR-00003-001)*, which is a pre-existing plan for operations, EC is not providing comments. Likewise for the *OSR Procedure – East Coast Oil Spill Response Plan (EC-M-99-X-PR-00125-001)*.

16.11.2 Single vessel Side Sweep System

It would be beneficial to have a brief description on how equipment would be retrieved and cleaned, and how waste oil and sorbents would be handled

16.13.3 Dispersants

It would be beneficial to indicate dispersant (Corexit 9500) availability, and whether quantities would meet the requirements at various levels of possible response.

16.14 Offshore Training – Spill Response Operations

It would be beneficial to indicate the types of exercises undertaken that would test crew and equipment under real conditions. Associated with these exercises could be the testing of communications and response management structures that combines the efforts of on-scene and on-shore emergency management. The communications hierarchy would also include communications to regulators and 24/7 pollution reporting (CCG-EC).

16.17.3 Physical Management

Quote (Page 16-30): "The effectiveness of operational iceberg towing conducted during the 1980s has been studied (Bishop 1989). The conclusions were that, of 354 iceberg towing operations considered, 277 were successful with no difficulties, 74 were successful but required several attempts and 49 were unsuccessful. This translates into an effectiveness of 86 percent. Recently, much has been made of the criteria used in this study to define successful tows. However, since in most cases it is unknown what the free-drifting track would have been if the iceberg were not towed, tow success can only be evaluated on one simple criterion: did the offshore facility have to move? If not, the tow was successful".

Since the WHP is not mobile, how would this affect the required design of the CGS?

Oil Spill Fate and Behaviour Modelling Supporting Document

See Attached Document
Review of Husky Energy Proposal for The White Rose Extension Project Oil Spill Aspects, Merv Fingas Spill Science Edmonton, Alberta (For Environment Canada (February 2013)).

Department of National Defence

The Department of National Defence is likely to be operating in the vicinity of the study area in a non-interference manner during the project timeframe. A search of the unexploded ordinates (UXO) records was conducte3d and those records indicate that there are two wrecks within the study area. There are two sunken U-Boats dating from 1942. The approximate locations of the U-Boats are 47.78N, 49.83E and 50.00N, 46.53E. Due to the limits of technology at the time of the sinking, the location information is considered inaccurate.

Given DND's understanding of the survey activities to be conducted, the associated UXO risk is assessed as negligible. Nonetheless, due to the inherent dangers associated with UXO and the f ct that the Atlantic Ocean was exposed to many naval engagements during WWII, should any suspected UXO be encountered during the course of the proponent's operations it should not be disturbed/manipulated. The proponent should mark the location and immediately inform the Coast Guard. Additional information is available in the 2012 Annual Edition - Notices to Mariners. Section F, No.37. In the event of activities which may have contact with the seabed (such as drilling or mooring), it is strongly advised that operational aids, such as remote operated vehicles, be used to conduct seabed surveys in order to prevent unintentional contact with harmful UXO items that may have gone unreported or undetected. General information regarding UXO is available at our website at www.uxocanada.forces.gc.ca.

Natural Resources Canada

Coastal and Marine Geology:
NRCan's Conclusions:

The proponent has properly referenced and described both nearshore and offshore Grand Bank geology (surface and shallow subsurface). The Final design criteria for the potential gravity-based structure will be based on a detailed geotechnical investigation and proper engineering design and installation details are not provided in the EA document. NRCan does not have expertise to advise on those aspects.

NRCan has not identified any issues or information gaps on aspects related to coastal and marine geology.

Seismicity:
NRCan's Conclusion:
Based on NRCan's review of section 4.3.8, the seismicity and seismic hazard review analysis is reasonably comprehensive. The proposed 1/2500 year hazard values appear to be considerably higher than previous industry assessments and, if they are used in the design process, should be adequate.

Using the average of the values from Model A and B is a little un-conservative relative to using a model that gives each a 50% weight. NRCan confirms that the estimated "GSC model" entries in Table 4-83 are approximately the same as when NRCan's Geological Survey of Canada (GSC) runs its NBCC2005 model for the White Rose site. The GSC values are median values, but it is uncertain whether the URS seismic hazard values in Table 4-83 of the EA document are mean or median values and should be clarified before they are used in design. The GSC is currently working on a revised model for NBCC2015 that gives lesser weight to "Model 2". Indications are that the mean hazard that the full model gives at the White Rose site will not exceed the "URS" values in Table 4-83. Note that the NBCC seismic source models are national in scope and of necessity very general for specific locations, so the values from the model are only suitable for screening purposes. Site-specific studies are recommended where safety or cost implications justify them.

NRCan Recommendation:
The proponent should clarify whether the URS seismic hazard values in Table 4-83 (chapter 4) are mean or median values before they are used in design.

Transport Canada

Specific Comment / Request for Additional Information:
The Proponent is advised to assess all proposed works, including dredging operations, against the Minor Works and Waters Order.

The Proponent is advised to submit a completed 'Request for Work Approval' for all works and activities that do not meet the criteria outlined in the Minor Works and Waters Orders. Completed requests can be submitted to:

Navigable Waters Protection Program
Transport Canada – Marine Safety
PO Box 1013
Dartmouth, NS B2Y 4K2
P: (902) 426-2726
F: (902) 426-7585
E: nwpdar@tc.gc.ca

The Minor Works and Waters Order, 'Request for Work Approval' application, and other relevant information are available from the following website:

http://www.tc.gc.ca/eng/marinesafety/oep-nwpp-menu-1978.htm

Specific Comment / Request for Additional Information:
In addition to the applicable regulations under the Canada Shipping Act, all international project vessels must apply for a Coasting Trade Permit issued under the Coasting Trade Act. This means that the vessel would comply with all applicable regulations under International Maritime Organization (IMO) Conventions, including but not limited to;
- International Convention for the Safety of Life at Sea (SOLAS)
- International Convention for the Prevention of Pollution from Ships (MARPOL)
- International Convention on Standards of Training, Certification, and Watchkeeping for Seafarers (STCW)
- International Convention on Load Lines (LL)
- International Convention on Tonnage Measurement of Ships (TONNAGE)
- International Convention on the Control of Harmful Anti-Fouling Systems on Ships (AFS)
- International Convention on Civil Liability Damage for Oil Pollution Damage (CLC).

The Coasting Trade Permit is actually issued by Canadian Customs in consultation with Canadian Transportation Agency and Transport Canada.
Page 17-15 of the EA Report states that project-related vessels will use designated routes during construction activities to help mitigate interactions with project vessels and other vessels. Transport Canada – Marine Safety would like an opportunity to review the proposed designated routes. Plans on the designated routes can be forwarded to:

Compliance and Enforcement
Transport Canada – Marine Safety

John Cabot Building, 10 Barter's Hill
PO Box 1300
St. John's, NL A1C 6H8
Tel: (709) 772-5167

Section 15.2.1 - The Proponent is advised that Transport Canada may conduct compliance monitoring in relation to conditions listed on any Part 1, Section 5 Approval issued under the Navigable Waters Protection Act. The potential environmental effects associated with any NWPA approvals may also be evaluated by Transport Canada.

Page 2-22 of the EA Report - The Proponent is advised to communicate the final design of the graving dock to Transport Canada should the graving dock remain flooded and accessible to the navigating public once construction activities are complete.

Canada-Newfoundland and Labrador Offshore Petroleum Board

Page v of xxix - says "*Husky has an Environmental Protection and Compliance Monitoring Plan for its existing activities in the White Rose field. The Environmental Protection and Compliance Monitoring Plan will be modified to include the offshore activities associated with the WREP...*"

- The WHP, if the option selected, will require an installation specific EPP.

Page v of xxix – says "*On June 19, 2012, the Newfoundland and Labrador Department of Environment and Conservation (NLDEC) advised Husky of its determination that the WREP is an undertaking requiring environmental review pursuant to the Environmental Protection Act and that registration was therefore required. Husky formally submitted the Registration to the Province of Newfoundland and Labrador on August 3, 2012*."

- [only] the construction site for the WHP is a provincial undertaking ?

Page vi of xxix – the subsection **Assessment Scope and Approach**

- needs more clarity around the geographic and temporal scope of the assessment

Page vi of xxix – says "This environmental assessment meets these requirements, as well as the requirements of the C-NLOPB Development Plan Guidelines (C-NLOPB 2006)."

- It would be more appropriate to preface the word "meets" with the words "is intended to"

Page x of xxix – says "The environmental effects of hydrocarbon spills could be significant if spills are large and persistent enough to affect more than one generation."

- Is this intended to mean that the on-water slick or shoreline fouling would persist for longer than one generation [which I read as one year but which could be longer], or that the population effect from a large and persistent spill will endure for longer than one generation. Some improvement in sentence construction would be appropriate here.

Page xi of xxix – the sections after the header **Species at Risk** should be designated as **SAR Marine Fish, SAR Marine Mammals and Sea Turtles, and SAR Birds** since there is no other way to distinguish between these headers and the same headings for non-SAR fauna on preceding pages.

Page xiv of xxix – says "*WREP design and planning will benefit from the years of physical data collection in the White Rose field. The WREP design and operations planning incorporates metocean criteria for specific nearshore and offshore conditions. Physical metocean data collection will continue during the WREP*."

- Check against development plan for inclusion of modern metocean data.

Page 1-9 - says "*This environmental assessment meets these requirements, as well as the requirements of the C-NLOPB Development Plan Guidelines (C-NLOPB 2006).*"

- Replace "meets" with "is intended to meet".

Page 1-10, Section 1.5.1

- Need temporal scope

Page 1-11, Section 1.5.2

- Need temporal scope

Page 2-7 says "*AMA would also have to take ownership of the material post-excavation, as material handling is not part of Husky's business*." But page 2-9 says "*In an effort to minimize the environmental footprint and disturbance to all stakeholders as much as possible, Husky has committed to ensuring proper disposal and use of the excavated and dredged material within the Argentia Peninsula. Husky has assumed environmental responsibility for the material from the AMA, and will test and treat the material as required, for the designated use.*"

- Are these statements coherent? If not, make them coherent.

Page 2-9, Table 2-4: WHP Life of Field/Structure is up to 25 Years and Subsea Drill centre productive life is up to 20 years.

- Is this consistent with the original White Rose Environmental Assessment? Is it the proponent's intent to revise the project temporal scope?

Page 2-10, Table 2-4: Well Treatment fluids attribute is described as "≤ 30 mg/L…"

- Insert OIW before ≤ 30 mg/L

Page 2-11, Section 2.4.2 lists "Seawater systems including cooling water and firewater" and Table 2-4 shows "No discharge limit" for "Fire Control Systems Test Water."

- The SeaRose FPSO has [in the past] required continuous discharge from the firewater ringmain to prevent freezing and that this water is expected to meet discharge limits for chlorine concentration. This potential discharge should be considered for the WHP as well.

Page 2-11 and elsewhere – references to OWTG

- References to the OWTG (National Energy Board et al. 2010) should include the phrase "as amended."

Page 2-11 and 2-12 – Discussion of water based mud and cuttings

- This discussion of WBM and Table 2-5 should be moved to a separate section for discussion of mud and cuttings since it is not a discussion of wellhead platform systems and the associated systems are already listed in the preceding list.

Page 2-12 – Discussion of Subsea Drill Centre

- The MODU and its subsystems have been omitted and should be included here

Page 2-13 – Discussion of WBM and SBM cuttings

- This discussion of WBM and SBM cuttings and Table 2-6 should be moved to a separate section for discussion of mud and cuttings since it is not a discussion of subsea drill centre equipment.

Page 2-13 Section 2.5

- The phrase "life of the White Rose field" should be clarified with respect to assessed temporal scope.

Page 2-16

- What is meant by the term "industrial-sized road"?

Page 2-20 On-Land Construction Section 2.6.2 – does the emergency generator have a capacity of 750 kilowatts per hour as well? If not, then what is the hourly kilowatt number? Kilowatts per hour is the much more common and useful value.

Page 2-23, Section 2.6.3.2 says "As part of PWGSC's site-wide environmental site assessments (ESAs) completed in 1993/1994 and 1995, 64 test pits, 62 monitor wells, and 15 boreholes with related soil and groundwater sampling were completed at the NFSA site, with the primary emphasis on petroleum hydrocarbon contamination in the area of petroleum hydrocarbon product tank storage, located immediately east of the current site (Figure 2-7)" and Page 2-24, Figure 2.7:

- Are the test pits, boreholes and wells referred to above shown on figure 2-7 since this drawing is titled "Casting Basin Geotechnical Borehole Location Plan" and the notes are somewhat cryptic. Are the existing boreholes locations completed as wells or filled and abandoned? Are the test pits in place or filled and abandoned? Are the proposed observation wells to be installed by Husky or were these proposed and installed some time ago by PWGSC. Please provide additional clarity in relation to figure 2-7.
- If figure 2.7 is to be used for reference then the quality of the figure needs improvement

Page 2-45, Section Wellhead Platform – Flowlines are discussed in Section 2.8.2 Subsea Drill Centre but not here. Are they proposed for the Wellhead Platform? If so, details with regard to installation (e.g. buried, rock covered) should be provided

Page 2-46 Section 2.8.2 Subsea Drill Centre – The particulars of the drill centres should be compared to the previously assessed drill centres, such as size, depth, amount of seabed sediment to be removed per drill centre, etc. If different then it must be addressed.

Page 2-49 White Rose Extension Project Operation Section 2.9 – it is stated that if the WHP development option is selected, then SBM cuttings will be reinjected. How will the SBM cuttings be dealt with before the cuttings reinjection well is drilled?

Page 2-51, Section 2.9.2 says "SBM cuttings will be treated and discharged from the MODU in accordance with the OWTG (NEB et al. 2010)."

- References to the OWTG (National Energy Board et al. 2010) should include the phrase "as amended."

Page 2-47 Subsea Drill Centre Section 2.8.2 – "Dropped object proection", assume it is supposed to be "protection."

Page 2-52 Shipping/Transportation Section 2.12 – "Oil will be stored on the ..."

Page 2-53 Offshore Section 2.14.2– "... in accordance with standard oil field practices AND approved by the C-NLOPB, then..."

Page 2-53, Section 2.14.2 says" *Under the WHP development option, the WHP will be decommissioned and abandoned by first abandoning the wells in accordance with standard oil field practices, then decommissioning the topsides, followed by decommissioning and abandonment of the CGS. All infrastructure will be abandoned in accordance with the relevant regulations. The topsides will be removed from the CGS in a manner evaluated to be most effective at the time of decommissioning. The WHP will not be abandoned and disposed of offshore, nor converted to another use on site.*"

- How does this compare to statements in the 2000 ES
- Should we require a surety for removal costs?

Page 2-53, Section 2.14.2, says" *Under the WHP development option, the WHP will be decommissioned and abandoned by first abandoning the wells in accordance with standard oil field practices, then decommissioning the topsides, followed by decommissioning and abandonment of the CGS. All infrastructure will be abandoned in accordance with the relevant regulations. The topsides will be removed from the CGS in a manner evaluated to be most effective at the time of decommissioning. The WHP will not be abandoned and disposed of offshore, nor converted to another use on site.*"

Under the subsea drill centre development option, the wells will be plugged and abandoned and the subsea infrastructure will be removed or abandoned in accordance with the relevant regulations."

- The text regarding decommissioning should be consistent with the 2001 Comprehensive Study Report…

  [Husky 2001] Page 24, Section 2.5 says "At the end of the production life of the White Rose oilfield development, the operator will decommission and abandon the site according to C-NOPB requirements and Newfoundland Offshore Area Production and Conservation Regulations. The floating production facility will be removed from the oilfield. Subsea infrastructure will be removed and the wells will be plugged and abandoned."

  [Husky 2001] Page 38, Section 4.1.2.3 says "The White Rose site will be abandoned at the end of the production life and will be restored to minimize residual effects on the environment…conditions should revert to those before development and overall there will be no adverse effect. If some structures remain projecting above the seabed, there will be a positive, very localized effect on fish

populations due to the reef effect, provided these structures are protected from trawlers."

[Husky 2001] Page 47, Section 4.2.2.3 says "The White Rose site will be abandoned and restored to near pre-development conditions at the end of its production life to minimize potential residual effects on the environment…"

[Husky 2001] Page 53, Section 4.3.2.3 says "The White Rose site will be abandoned and restored at the end of production to minimize permanent effects on the environment…"

Page 2-53, Section 2.15 says "*Regardless of the development drilling option selected, potential future activities include excavating and installing up to two additional drill centres within the White Rose field. Note that these drill centres have been previously assessed (LGL 2007a), but are included in this environmental assessment in order to extend the temporal scope of these activities.*"

- Is this consistent with the original White Rose Environmental Assessment? The production project temporal scope extends only to 2020. Is it the proponent's intent to revise the project temporal scope?

Page 3-2, Section 3.1.1 says "…*receptor height was set to sea level… the height of the platforms was set at 30 m above sea level to represent the first deck*…"

- Since human exposure to air emissions is one of the primary concerns for air quality, is the meaning of the text noted above for the three discrete receptors [adjacent structures]? The air quality is modeled at the height of the [human] receptors.

Page 3-3, Section 3.1.1 says" *Ground level concentrations have been predicted for all these listed air contaminants*."

- Do you mean sea level or deck level?

Page 3-3, Section 3.1.2.1 says" The maximum predicted 1-hour ground level concentrations at each of the three discrete installations for CO, NO_2, SO_2, total particulate matter (TPM), PM_{10} and $PM_{2.5}$ during normal operation of the proposed WHP are listed in Table 3-1." The term "ground level is used repeatedly in this section.

- Do you mean deck level concentrations?

Page 3-5, Section3.1.2.2
Page 3-9, Section 3.1.2.3
Page 3-10, Section 3.1.2.4
Page 3.14, Section 3.1.2.5

- Do you mean deck level where the term "ground level" occurs?

Page 3-17, Table 3-26 and 3-27

- In the total column in Table 3-7 the WHP carries over the total burden of operations as described in Table 3-26 while the MODU carries over only the MODU specific emissions. Make these consistent.

- Can the proponent verify that the GHG emissions obtained from Environment Canada are calculated in the same manner as those presented for the WHP and MODU operations?
- Please provide details on what activities at the WHP account for the large difference between WHP Operations, specifically power generation, and MODU Operations.

Page 3-18, Section 3.2 and subsections

- Some reference to the sections where impacts of underwater noise are assessed would make this information relevant. It might be useful to include something very brief regarding the sound level magnitude where effects would be detected in identified receptors [or even to say where this information is in the report].

Page 3-33 Model Inputs Section 3.3.1- "... that a 160 m-wide swath is required to..."

Page 3-39, Section 3.4 and subsections:

- Page 3-40 lists a number of assumptions about cuttings size distributions…Husky has been drilling in the Jeanne d'Arc basin for some time now and should be able to provide an average particle size distribution from SBM drilling operations.

Page 3-40 Drill Cuttings Deposition Section 3.4 & Table 3-36 – "These times do not include..."

Page 3-56, Section 3.6 refers to a "recent study"

- (NAS 2002) is not recent even if it is the last iteration from NAS and the most appropriate reference.

Page 3-57 says "Other sources used, notably Scandpower (2000), and NAS (2002), have not been updated."

- The proponent is directed to two studies referenced in the Hebron Comprehensive Study
    - Scandpower Risk Management AS. 2006. *Blow-out and Well Release Frequencies – based on SINTEF Offshore Blow-out Database, 2006*. Report No. 90.005.001/R2
    - IAOGP (International Association of Oil & Gas Producers). 2010. *Blow-out Frequencies*. Report No. 434-2.

Page 3-57 says "*Each drill centre will have 16 wells. Based on this, the total number of wells could range from 48 under the subsea drill centre option and 72 wells under the WHP option. For calculation purposes, the number of wells to be drilled will be assumed to be 60 (average of the range of 48 to 72) and the production well-years assumed to be 300 (60 wells, half of which assumed to be producers, each with a producing life of 10 years).*"

- It would be more appropriate to calculate separate exposures for each scenario rather than to pool them.

Page 3-57 Hydrocarbon Spill Probabilities Section 3.6 – "... using an exposure variable based on the number..."

Page 3.58, Table 3-48 - It is stated that the Australia spill is under investigation.

- This spill investigation has been completed. Spill volume estimate remains "best estimate".

Page 3-58 to 3-59, Section 3.6.1.1…

- If Deloitte (2012) says there are 85,796 development wells to end 2011, why is the frequency of an extremely large blowout calculated as [1/67,703] not [1/85,796]? Please explain or correct.
- The same calculation error is repeated for very large spills and should be corrected. In addition the statistic being calculated is actually frequency of "Spills >10,000 bbl Volume" which includes very large and extremely large spills.

Page 3-59 Blowouts During Production and Workovers Section 3.6.1.2

- The frequency of very large spills (including extremely large) should be [8/350,000] or 2.28 $x10^{-5}$ blowouts/well-year.

Page 3-60 says "*With respect to the WREP, there will be approximately 70 development wells drilled, and an estimated 300 well-years of production" but page 3-57 says "For calculation purposes, the number of wells to be drilled will be assumed to be 60*"

- Make these numbers agree

Page 3-60… the section is inserted below in its entirety:

> With respect to the WREP, there will be approximately 70 development wells drilled, and an estimated 300 well-years of production. Using the above world-wide spill frequency statistics as a basis for prediction, the spill frequencies estimated for the WREP would be as follows:
>
> - Predicted frequency of extremely large hydrocarbon spills from blowouts during a drilling operation, based on an exposure of wells drilled: 70 x 1.5 x 10-5 = 1.1 x 10-3,
>
> or a 0.11 percent chance over the life of the WREP.
> - Predicted frequency of very large hydrocarbon spills from drilling blowouts based on
>
> an exposure of wells drilled: 70 x 5.9 x 10-5 = 4.1 x 10-3 or a 0.41 percent chance over the life of the WREP.
> - Predicted frequency of extremely large hydrocarbon spills from production/workover blowouts, based on an exposure of well-years = 300 x 5.7 x 10-6 = 1.7 x 10-3 or a 0.17 percent chance over the life of the WREP.
> - Predicted frequency of very large hydrocarbon spills from production/workover blowouts, based on an exposure of well-years = 300 x 1.4 x 10-5 = 4.2 x 10-3 or a 0.42 percent chance over the life of the WREP.

The content above is wrong, the following corrections are provided

With respect to the WREP, there will be approximately 70 development wells drilled, and an estimated 300 well-years of production. Using the above world-wide spill frequency statistics as a basis for prediction, the spill frequencies estimated for the WREP would be as follows:

- The frequency of an extremely large hydrocarbon spill from a blowout during development drilling operations is 1/85,796 = 1.16×10^{-5} spills/well

- The predicted number of extremely large hydrocarbon spills from blowouts during a drilling operation, based on an exposure of wells drilled: 70 wells x1.16×10^{-5} spills/well = 8.2×10^{-4} spills

- The frequency of very large hydrocarbon spills (including the extremely large category) from a blowout during development drilling operations is (4/85,796) = 4.66×10^{-5} spills/well

- The predicted number of very large hydrocarbon spills from blowouts during a drilling operation, based on exposure of wells drilled: 70 wells x 4.66×10^{-5} spills/well= 3.26×10^{-3} spills

- The frequency of extremely large hydrocarbon spills from production/workover blowouts is 2/350,000 = 5.71×10^{-6} spills/well-year

- The predicted number of extremely large hydrocarbon spills from the WREP based on well-years is calculated as 300 well-year x 5.71×10^{-6} spills/well-year=1.7×10^{-3} spills

- The frequency of very large hydrocarbon spills (including extremely large) from production/workover blowouts is 8/350,000 = 2.28×10^{-5} blowouts/well-year

- The predicted number of very large hydrocarbon spills (including extremely large) based on an exposure of well-years = 300 well-years x 2.28×10^{-5} blowouts/well-year = 6.8×10^{-3} spills

The following text is to provide background to comments
Of course you can't have 6.8×10^{-3} spills, which is what makes someone who didn't carry units through their equation think that they've calculated a probability. However, the problem is that the calculation of a probability for such an event is more complex.

Having a blow-out is a yes or no event (i.e. you either have one or you don't) and events of this type are typically viewed as being binomially distributed. If you model blow-outs as binomially distributed data using historical frequencies you find that you can use the Binomial Probability Formula to generate probabilities of x number of events occurring (where x has a value from 1 to n, and n is the total number of trials: 70 wells-drilled or 300 well-years as appropriate. If you do that and take the sum of probabilities for potential x

(1,2,3,4,5...n) as the "probability of at least one event"; then for low probability events that sum is very close to (i.e. the same as) the number calculated using the formula used by the proponent, but, as the likelihood of the event increases, the numbers become increasingly different.

For example, to model the likelihood of a very large blowout spill during development drilling where the frequency is 4.66x10^{-5} spills/well. The binomial probability of any discrete number of spills ***k*** *(1 to 70) in* ***n*** *trials (70) can be modeled using the binomial probability function*

$$P = \binom{n}{k} p^k q^{n-k}$$

Where n = number of trials (wells)
k = number of successes (spills)
p =probability of success in one trial (spills per well)
q =1-p

k	***P***
1	*0.00325153*
2	0.00000523
3	0.00000001
4	0.00000000
Sum	0.00325

One can see that the value of P is vanishingly small with larger k (i.e. the probability of 4 [or more] very large spills in 70 wells is very small). The probability of at least one very large spill in 70 wells is the sum of the calculated values ≈ 0.00325.

Or you could use $P_{k\geq 1} = 1 - (1-p)^n$ *to directly calculate a P value for probability that there will be at least one very large spill in n=70 wells. Which, for the example above, yields P =0.00325.*

The formula used by the proponent to calculate "frequency over the life of the project" is both mathematically incorrect (as it does not preserve units) and will fail to produce a "statistically reasonable" answer for higher frequency events since the calculated probability will be greater than 100 percent.

Page 3-62 says "*The probabilities of the various blowout categories are shown in Table 3-50, abstracted from Scandpower (2000).*"

- This table actually contains the incident counts for various blowout categories and should be labeled as such.

Page 3-64, table 3-53

- Note that the blowout frequency has the units "Blowout per Well-year"

Page 3-64 Section 3.6.2.3 says "There are an estimated 70 wells to be drilled for the WREP, so the calculated number of deep blowouts during development drilling becomes 70 [wells] x 4.8 x 10^{-5} [blowouts/well]= 3.4 x 10^{-3}[blowouts]'

- Insert "using the deep-blowout frequency from OGP (2010)" and the units as indicated above

It then says "For gas blowouts occurring during production and workovers, the statistic for the WREP becomes 300 well-years x 1.17 x 10^{-4} blowouts/well-year, or approximately 3.5 percent probability over the 20-year life of the WREP.

- The quantity calculated is the number of events predicted. However, it is very close to the "probability of at least one spill" which may be calculated in the manner described in the note above as 0.0345

It also says "For gas blowouts that occur during production and workovers that involve some hydrocarbon discharge (>1 bbl), the statistic for White Rose becomes 300 well-years x 2.8 x 10^{-5} blowouts/well-year, or approximately 0.84 percent probability over the 20-year life of the WREP.

- The quantity calculated is the number of events predicted. However, it is very close to the "probability of at least one spill" which may be calculated in the manner described in the note above 0.0084.

Page 3-65 Section 3.6.3 says" The number of production well-years for WREP is 300; therefore, the probability over the WREP period would be 4.5 x 10^{-3} for a 1,000 bbl spill and 1.7 x 10^{-3} for a 10,000 bbl spill."

- These are the "probability of at least one spill" of the given size

Page 3-68, Table 3.6.6

- The proponent should review the contents of the table in relation to the notes above
- If "Platform Spills" includes blowouts the probability for platform spill >10,000 bbl should be larger than the probability of a production/workover blowout > 10,000 bbl. Please review the contents of the "Probability over the WREP Life" column.

Page 3-68, says "Over the 20-year life of the WREP, the probability of having a large or very large spill as a result of an accident on a platform is 0.5 and 0.2, respectively. This is calculated on the basis of US OCS experience."

- Is the word "percent" missing?

Page 3-78 Subsea (seafloor) Blow-out Spill Section 3.8.2.1– Figure 3-47 and Figure 3-48 – these figures need to be redrawn to fit the results of the oil spill trajectory model results. The author has erroneously placed the results of the oil spill model into a fixed diagram. This error is also present in the supporting oil spill trajectory model document. The author is advised to redraw any other figures that have the oil spill modelling results truncated by the fixed diagram.

Page 4-213 Sea Ice Floe Size Section 4.3.4.1 – the author has identified "melting" as a reason why floe sizes are smaller south of 49^{o}N. What about warmer air? Also, why is it

necessary to include "higher water temperatures" when you have stated "melting", which implies higher temperatures, overall? Please clarify.

Page 4-262, Figure 4-159

- The chart should include a note as to why (0) is set at the sea-level elevation corresponding to year 1990.

Page 5-2, Section 5.2

- Temporal scope is not discussed and needs to be included. The time of year for activities should be included.

Page 5-12, Section 5.3.2.2 Temporal Boundaries, and
Page 7-6, Table 7-2
Page 8-2, Table 8-1
Page 9-5, Table 9-1
Page 10-2, Table 10-1

- The temporal boundaries of the WHP and subsea option are not consistent with the temporal boundaries for the original White Rose Project, including the operation of the SeaRose FPSO.

Page 5-23 Step 7 – Cumulative Environmental Effects Section 5.3.7, Table 5-3 – The information presented in this table is out of date. Please revise.

Page 8-42 Summary of Potential Environmental Effects Section 8.4.4 – Table 8-5 – if the "x" is to indicate interaction, what does the "+" mean?

Page 8-48 Concrete Graving Structure Construction and Installation *Sedimentation* – Section 8.5.1.2 – "...(Van Dalfsen et. al. 2000), while other species such..."

Page 8-64 Production/Operation and Maintenance - Table 8-8 – Section 8.5.2.2 – Explain how the potential mortality of fish in the Safety Zone is a positive effect?

Page 8-66 Production/Operation and Maintenance – O*perational Discharges* – Section 8.5.2.2 – there is no such thing as OWTG Regulations. The OWTG are Guidelines, the Drilling and Production Regulations are Regulations.

Page 8-68 Production/Operation and Maintenance – O*perational Discharges* – Section 8.5.2.2 – "...and/or discharging SBM and WBMs..."

Page 9-44 Study Area Value of Harvest by Year, All Species, 2005 to 2010 Figure 9-25 – Upon analysis of the Study Area and the affected NAFO zones, these two areas do not overlap in a symmetrical way so how can the author extrapolate anything, let alone dollar value of harvest, based on this approach? Explain your methodology of attaining dollar value for harvested species when the Study Area overlaps sections of NAFO zones.

Figure 9-26 Project Area Quantity of Harvest by Year, All Species (Snow Crab), 2005 to 2010 – is this all species, all species of crab or just Snow Crab?

Figure 9-27 Project Area Value of Harvest by Year, All Species (Snow Crab), 2005 to 2010 – Again, is this all species, all species of crab or just Snow Crab? Also, was the value of the harvest for 2007, 2009 and 2010 below $100,000 each year? This seems low, clarify.

General comment – The Project and Study Areas are not symmetrical with NAFO Zones, therefore, how can the author determine the Quantity of Harvest or the Value of Harvests?

9.4.1.1 Graving Dock and Concrete Gravity Structure Construction – the proponent appears to be assuming first rights to traditional and commercial fishing grounds. The proponent is reminded to work constructively with other users of the marine environment. Also, the author has written that "Fishing gear set to close to planned dredging operations..." This may be incorrect because if fishing gear is already in the water before dredging operations commence then the proponent will have to work constructively with fish harvesters to remove fishing gear with the use of an approved compensation plan.

9.5.1.2 Concrete Gravity Structure Tow-out and mating at the Deep-water Site – Access to Fishing Grounds – page 9-92 – "Dredging vessel(s) will need a 500 m safety zone,..."

..."there will also need to be a temporary..."

General comment – this type of presumptive language continues up to, and including page 9-98. Please revisit this and rewrite to remove presumptive language.

10.3.3 Data Sources and Survey Effort for Marine Birds in the Study Areas – the author has used the word "Tasker" in a number of places. The reviewer is assuming that the intention was to use the word "Tanker", clarify.

10.3.6.8 Alcidae (Murres, Razorbill, Puffins, Guillemots and Dovekie) page 10-27 Alcids either eat fish or feed on fish, they do not feed on eat fish.

Page 10-38 Operation and Maintenance Section 10.4.2.2 - says "Cooling water will be chlorinated and discharged overboard at an approximate temperature of 30°C, with a residual chlorine level <0.5 ppm."

- This is not consistent with current chlorine residual on the SeaRose FPSO and conflicts with Table 2-4 on page 2-9 of the Environmental Assessment.

Table 11-1 Temporal Boundaries of Nearshore and Offshore Study Areas - ... decommissioned and abandoned in accordance with standard practices, as approved by the C-NLOPB, at the end..."

11.3.1 Marine Mammal Monitoring in the Jeanne d'Arc and Orphan Basins in the Past Decade – There have been more recent surveys, see http://www.cnlopb.nl.ca/exp_stat.shtml

for recent executed geophysical activity and incorporate the results of the respective marine mammal monitoring programs.

11.3.1.3 Fisheries and Oceans Canada Cetacean Sighting Database page 11-11 – the personal communication with J. Lawson is somewhat dated. When wad the last time the author communicated with DFO on the cetacean sighting database?

11.4.1.1 Graving Dock Construction – Effects of Pile Driving – page 11-35 – this section/paragraph requires explanation or support from analysis of actual data or peer-reviewed research. The author simply cannot make statements that downplay the effects without scientific support or is this a non-qualitative assumption? Explain.
11.5.1.1 Graving Dock Construction – *Pile Driving* – page 11-64 – provide evidence to support "it is very unlikely that on-land pile driving..." See comment **11.4.1.1 Graving Dock Construction – Effects of Pile Driving – page 11-35** above.

11.5.1.2 Concrete Gravity Structure Construction and Installation – Change in Habitat Quality – page 11-65 – the author's concluding statement that effects are negligible does not coincide with the "Medium" effects in Table 11-10. Rewrite this conclusion to better reflect the actual magnitude of effect.

11.5.1.2 Concrete Gravity Structure Construction and Installation – Change in Habitat Quality – Dredging - page 11-66 – change the "negative effects language" to coincide with the medium magnitude effect in Table 11-10.

11.5.1.3 Accidental Effects in the Nearshore – Change in Habitat Quantity – page 11-71 "... in habitat quality**,** because of an accidental hydrocarbon spill, may directly reduce..." An accidental spill does not have an indirect effect on habitat, it is a direct effect of an accidental event.

11.5.2.2 Production/Operations and Maintenance – Change in Habitat Quality – *Other Activities* – page 11-80 – it is not necessary to write out the reference to the OWTG (NEB et al. 2010) after it has been repeatedly abbreviated.

13.0 Sensitive Areas – page 13-1 – "... stakeholder and regulatory requirements about the..."

Figure 13-2 – Sensitive Areas Identified Within or Near to the Offshore Study Area – the Placentia Bay/Grand Banks LOMA does not have a land component, redraw the Figure with this correction.

Page 13-10 Eelgrass Beds – remove the very first sentence in this section as it is not necessary. The third sentence is referenced and is better placed after the second sentence, which introduces the idea of eelgrass beds.

Page 16-4, Section 16.4

- Should include a reference to the *Environmental Protection Plan Guidelines* (National Energy Board, *et al*. 2011) to be consistent with other similar sections.

Page 16-22, Section 16.13.2

- Husky has not indicated how they avail of the GRN.

Page 17-1 Summary and Conclusions Section 17.0 – "*All production from the potential future drill centres will be processed through the SeaRose FPSO currently operating at White Rose. The effects of production have been previously assessed (Husky Oil 2000; LGL 2007a), and are not addressed in this document*." Again, the temporal scope for the previous EAs for operation of the SeaRose FPSO will have to be considered in relation to the temporal scope for the operation of this proposed project.

Page 17-2 Results of White Rose Extension Project Modelling Section 17.2.1 – See specific comments on Supporting Document below.

Page 17-4 Air Quality Section 17.2.2 – See specific comments on Supporting Document below.

SUPPORTING DOCUMENT COMMENTS

Drill Cuttings and WBM Operational Release Modelling (AMEC June 2012)

General Comments

G1 Throughout the document it is stated that the release of mud and cuttings will be in accordance with the Offshore Waste Treatment Guidelines (OWTG). The OWTG outline: " …*the goals, objectives and requirements of the applicable acts and regulations, and to explain the expectations of the Boards regarding the management of waste material* …". For an operator, the governing document with respect to management of discharges to the natural environment is the Environmental Protection Plan (EPP) submitted as part of the authorization application (OWTG page 2). The document should describe the discharge of cuttings and mud expected for the project (e.g. mud types, discharge locations, oil on cuttings).

G2 There are a number of assumptions made, such as particle size and distribution, well depths and aggregation of cuttings. It is difficult to say if the assumption is valid. The basis on which all model assumptions are based should be provided.

G3 It is not clear from the report that the modeling accounts for the effect the WHP and its orientation may have on local currents and the dispersion of cuttings. An explanation of how the WHP would affect currents and dispersion should be provided.

G4 Husky has completed a number of Environmental Effects Monitoring (EEM) Programs which give an indication of the extent of area affected by cuttings discharge from a MODU. There is no indication that the model has been calibrated or compared to the results of the EEM Programs. Such a comparison would demonstrate the accuracy of the model to predict the deposition of cuttings discharged.

Specific Comments

Executive Summary, pgs i-ii – "*These will be almost exclusively the fast-settling pebbles and coarse sand (a very small percentage of the fines will drift for a time and ultimately settle near the WHP…".* Please provide the reference for the grain sizing.

Executive Summary, pg ii – "*Under the subsea scenario, the footprint of WBM cuttings is smaller than that for the WHP option, with a range generally restricted to within 2 km. The primary difference factor is the reduced number of wells drilled (16 as opposed to 40) and the reduced volume of cuttings material released (267 m3 per well as opposed to 295 m3) for the subsea option".* This statement should be reviewed, as the settling rate would be the main determining factor for the area affected and to a much lesser extent the volume of material discharged.

Executive Summary, pg ii – "*Under the subsea drill centre option, the majority of SBM cuttings are deposited quite close to the drill centre, due to the large percentage of large cuttings pieces having fast settling speeds*." Please provide the reference for both the grain sizes expected for cutting and settling rates, and how they were determined.

Executive Summary, pg ii – "*The environmental effects of released WBMs are generally associated with the potential physical toxicity of fine particulate matter, either barite or bentonite, which are sometimes used to increase the density of the mud mixture, and these additives have greater potential to affect filter feeding organisms as they remain suspended in the bottom boundary layer."* Barite and bentonite should sink to the ocean floor and not remain suspended in the bottom boundary layer. Explain what is meant by the bottom boundary layer and provide a reference for the assertion that WBM are generally associated.

Executive Summary, pg ii - *"The most likely composition of the WBM planned for use during the WREP does not include these weighting agents".* Either the WBM contains or does not contain weighting agents. The authors need to consult with the proponent regarding the types and general composition of muds to be used.

Executive Summary, pg ii – "*No component of the WBM has been identified as potentially toxic; therefore…".* Please define toxic and identify the generic composition of the mud and the toxicity of its components. Provide references for the toxicity of the mud components.

Section 2 Drilling Program, pg 2 – "*For drilling of the deeper intermediate and main hole sections - for both WHP and MODU drilling - SBM will be used. Under the WHP option the base case is to use two cuttings reinjection wells into which treated SBM and cuttings will be re-injected (i.e., no return of materials to the sea)".* The discharge of SBM cuttings will not be permitted until the cutting reinjection system is operative. This would mean no drilling with SBM.

Section 2 Drilling Program, pg 3 – "*Well lengths assumed are for a typical producing well from a MODU, which is approximately 5,500 m (mKB)."* Well length should be typical to

what is being drilled and what the proponent expects to be drilling and not typical to a MODU.

§3.1.1 Advection Dispersion Model Description, pg 6 - *"For the purposes of predicting their physical deposition on the seabed, the cuttings are considered as a composition of particle types or sizes; typically larger cuttings pieces pebbles coarse sand, medium sand and fines. These particle sizes are assumed to be generally representative of the materials likely to be encountered in the area and generated using WBM or WBM."* Please provide the percentage of each particle size and reference the source of the composition. It is inappropriate to make assumptions and where assumptions are made the rational for that assumption needs to be described.

SBM are proposed to be discharged from the MODU for subsea development but according to the statement only WBM are modeled. SBM are to also be modeled.

§3.1.1 Advection Dispersion Model Description, pg 6 - *"After completion of a model run, when all particles have settled, or have reached the model grid boundaries (in which case, they are taken to have drifted outside the domain and are tabulated as 'lost')…".* If particles reach the boundary then the boundary will need to be extended. Otherwise, no conclusion can be reached as to the extent of the affected area. State if the particles exceed the boundary.
§3.1.1 Advection Dispersion Model Description, pg 7– "*All cuttings are assumed to be adequately treated to reclaim oil as required by present regulations. Oil content on cuttings produced during drilling with SBM, $OC_{initial}$ was set to 7.4 g / 100 g, equal to 6.9 g / 100 g oil on wet solids, as per the OWTG (NEB et al. 2010)."* The use of oil on cuttings data from the proponent's current operation would be more appropriate for modeling purposes.

§3.2.1 Scenarios, Well Sequences, Well Types, Table 3-1, pg 8 – Please provide the information on the duration for drilling each well section. Duration should be based on actual time to drill a well in the White Rose field.

§3.2.2 Cuttings Particle Characterization, pg 9 - *"Information for the Hibernia K-18 well is available from a sieve analysis performed by AGAT Laboratories (1993) and details depths of 900 to 5,010 m. This has been employed in the previous cuttings modelling for Hibernia, Terra Nova and White Rose (Hodgins 1993; Hodgins and Hodgins 1998, 2000), and Hebron (AMEC 2010), with estimates of percentage pebbles, coarse sand, medium sand and fines, and is the best available source of information."* Information on particle size could be obtained through Husky's current drilling program and would be more representative of particles sizes while drilling with SBM.

§3.2.2 Cuttings Particle Characterization, pg 9 – "*Experience with both SBM and WBM has shown that SBM systems are not dispersive; cuttings are large, and they remain intact until deposited on the seabed."* Whose experience and what is the basis of that experience? For SBM cuttings, the more the cuttings are processed the more the particle size decreases and remain suspended in the water column. This increases the affected area. In addition, as cuttings get drier, the amount of oil decreases. Please see Brandsma, 1996 which states that "*The explanation for this apparent conundrum is that while treatments other than*

centrifugation also reduce oil content (from an untreated level of 15.8% [w/w] to a range of 0.3% to 5.1%, these treatments also generate cuttings with finer particle sizes. Thus, according to the model, the untreated and centrifuged OBF-cuttings would not reach the 1000 m mark to the same extent that the treated OBF-cuttings would because the finer particles created by the treatment have lower settling velocities and are transported farther in the water column."

US EPA. 2000. Environmental Assessment Of Final Effluent Limitations Guidelines And Standards For Synthetic-Based Drilling Fluids And Other Non-Aqueous Drilling Fluids In The Oil And Gas Extraction Point Source Category, December 2000, report number EPA-821-00-014 Page 4-4.

Brandsma, M.G. 1996. Computer simulations of oil based mud cuttings discharge in the North Sea. In: The Physical and Biological Effects of Processed Oily Frill Cuttings. E&P Forum Report No.2.61/202. April 1996. Pages 25-40.

§3.2.2 Cuttings Particle Characterization, pg 9 – *"Cuttings drilled with SBM will be large, on the order of 2.5" in length, 1" wide, and 1/8" thick. To characterize these large cuttings as spherical particles for the model, their volume corresponds to a particle diameter of about 1 to 3 cm. This large cutting size type was added to the pebbles, coarse sand, medium sand and fines types used to characterize the WBM-cuttings noted above. It was assumed that most (approximately 70 percent) of the cuttings will be large, approximately 20 percent 0.5 to 1 cm, 5 percent 0.1 cm, with the remaining 5 percent being very fine particles, with diameters of 0.01 cm (Table 3-3)."* Provide the reference for the data source.

§3.2.2 Cuttings Particle Characterization, pg 10 – "*It is assumed that the cuttings will enter the sea in a disaggregated form".* There are a lot of assumptions made for this modeling however no basis for the assumptions is given. Provide the basis on which this assumption is made.

§3.2.2 Cuttings Particle Characterization, pg 11 – Reference the source of the data provided in Table 3-4.

§3.2.3 Ocean Currents, pg 12 – "*It was assumed that drilling would commence in the fall, for either the WHP or subsea".* Drilling can occur at any time of the year. Will the timing of drilling activities affect the outcome of the modeling? Please confirm the timing of drilling activities.

§3.2.4 Model Geometry, pg 14 - *"The subsea development option differed from the WHP option only in that West White Rose was drilled with a MODU rather than from the WHP; and 16 wells as opposed to 40 were drilled with the subsea option. For visualizations of combined scenario results (e.g., for the WHP option, 40 wells at the WHP, plus 16 wells at the SWRX, for a total of 56 wells".*

It is stated in the Introduction that "*Two development options are being considered for the West White Rose component of the WREP: a WHP, which essentially is a fixed drilling*

platform; or a subsea drill centre with wells drilled by a mobile offshore drilling unit (MODU). Also as part of the WREP are up to three additional drill centres in other areas of the White Rose field. If a WHP is used in the West, the total number of wells could be up to 88: 40 wells from the WHP, plus up to three additional subsea drill centres, each with up to16 wells (Husky 2012). For the subsea drill centre option, the total number of wells could be up to 64: 16 wells each for West White Rose plus up to three additional drill centres (Husky 2012). These wells will be a combination of producing, water injection, gas injection and (WHP option only) cuttings reinjection."

Modeling 56 wells when there is potentially 88wells is not adequate to show the extent of the area that may be affected by cuttings. Modeling is to be done for the project scenarios described in the environmental assessment report. The proposal for the WHP and subsea development is 40 platform wells and 48 subsea wells, and the subsea option of 64 wells.

§3.3.1 Water-based Mud Cuttings, pg 15 – "*Cuttings from drilling the upper two well sections with WBM will all be released as per the OWTG (2012) close to the seafloor, under either the WHP option with chute release, or under the subsea option with MODU riserless drilling. Therefore, there is little time for the cuttings to be transported large distances by the ambient currents."*. The Cuttings are not being released as per the OWTG, they are being released based on the design of the facilities and drilling practices. Also, the MODU discharges WBM at the sea floor while the wellhead platform will release discharges above the sea floor. The paragraph should be reworded to reflect that cuttings are being released based on facility design and practice and that the release of WBM from the platform and MODU are different but simplified for the purposes of the modeling.

§3.3.1 Water-based Mud Cuttings, pgs 16-17 - There is no figure showing the combined deposition of WBM and cuttings for either the WHP option or the Subsea option. There is also no figure showing the disposition of WBM cuttings discharged from all of the subsea wells. The only figure presented is for 16 wells and not the 88 wells for the wellhead platform or the 64 with the subsea option.

§3.3.2 Synthetic-based Jud Cuttings, pg 21 – "*For MODU drilling, SBM cuttings will be treated and released in accordance with the Offshore Waste Treatment Guidelines (OWTG) (National Energy Board (NEB) et al. 2010)*".

See previous comments.

§3.3.2 Synthetic-based Jud Cuttings, pg 28 - A smaller scale figure would be useful to distinguish the near field deposition.

§3.4 Sensitivity Discussion, pg 31 - *"Sensitivity to the amount of cuttings material is straightforward; in general, the cuttings weights, densities and thicknesses seen over a given area are directly proportional to the volume of materials released*." Provide the reference as to the source of the statement or more detail as to how the conclusion that densities and thicknesses are proportional to the volume of material released.

§3.4 Sensitivity Discussion, pg 32 – "*For the present modelling, one settling velocity is employed for each particle type. For a faster fines settling velocity sensitivity, the value of 0.005 m/s from Tedford et al. (2003) was selected and applied for the scenario of drilling one of the potential future subsea drill centres."* A more detailed explanation as to why this velocity was selected and the others excluded is required. Also, Tedford et al. only studied water based muds so an explanation as to the application of the settling velocities for WBM is comparable to SBM cuttings.

Section 4 Drilling Mud Properties and Discharge characteristics, pg 38 – "*The use and disposal of water-based muds are subject to the Offshore Waste Treatment Guidelines (OWTG) (NEB et al. 2010)*".

Previous comments

Section 4 Drilling Mud Properties and Discharge characteristics, pg 38 – "*The most likely composition of the WBM planned for use during the WREP does not include these weighting agents, therefore no amount of particulate matter is expected to be introduced to the environment due to the release of WBM during any stage of the drilling process. The anticipated composition of WBM (Table 4-1) constitutes primarily of brine, with the possible addition of Sodium Acid Pyrophosphate (SAPP). SAPP is a white powder that is water soluble. It is used as a mud thinner and dispersant, and is especially effective for treating cement contamination (MiSwaco 2006)."* Confirm with the proponent what the composition of WBM will be.

Section 4 Drilling Mud Properties and Discharge characteristics, pg 38 – "*No component of the WBM has been identified as potentially toxic; therefore the dispersion of WBM following the discharges has not been treated in further detail."* A reference of other information to support this conclusion is required otherwise it is an unfounded assumption.

Section 4 Drilling Mud Properties and Discharge characteristics, pg 39 – "*Drilling operations involving SBMs will be conducted in accordance with the OWTG (NEB et al. 2010), which dictate the following:*

> *Where there is technical justification (e.g., requirements for enhanced lubricity or for gas hydrate mitigation), operators may use synthetic based mud (SBM) or enhanced mineral oil based mud (EMOBM) in the drilling of wells and well sections. Other than the residual base fluid retained on cuttings as described in the operator's EPP, no whole SBM or EMOBM base fluid, or any whole mud containing these constituents as a base fluid, should be discharged to the sea."*

See previous comments

SBM Accidental Release and Dispersion Modelling (AMEC June 2012)

General Comment

The proponent does not understand the current regulatory environment and should familiarize themselves with the difference between regulation and guidance. The OWTG is not regulation, it is guidance. The OWTG states "…*the goals, objectives and requirements of the applicable acts and regulations, and to explain the expectations of the Boards regarding the management of waste material…" For an operator, the governing document with respect to management of discharges to the natural environment is the Environmental Protection Plan (EPP) submitted as part of the authorization application*." (OWTG page 2). The document should describe the discharge of cuttings and mud for the project which would include, mud types, discharge locations, and oil on cuttings as expected for the project.

Specific Comments

Executive Summary, pg I – "*The development of the White Rose Extension Project (WREP) will involve the use of synthetic-based muds (SBMs), due to their unique performance characteristics, as well as their low toxicity and relatively low environmental effects compared to oil-based muds (OBMs).* "Low toxicity" and "relatively low environmental effects" need to be defined to put the intended meaning in perspective. Information to support the assertion that SBM have low toxicity and relatively low environmental effects compared to OBM is required.

Executive Summary, pgs i – "*The interpretation of the predicted footprint areas and thicknesses should take into account that these are only preliminary dimensions of the projected landing area for the SBM droplets,…".* What is meant by Preliminary Dimensions?

Executive Summary, pgs i-ii – "*The subsequent fate and the footprint are likely to evolve in a less predictable fashion, as the negatively buoyant SBM droplets are expected to coalesce into streams or pools, and flow under the influence of gravity and the local bathymetric features.".* How does the unpredictability of the settling of SMB affect the model results and the extent of the area affected? This should be better explained in the report.

Executive Summary, pg ii – "*As there is a trade off between the area covered by the spill and the thickness of the spill,…".* What is the trade off? Provide more explanation as to the relationship between the area covered and spill thickness, and how this affects the outcome of the model.

Executive Summary, pg ii – "**…***it is expected that the biodegradation of the SBM on the seafloor would take place over periods on the order of several weeks."* A reference and information to support this conclusion is required. Not all of the components of the mud will degrade. The synthetic-based fluid is the component that will degrade faster than remaining components, some of which will not degrade. The assumption that the SBM will degrade is not entirely accurate. Revise the statement to reflect this.

§1.1 Project Background, pg 1 – "*1 Under the wellhead platform (WHP) development option (the alternative to the subsea drill centre option), for both intermediate and main well sections, all SBM will be treated and reinjected or stored/ transferred to the next well."* The proponent has neglected to consider that it is possible to spill SBM from the platform. For example on January 28, 2003 Hibernia spilled 23.7 m^3 of SBM when gates were not properly aligned to direct SBM to cuttings reinjection. There have also been instances where SBM was spilled due to breakages of bunkering hoses. The proponent should review the possibilities of SBM being lost from the WHP and, as appropriate, model those situations.

§1.1 Project Background, pg 1 – "*The use of SBMs in offshore drilling operations is regulated in accordance with the Offshore Waste Treatment Guidelines (OWTG) (NEB et al. 2010), which dictate the following:…".* The OWTG are not regulation they are guidance. Please refer to general comment above on the difference between guidance and regulation.

§1.1 Project Background, pg 1 – "…*as the synthetic fluids that comprise the continuous phase exhibit low toxicity to aquatic life and are more biodegradable in marine sediments than OBMs.".* The statement "low toxicity and more biodegradable" needs to be put in context. Define what is meant by low toxicity and explain (and reference) how SBM is more biodegradable than OBM.

§1.1 Project Background, pg 1 –At the end of page 1 Burke and Veil (1995) is cited; however no such reference appears in the "Literature Cited" section. The reference can not be checked to verify that it supports the statements made in the paragraph.

§1.2 Objectives, pg 2 – "*It is noted that these studies are preliminary and the information will be updated as design progresses through FEED and detailed engineering.*" MODU are not dependent on the FEED analysis. They are not a specific design for the Project. There should be sufficient information regarding accidental releases of SBM from these facilities. The design of the WHP should be at a stage where losses of SBM can be identified.

§2.2 Potential Synthetic-based Mud Accidental Release Scenarios for the White Rose Extension Project, pg 6 – "*The most severe hypothetical scenario that can be anticipated for the WREP involves the inadvertent discharge of the entire volume of a mud tank, resulting in 60 m3 of SBM being discharged through a 25 cm (10 inch) (internal diameter) pipe a few metres below the sea surface.".* An explanation as to how this hypothetical case was arrived at is needed considering that this is not the worst case in the C-NLOPB jurisdiction. The worst case was on October 24, 2004 when Husky spilled 96.7 m^3 from the GSF Grand Banks through the diverter line.

Section3.0 Synthetic-Based Mud Spill Dispersion Modelling, pg 9 – "*A literature review of the current state of scientific knowledge of the behaviour of SBM in the marine environment, as well as reports of observations of actual SBM spill events, revealed that SBMs exhibit a unique behaviour in the marine environment due to the fact that they are immiscible in water (i.e., cannot be mixed with), and are negatively buoyant.".* A reference is required to support this conclusion.

Section3.0 Synthetic-Based Mud Spill Dispersion Modelling, pg 9 – "*Unlike water-based fluids, they tend to form distinct jets and droplets that fall relatively rapidly through the water column, and they are prone to form visible and clearly-defined streams and pools at the seafloor, where their dispersion is in large part driven by gravity in conjunction with the local seafloor features.".* A reference is required to support this conclusion

Section3.0 Synthetic-Based Mud Spill Dispersion Modelling, pg 9 – "*To date, there have been no systematic field observations of SBM dispersion in the marine environment that could be used to quantify their dispersion properties in a real world scenario.".* The Proponent's EEM programs would provide an indication of the extent of SBM dispersion to verify the model.

§3.1 Synthetic-based Mud Properties and Behaviour, pg 9 – "…*the continuous phase is comprised of Puredrill IA-35LV, a non-toxic and readily biodegradable synthetic fluid…".* A reference is required to support this conclusion. The terms "low toxicity" and "readily biodegradable" need to be defined.

§3.1 Synthetic-based Mud Properties and Behaviour, pg 9 – "*The overall density of the SBM will be 1,350 kg/m3.".* Density of a drilling mud varies depending on the specific conditions of well section being drilled. For the purpose of this modeling, it is best to use a generic mud formulation which would produce a worst case result.

§3.4 Synthetic-based Mud Dispersion Model Results, Figure 3-3. pg 17 - The graphical presentation in Figure 3-3 is rather crude and small. It should be revised in finer resolution. Please indicate what each axis represents and where the release originated.

§3.5 Synthetic-based Mud Dispersion Model Sensitivity Tests, pg 19 – "*However, the tradeoff is that the larger footprint will result in a lower average SBM layer thickness at the seafloor, compared to the case where a smaller area receives a larger portion of the SBM.".* Is this a trade off or an outcome of the model?

Section 4.0 Summary, pg 22 – "*The interpretation of the predicted footprint areas and thicknesses should take into account that these are only preliminary dimensions of the projected landing area for the SBM droplets, and the estimated SBM layer thickness if the full spill volume landing in each model cell were to be equally distributed within that cell.".* Saying that these are preliminary results implies that the information provided is not finalized and that there is more work to be done to calibrate the model or to collect additional data so the model's output represents the actual dispersion of mud. The Proponent needs to complete this work, submit a new report and revise the environmental assessment report, as appropriate.

Air Emissions Study – White Rose Extension Project (Stantec June 21, 2012) Revised Draft Report

General Comments

G1 The "Air Emissions Study" report submitted is a revised draft report. Is it Husky Energy's intention to submit a final report?

G2 Section 5.3.6.2 of the Scoping Document directs the proponent to describe the potential means for reduction and reporting of air emissions. This report only deals with ambient air quality and does not examine the potential to reduce emissions from equipment or the facilities (*i.e.*, WHP or MODU). The proponent should provide details with regard to plans to reduce and report air emissions. The proponent should also consider the future direction the federal government will take in achieving reductions of green house gases in its evaluation.

G3 The report has not mentioned gas dehydration for the WHP. If gas is to be dried for use on WHP it should be included in the report along with emissions estimates.

Specific Comments

§3.2.2.1 Option 1 – Wellhead Platform, pg 12 – "*During normal operations of the WHP, a support vessel will be on stand-by for the Platform 365 days/year and at least one supply vessel will also be in operation 365 days/year, travelling between the east coast of…".* The estimated number of vessels, two, appears to be low. The number of vessels to be used should be confirmed and compared to the number of vessels associated with other similar operations.

§3.2.2.1 Option 1 – Wellhead Platform, pg 12 – "*Helicopters will also routinely travel between the east coast of Newfoundland and the offshore WREP site to transport employees to and from work, approximately three round trip flights per week.*" This estimate is for rotation of employees and does not account for other flights that may occur such as adhoc or medivacs. Such flights should also be included.

§3.2.2.1 Option 1 – Wellhead Platform, pg 14 – "*The fuel gas composition analysis, as presented in Table 3-8, indicates that there is no hydrogen sulphide (H2S) present in the gas;…".* This is the composition of the gas now, however, as the field ages it is possible that the field may sour and H_2S present in the gas. The proponent needs to examine this possibility and, if possible, account for souring in the modeling.

§3.2.2.1 Option 1 – Wellhead Platform, pg 14 – "*Emissions related to the operation of the two 10 MW dual-fueled turbine generators were calculated using emission factors acquired from the US EPA AP-42 Chapter 3.1 Stationary Gas Turbines (US EPA 2000) and assuming a 34 percent efficiency (shaft plus electrical) for normal operations."* Information on the efficiency of turbine generators is assumed but should be available and used in the modeling. The basis of the assumption used needs to be stated along with how the assumptions affect the outcome of the modeling.

§3.2.2.2 Option 2 – Subsea Drill Centre, pg 15 - Only total quantities of air emission are presented. This section should include a list of the emission sources and their contribution to the total emissions. If flaring is to occur with MODU, flare emission from the MODU will need to be included.

§4.5.3 Source Inputs, pg 23 – "*As discussed in Section 3.2.2, there is potential for approximately 12 blowdowns to occur per year. During a single blowdown event approximately 7,400 m3 of gas is released from the flare. This type of flaring usually occurs over a short period of time and for calculation purposes a 10-minute release rate has been assumed for this study.".* What are the source of the 12 blowdowns and 7,400 m^3 of gas? Why is an assumption made? The Proponent currently operates a FPSO and should be able to provide the duration of a blowdown. Please provide the basis of this assumption.

§5.6 Greenhouse Gas Emissions (Wellhead Platform and Subsea Drill Centre), pg 36 - The summary only deals with air quality objectives. It does not deal with emissions from equipment and how their emissions can be minimized. The report also does not consider future emission reduction targets being considered by the federal government. The Proponent should address these issues as they are more relevant to the proposed operation than achieving air quality objectives. Air Quality objectives are not relevant as the proposed operation is in flat terrain with good dispersion and distant receptors.

Government of Newfoundland and Labrador

Department of Advanced Education and Skills

The Labour Market Development Division and the Skills Development Division of the Department of Advanced Education and Skills have reviewed the environmental assessment report provided for EA Registration #1665 by the proponent (Husky Energy). We are satisfied that the information provided in this report meets our requirements as outlined in the EA Guidelines for this project, and have no further comments on this report. In our opinion, the project may proceed.

As the project moves closer to commencement, we are requesting copies of any HR, Benefits, Diversity and/or Women's Employment plans prepared for this project, as well as quarterly employment reports as outlined in the guidelines document.

Department of Environment and Conservation

Environmental Assessment Division

Adequate justification provided on the need for a labour camp.

Regarding site decommissioning see Water Resources Management Division comments below.

Pollution Prevention Division

Further Information Required during EA:

1. Information related to all potential discharges from the activity should be provided. This includes, but is not limited to details regarding the discharge locations, expected quality, duration, monitoring and receiving areas.
2. It is stated that water removed from the graving dock will be pumped into a lined 2,700 m^2 settling pond, where it will be aerated and tested against applicable regulations prior to ocean disposal. Details should be provided on how the water flow into the settling pond will be managed, and how this water will then be discharged into the ocean. Is it known that the proposed settling pond will be able to hold a large enough volume of water to avoid overflow and potential ground contamination?

3. Section 2.3.2.2 indicates the material volume proposed to be disposed of in the pond would exceed the water volume but would not exceed the volume of the natural topography of the pond. If this is the case, would additional soil be brought to the site to completely level the area? Please provide further information.

4. In order for material to be disposed in the Pond, it must be demonstrated that this is a beneficial use. This has not been demonstrated thus far. It is stated that "*Sediments within the pond are contaminated and capping the contaminated sediments with cleaner sediments is a method of remediation that has previously been proposed*" The ERA completed in 1998 indicated potential for unacceptable risks from PAHs in

The Pond. However, in closure documentation provided to the Department by PWGSC, it is stated that a Risk Management Objectives (RMOs) were developed by Cantox in 2005 which concluded that further remediation was not required at the Pond. This same conclusion is referenced on page 2-33. It is therefore not evident that remediation/risk management is actually required at the Pond. In addition, based on the sediment samples collected during the recent sampling programs conducted by Husky, the pond sediment chemistry does not appear to be significantly different than that of the dredged materials and soil, with the exception of some slight PCB exceedances. The PCB results appear to be fairly consistent with those from 1997. Based on this, in order to determine if disposal in the pond is a beneficial use for excavated materials, an updated risk assessment would be required to demonstrate that risk management/capping is warranted.

5. Should dredged material be permitted to be placed in the Pond, what measures will be in place to prevent fines in the material from becoming airborne?

6. In the assessment of disposal alternatives for excavated materials, it is noted that out of area disposal is the environmentally preferred option. Clarification should be provided as to whether there is sufficient demand in the region for the excavated materials to be used as landfill cover. Section 2.3.2.3 refers to recent informal correspondence with Eastern Waste Management regarding the demand for cover material at nearby landfills. Husky should consult with the Department of Municipal Affairs to ascertain this demand, as that Department is the lead agency for the closure of landfills in this province.

Department Requirements

7. It has been suggested that Husky would like to treat any petroleum hydrocarbon and metals impacted soil on site. Note that prior to this, approvals from Service NL and Department of Environment and Conservation would be required and there may be further sampling requirements.

8. The operation of diesel generators at the site may require a Certificate of Approval from the Pollution Prevention Division, as per the Department's Guidance Document GD-PPD-061.1 (Approval of Diesel Generators).

9. Pending a review of the additional information to be provided by the proponent, a Certificate of Approval may be required from the Pollution Prevention Division for this project.

10. Any use of regulated substances, for example in cooling systems and fire suppression systems, associated with this proposed activity is subject to Halocarbon Regulations.

11. Any discharge from the proposed site is subject to compliance with the Environmental Control Water and Sewage Regulations. Analyses completed for the purposes of compliance will be subject to the Accredited Laboratory Policy (PD:PP2001-01.2).

12. White Rose has an Environmental Effects Monitoring (EEM) program in place for the offshore operations and this program will be re scoped to include the expansion. If there is a federal requirement for EEM at the Argentia site during construction, copies of the study designs and reports should be provided to the Department.

Other Comments

13. As a condition of release from Environmental Assessment, the Proponent should be required to prepare an acceptable Environmental Protection Plan that includes proposed effluent monitoring programs.

14. During a site visit by Department officials in the fall of 2012, several coils of razor wire were noted just to the east of The Pond. These should be removed and disposed of safely.

15. There is indication of groundwater monitoring at the site to determine site suitability. The groundwater monitoring should continue throughout the proposed activity to ensure that there are no impacts as a result of the activity.

Water Resources Management Division

General Comments

1. The requested information on groundwater flow and groundwater quality monitoring and treatment has not been provided in sufficient detail for WRMD to provide any recommendation. The proponent should provide the requested information.

2. As per information provided, the Pond has been contaminated by previous users, does not have any fish, has no surface connections to other water bodies and is not accessible to the public because it is surrounded by private land. As such, the proponent must obtain a permit under Section 48 of the Water Resources Act prior to infilling the Pond and ensure that water discharged from the Pond meets all regulatory requirements.

3. Pg2-2: the proponent indicates that the graving dock could be constructed as a permanent facility with gates or single-use facility that will be left flooded. The EA document does not confirm whether the proponent has chosen an option or not at this time.

Permitting Requirements

The proponent must apply for a non-domestic drilled well permit under Section 58 of the Water Resources Act for the proposed drilled well(s)
Contact: Manager, Groundwater Section, (709) 729-2539.

The proponent must obtain a Water Use License from this Division for the use of any volume of water from any water source. As part of this licence the proponent will be

required to provide a water use or diversion monitoring and reporting plan for all groundwater and surface water sources.
Contact: Manager, Water Rights Section (709) 729-4795

The proponent will require approval from this Division under Section 48 of the *Water Resources Act* before starting construction activities within 15 metres of any water body (including wetlands). Construction activities include all stream crossings, dams, drainage works, fording and any other work such as landscaping, clearing or cutting of any natural vegetation within 15 metres of a body of water.
Contact: Manager, Water Investigations Section, (709) 729-5713

Any effluent or runoff leaving the site will be required to conform to the requirements of the Environmental Control Water and Sewage Regulations, 2003.

Executive Council, Women's Policy Office

The Women's Policy Office is in agreement with the assessment provided by Natural Resources.

The Operator failed to include comments requested by WPO in the Guidelines and we reiterate the need for the Operator to include in the EPR document the following commitment:

- All benefit amendment components including Gender Equity and Diversity Plans (including Business Access Strategies) with the Province for the construction, operations and decommissioning phases of the project will be finalized and approved by the Minister of Natural Resources, and for Gender Equity and Diversity, the Minister responsible for the Status of Women prior to the start of construction.

Department of Natural Resources

On behalf of Natural Resources (Mines and Energy), we have reviewed the EPR report for the Argentia Wellhead Platform Project and have found that the Operator failed to include comments requested in the Guideline.

Thus, we reiterate the need for the Operator to include in the EPR document the following commitments:

- All benefit amendment components including local benefit capture, and Gender Equity and Diversity Plans (including Business Access Strategies) with the Province for the construction, operations and decommissioning phases of the project will be finalized and approved by the Minister of Natural Resources, and for Gender Equity and Diversity, the Minister responsible for the Status of Women prior to the start of construction,

- The Operator must agree to address any additional benefit concerns identified by the province arising from the Wellhead project, and

- Any Benefit Amendments will be submitted to the CNLOPB as an amendment to the Benefits Plan, and will also be amended in the overall White Rose Benefit Framework if deemed necessary by the Province.

Fish, Food and Allied Workers

While the FFAW is generally supportive of the proposed project we have to balance that support with our responsibility to protect the interests of our fish harvester and plant worker membership and the health of our ocean for future generations.
Fundamentally, the overall project will impact fish harvesters both in Placentia Bay and the offshore. The near-shore component of the project will result in some loss of fishing grounds to harvesters in Placentia Bay. It needs to be noted that accessing alternate fishing grounds can be problematic when considering the traditional nature of the fishery in Newfoundland & Labrador. Fishing alternate grounds generally means that they are infringing on another harvester's "territory". As well, commercial species are not distributed equally in bays and coves. Therefore, the impacts of project-related activities in the next few years will have an impact on many harvesters in Placentia Bay, that is, not just those in the communities adjacent to the construction activities. All Placentia Bay harvesters will be subjected to increased risk of gear/vessel loss and damage, accidental spills, as well as reduced safety on the water, access to fishing grounds, and catch rates as a result of this project. As well, similar impacts will be faced by offshore harvesters with quotas to fish in NAFO Division 3L as offshore development begins.

Specific Comments

1. Establishing a Fisheries Liaison Committee with adequate fish harvester representation will be key in the coming months to enable appropriate consultation with the affected harvesters as the project proceeds (Section 6.2.1.3 and 9.5.1.2). Involving harvesters in the development of a near-shore Environmental Effects Monitoring program prior to the start of construction at the site will also provide opportunity for collaboration (Section 15.2.1). The FFAW and the harvesters whom it represents are looking forward to future consultations regarding the deepwater mating location as committed to by the Partners (Section 2.7.5)

2. In the discussion on planning for the development of the White Rose Expansion Project involving the western expansion in Section 2.4 there the acronym for the Wellhead Platform (WHP) is used on page 2-14, yet in Figure 2-1 said acronym is not involved in the depiction.

3. Possible construction of the proposed Wellhead Platform structure in Placentia Bay will have an impact on the environment in the bay and more specifically fish habitat. Concerns from fish harvesters have been noted in the report with respect to dredging, debris, discharges, dumping, accidental spills, construction related noise and lighting. It needs to be reiterated however that construction activity will also impact catchability, and therefore profitability, for fish harvesters.

4. The future fisheries were nominally encountered in this Environmental Assessment. With significant environmental changes it is anticipated that there will be a change in the biomass composition in Newfoundland & Labrador waters. With the environment readjusting to more stable/normal state there is an expectance of an increased presence of finfish (such as Cod). Therefore, although Figure 9-23 shows a drastic decrease around 1990 and since stability, there are indicators that this is about to change again. The likelihood is that harvesting patterns will change and there will be a significantly increased level of fishing activity

throughout the Grand Banks. Potentially that activity could rival the time prior to the cod moratorium. The White Rose Partners should consult with the fishing industry on a regular basis to keep up to date with the fishing trends for the various species.

5. Also with respect to future fisheries, information presented at RAP meetings in 2009 and 2010 indicated that there are increasing signs of cod in the offshore with scope for more recovery, with indication of a low natural mortality. The 2011 Assessment of Northern (2J3KL) Cod (Science Advisory Report) noted that the annual DFO trawl surveys indicated an eight-fold increase in the spawning stock biomass from 2004 to 2008. A commercial fishery for Atlantic cod on the Flemish Cap (an adjacent, NAFO-regulated stock) opened in 2010. For Southern Grand Banks cod (3NO) it is expected that the spawning stock biomass will surpass the conservation limit reference point set by DFO in 1999 at 60,OOOt.The resumption of offshore groundfish fisheries would significantly alter fishing patterns and activities within the Jean d'Arc Basin of the Grand Banks and have an impact on fishing enterprises. Again, the fishing industry should be regularly consulted to keep apprised of fishing trends.

6. The FFAW feels that the fisheries statistics contained in the Environmental Assessment are insufficient in that they do not give any reflection of the historical harvest for groundfish on the Grand Banks. With the changing environment it would be pertinent for the Environmental Assessment to contain indicators of where and how groundfish harvest was pursued on the Grand Banks, especially the formerly important codfish. Effectively, a five year horizon for past fisheries is not sufficient and does not provide a good enough perspective of the activities for the members of the FFAW.

7. Looking at the various discussions on habitat through out the Environmental Assessment there are some mishaps, such as a subheading in Section 8.5.2.1 being *Change of Habitat Quality*, the lead sentence then reads. "Habitat quantity may be reduced as a result of lighting, discharges, sedimentation and increased noise occurring due to the above activities." There obviously is a disconnect between what is written and what was intended written. It is further worth to note that the final paragraph of Section 8.5.1.3 suggests that in a worst case scenario of an accidental event the impact would be such to only affect abundance or distribution of one generation of fish, and to be re-established to previous levels within several generations. This is a significant statement as with the state of the Newfoundland & Labrador fisheries any impact on the biomass or resource availability is *significant.*

9. The establishment of a Safety Zone (Section 9.5.1.1 and 9.5.1.2) at the locations in Placentia Bay will result in a loss of fishing grounds to harvesters in Placentia Bay. This is significant for inshore harvesters in Placentia Bay as previously discussed.

10. The Husky Energy Extension Project Environmental Assessment presents an untenable spin on an unfortunate situation in the Gulf of Mexico, making light of an environmental disaster (Section 9.5.3). There are now cases of species in the Gulf of Mexico that are experiencing changes in gender composition, directly affecting the species recruitment. The FFAW does not appreciate a suggestion of a potential better economic return per volume harvested, due to diminished resource availability on the market as a result of an

environmental disaster. Section 9.5.3 leads with the indication that the "...effects from a spill or blowout will be not significant. However, economic impacts might still occur if a spill prevented or impeded a harvester's ability to access fishing grounds, caused damage to fishing gear or resulted in a negative effect on the marketability of fish products."

11. With regards to socio-economic considerations there is a mention that "90 percent of the nickel processing plant's construction workforce live outside of the Argentia area and commute to the WREP site on a daily basis, and a similar situation is expected with the WREP." It is unfortunate that this was not caught before the document was sent out for review. In addition who is to say that the WREP will have access to the potential labour supply surplus resulting from the completion of the nickel processing plant, there are two other major industrial projects taking place in the province at the same time that the Wellhead Platform is expected to be constructed.

12. In the consultation session with the Offshore Harvesters, one fisherman raised an issue with regards to the possibility of the petroleum activity within the White Rose Field expanding to the Northeast. If this were to take place it would have a direct impact on some of the most fruitful snow crab harvesting grounds. This was brought up as the diagrams showing the White Rose field with new drilling centres had one listed to the Northeast of the current North Drill Centre (Figure 2-15 and/or Figure 2-16). At a subsequent meeting on October 9th, 2012 between the Husky Energy and the FFAW (One Ocean was also present) Husky was indicating that any expansion towards the Northeast was not within the horizon, and there are currently no plans to pursue anything in this area. Nevertheless, when the Environmental Assessment was sent out for review this is still listed in the figures listed above. Further to this, it is mentioned that offshore harvesters were concerned that the extension into the west of the White Rose field would go into snow crab grounds (Section 6.2.2.2). This is factually inaccurate, the concern raised by the harvesters was about extending to the north, there is very limited harvest taking place to the west of the White Rose field as evident from the (limited) information presented in Figure 9-28.

13. With regards to the concerns that were raised in the context of the SWRX (Page 6-10), the issue at hand was that the Safety Zone depicted in the consultation slide differed from that which is in place out in the field. The map which was used included a zonal change, which Husky subsequently went on to apply to get implemented. At the September 20th, 2012 consultation meeting the submission to change the Safety Zone had not been made. However, at the follow-up meeting on October s". 2012 Husky indicated that the application for changing the Safety Zone had been submitted. The issue was not that the FFAW and One Ocean were not consulted on the SWRX, but rather that said consultation had not had any mention of a change to the White Rose Safety Zone. This approach was not conducive to the enhancement of mutual trust between the two industries. The FFAW does realize that at the time of submitting the original Environmental Assessment for the subsea drill centres Husky did not know the exact location where they would be drilling. But when the proponent knows where the drill centres will be, there needs to be further consultation if there is going to be an impact on the fishing vessels that use the area.

14. The FFAW and its members are very concerned about the potential of aquatic invasive species, such as green crab, infesting our bays and coastal waters. The additional vessel traffic associated with the construction of the Wellhead Platform in Placentia Bay may potentially lead to the introduction or proliferation of unwanted aquatic invasive species. The green crab that has become resident in areas of Placentia Bay for example has destroyed eel grass beds and competes with native crab and lobster species for food. The potential for the introduction of aquatic invasive species in the area was merely mentioned in passing (Section 12.4.2.3) in the White Rose Extension Project Environmental Assessment document. The FFAW strongly encourages the Partners to consider and detail the mitigation strategies that the contracting marine vessel companies will need to follow to prevent the introduction and/or proliferation of aquatic invasive species in Placentia Bay. Furthermore, the FFAW calls upon the various regulatory bodies to be very stringent regarding any ballast water exchange plans proposed by the Partners and ensure vessels follow proper ballast water management practices. As well, aquatic invasive species should be incorporated into the near-shore Environmental Effects Monitoring program.

Fisheries and Oceans

See Appendix 1

Appendix 1

No.	Sector	Reviewer Initial	Section / Page No.	Comment / Information Request
GENERAL COMMENTS				
1	HPD	SL		DFO has recently reviewed the post-construction survey for the South White Rose Extension. It has been determined that the authorized footprint for excavation of the South White Rose drill center and associated spoils disposal has been significantly exceeded. Throughout the document, Husky states there is sufficient capacity within the existing authorization for all works and undertakings proposed for the offshore component. DFO would like to highlight the fact that although Husky Energy has a valid authorization (Authorization No. 07-01-002) until December 31, 2015 for the White Rose Extension Project, an amendment may be required if Husky Energy plans to carry out any further excavation activities at the West White Rose other than that required for installation of the CGS and/or develop the North White Rose drill center as originally authorized.
2	HPD	SL		Based on recent ROV surveys of a nearby oil development, it appears that accumulation of drill cuttings in proximity to offshore oil drilling sites may be greater than predicted during the environmental assessment (EA). As such, DFO will be requesting that all oil developments (existing and future) conduct additional monitoring to determine the magnitude and extent of deposition of drill cuttings closer to the drill centers where current monitoring has not been carried out (i.e., within 250-500 m). This will require further discussions with DFO.
3	HPD	SL		There is no mention in the EA of subsea cables occurring within the nearshore dredging/excavation areas. The proponent should contact Canadian Hydrographic Service, NL Region to ensure that there are no cables or other impediments within the proposed route prior to commencement of dredging activities and CGS tow-out.

No.	Sector	Reviewer Initial	Section / Page No.	Comment / Information Request
4	DFO (Sci.)			Species descriptions should include the most up-to-date, relevant information available. For example, many of the distribution maps, particularly those for marine fish and SAR, are based on data prior to 2001 and need to be updated accordingly. Significant changes have occurred over the past 10 to 20 years for many marine species, as well as the marine environment.

SPECIFIC COMMENTS

1	HPD	SL	2.4.1 White Rose Extension Project Design Criteria Table 2-4, P. 2-10	Please provide the correct dimensions of the CGS as the table reports the diameter in m^2. The exact footprint of the CGS is not specifically reported, which is needed to confirm that the authorized area under the current *Fisheries Act* Authorization has not been exceeded.
2	HPD	SL	2.6.3.1 Excavation, P. 2-20	The proponent should ensure that the cut-off wall is constructed using appropriate mitigations, such as sedimentation and erosion control measures as outlined in DFO's *Guidelines for Protection of Freshwater Fish Habitat in Newfoundland and Labrador*. Please note that mitigation measures as described in this document are applicable in both the freshwater and marine environments. Also, please confirm that there will be no in-water works during construction of the cut-off wall.
3	DFO (Sci.)		Section 2.6.3.3, P. 2-25 to 2-29	Baseline data on the health of fish in Argentia Harbor would be useful. Data is presented on levels of contaminants in sediment, but information on contaminant levels alone is of very limited value in assessing any potential risks to aquatic organisms. It is also noted that levels of contaminants in some sediment samples are above Canadian Council of the Ministers of the Environment (CCME) guidelines.
4	HPD	SL	2.6.4 The Pond, P. 2-30	During water withdrawal at The Pond, ensure adherence to DFO guidelines as described above, including the use of appropriately sized screens as described in DFO's *Freshwater Intake End-of-Pipe Fish Screen Guidelines* (1995).
5	HPD	SL	P. 2-32	Please confirm that activities within The Pond will not compromise the integrity of the bar sway/berm, which could result in a breach of the structure and a resultant release of sediment into the marine environment.

6	HPD	SL	2.7.2 Shoreline Dredging, P. 2-37	During shoreline dredging, please ensure appropriate mitigations are implemented, particularly erosion and sedimentation control measures. Dimensions of the graving dock entrance are unclear. Please clarify whether the excavated/dredged area will be 18-20 m deep across the entire 180 m channel.
7	HPD	SL	2.7.3 Tow-out Channel Dredging, P. 2-38	The overall size of the dredging footprint appears to be different than that reported in the *Marine Habitat Characterization Report*, dated September 2012 (i.e., decreased from 223,800 to 215,000 m^2). Prior to the start of construction, a final estimate of the dredging footprint should be provided to DFO.
8	HPD	SL	2.7.6 Topsides Mating and Commissioning, P. 2-42	Please provide more detailed information on the proposed mooring systems, including anchor dimensions, water depth and substrate type at anchoring points, timing and duration of deployment, etc.
9	HPD	SL	2.8.1 Wellhead Platform, Figures 2-15 and 2-16, P. 2-45 & 2-48, respectively	The drill center SWRX should be included in the figures as it has been excavated and will be developed in 2013 with completion of the site prior to the offshore component of this project.
10	HPD	SL	2.8 White Rose Extension Project: Installation, Table 2-12, P. 2-46	The table indicates that rock berms could be installed offshore. It is DFO's understanding that there would not be extensive use of rock berms in the offshore. Please confirm in writing that concrete sleeves will be used instead of berms for flowline protection (phone conversation between S. Lewis and D. Pinsent, February 8, 2013), as this could have implications under s.35(2) of the *Fisheries Act*.
11	HPD	SL	2.8.2 Subsea Drill Centre, Table 2-13, P. 2-49	Maintenance of drill centers and flowlines, including the removal of excess drilling muds should be included in the list of activities as there could be implications under s. 35(2) of the *Fisheries Act* depending on the scale of activities required.
12	HPD	SL	2.9.1 Wellhead Platform Operation and Maintenance, P. 2-51	This section indicates that SBMs will be re-injected if a suitable formation can be found. Please provide a contingency plan if this is not possible.
13	HPD	SL	2.14 Decommissioning and Abandonment, P. 2-53	As part of the decommissioning plan for the graving dock, stabilization and erosion control measures should be implemented to ensure the conservation and protection of fish habitat. The long term plans of the graving dock should also be discussed with DFO to ensure whether there is any potential for fish habitat restoration measures. It is important to note that during offshore decommissioning, any structures currently considered as fish habitat (i.e. existing rock berms) should not be removed without prior consultation and approval with DFO.

14	HPD	SL	2.15 Potential Future Activities, P. 2-53	See comment G-1.
15	HPD	SL	3.4 Drill Cuttings Deposition, P. 3-39	Figures in this section should include finer scale images such as 0-1 km scale. As described in the general comment (G-2), based on recent ROV surveys at a nearby oil development, it appears that accumulation of drill cuttings in proximity to offshore oil drilling sites may be greater than predicted during the EA. As such, DFO may require Husky Energy, as well as operators of other existing and future oil developments, to provide additional monitoring adjacent to the drill centers in order to verify these predictions. It should be noted that in the past, DFO has recognized that drill cuttings deposition with thicknesses of greater than 10 cm are considered harmful to benthic organisms. Predictions provided in this section suggest that maximum thicknesses could reach approximately 8.6 cm within 100 m from the deposition area.
16	HPD	SL	3.5 Synthetic-based Whole Mud Spill Trajectory Modelling, P. 3-52	The EA indicates that the SBM would biodegrade over several weeks; however, the properties are unknown. Please provide references or evidence to support this claim.
17	HPD	SL	Tables 3-50 to 3-52, P. 3-62 to 3-63	Oil spill information presented in these tables is based on data from 1987 to 1997. Although, previous EAs have also used the same data, it may be useful to incorporate more recent information as available.
18	HPD	SL	5.2 Scope of Environmental Assessment, P. 5-2	See comment G-1.
19		DFO (Sci.)	5.3.1 Step 1 - Scoping Issues and Selecting Valued Environmental Components, P. 5-7	The EA states "*Populations of marine mammals and some sea turtle species migrate to the Offshore Study Area primarily to forage for food*". It should be noted that some marine mammal species and the Leatherback Sea Turtle also migrate to the nearshore study area to feed in the summer and fall. The draft Critical Habitat for the Leatherback Sea Turtle may encompass part of the southern Placentia Bay area so this may require further mitigation and monitoring.
21		DFO (Sci.)	8.3.1.5 Fish and Shellfish – Capelin, P. 8-22	The statement: "…*migrate to deeper waters to spawn offshore at depths up to 125 m (likely when conditions for beach spawning are not ideal*" is incorrect. Nakashima and Wheeler (2002) indicate that spawning occurs subtidally when water temperatures at the beach are too warm. Furthermore, this redirected spawning occurs in coastal waters generally at depths considerably less than 125m. Please adjust the statement appropriately.

				The statement that eggs "*…remain in the sediment for 14 to 52 days…*" is not supported by Scott and Scott (1988) as indicated in the document. Scott and Scott (1988) indicate that eggs hatched in the beach from 9 to 24 days depending on where they were in the intertidal zone. If this statement is in reference to demersal spawning on the Southeast Shoal where water temperatures are much cooler, 52 days may be acceptable.
22		DFO (Sci.)	8.3.1.5 Fish and Shellfish – Capelin, P. 8-23	The statement that juvenile Capelin in the nearshore prefer eelgrass habitat should be supported with a reference. Most juvenile Capelin are found offshore where eelgrass does not occur. The following statement *"….except in autumn, when they have a reverse vertical migration (migrate to the surface during the day)*" that is attributed to Mowbray (2002) is incorrect.
23		DFO (Sci.)	8.3.1.5 Fish and Shellfish – Herring, P. 8-23	The description for Herring should be updated using DFO (2012).
24	HPD	SL	8.4.1.2 Concrete Gravity Structure Construction and Installation, P. 8-41	The EA states that a gated structure could be installed at the entrance of the graving dock post-flooding. Installation of the gate should be included in the assessment as an activity resulting in potential impacts to fish and fish habitat.
25	EAMP	LN	8.4.4 Summary of Potential Environmental Effects, Table 8-5, P. 8-43	i. Under Subsea Drill Center Installation, installation of subsea equipment: "x/+" should be depicted under *Change in Habitat Quantity*, as habitat is being lost as a result of the placement of equipment on the seafloor. *ii.* Under Potential Future Activities, excavation of drill centers: "-" should be depicted under *Potential Mortality*, as there will likely be loss of benthic organisms as a result of the excavation and disposal of dredge spoils. ii. Under Wellhead Platform Installation/Commissioning, Dredging and disposal of dredge material should have "X" for *Potential Mortality* *iv.* Under Potential Future Activities, Installation of Pipeline(s) and Testing from Drill Centres to FPSO, including Flowline Protection should have an "X" for *Potential Mortality*.
26	HPD	SL	8.5.1.1 Graving Dock Construction, P. 8-46	As discussed in the EA, The Pond will be drained prior to disposal of the graving dock and dredge spoils. However, given the permeable nature of the berm/barasway, please provide justification/evidence to illustrate that there will be no contamination or sedimentation from The Pond into the marine environment. Also, it should be noted that appropriately sized screens should be employed during the draining of The Pond as noted above (S-4).

27	HPD	SL	8.5.1.2 Concrete Graving Structure Construction and Installation, P. 8-50	The proposed Dredging Area nearshore was originally proposed to be 24,150 m^2 (as stated in the *Marine Habitat Characterization Report*, 2012), whereas the EA indicates that a significantly smaller area will be dredged/excavated (55 m x 200 m). Please confirm the actual amount of habitat that will be potentially affected. Also, depending on the final design of the graving dock entrance (i.e. gated or left open), additional habitat protection measures may be required. Measures to offset the impacts to fish habitat as a result of dredging/excavation of eelgrass beds and other productive nearshore habitats should be included. The EA should demonstrate that there are sufficient mitigation measures in place to ensure there are no significant adverse environmental effects. As discussed above (S-8), please confirm there will be no change in the quantity of fish habitat at the deep-water mooring points.
28	EAMP	LN	8.5.1.2 Concrete Graving Structure Construction and Installation Table 8-6 /P 8-52	The Ecological/Social/Cultural/Economic Significance should be rated "2 (Evidence of existing adverse activity)".
29	HPD	SL	8.5.1.3 Accidental Events in the Nearshore, P. 8-54	The potential collapse of the settling pond at The Pond and a breach at the berm/barasway resulting in a sedimentation event in the marine environment are potential accidental events that should be included in this section.
30	EAMP	LN	8.5.1.3 Accidental Events in the Nearshore P 8-59	In the nearshore, another accidental event that could potentially have an adverse effect on fish and fish habitat is a oil spill near a capelin spawning beach during a sensitive time of the year.
31	EAMP	LN	8.5.2.2 Production/Operation and Maintenance Table 8-8 / P. 8-64	i) The Ecological/Socio/Cultural/Economic Significance should be given a lower rating of 2 = evidence of existing adverse activity. In fact, this would apply for any of the potential effects assessment summary tables. ii) The change in habitat quantity for flowline rock berms is Negative as well as Positive.
32	HPD	SL	8.5.2.2 Production/Operation and Maintenance, P. 8-67	It is important to note that even though Husky Energy has already been previously authorized for the footprint of the CGS, this will cause a change in fish habitat quantity and therefore should be included. Although a "reef effect" may occur at the installation site, it is temporary in nature as the CGS will be removed during decommissioning.
33	HPD	SL	8.5.2.3 Offshore Decommissioning and Abandonment, P. 8-69, 8-72	As stated above (S-10), the removal of rock berms and flowlines which were approved as compensation for fish habitat loss may constitute a harmful destruction of fish habitat and as such could require a *Fisheries Act* Authorization.

34	HPD	SL	8.5.2.4 Potential Future Activities, P. 8-72	Future maintenance of drill centers could result in further harmful alteration and/or destruction of fish habitat depending on the magnitude and extent of operations. For large-scale maintenance projects and extensive installations of new equipment, Husky is advised to consult DFO to determine whether there are any *Fisheries Act* implications.
35	EAMP	LN	8.5.2.4 Potential Future Activities Table 8-11 / P 8-74	i) The intentions surrounding the potential future activities should be clarified as the potential effects associated with activities or components outside of the current project description would be subject to regulatory view and may require additional EA. ii) The Ecological/Socio/Cultural/Economic Significance should be given a lower rating of 2 = evidence of existing adverse activity. iii) Please provide clarification on the mitigation measure referring to s.32 *Fisheries Act* Authorization. The issuance of a s.35(2) *Fisheries Act* Authorization is more accurate.
36	HPD	SL	8.5.3.1 Nearshore, P. 8-80	As described in the general comments (S-4), submarine cables and other obstacles may be present in the coastal environment which could pose a risk during dredging activities.
37	HPD	SL	8.5.5 Follow-up and Monitoring, P. 8-83	Fish habitat compensation monitoring will be required as a condition of the s. 35(2) *Fisheries Act* Authorization to be issued for the harmful alteration or destruction of fish habitat associated with the dredging/excavation activities within the immediate vicinity of the graving dock.
38	EAMP	LN	11.4.4 Summary Table 11-9 / Pg 11-57 12.4.1.5 Summary Table 12-4 / Pg 12-61	i) Avoidance should be considered a Change in Habitat Quantity associated with seismic activities. ii) Collisions should be considered as Potential Mortality associated with Cumulative Effects.
39	EAMP	LN	11.5.1.1 Graving Dock Construction, Table 11-10, P. 11-61	Avoiding mammal concentrations, maintaining a steady course and safe speed (identify limit, i.e., less than 26 km/hr) should be mandatory rather than "when possible", otherwise, conditions not likely to implement a safe speed should be identified.
40	EAMP	LN	11.5.2.5 Accidental Events, P. 11-87	Please provide additional rationale why the Killer Whale population-level effects conclude "no population-level effects."
41	EAMP	LN	12.2 Definition of Significance, P. 12-2	The qualifying statement, "…if a population is vulnerable to extinction" should be removed from the definition. This also applies to inclusion of "vulnerable to extinction" in the summary on page 12-71.

42	DFO (Sci.)		12.3 Existing Environment, Table 12-3, P. 12-5	For Smooth Skate, Table 12-3 should also state "*Southern NF population has moderate potential for occurrence in Nearshore Study Area*". This addition also applies to ***Page 12-25 (para. 4)***. The second most common skate species caught in the inshore NF/Subdiv. 3Ps skate fishery is Smooth Skate (*Malacoraja senta*), all discarded at sea; albeit *not* SAR population of the Funk Island Deep DU.
43	DFO (Sci.)		12.3 Existing Environment, Table 12-3, P. 12-6	For Blue Shark, Table 12-3 should read "*Prionace glauca*"; not "*Priomace glauca*". Also should read "*Cape Hatteras*"; not "*Cape Hattaras*" for Spiny Dogfish (*Squalus acanthias*) and elsewhere. The EA statement, "*Most abundant along the coast of Nova Scotia and offshore Scotian Shelf*" is irrelevant to this Newfoundland EA study; however, Blue Sharks (*Prionace glauca*) are an abundant regular seasonal visitor to Newfoundland waters.
44	DFO (Sci.)		12.3 Existing Environment, Table 12-3, P. 12-7	For Basking Shark, Table 12-3 should read "*Low to moderate potential for occurrence in Nearshore Study Area during summer*"; not "*Low*". Also, the table should read "*Usually present in surface waters of Newfoundland bays feeding on plankton from May to September.*" This correction also applies to ***Page 12-40 (para. 2)***.
45	DFO (Sci.)		12.3 Existing Environment, Table 12-3, P. 12-7	For Thorny Skate, Table 12-3 should read "*Moderate to high potential for occurrence in Nearshore Study Area*; not "*Moderate*" as suggested. This correction also applies to ***Page 12-44 (para. 2)***.
46	DFO (Sci.)		12.3.1.2 Wolffish, P. 12-9	Regarding the following statement, "*No wolffish were observed during the nearshore ROV habitat survey of Argentia and area*", any conclusions are dependent upon the date(s), time of day, survey depth(s), and remotely operated vehicle (ROV) proximity to bottom topographic features. The ROV survey was conducted "outside" of the Atlantic Wolffish (*Anarhichas lupus*) spawning/nesting season; therefore, it is not unexpected to find *low/no* observations of adults "near shore". If this ROV survey was conducted "within" the wolffish spawning/nesting season, this conclusion may change. Therefore, the specifics of the ROV survey are crucial for the validation of conclusions in regard to wolffish in the proposed Argentia Peninsula (i.e., Nearshore) development.
47	DFO (Sci.)		12.3.1.2 Wolffish, P. 12-11	The following statement, "*Females guard the nests*", is incorrect and the cited references do not support those statements. For all three wolffish species, the adult male of each mated pair guards and aerates the resultant egg mass (i.e., "nest") until hatching.

48	DFO (Sci.)		12.3.1 Marine Fish Species at Risk, Figures 12-1 to 12-7, 12-9 to12-12, 12-14 to 12-16, and 12-18	Please update the figures as more recent data is available.
49	DFO (Sci.)		12.3.1.3 Atlantic Cod, P. 12-15	The distribution plots for Atlantic Cod (and other species using Kulka et al. 2003) are based on data from 2000 and should be updated, particularly in relation to baseline information for the project.
50	DFO (Sci.)		12.3.1.5 Porbeagle Shark, P. 12-22	The statement, "*Porbeagle are also caught as bycatch in other fisheries…of the 57 mt of discards annually*" (based on Campana et al. 2011), underestimates fishing bycatch mortality for this species. A more realistic estimate/fisheries overview can be obtained from Benjamins et al. (2010). This paper also considers several other SAR shark species including Shortfin Mako, Spiny Dogfish, Blue Shark, and Basking Shark.
51	DFO (Sci.)		12.3.1.8 Redfish, Figure 12-9, P. 12-27	The distribution plots for redfish indicate very low relative abundance except for an occasional hot spot. This was not expected and should be reviewed for accuracy. In addition, the low abundance of the distribution plots for redfish appear to contradict the results of the DFO RV survey in Div. 3L for 2010 and 2011 where Deepwater Redfish (*Sebastes mentella*) is the dominant species by weight both years (***Page 8-34***).
52	DFO (Sci.)		12.3.1.12 Atlantic Salmon, P. 12.32	For the south coast of Newfoundland, Atlantic salmon (*Salmo salar*) remain in the river until age three or four, not "*age two*". The species is no longer valued as "commercial fisheries" (also delete sentence 2 of ***para. 6***). The third sentence of para. 2 should be revised because salmon breed in other areas besides the southeast tip. In ***para. 5,*** the last sentence should state "*20 percent for small salmon and by 11 percent for large salmon.*" Note that the small salmon are adults. In Figure 12-13, "*post-smelt*" should be post-smolt.
53	DFO (Sci.)		12.3.1.18 Thorny Skate, P. 12-44	The statement, "*Simon and Frank (2000) found that in the skate fishery on the eastern Scotian Shelf…majority was Winter Skate*", is irrelevant to this EA study. Instead, scientific papers reporting on the annual Newfoundland skate fishery - in which *95%* of the skate catch is Thorny Skate (*Amblyraja radiata*) - should have been used. This fact, "*95% of the skate catch is Thorny Skate*", also applies to the skate fishery in Placentia Bay; rather than the ambiguous EA statement, "*is thought to be Thorny Skate*". (Simpson and Miri, 2012).
54	DFO (Sci.)		12.5.1.1 Nearshore, P. 12-97 and 12-98	Previous published studies of the possible effects of pile driving are discussed, but not in relation to the pile driving activities proposed in the EA. In addition, there is no mention of sound output into the marine environment from pile driving in ***Section 17.2.1***.

55	DFO (Sci.)		12.5.1.1 Nearshore, P. 12-120	The EA states that "*Although effects of the* Exxon Valdez *oil spill were substantial on killer whales, killer whales are uncommon in Placentia Bay, and no population-level effects would be expected.*" This conclusion may be incorrect based on the apparent small size of the Northwest (NW) Atlantic Killer Whale population. Even if the number of known individuals reaches 100, loss of one or two animals would represent a "*population-level effect*".
56			12.5.2.2 Offshore, P. 12-126	Please specify a "*safe speed*" for project vessels. To ensure no mortality to listed marine mammals or sea turtles the safe speed would be (an unrealistic) zero knots. And it is unlikely that vessels transiting in night, fog, or high wave height conditions will be able to detect, much less, avoid a sea turtle or beaked whale.
57	DFO Oceans		13.0 Sensitive Areas, P. 13-1	The definition for sensitive areas quoted from the Scoping Document differs from the sensitive areas definition that has been used for other recent strategic and project based EAs (ex. Western Newfoundland SEA Update). In addition, in some assessments, sensitive areas are grouped with "special areas" (Western Newfoundland SEA), referred to as "potentially sensitive areas" (Southern Newfoundland SEA) or simply referred to as "special areas" (Laurentian Sub-Basin SEA). In the interest of clarity and consistency, it is suggested that the C-NLOPB identify a common, comprehensive definition and use common terminology for all SEAs and project based EAs when referring to special and sensitive areas.
58	DFO Oceans		13.3 Existing Environment, P. 13-5	Please provide consistency in reference to the CPAWS Special Marine Areas. There are three areas not two areas, as specified in the EA. These three Special Marine Areas should be depicted on a map as they are currently not shown in the document.
59	DFO Oceans		13.3.1 Nearshore, P. 13-6	The EA states: *"…The Placentia Bay Extension EBSA (which includes all of Placentia Bay) is ranked second by DFO (2007b) in priority among the 11 identified EBSAs within the PBGB LOMA as candidate sites for designation as an MPA…".* The Placentia Bay Extension EBSA was not ranked second in relation to priority for Marine Protected Area designation. The area scored second out of the 11 EBSAs in relation to the criteria evaluated to determine the ecological or biological significance of the areas examined by DFO Science. The EA document refers to these criteria on p.13-16 in Section 13.3.2.1. The identification of EBSAs is not restricted to considerations for MPA designation. While portions of EBSAs may be potentially considered for MPA designation, there are a suite of potential management measures that may be established for EBSAs, not just strict protection. It is suggested that the proponent refer to Appendix 1 of the Southern Newfoundland Strategic Environmental Assessment http://www.cnlopb.nl.ca/pdfs/snsea/snseaapp1.pdf where DFO submitted a clarification of the purpose for identifying EBSAs.

				References framing EBSAs solely in the context of MPA designation should be corrected (ex. P. 13-6 and third paragraph P. 13-16).
60	DFO Oceans		13.3.1.2 Eelgrass Beds, P. 13-10	The location of eelgrass beds should be depicted in a map as per the statement *"…Extensive eelgrass beds have been identified in Placentia Bay (Catto et al. 1999; CPAWS 2009)…"*.
61	HPD	SL	13.5.1 Nearshore Pre-construction and Construction, Table 13-4, P. 13-24	The reversibility eelgrass bed destruction is not accurate as presented in the table. The cut-off wall will be excavated to 18-20 m depth making it too deep for eelgrass re-colonization. Therefore, the effects would be irreversible. Please clarify.
62	HPD	SL	15.1 Existing White Rose Offshore Environmental Effects Monitoring Program, P. 15.1	While it is acknowledged that the WHP requires inclusion into the existing EEM, DFO has not reviewed any plans for the insertion of the SWRX into the EEM design. Prior to the commencement of the next iteration of the EEM program (2014), it is advised that the proposed design be submitted to DFO for review.
63	HPD	SL	15.1.2 Environment Effects Monitoring Sampling Design, P. 15-3	Additional sampling will likely be required to verify predictions made during the EA regarding dispersion and subsequent accumulation of drill cuttings and therefore should be included in the monitoring program.
64	HPD	SL	15.2.1 Nearshore Environmental Compliance Monitoring, P. 15-4	The proponent should also specify that a Section 35(2) *Fisheries Act* Authorization will likely be required for the nearshore dredging component.
65	HPD	SL	15.2.2 Offshore Environmental Compliance Monitoring, P. 15-5	See comment G-1.
66	HPD	SL	15.3 Other Required Programs, P. 15-5	It is important to note that although there will be upcoming changes to the *Fisheries Act*, the current requirements of the *Fisheries Act* and DFO's *Policy for the Management of Fish Habitat* (1986) are still in effect for on-going projects.
67	DFO (Sci.)		15.3	Dynamic positioned rigs and vessels will produce significant and long-duration underwater noise through propeller cavitation and thruster operations displacing marine mammals, or in the case of Northern Bottlenose Whales (*Hyperoodon ampullatus*), may attract them to such operations. Regular monitoring before, during, and after the onset of such activities would help to determine if there were distributional or behaviour responses to such noise

				sources.
68	HPD	SL	17.4 Summary of Monitoring and Follow-up, P. 17-11	There is an indication that the EEM will be updated to incorporate the West White Rose development; however, the SWRX also needs to be included into the existing EEM program as described above (S-62).
69	Oceans		17.5 Conclusions, Table 17-2, P. 17-12	Please be consistent in referring to "Special Areas" or "Sensitive Areas" throughout the EA.

DFO Comments: Husky Energy White Rose Extension Project
Drill Cuttings and WBM Operational Release Modelling

No.	Sector	Reviewer Initial	Section / Page No.	Comment / Information Request
GENERAL COMMENTS				
1	HPD	SL	Executive Summary, P. ii	The statement "*Nor is account made of the possibility of cuttings near the cuttings deposits directly about the excavated drill centre(s) being cleared by a seafloor cutting transportation system and moved to another seafloor location*" is concerning to DFO. The transportation of drill cuttings outside the authorized area could have *Fisheries Act* implications and therefore DFO should be contacted prior to the relocation of drill cuttings.
2	HPD	SL	2.0 Drilling Program, P. 2	The document suggests there could be three additional subsea drill centers at the White Rose field as well as the WHP. This is inconsistent with the EA and other documentation. Regardless, as stated in DFO's comment G-1 of the EA, the post-construction survey results from the SWRX have indicated Husky Energy may require amendments to existing authorizations to enable the excavation of anymore drill centers beyond the installation of the WHP.
3	HPD	SL	Figure 2-1, P. 3	The drill center SWRX is not depicted on the figure. Similar to S-9, please include it in the figure.

No.	Sector	Reviewer Initial	Section / Page No.	Comment / Information Request
4	HPD	SL	3.3.2 Synthetic Based Muds, P. 31	As discussed above, relocation of drill cuttings could have implications to fish and fish habitat, therefore contact DFO prior to the undertaking such activities.
5	HPD	SL	4.0 Drilling Mud Properties and Discharge Characteristics, P. 38	It should be noted that another environmental effect of released WBMs is the smothering of benthic organisms that should be included.

DFO Comments: Husky Energy White Rose Extension Project
Underwater Sound Propagation

No.	Sector	Reviewer Initial	Section / Page No.	Comment / Information Request
	GENERAL COMMENTS			
1	DFO (Sci.)		Table 1-2, P. 4	While the injury criteria in Southall et al. (2007) are accepted by many reviewers, the behavioural criteria are not generally accepted. For some cetaceans, reactions to sound appear to be highly dependent on context and their behavioural state. Based on the modelled sound propagation the area ensonified to a level that would result in behavioural reactions by cetaceans could be quite large.
2	DFO (Sci.)		Table 2-2, Section 2.2.2 and elsewhere	Given that sounds from propeller cavitation and dynamic positioning using thrusters can be substantial – it would have been useful to review these models separately as they might be significant.
3	DFO (Sci.)		Section 3.0	Provide a rationale for the exclusion of 5% of the furthest distance values to a given sound level; it does not seem useful to present this reduced dataset.

Sources of information

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