Husky Energy

White Rose Extension Project

Response to Review Comments on the White Rose Extension Project Environmental Assessment Addendum

WH-DWH-RP-0035

June 2013

Husky Energy SUNCOR ENERGY nalcor energy

Table of Contents

List of Figures

List of Tables

1.0 GENERAL COMMENTS

1.1 Fisheries and Oceans Canada

Husky Energy has indicated, for numerous DFO comments, "*Comment Noted. Thank you.*" While this type of response may be appropriate in cases where DFO is offering advice related to regulatory responsibilities or next steps in the review process, it is not appropriate where DFO has addressed errors, asked for additional information or clarification. Each comment should be appropriately addressed.

Husky Response: Please see Section 2.3 for Husky response to specific DFO comments.

1.2 Environment Canada

In its response, Husky Energy has often indicated "Comment Noted" in response to Environment Canada commentary. The meaning of this response is not clear and reviewers were unable to evaluate how or whether their concern has been addressed. Environment Canada has identified such cases with "Non-Responsive" and requests a proper response (see specific comments).

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

Husky Response: Comment noted. Thank you.

EC Response: Non-Responsive

Husky Response: Revised Table 10-3 is provided as Table 1.

Table 1 Revised Table 10-3 Offshore Study Area Marine Bird Observations 2004 to 2008

Project	Time Period	Location (Relative to Project Area and/or Study Area)	Approximate Water Depth (m)	Species with Highest Relative Abundances during Observations
CCGS *Hudson* Research Expedition	June 2004	South Grand Banks (southwestern Study Area)	<100	<u>Great</u> Shearwater
CCGS *Hudson* Research Expedition	June 2004	Salar Basin (southwestern Study Area)	>1,000	<u>Great</u> Shearwater Northern Fulmar
CCGS *Hudson* Research Expedition	June 2004	Western Slope of Southern Flemish Pass (north-central Study Area)	~ 500	Northern Fulmar <u>Great</u> Shearwater Sooty Shearwater
CCGS *Hudson* Research Expedition	June 2004	Sackville Spur (northeast of Study Area)	~ 1,000	Northern Fulmar <u>Great</u> Shearwater Great Black-backed Gull
CCGS *Hudson* Research Expedition	June-July 2004	Orphan Basin (north of Study Area)	>2,000	Northern Fulmar <u>Great</u> Shearwater Great Black-backed Gull Leach's Storm-Petrel
CCGS *Hudson* Research Expedition	July 2004	North Grand Banks (northwestern Study Area)	200 to 1,000	<u>Great</u> Shearwater Manx Shearwater
Seismic Program for Chevron Canada Resources and ExxonMobil Canada Limited	June-September 2004	Orphan Basin (north of Study Area)	1,850 to 2,500	Northern Fulmar <u>Great</u> Shearwater Leach's Storm-Petrel Sooty Shearwater Black-legged Kittiwake (Aug-Sept)

Project	Time Period	Location (Relative to Project Area and/or Study Area)	Approximate Water Depth (m)	Species with Highest Relative Abundances during Observations
Seismic Program for Chevron Canada Resources and ExxonMobil Canada Limited	May-September 2005	Orphan Basin (north of Study Area)	1,108 to 2,747	Northern Fulmar Leach's Storm-Petrel Great Shearwater Black-legged Kittiwake, Dovekie, and Thick-billed Murre (May-June) Great Black-backed Gull (Aug-Sept)
Seismic Program for Husky	October-November 2005	Approximately 75 km northwest of Terra Nova FPSO (northwestern Study Area)	68 to 376	Northern Fulmar Dovekie Black-legged Kittiwake Thick-billed Murre
Petro-Canada`s *Terra Nova* Hull Cleaning	May-June 2006	46 km radius around Terra Nova FPSO	65 to 190	Leach's Storm-Petrel
Seismic Program for Husky	July-August 2006	1) 95 km north and 2) 15 km east of Terra Nova FPSO	86 to 387	Great Shearwater Leach's Storm-Petrel
CSEM Program for ExxonMobil Canada Limited	August-September 2006	Orphan Basin (north of Study Area)	2,076 to 2,603	Great Shearwater Leach's Storm-Petrel Black-legged Kittiwake Northern Fulmar
Seismic Program for Petro-Canada	June-July 2007	Approximately 17 km northwest of Terra Nova FPSO (northwestern Study Area)	61 to 171	Great Shearwater Northern Fulmar Leach's Storm-Petrel
CSEM Program for ExxonMobil Canada Limited	July-September 2007	Orphan Basin (north of Study Area)	1,122 to 2,789	Leach's Storm-Petrel Great Shearwater Northern Fulmar
Seismic Program for Petro-Canada, StatOil Hydro, and Husky	May-September 2008	Jeanne d'Arc Basin	66 to 119	Great Shearwater Northern Fulmar Leach's Storm-Petrel
Source: Lang and Moulton 2004, 2008; Moulton et al. 2005, 2006a; Lang et al. 2006; Lang 2007; Abgrall et al. 2008a, 2008b, 2009.				

Section 10.3.6.2, Great Shearwater, Page 10-20. The second and third paragraphs are revised to read:

Concentrations of 100,000 shearwaters, mostly Greater with some Sooty Shearwaters, have been observed on the east side of Placentia Bay in June. Such observations serve as the basis for the IBA in eastern Placentia Bay (www.ibacanada.com). Large numbers of shearwaters are attracted to the southern Avalon Peninsula during the early summer season from mid-June to late July when capelin spawn. The numbers of Great and Sooty Shearwaters using Placentia Bay during the summer is not accurately known, but is probably in the hundreds of thousands.

Great Shearwater was among the top four most numerous species observed on the Orphan Basin during seismic monitoring 2004 to 2007 from June to September, with monthly density averages ranged from 2.4 to 35.4 birds/km^2 (Moulton et al. 2006a; Abgrall et al. 2008b). Seismic monitoring on the Jeanne d'Arc Basin showed Great Shearwater were common in summer with a mean weekly density of 5.1 birds/km^2 from 9 July to 16 August 2006 (Abgrall et al. 2008a) and 11.9 birds/km^2 from 21 May to 29 September 2008 (Abgrall et al. 2009). ECSAS survey data from 2006 to 2009 lumps all shearwater species within the Offshore Study Area shows densities per 1º survey blocks ranging from 0 to 14.1 birds/km^2 during the summer period May to August (Fifield et al. 2009).

Section 10.3.6.2, Sooty Shearwater, Page 10-20. The first paragraph is revised to read:

The Sooty Shearwater breeds in the Southern Hemisphere from November to March. A large percentage of the population migrates to the Northern Hemisphere and is present from May through October. It is a common bird during the summer months off Atlantic Canada north to Labrador, but it usually outnumbered by the Great Shearwater, with which it often associates.

2.0 SPECIFIC COMMENTS

2.1 Food, Fish and Allied Workers

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)

Husky Response: Husky agrees that the Fisheries Liaison Committee (FLC) is key to successful cooperation between marine users. The FLC will be established prior to the start of marine construction activities. For clarification, Section 15.2.1 discusses an Environmental Protection Plan (EPP) to be implemented during construction activities at Argentia. The EPP will outline the testing requirements to ensure compliance with regulations and guidelines. The EPP will be prepared and submitted to the provincial Department of Environment and Conservation for review and approval. Husky is committed to holding further consultations with the FFAW once the deep-water site has been confirmed.

> ***FFAW Response****: The Fisheries Liaison Committee should not have to wait on the commencement of marine construction activities. Seeing that all activity will have some impact/involvement from/to the marine environment. Constituting the Fisheries Liaison Committee at the earliest convenience would largely be a beneficial venture, rather than holding off until activity happens. Early constitution will be conducive to enhance the positive approach to the mitigation efforts relating to the WREP. Looking at the response, the FFAW feels that there needs to be a definition of what prior to the start of marine construction activity is warranted.*

Husky Response: Husky also views a Fisheries Liaison Committee (FLC) as a beneficial venture with the purpose of mitigating WREP effects. We would anticipate establishing a FLC six months prior to the start of marine construction activity.

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.

Husky Response: The WREP EA assesses the potential impact of all project activities on fish and fish habitat in Chapter 8. Potential impacts to Fisheries, including catchability, are assessed in Chapter 9. Husky has included an extensive list of mitigations to minimize potential impact to fish harvesters in Section 9.5.

> ***FFAW Response****: The FFAW feels that using only the interior of Placentia Bay excludes the headland communities. The WREP would have been better served using the whole of 3Psc as study area. This relates back to the fact that mitigation needs to include consideration of whole bay as a complex ecosystem and socio-economic environment. Activity in a single area can/will have economic and social implications for whole of bay.*

Husky Response: The Scoping Document for the WREP Environmental Assessment (C-NLOPB 2012) specifies that the Study Areas and associated boundaries should be described based on consideration of potential areas of effects as determined by modelling (e.g., spill trajectory, produced water and drill cuttings dispersion), the scientific literature and project-environment interactions. Husky defined the Nearshore Study Area by modelling WREP-environment interactions (underwater noise (JASCO 2012), dredge materials (AMEC 2012) and air quality (Stantec 2012)), including accidental events (oil spill trajectories (SL Ross 2012)).

This is the area within which environmental effects were determined, including the effects on the fish, fish habitat and fisheries. Apart from an accidental event, the effects of the WREP were determined to be localized.

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.

Husky Response: Husky intends to continue regular consultation with fishery representatives and the FFAW through One Ocean to remain current knowledge of trends and changes in both the nearshore and offshore fisheries environment. Husky provides annual updates to the FFAW and One Ocean on planned future activities. There is also ongoing liaison with the fishing industry through regular meetings of the One Ocean Technical Working Group. The C-NLOPB requires that all active environmental assessments are updated annually with the most current fisheries data available. Consultation with One Ocean and the FFAW are conducted as part of those environmental assessment updates.

> ***FFAW Response****: The response provided by Husky Energy does not suffice in the context of the comment. As relating to Comment #6, 20 years is an inadequate timeframe in view of the FFAW. Historical data should/must include considerations of patterns pre-moratorium.*

Husky Response: Husky believes that consideration of pre-moratorium fishing patterns and catch levels are of limited value for the purpose of the WREP Environmental Assessment. As a case in point, an extensive analysis was undertaken for Mobil Oil in 1980 for the Hibernia environmental assessment, which concluded that Unit Area 3Lt was not a major or economically important cod fishing zone in the overall Grand Banks fishing industry and at that time, there were no crab being harvested from that zone. Since that time, the Unit Area 3Lt has become a highly valuable crab-fishing area, which Mobil's detailed analysis of the historical data and its extensive consultations with the fishing industry did not and could not have predicted in the 1980s. Even a 40-year catch data perspective cannot demonstrate the present or future economic importance and value of the commercial fisheries in a given area.

Husky intends to continue regular consultation with fishery representatives and the FFAW through One Ocean to maintain current knowledge of trends and changes in both the nearshore and offshore fisheries. As required by the C-NLOPB, potential future changes to the fishery will be assessed annually though environmental assessment updates. Consultation with One Ocean and the FFAW are conducted as part of those environmental assessment updates.

New Reference:
Mobil Oil 1980. Baseline analysis of commercial fisheries activities in eastern and southern Newfoundland. Hibernia Environmental Impact Statement, 1980-1981).

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.

Husky Response: WREP EA Section 9.3.2.1 - Historical Overview of Regional Fisheries (Placentia Bay) provides a broad overview of historical trends in the nearshore fisheries in Placentia Bay during the past 20 to 25 years. Section 9.3.3.1 - Historical Overview of Regional Fisheries (Eastern Grand Banks) provides a 20-year perspective of fisheries harvesting trends in NAFO 3LMN. As noted above, Husky will continue to consult on a regular basis with offshore fisher representatives, FFAW managers and One Ocean in order to keep apprised of future trends and changes in the offshore fisheries environment.

> ***FFAW Response**: The response aptly manages to quote and specify exactly what the FFAW comment identified as insufficient. The FFAW indicated that the data should go back past 1990, for a proper perspective of the potential harvesting patterns – particularly in the offshore.*

Husky Response: Please see response to Comment #4.

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.

Husky Response: Comment noted. Thank you. The heading for Section 8.5.2.1 should read Change in Habitat Quantity. Section 8.5.1.3 assesses the effect of an accidental event on fish and fish habitat.

> ***FFAW Response**: It is clear that the reviewer is aware of what the sections contain. Therefore, merely re-citing the section number as it is in the comment is the same as not providing an answer or response to the comment.*

Husky Response: Our response was intended to acknowledge that Section 8.5.2.1 was mislabelled and to reiterate that Section 8.5.1.3 assesses the effects on fish and fish habitat, not fisheries. We further acknowledge the reviewer's comment that any effect on fish or fish habitat could translate into an effect on fisheries.

8. *In the responses prepared by Husky Energy, Comment #8 was collapsed in with Comment #7.*

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.

Husky Response: While the establishment of a deep-water mating site safety zone will create a temporary loss of access to fishing grounds within these areas, it will serve as a key mitigation to avoid or prevent interaction and to help ensure the safety of workers, fishers and other marine users. Husky has committed to several mitigation measures in Section 9.5.1.2 to mitigate the impact of the WREP on fish harvesters. Details of these mitigations will be further discussed during the Fisheries Liaison Committee meetings.

> ***FFAW Response**: It is prudent to recognize that any displacement of harvesting effort will have a broader impact than only the immediate area. Husky should not wait to engage harvesters – why not engage harvesters fully before the decision on the deep-water mating site. The mitigation efforts should not be confined to having consultations inside the project area, as stated elsewhere Placentia Bay is a whole. Further it is suggested in the Mitigations section that the Fisheries Compensation Program would already have been discussed at the Fisheries Liaison Committee – a committee not yet constituted (to the best of my knowledge).*

Husky Response: Husky and our environmental assessment consultants have met with the FFAW and area fishers for the purposes of assessing proposed activities at a deep-water site. The environmental assessment concludes that the potential effect of the WREP will be localized and of short duration.

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.

Husky Response: Husky will work with its contractors, who will work directly with the appropriate trade unions, to offer a competitive wage and benefits package to attract and retain the required workers for the Project. A competitive wage and benefits package, in addition to the location of the project site, will support recruitment of qualified persons from the local area, throughout Newfoundland and Labrador, as well as nationally and internationally as required.

> ***FFAW Response**: There is no question that the WREP will have to be competitive to attract the workforce. "90 percent of the nickel processing plant's construction workforce live outside the Argentia area and commute to the WREP (Sic) site on a daily basis." It remains doubtful that the construction crew at Long Harbour travels to Argentia daily; this is what was meant to be pointed out from the quoted text. .*

Husky Response: Correction acknowledged. The construction crew at Long Harbour would not be travelling to Argentia on a daily basis.

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.

Husky Response: Husky makes every effort to inform stakeholders of planned activities once schedules have been confirmed. We continue to ensure that consultation meetings are held with the FFAW and One Ocean in a timely manner.

> ***FFAW Response**: The foundation of this comment is that Husky Energy used a map reflecting a Safety Zone which had not been submitted to Transport Canada at the time of the consultation with harvesters.*

Husky Response: Correct. Consultation on changes to the safety zone occurred prior to the application being filed with Transport Canada.

2.2 Environment Canada

Section 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."

Husky Response: Comment noted. Thank you.

> ***EC Response****: Non-Responsive.*

Husky Response: The second paragraph in Section 3.6.1.1 is revised to read:

There has been one extremely large spill during offshore development drilling, so the frequency to the end of 2011 is (1/67,703) 1.5 x 10^{-5} spills per well drilled, or one such spill for every 68,000 wells drilled. A similar analysis can be done for very large spills. 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.

Section 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".

Husky Response: Comment noted. Thank you.

> ***EC Response****: Non-Responsive.*

Husky Response: Revised Figure 4-75 is provided as Figure 1.

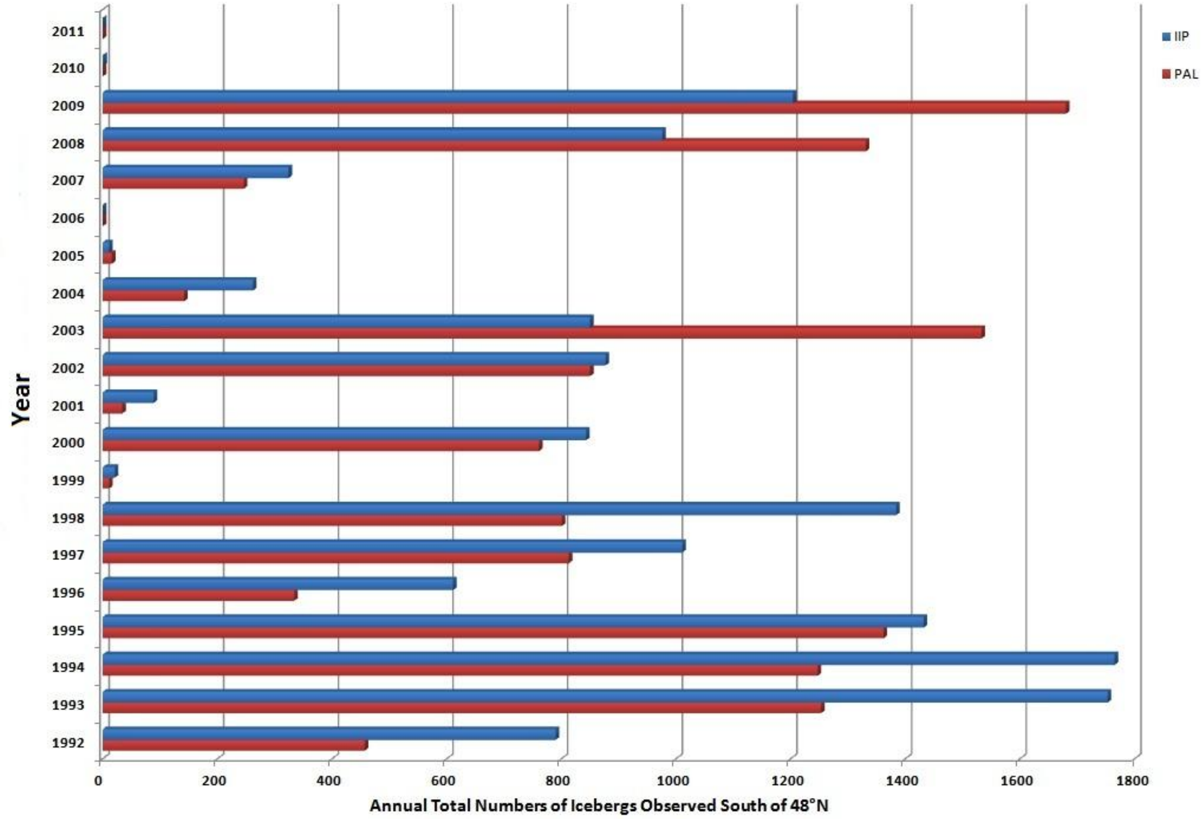


Figure 1 Revised Figure 4-75 Comparison of International Ice Patrol and Provincial Airlines Limited Iceberg Databases 1992 to 2011

Section 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.

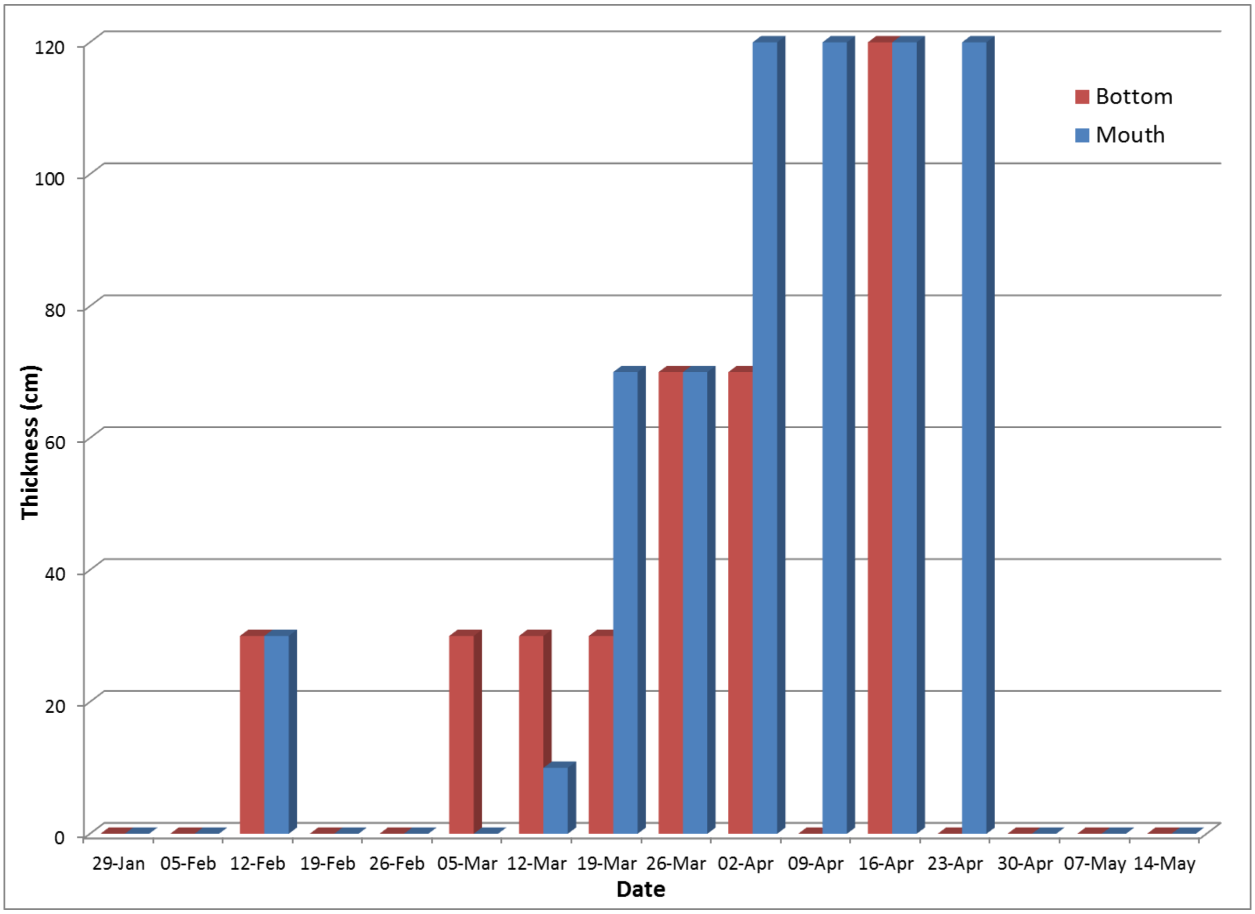
Husky Response: Comment noted. Thank you.

***EC Response**: Non-Responsive.*

Husky Response: Section 4.2.4.1, Sea Ice Conditions in Placentia Bay, first paragraph is revised to read:

Pack ice presence in Placentia Bay from year to year may be variable, based on a review of the weekly CIS charts from 1981 to 2010, inclusive (Environment Canada CIS 2010). Most sea ice within the bay is formed off southern Labrador and drifts south to enter the bay around the mid-February timeframe. Pack ice begins to enter Placentia Bay in February, typically as grey or grey-white ice (<30 cm), followed by first-year ice incursion in March and April. Placentia Bay generally experiences thin or medium first-year ice (30 to 120 cm thick). The bay has been divided into two sections for analysis: the mouth and the bottom (Figure 4-76). The mouth of the Bay is more susceptible to incursions of the annual pack, while the bottom of the bay only fills with pack when there are sustained periods of onshore winds. The available data do not have the resolution to provide information on ice distribution in the various inlets and coves around the bay.

Revised Figure 4-78 is provided as Figure 2.



Source: CIS 2011

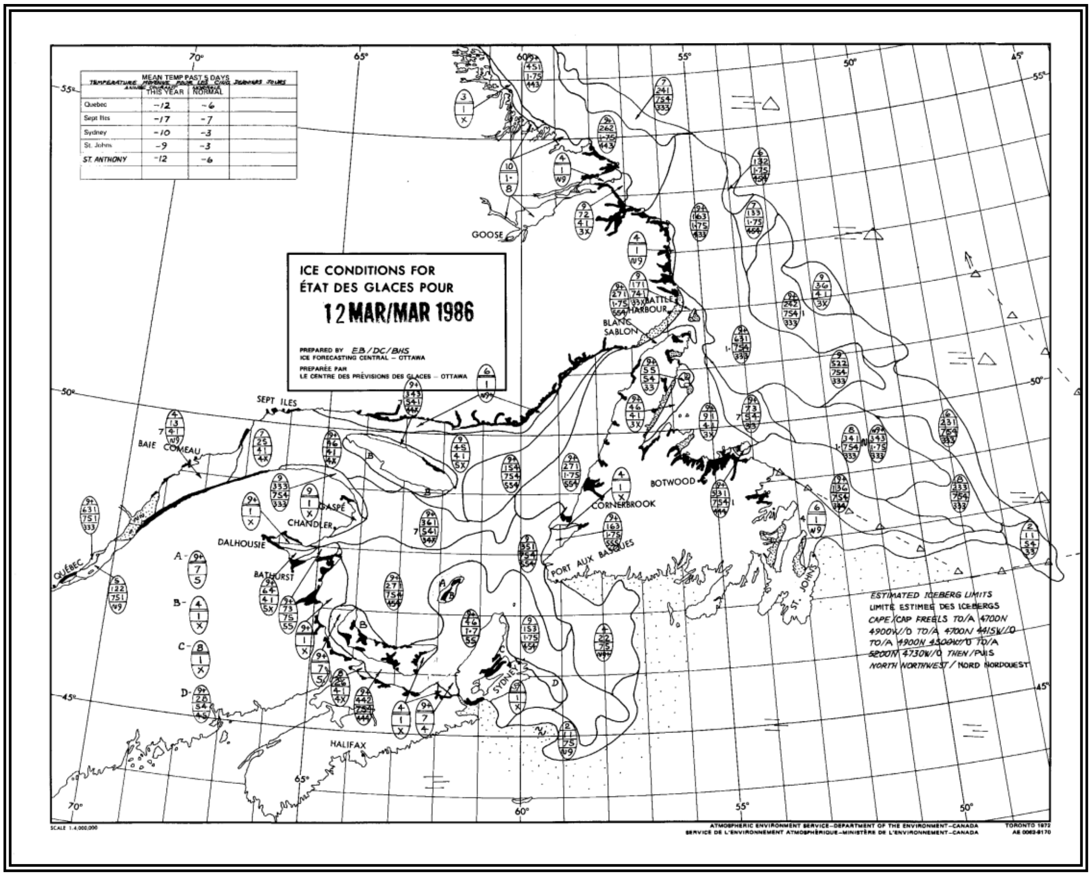
Figure 2 Revised Figure 4-78 Derived Sea Ice Thickness at the Mouth and Bottom of Placentia Bay (30 year average for period from 1981 to 2010)

Section 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.

Husky Response: Comment noted. Thank you.

EC Response*: Non-Responsive.*

Husky Response: Figure 4-121 is provided with appropriate caption as Figure 3.



Source: Canadian Ice Service

Figure 3 Figure 4-121 Ice Coverage on March 12, 1986

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

Husky Response: Comment noted. Thank you.

***EC Response**: Non-Responsive*

Husky Response: Revised Table 4-44 is provided as Table 2.

Table 2 Revised Table 4-44 Monthly Maximum MSC50 Wind Speed (m/s) by Direction, 1954 to 2010

Month	Direction								Monthly	
	NE	E	SE	S	SW	W	NW	N	Min	Max
January	21	23	24	26	29	28	27	25	21	29
February	23	22	25	30	30	30	32	24	22	32
March	22	25	24	22	25	28	28	25	22	28
April	22	20	21	25	24	23	24	24	20	25
May	16	18	18	19	20	19	23	19	16	23
June	16	17	21	18	18	22	23	15	15	23
July	14	16	17	20	17	17	18	15	14	20
August	17	18	19	29	28	23	29	24	17	29
September	21	21	24	24	25	23	21	21	21	25
October	22	22	24	27	27	27	25	23	22	27
November	21	23	23	27	23	27	28	26	21	28
December	22	22	25	23	28	28	30	25	22	30
Years Max	23	25	25	30	30	30	32	26		

Section 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.

Husky Response: Ice accumulation on stationary offshore platforms is a rare event. Freezing spray is more common on ships transiting rough seas. Data on ice accumulation are not recorded in either case.

> ***EC Response****: Not Satisfactory. "EC had recommended that the EIS include analysis of observed freezing spray and icing accumulation measured on the platforms. This would augment the modeled potential icing results. Knowledge gained through direct experience and observations of ice accretion (whether formally reported or not) from years of winter operations in this area by station keeping production vessels, mobile drilling platforms, and supply vessels should be used to help characterize this significant environmental hazard."*

Husky Response: Husky has no record of ice accretion on the *SeaRose FPSO* or from drilling rigs while under contract to Husky. The WHP is being designed for ice loads according to the standards of NORSOK N-003 'Actions and Action Effects' and CAN/CSA ISO 19906 'Petroleum and natural gas industries – Arctic offshore structures'.

Section 4.3.4.1 Sea Ice, ***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.**"

Husky Response: Comment noted. Thank you.

> ***EC Response****: Non-Responsive*

Husky Response: Section 4.3.1.1 Spatial Distribution, third paragraph is revised to read:

In typical years, the ice edge reaches the northern tip of Newfoundland in early January and the Grand Banks in mid-February (National Climate Data Centre 1986). The pack ice off Newfoundland generally reaches annual peak coverage in March, but can remain at high levels through May. 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.

Section 4.3.4.1 Sea Ice, *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."

Husky Response: Comment noted. Thank you.

> ***EC Response****: Non-Responsive*

Husky Response: Section 4.3.1.1 Spatial Distribution, fourth paragraph is revised to read:

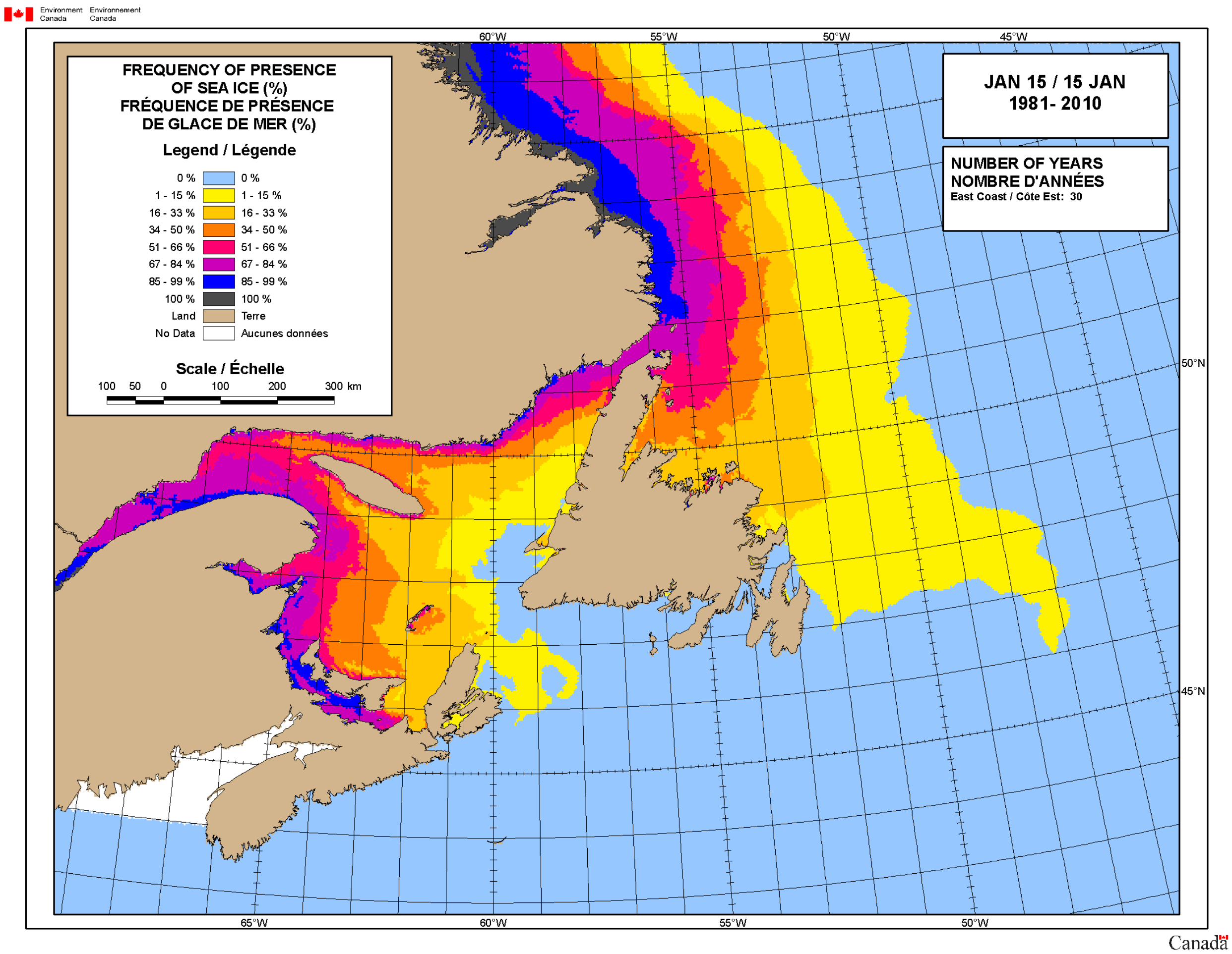
By the end of July, the ice pack has retreated rapidly northward, with substantial ice concentrations confined to north of Labrador. Occasionally, first-year ice remnants linger at the end of the summer season off the east coast of Baffin Island, near 70°N. These remnants, together with late discharges of first-year and older ice from Lancaster, Jones and Smith sounds, are the source of the old ice that can appear off Labrador the following ice season (Markham 1980).

Section 4.3.4.1 Sea Ice, *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.

Husky Response: Comment noted. Thank you.

> ***EC Response****: Non-Responsive*

Husky Response: Revised Figure 4-122 is provided as Figure 4.



Source: Environment Canada CIS 2011

Figure 4 Revised Figure 4-122 Frequency of Pack Ice Cover: Week of January 15 (1981 to 2010)

Section 4.3.4.1 Sea Ice, *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."

Husky Response: Comment noted. Thank you.

***EC Response**: Non-Responsive*

Husky Response: Section 4.3.4.1, Spatial Distribution, Paragraph on Page 4-209 is revised to read:

The annual 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. These data show the years of higher-than-average incursion (1983 to 1995, 2000 and 2008). The maximum recorded incursion of sea ice for east Newfoundland waters occurred in 1993 and is illustrated in Figure 4-128.

Section 4.3.4.1 Sea Ice, *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)."

Husky Response: Comment noted. Thank you.

> ***EC Response**: Non-Responsive*

Husky Response: Section 4.3.4.1, Spatial Distribution, Paragraph on Page 4-209 is revised to read:

The annual 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. These data show the years of higher-than-average ice coverage during the initial period of ice incursions (1983 to 1995, 2000 and 2008). The maximum recorded incursion of sea ice for east Newfoundland waters occurred in 1993 and is illustrated in Figure 4-128.

Section 4.3.4.1 Sea Ice, *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."

Husky Response: Comment noted. Thank you.

> ***EC Response**: Non-Responsive*

Husky Response: Section 4.3.4.1, Spatial Distribution, Paragraph on Page 4-209 is revised to read:

The annual 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. These data show the years of higher-than-average ice coverage during the initial period of ice incursions (1983 to 1995, 2000 and 2008). 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.

Section 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.

Husky Response: Comment noted. Thank you.

> ***EC Response**: Non-Responsive*

Husky Response: Section 4.3.4.2, Origins and Controlling Factors, first paragraph is revised to read:

Glacial ice is formed from the accumulation of snow, which gradually changes form as it is compressed into a solid mass of large granular ice. This process produces a structure quite different from pack ice. The principal origins of the icebergs that reach the White Rose field location are the tidewater glaciers of West Greenland. Between 10,000 and 15,000 icebergs are calved each year, primarily from 20 major glaciers between and including the Jacobshavn and Humboldt glaciers. These glaciers account for 85 percent of the icebergs that reach the Grand Banks. Of the remaining icebergs, 10 percent come from the East Greenland glaciers and 5 percent from the glaciers and ice shelves of Ellesmere Island.

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.

Husky Response: Comment noted. Thank you.

EC Response: *Non-Responsive*

Husky Response: Section 4.3.4.2, Origins and Controlling Factors, fourth paragraph is revised to read:

Deterioration of icebergs during subsequent southward drift determines seasonal iceberg severities in offshore Newfoundland. The number of icebergs that survive to reach the Grand Banks each spring has been shown to have a direct relationship to the pack ice extent off Labrador in the winter and early spring (Marko et al. 1994b). In other words, when the pack ice covers the core of the Labrador Current, iceberg counts for the Grand Banks increase markedly per unit increase in pack ice cover. The positive correlation between iceberg numbers and pack ice extent is due to the fact that the pack ice protects the icebergs from melt and wave-induced deterioration during their trip southwards. Because of this, many more icebergs 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.

Husky Response: Comment noted. Thank you.

EC Response: *Non-Responsive*

Husky Response: Section 4.3.4.2, Origins and Controlling Factors, fifth paragraph is revised to read:

According to the IIP and PAL, the number of icebergs reaching the Grand Banks (48 degrees latitude) each year varied from a low of zero in 1966 (not shown), 2006 and 2011, to a high of 2,202 in 1984 (Figure 4-133). Of these, only a small portion will pass through the White Rose field.

Size Distributions: ***Page 4-226, Table 4-80:***

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.

Husky Response: Comment noted. Thank you.

***EC Response**: Non-Responsive*

Husky Response: Revised Table 4-80 is provided as Table 3.

Table 3 Revised Table 4-80 Iceberg Size

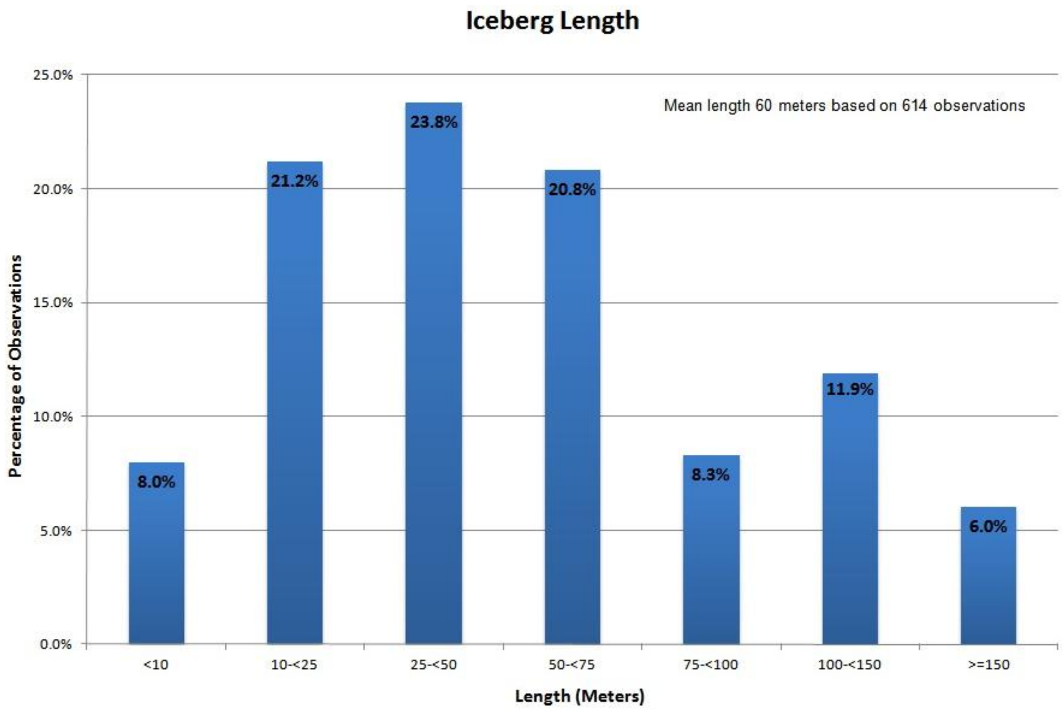
Category	Height (m)	Length (m)	Approx. Mass (t)
Very Large	>75	>200	>10 Million
Large	46 to 75	121 to 200	10 Million
Medium	16 to 45	61 to 120	2 Million
Small	5 to 15	15 to 60	100,000
Bergy Bit	1.0 to 4	5 to 14	10,000
Growler	<1.0	<5	1,000
Source: Meteorological Service of Canada CIS MANICE (2002)			

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.

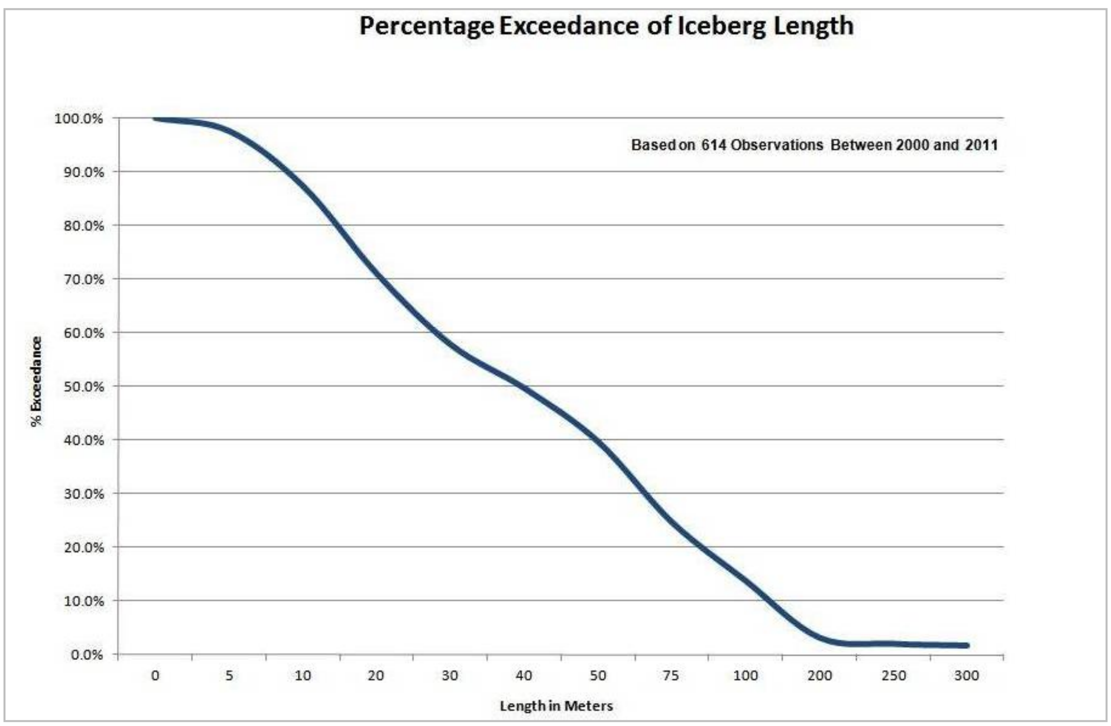
Husky Response: Comment noted. Thank you.

***EC Response**: Non-Responsive*

Husky Response: Figure 4-140 is provided as Figure 5.



(A) Iceberg Length



(B) Percentage Exceedance of Iceberg Length

Source: PAL Iceberg Sighting Database 2000 to 2011

Figure 5 Revised Figure 4-140 Iceberg (A) Length and (B) Percent Exceedance of Iceberg Length on the Grand Banks

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.

Husky Response: Comment noted. Thank you.

> ***EC Response****: Non-Responsive*

Husky Response: Section 4.3.4.2, Iceberg Length, third paragraph is revised to read;

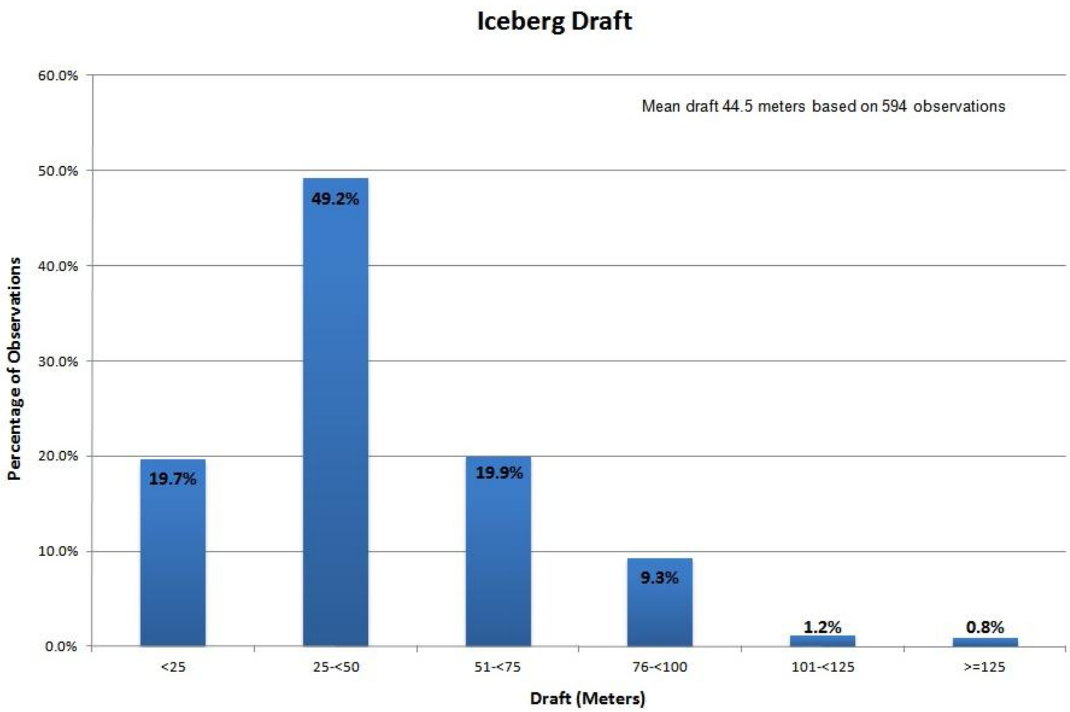
Of note are several ice island fragments or very large icebergs sighted in the 2002, 2003, 2004 and 2011 ice seasons. Several of these fragments were detected from facilities on the Grand Banks, and were thus within 20 nautical miles of the locations. In 2011, however, the fragments deteriorated prior to making it south of 48°N. These icebergs, while having very large surface area, had drafts of 50 m or less. Based on several studies (Stoermer and Rudkin 2003; Rudkin et al. 2005; PERD 2004) these ice island fragments were the result of a significant calving event on the Petermann Glacier. The Petermann Glacier is in northwest Greenland, north of the 20 greatest sources of icebergs noted earlier (Section 4.3.4.2 Icebergs Origins and Controlling Factors: Page 4-217, Paragraph 1, Sentence 4,), which lie between and include Jacobshavn Isbrae and the Humboldt Glacier. The Petermann Glacier has a history of calving large tabular ice islands as opposed to hundreds of smaller icebergs, 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.*

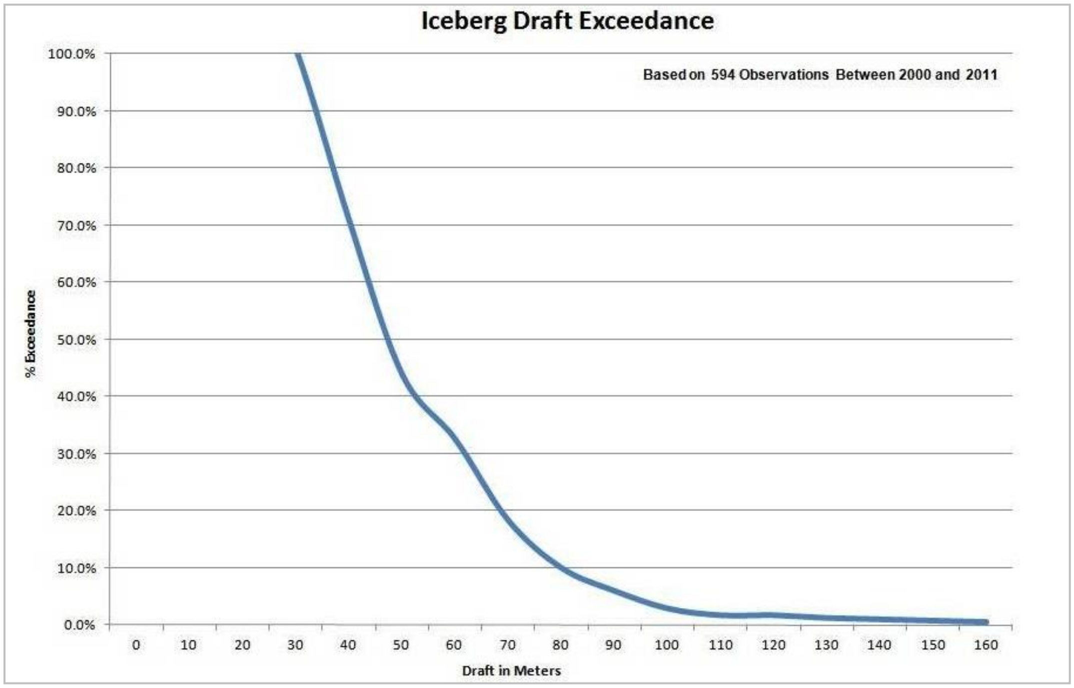
Husky Response: Comment noted. Thank you.

> ***EC Response****: Non-Responsive*

Husky Response: Figure 4-141 is provided as Figure 6.



(A) Iceberg Draft



(B) Iceberg Draft Exceedance

Source: PAL Iceberg Sighting Database 2000 to 2011

Figure 6 Revised Figure 4-141 Iceberg (A) Draft and (B) Exceedance of Iceberg Draft for Icebergs on the Grand Banks

***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.*

Husky Response: Comment noted. Thank you

> ***EC Response**: Non-Responsive.*

Husky Response: Section 4.3.4.2, Iceberg Draft, first paragraph is revised to read:

The draft of icebergs (the depth of the iceberg below the water) as derived from observations and measurements made from 2000 to 2011 on the Grand Banks is illustrated in Figure 4-141. The mean iceberg draft was 44.5 m. Almost half (49.2 percent) of draft observations fall into the 25 to 50 m category. Less than 1 percent (0.8 percent) of observed icebergs have drafts which exceed 125 m.

Section 4.3.9.1 Sea Level Rise

***EC Response:** the climate change aspects are sufficient. The proponents may want to expand their discussion to include impacts of vertical land motion on local sea level.*

Husky Response:

There is abundant evidence that sea level has risen on the northeastern Grand Banks as a result of both eustatic and isostatic adjustment following the melting of glacial ice and subsequent unloading of the Earth's crust during and after the end of the last glaciation (e.g., Shaw 2006; Shaw et al. 2006). The component of isostatic adjustment contributing to contemporary local change in sea level on the northeastern Grand Banks is not known because of its distance from land.

New References:

Shaw, J. 2006. Palaeogeography of Atlantic Canadian continental shelves from the last glacial maximum to the present, with an emphasis on Flemish Cap. *Journal of Northwest Atlantic Fisheries Science*, 37: 119-126.

Shaw, J., D.J.W. Piper, G.B.J. Fader, E.L. King, B.J. Todd, T. Bell, M.J. Batterson and D.G.E. Liverman. 2006. A conceptual model of the deglaciation of Atlantic Canada. *Quaternary Science Reviews*, 25: 2059-2081.

Section 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.

Husky Response: Comment noted. Thank you.

> ***EC Response**: Non-Responsive*

Husky Response: Section 10.3.1 first paragraph is revised to read:

Placentia Bay is one of the richest bays in coastal Newfoundland for marine birds. There are four Important Bird Areas (IBA) at the mouth of Placentia Bay (Figure 10-1), all of which are outside the Study Area, but are mentioned here for completeness (see also the Sensitive Areas Chapter; Section 13.3.1.5). An IBA is a site that provides essential habitat for one or more species of breeding or non-breeding birds. These sites may contain threatened species, endemic species, species representative of a biome, or highly exceptional concentrations of birds (www.ibacanada.com). Cape St. Mary's Ecological Reserve, designated pursuant to the provincial Wilderness and Ecological Reserves Act and situated at the southeast corner of Placentia Bay, is one of the most important seabird nesting colonies in Newfoundland and Labrador. It contains the largest Northern Gannet nesting colony (14,696 pairs (2011) (CWS unpublished data)), the largest Thick-billed Murre colony on the Island of Newfoundland (which is also the most southerly colony of the Thick-billed Murre's breeding range) and third largest Common Murre colony (14,789 pairs (2009) (CWS unpublished data)) in Newfoundland and Labrador (Table 10-2). 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). Both Corbin Island and Green Island on the Burin Peninsula support more than 100,000 pairs of breeding Leach's Storm-Petrel (Figure 10-1; Table 10-2). Placentia Bay supports large numbers of non-breeding Great Shearwaters during the capelin spawning season. As a result, the southeastern quarter of the bay is designated an Important Bird Area (see the Sensitive Areas Chapter). There are over 365 islands in Placentia Bay, many of which support small colonies of terns, gulls and cormorants. In the winter months, several thousand Common Eider and other sea duck species winter along the coast of Placentia Bay. Cape St. Mary's is an important wintering area for the eastern Harlequin Duck, currently listed as a species of Special Concern on Schedule 1 of SARA and Vulnerable under the Endangered Species Act of Newfoundland and Labrador. Harlequin Duck are discussed in Section 12.3.3.1.

Section 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.

Husky Response: Comment noted. Thank you.

***EC Response**: Non-Responsive*

Husky Response: Section 10.3.5, first paragraph is revised to read:

Millions of marine birds nest on headlands, cliffs and islands along the coastline of the Avalon Peninsula. The marine bird nesting colonies on Baccalieu Island, the Witless Bay Islands and Cape St. Mary's are among the largest in Atlantic Canada. 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). Two of the three Northern Gannet colonies in the province of Newfoundland and Labrador are on the Avalon Peninsula (Cape St. Mary's Ecological Reserve and Baccalieu Island Ecological Reserve). No major marine bird nesting colonies are located within either the Nearshore or Offshore Study Areas, so these sites are not discussed within the Sensitive or Special Areas VEC, with the exception of Cape St. Mary's. All of these colonies are included here as part of the profiles of the species within the Nearshore and Offshore Study Areas.

Section 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).

Husky Response: Comment noted. Thank you.

> ***EC Response****: Non-Responsive*

Husky Response: Section 10.3.6.8, Atlantic Puffin, second paragraph is revised to read:

Atlantic Puffin occur in Placentia Bay during migration and in small numbers in summer and winter. Grand Colombier in St. Pierre et Miquelon is the only breeding colony near Placentia Bay; 9,543 breeding pairs nest there (Lormee et al. unpublished data). During the monthly pelagic bird survey program in Placentia Bay from August 2006 to April 2007, Atlantic Puffin were observed in low numbers in all months surveyed, suggesting that the species overwinters in that bay (Goudie et al. 2007).

Section 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.

Husky Response: Comments noted. Thank you.

> ***EC Response****: Non-Responsive*

Husky Response: Section 14.4.6 first paragraph is revised to read:

Pack ice presence in Placentia Bay from year to year is variable, but the maximum frequency of occurrence over 30 years is 15 percent (Section 4.2.4.1). Pack ice begins to enter Placentia Bay in February, typically as grey or grey-white ice (< 30 cm), followed by first-year ice incursion in March and April. Placentia Bay generally experiences thin or medium first-year ice (30 to 120 cm thick). The mouth of the Bay is more susceptible to incursions of the annual pack, while the bottom of the bay only fills with pack when there are sustained periods of onshore winds. There are few data on the exact thickness of the sea ice in Placentia Bay. Ice thicker than 100 cm is uncommon at the bottom of Placentia Bay; average thicknesses between 30 and 50 cm are the most common. The International Ice Patrol has recorded icebergs in Placentia Bay. Icebergs were recorded in 7 of the 30 years between 1974 and 2003. A total of 30 icebergs were recorded in this period.

Section 14.5.8 Climate Change (New Comment) The proponents should also consider and/or provide more information about projected changes in precipitation (what is the source of the projections in section 14.5.8?) and extremes (e.g. heavy precipitation events). The "annual precipitation increases projected for Atlantic Canada between years 2020 and 2080 range from 18 to 21" (no units here but it is assumed to be %). This range is very high.

Husky Response: The following text is added as the final paragraph in Section 14.5.8:

The possibility of more severe storms, or severe storms occurring more frequently, pose additional risks to offshore development that cannot be evaluated by examining historical climate data. Relying on climate prediction models to understand future changes to precipitation therefore allows new developments to properly prepare and construct infrastructure to withstand predicted changes. Predictions of future precipitation due to global warming are subject to many uncertainties, and are dependent on the model employed to make the prediction as well as local geography (e.g., nearby topography and proximity to water bodies). Predicted future precipitation levels for Atlantic Canada vary widely. Specifically for the east coast of Island of Newfoundland, climate projection models such as CGCM2 generally predict increasing precipitation levels by 2050 (Lines et al. 2005). Climate prediction models have also indicated that the return period for intense storms could increase off the east coast of Newfoundland: put another way, storms currently considered severe could become more commonplace in the region. Enhanced snowfall or increasing levels of freezing rain in particular could potentially lead to increasing shutdowns of the facility to protect staff from working in adverse weather conditions. However, the facility will be designed to withstand projected increases precipitation frequency or intensity off the coast of eastern Newfoundland. Therefore, the effect of higher levels of precipitation by 2050 on the WREP is not significant. While the number of suspensions of work due to extreme weather may increase slightly, the normal operation will not be affected.

New Reference:
Lines, G.S., M. Pancura and C. Lander. 2005. *Building Climate Change Scenarios of Temperature and Precipitation in Atlantic Canada Using the Statistical Downscaling Model (SDSM)*. The Meteorological Service of Canada, Atlantic Region, Science Report Series 2005-9.

2.3 Fisheries and Oceans Canada

2.3.1 White Rose Extension Project Environmental Assessment

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.

Husky Response: The four cuttings plan view figures in this section consist of base case and fast settling of fines sensitivity runs for two views: a 28-km view, and a 5-km view. A new pair of "1.5 km" views have been prepared. An additional figure shows the model run over a finer scale is presented in Figure 3-16a and is provided as Figure 27 at the end of the DFO comment tables.

> ***DFO Response**: DFO would like to discuss monitoring of drill cutting dispersion for the EEM Program*

Husky Response: Husky would be pleased to meet with DFO to discuss monitoring of drill cuttings dispersion.

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.

Husky Response: Comment noted. Thank you

> ***DFO Response:** Will Husky apply additional mitigations to reduce potential impacts on Leatherback Sea Turtles?*

Husky Response: The Nearshore Project and Study Areas do not overlap with southern Placentia Bay. However, if Critical Habitat is implemented for leatherback sea turtles in the southern Placentia Bay Area, Husky will consult with DFO to discuss regulations, including further mitigation measures, that pertain to the Critical Habitat designation.

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*.

Husky Response: Comments noted. Thank you.

> ***DFO Response:** Are revisions to the text accepted?*

Husky Response: The underlined text has been added to Section 8.3.1.5 Fish and Shellfish – Capelin, P. 8-22:

Typically, capelin winter offshore and will undergo extensive migrations to coastal areas during spring to spawn (Carscadden and Nakashima 1997). Timing of the inshore spawning of capelin in coastal Newfoundland can be highly variable, with temperature as one of the prime factors in explaining variability (Carscadden et al. 2001; Regular et al. 2009). During periods when colder than normal temperatures prevail, spawning is delayed. In late spring and summer, capelin move to shallower bays to spawn on beaches, or alternatively, spawning occurs subtidally in coastal waters when water temperatures at the beach are too warm (Nakashima and Wheeler 2002). Spawning may occur in a given location year after year, or only occur periodically in some locations (Nakashima and Wheeler 2002). Females may produce as many as 50,000 eggs at one time. Eggs attach to the substrate and hatch in the beach from 9 to 24 days, depending on where they were in the intertidal zone, with hatching time triggered by temperature (Scott and Scott 1988). A survey of local knowledge was used to document the location of capelin spawning beaches in Placentia Bay (Sjare et al. 2003), and this is discussed in further detail in the chapter on Sensitive Areas (Section 13.3.1.4). The beach on the northside of the Argentia peninsula is a known spawning beach for capelin, and demersal spawning by capelin and herring is also known to occur in this area. Though this beach has been used in the past for spawning, it has not been known to be used in recent years (J. O'Rourke, pers. comm.). There are no reports of capelin spawning on the beach adjacent to the graving dock construction site. The beach is not expected to be affected by activities associated with the WREP.

8.4.4 Summary of Potential Environmental Effects, Table 8-5, P. 8-43 1. 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. 2. 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. 3. Under Wellhead Platform Installation/ Commissioning, Dredging and disposal of dredge material should have "X" for Potential Mortality. 4. 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.

Husky Response: All comments are noted. Thank you.

***DFO Response**: Does Husky Energy accept the proposed changes to Table 8-5? Will the table be revised?*

Husky Response: See Table 4 (revised Table 8-5) at the end of these responses. Please Note: *iii Under Wellhead Platform Installation/Commissioning, Dredging and disposal of dredge material should have "X" for Potential Mortality* - There is no dredging and disposal of dredged material with the WHP installation (not listed in table). An "X" for Potential Mortality has been added under Subsea Drill Centre Installation/Commissioning, Dredging and disposal of dredged material.

Table 4 Revised Table 8-5 Potential White Rose Extension Project-Related Interactions – Fish and Fish Habitat

Potential WREP Activities, Physical Works, Discharges and Emissions	Change in Habitat Quality	Change in Habitat Quantity	Potential Mortality
Nearshore (WHP only)			
Graving Dock Construction			
Lighting	x		
Water discharge from The Pond	x		
Construction of graving dock (include sheet pile driving, potential grouting, potential gate)	x		
Dewater graving dock	x		
CGS Construction and Installation			
Onshore (Argentia Construction Site)			
Lighting	x		
Marine (Argentia and Deep-water Mating Site)			
Operation of vessels	x		
Additional nearshore surveys (e.g., multibeam, sonar, environmental)	x		
Dredging	x	x	x
CGS solid ballasting (which may include disposal of water containing fine material)	x		
CGS water ballasting and de-ballasting	x		
CGS towing to deep-water mating site	x		
Noise from topsides mating	x		
Lighting	x		
Safety zone			+
Operation and Maintenance of Permanent Graving Dock			
Dewatering of graving dock	x		
Flooding of graving dock	x		
Offshore			
Wellhead Platform Installation/Commissioning			
Clearance surveys (e.g., sidescan sonar) prior to installation of WHP or pipelines/ flowlines	x		
Operation of helicopters and vessels/barges	x		
Installation of flowlines and pipelines between WHP, subsea drill centre(s) and existing infrastructure	x		
Potential rock berms for flowline protection		x/+	
Lighting	x		
Safety zone			+
Drilling-associated seismic (VSPs and wellsite surveys)	x		
Subsea Drill Centre Installation/Commissioning **(Previously assessed; LGL 2007a)**			
Dredging and disposal of dredge material	x	x	x
Clearance surveys (e.g., sidescan sonar) prior to installation of pipelines/flowlines	x		
Operation of helicopters and supply, support, standby and tow vessels/barges	x		
Lighting	x		
Safety zone			+
Installation of subsea equipment, flowlines and tie-in modules to existing subsea infrastructure	x	x/+	
Drilling-associated seismic (VSPs and wellsite surveys)	x		x
Production/Operation and Maintenance (Wellhead or Subsea Drill Centre)			
Presence of structure	x	x/+	
Safety zone			+
Noise from drilling from a MODU and WHP	x		
WBM (from either WHP or MODU) and SBM (from MODU only) cuttings [(A)]	x	x	x
Lighting	x		
Operation of seawater systems (cooling, firewater)	x		
Operation of helicopters, supply, support, standby and tow vessels/barges/ROVs	x		
Surveys (geotechnical, geophysical and environmental)	x		x
Cementing and completing wells	x		
Oily water treatment [(B)]	x		
Decommissioning and Abandonment (WHP or Subsea Drill Centre)			
Removal of WHP		x/+	
Plugging and Abandoning Wells	x		
Operation of Vessels (supply/support/standby/tow vessels/barges/diving/ROVs	x		

Potential WREP Activities, Physical Works, Discharges and Emissions	Change in Habitat Quality	Change in Habitat Quantity	Potential Mortality
Lighting	x		
Safety zone			x
Surveys (geotechnical, geophysical and environmental)	x		x
Potential Future Activities			
Surveys (e.g., geophysical, geological, geotechnical, environmental, ROV, diving)	x		
Excavation of drill centres (including disposal of dredge spoils)	x	x	x
Noise from drilling from MODU at potential future subsea drill centres	x	x	
WBM and SBM Cuttings	x	x	x
Installation of Pipeline(s)/Flowline(s) and Testing from Drill Centres to FPSO, including Flowline Protection	x	x	x
Chemical Use and management (e.g., BOP fluids, well treatment fluids, corrosion inhibitors [(C)])	x		
Accidental Events			
Marine diesel fuel spill from support vessel	x		x
Graving dock breach	x	x	
SBM whole mud spill	x		
Subsea hydrocarbon blowout	x		x
Hydrocarbon surface spill	x		x
Other spills (e.g., fuel, waste materials)	x		x
Marine vessel incident including collisions (i.e., marine diesel fuel spill)	x		x
Cumulative Environmental Effects			
Commercial fisheries (nearshore and offshore)	x		x
Marine traffic (nearshore and offshore)	x		
White Rose Oilfield Development (including North Amethyst and the South White Rose extension drill centre)	x	x	x
Terra Nova Development	x	x	x
Hibernia Oil Development	x	x	x
Hibernia Southern Extension Project	x	x	x
Hebron Oil Development	x	x	x
Offshore Exploration Seismic Activity	x		x
Offshore Exploration Drilling Activity	x	x	

Notes:
(A) Water-based drilling fluids and cuttings will be discharged overboard. Husky will evaluate best available cuttings management technology and practices to identify a waste management strategy for spent non-aqueous fluid and non-aqueous fluid cuttings from the MODU. SBM cuttings will be re-injected into a dedicated well from the WHP, pending confirmation of a suitable disposal formation
(B) Water (including from open drains) will be treated prior to being discharged to the sea in accordance with the *Offshore Waste Treatment Guidelines* (OWTG) (National Energy Board (NEB) et al. 2010)
(C) Husky will evaluate the use of biocides other than chlorine. The discharge from the hypochlorite system will be treated to meet a limit approved by the C-NLOPB's Chief Conservation Officer

8.5.2.2 Production/Operation and Maintenance Table 8-8 / P. 8-64 1. 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. 2. The change in habitat quantity for flowline rock berms is Negative as well as Positive.

Husky Response: Both comments are noted. Thank you.

> ***DFO Response:*** *Does Husky Energy accept the proposed changes to Table 8-8? Will the table be revised?*

Husky Response: Revised Table 8-8 is provided as Table 5.

It is also acknowledged that the Ecological/Socio/Cultural/Economic Significance rating of 2 (evidence of existing adverse activity) would apply for any of the potential effects assessment summary tables.

Table 5 Revised Table 8-8 Potential Environmental Effects Assessment Summary for Fish and Fish Habitat –Wellhead Platform or Subsea Drill Centre Installation

WREP Activity	Potential Positive (P) or Negative (N) Environmental Effect	Mitigation Measure	Evaluation Criteria for Assessing Environmental Effects [(A)] Magnitude	Geographic Extent	Frequency	Duration	Reversibility	Ecological/Socio-cultural/Economic Significance	Significance Rating	Level of Confidence
Lighting	Change in habitat quality (N)	• Use only lights as necessary for safe operations	N	1	6	3	R	2	NS	H
Safety zone	Potential mortality (P)		N	2	6	5	R	2	NS	H
Dredging	Change in habitat quality (N) Change in habitat quantity (N) Potential mortality (of benthos) (N)	• Compliance with *Fisheries Act*.	L	1	1	2	R	2	NS	H
Clearance surveys (e.g., sidescan sonar) prior to installation of WHP or pipelines/ flowlines	Change in habitat quality (N)	• Use of best practices and improvement programs	N	1	1	1	R	2	NS	H
Operation of vessels and barges	Change in habitat quality (N)	• Adhere to *Canada Shipping Act, 2001* and industry best practices • Follow marine traffic rules and regulations	N	4	6	5	R	2	NS	H
Installation of flowlines and pipelines between WHP, subsea drill centre(s) and existing infrastructure	Change in habitat quantity (N)	• Minimize seabed disturbance • Compliance with *Fisheries Act* • Use of best practices and improvement programs	N	1	1	2	R	2	NS	H
Installation of subsea equipment, flowlines and tie-in modules to existing subsea infrastructure	Change in habitat quantity (N)	• Minimize seabed disturbance • Use of best practices and improvement programs	N	1	1	2	R	2	NS	H
Potential rock berms for flowline protection	Change in habitat quality (N) Change in habitat quantity (N/P)	• Compliance with *Fisheries Act*	N	1	6	5	R	2	NS	H
Drilling-associated seismic (VSPs and wellsite surveys)	Change in habitat quality (N) Potential mortality (N)	• Adherence to the *Geophysical, Geological, Environmental and Geotechnical Program Guidelines* (C-NLOPB 2012d)	L	2	1	1	R	2	NS	M

WREP Activity	Potential Positive (P) or Negative (N) Environmental Effect	Mitigation Measure	Evaluation Criteria for Assessing Environmental Effects (A)						Significance Rating	Level of Confidence
			Magnitude	Geographic Extent	Frequency	Duration	Reversibility	Ecological/Socio-cultural/Economic Significance		

Key:

Magnitude:
N = Negligible (essentially no effect)
L = Low: <10 percent of the population or habitat in the Study Area will be affected
M = Medium: 11 to 25 percent of the population or habitat in the Study Area will be affected
H = High: >25 percent of the population or habitat in the Study Area will be affected

Geographic Extent:
1 = <1 km radius
2 = 1 to 10 km radius
3 = 11 to 100 km radius
4 = 101 to 1,000 km radius
5 = 1,001 to 10,000 km radius
6 = >10,000 km radius

Frequency:
1 = <11 events/year
2 = 11 to 50 events/year
3 = 51 to 100 events/year
4 = 101 to 200 events/year
5 = >200 events/year
6 = continuous

Duration:
1 = <1 month
2 = 1 to 12 months
3 = 13 to 36 months
4 = 37 to 72 months
5 = >72 months

Reversibility (population level):
R = Reversible
I = Irreversible

Ecological/Socio-cultural/Economic Significance:
1 = Relatively pristine area not affected by human activity
2 = Evidence of existing adverse activity
3 = High level of existing adverse activity

Significance Rating:
S = Significant
NS = Not Significant
P = Positive

Level of Confidence:
L = Low level of confidence
M = Medium level of confidence
H = High level of confidence

(A) Where there is more than one potential environmental effect, the evaluation criteria rating is assigned to the environmental effect with the greatest potential for harm

11.4.4 Summary Table 11-9 / Pg 11-57 12.4.1.5 Summary Table 12-4 / Pg 12-61 1. Avoidance should be considered a Change in Habitat Quantity associated with seismic activities. 2. Collisions should be considered as Potential Mortality associated with Cumulative Effects.

Husky Response: Comment noted. Thank you.

> ***DFO Response:*** *Does Husky Energy accept the proposed changes to the tables? Will the tables be revised?*

Husky Response: Revised Table 11-9 is provided as Table 6. Re. Table 12-4 (Potential White Rose Extension Project-Related Interactions – Marine Fish Species at Risk) Collisions are considered under accidental events (Marine Vessel Incident Including Collisions) not cumulative effects.

Table 6 Revised Table 11-9 Potential White Rose Extension Project-related Interactions: Marine Mammals and Sea Turtles

Potential WREP Activities, Physical Works, Discharges and Emissions	**Change in Habitat Quality**	**Change in Habitat Quantity**	**Potential Mortality**
Nearshore			
Pre-construction and Installation			
Construction of Graving Dock (include sheet pile/driving, potential grouting)	x		
Air Emissions	x		
Water discharge from The Pond/Dewater graving dock	x		
CGS Construction and Installation			
Marine (Argentia and Deep-water Mating Site)			
Additional Nearshore Surveys (e.g., geotechnical, geophysical, environmental)	x		
Dredging	x		x
CGS Solid Ballasting (which may include disposal of water containing fine material)	x		
CGS Water Ballasting and De-ballasting	x		
CGS Towing to Deep-water mating site	x		
Noise from Topsides Mating	x		
Air Emissions	x		
Additional Hook-up and Commissioning of Topsides	x		
Operation of Helicopters, Supply, Support, Standby, Mooring and Tow Vessels/Barges/ ROVs	x		x
Offshore			
Wellhead Platform Installation/Commissioning			
Clearance Surveys (e.g., sidescan sonar) Prior to Installation of WHP or Pipelines/Flowlines	x		
Tow-out/offshore Installation	x		
Operation of Helicopters and Vessels/Barges	x		x
Diving Activities/Operation of ROVs	x		
Installation of Flowlines and Pipelines between WHP, Subsea Drill Centre(s) and Existing Infrastructure	x		
Potential Rock Berms for Flowline Protection	x		
Additional Hook-up, Production Testing and Commissioning	x		
Air Emissions	x		
Hydrostatic Test Fluid (flowlines)	x		
Possible Use of Corrosion Inhibitors or Biocides (flowlines) (A)	x		
Waste Generated (domestic waste, construction waste, hazardous waste, sanitary waste)	x		
Drilling-associated Seismic (VSPs and wellsite surveys)	x	x	
Subsea Drill Centre Excavation/Installation (previously assessed by LGL 2007a)			
Dredging and Disposal of Dredge Material	x		
Clearance Surveys (e.g., sidescan sonar) Prior to Installation of Pipelines/Flowlines	x		
Operation of Helicopters and Supply, Support, Standby and Tow Vessels/Barges	x		x
Diving Activities / Operation of ROVs	x		
Air Emissions	x		
Installation of Subsea Equipment, Flowlines and tie-in Modules to Existing Subsea Infrastructure	x		
Hydrostatic Test Fluid (flowlines)	x		

Potential WREP Activities, Physical Works, Discharges and Emissions	Change in Habitat Quality	Change in Habitat Quantity	Potential Mortality
Possible Use of Corrosion Inhibitors or Biocides (flowlines) [(A)]	x		
Waste Generated (domestic waste, construction waste, hazardous waste, sanitary waste)	x		
Drilling-associated Seismic (VSPs and wellsite surveys)	x	x	
Production/Operation and Maintenance			
Presence of Structure	x	x	
Noise from Drilling from a MODU and WHP	x		
WBM (from either WHP or MODU) and SBM (from MODU only) cuttings [(B)]	x		
Air emissions	x		
Chemical Use and Management (e.g. BOP fluids, fuel, well treatment fluids, corrosion inhibitors)	x		
Waste Generated (domestic waste, construction waste, hazardous, sanitary waste)	x		
Operation of Helicopters, Supply, Support, Standby and Tow Vessels/Barges/ROVs	x		x
Surveys (geotechnical, geophysical and environmental)	x	x	
Oily Water Treatment [(C)]	x		
Diving Activities / Operation of ROVs	x		
Decommissioning and Abandonment			
Removal of WHP	x	x	
Plugging and Abandoning Wells	x		
Operation of Helicopters	x		
Operation of Vessels (supply/support/standby/tow vessels/barges/diving/ROVs)	x		x
Air Emissions	x		
Surveys (geotechnical, geophysical and environmental)	x		
Potential Future Activities			
Surveys (e.g., geophysical, geological, geotechnical, environmental, ROV, diving)	x	x	
Excavation of Drill Centres (including disposal of dredge spoils)	x		
Noise from Drilling Operations from MODU at Potential Future Drilling Centres	x		
WBM and SBM Cuttings	x		
Hook-Up And Commissioning of Drill Centres	x		
Installation of Pipeline(s)/Flowline(s) and Testing from Drill Centres to FPSO, including Flowline Protection	x		
Chemical Use and Management (e.g., BOP fluids, fuels, well treatment fluids, corrosion inhibitors)	x		
Accidental Events			
Marine Diesel Fuel Spill from Support Vessel	x		x
Graving Dock Breach	x		
SBM Whole Mud Spill	x		
Subsea Hydrocarbon Blowout	x		x
Hydrocarbon Surface Spill	x		x
Other Spills (e.g., fuel, waste materials)	x		x
Marine Vessel Incident (including collisions) (i.e., marine diesel fuel spill)	x		x
Cumulative Environmental Effects			
Commercial Fisheries (nearshore and offshore)	x		x
Marine Traffic (nearshore and offshore)	x		x
White Rose Oilfield Development (including North Amethyst and South White Rose extension drill centre)	x		
Terra Nova Development	x		
Hibernia Oil Development	x		
Hibernia Southern Extension Project	x		
Hebron Oil Development	x		
Offshore Exploration Seismic Activity	x		
Offshore Exploration Drilling Activity	x		

Notes:

(A) Husky will evaluate the use of biocides other than chlorine. The discharge from the hypochlorite system will be treated to meet a limit approved by the C-NLOPB's Chief Conservation Officer.

(B) Water-based drilling fluids and cuttings will be discharged overboard. Husky will evaluate best available cuttings management technology and practices to identify a waste management strategy for spent non-aqueous fluid and non-aqueous fluid cuttings from the semi-submersible drilling rig. Synthetic-based mud cuttings will be re-injected into a dedicated well from the WHP, pending confirmation of a suitable disposal formation.

(C) Water (including from open drains) will be treated prior to being discharged to the sea in accordance with OWTG

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.

Husky Response: Both comments noted. Thank you.

> ***DFO Response:*** *Does Husky Energy accept the proposed changes to Table 12-3? Will the table be revised?*

Husky Response: Revised Table 12-3 is provided as Table 7. The underlined text has been added to the third and fourth paragraphs on Page 12-24:

Smooth skate (Funk Island Deep population) was assessed by COSEWIC as Endangered in May 2012 (COSEWIC 2011a) due to steep declines in the abundance of juveniles and adults since the early 1980s. Mean catch rates for the Funk Island Deep Designatable Unit peaked in 1978/1979 and then declined for both juveniles and adults until 1994. Catch rates remained consistently low but stable through to 2005. Slight increases have been observed since 2005 (Simpson et al. 2011). Although the abundance of adults appears to have increased in recent years, the overall abundance remains very low. These trends in abundance are matched by strong reductions in area of occupancy. Smooth skate will be considered for listing under SARA but, to date, do not have status. Although there is no directed fishery in Canadian waters, smooth skate is taken as bycatch. The second most common skate species caught in the inshore Newfoundland/Subdivision 3Ps skate fishery is smooth skate, all discarded at sea; albeit not the species at risk population of the Funk Island Deep Designatable Unit (DFO, pers. comm.). It is vulnerable to increased mortality as it is long-lived, slow-growing and late maturing (Frisk et al. 2001; Simpson et al. 2011). The period of decline in the Funk Island Deep Designatable Unit corresponds with the coldest water temperatures reported (Colbourne et al. 2006) and may also relate to high bycatch rates; however, other factors may be at play (Simpson et al. 2011).

Survey data suggest smooth skate concentrate north and south of the Nearshore and Offshore Project Areas. There is low potential for smooth skate to occur in the Offshore Study Area and moderate potential for smooth skate to occur in the Nearshore Study Area.

Table 7 Revised Table 12-3 List of Species Assessed as 'At Risk' by the Committee on the Status of Endangered Wildlife in Canada that Could Occur Within the Nearshore and Offshore Study Areas

Common Name	Species Name	COSEWIC Assessment	Occurrence in Relation to the WREP
Atlantic Cod (Newfoundland and Labrador population)	*Gadus morhua*	Endangered	High potential for occurrence in Nearshore and Offshore Study Areas. Atlantic cod from this population inhabit waters from the northern tip of Labrador to the southern Grand Banks
Atlantic Cod (Southern population)		Endangered	High potential for occurrence in the Nearshore and Offshore Study Areas. Atlantic cod from this population inhabit waters from the Bay of Fundy and southern Nova Scotia to the southern extent of the Grand Banks. Large numbers of this stock are known to spawn in Placentia Bay. This population has recovered better than other populations in Northwest Atlantic
Roundnose Grenadier	*Coryphaenoides rupestris*	Endangered	Moderate potential for occurrence in the Nearshore. Moderate to high potential for occurrence in Offshore Study Area. Closely associated with the seafloor and commonly found inhabiting depths of 800 to 1,000 m. Occurs year-round, with spawning in fall

Common Name	Species Name	COSEWIC Assessment	Occurrence in Relation to the WREP
Porbeagle Shark	*Lamna nasus*	Endangered	Moderate potential for occurrence in Nearshore and Offshore Study Areas. Migrant in Atlantic Canadian waters. Most common May to December in water depths of 35 to 100 m
Atlantic Bluefin Tuna	*Thunnus thynnus*	Endangered	Low to moderate potential for occurrence in Nearshore and Offshore Study Areas. Atlantic bluefin tuna may migrate through the Grand Banks following food stocks in July through December. May form schools
Smooth Skate (Funk Island Deep population)	*Malacoraja senta*	Endangered	Low potential for occurrence in Offshore Study Area. Moderate potential in Nearshore Study Area. Concentrates north of the Offshore Study Area. Occurs from 50 to 600 m (commonly 400 to 600 m) in Newfoundland waters
Deepwater Redfish (northern population)	*Sebastes mentalla*	Threatened	Low potential for occurrence Offshore Study Area. Not known to occur in Nearshore Study Area. Closely associated with the seafloor, commonly found inhabiting waters 350 to 500 m. Uncommon on the Grand Banks
Acadian Redfish (Atlantic population)	*Sebastes fasciatus*	Threatened	Unlikely to occur in Nearshore Study Area. Low to moderate potential for occurrence in Offshore Study Area. Closely associated with the seafloor and commonly found inhabiting waters 150 to 300 m. Mature individuals most common in area from May to October. Spawning occurs in fall. Larvae may be present in water column May to August
Shortfin Mako	*Isurus oxyrinchus*	Threatened	Low to moderate potential for occurrence in Nearshore and Offshore Study Areas. A pelagic species that migrates north following food stocks (i.e., mackerel, herring, tuna). Any occurrence would likely be transient in nature
American plaice (Maritime population)	*Hippoglossus platessoides*	Threatened	Low potential for occurrence in Nearshore Study Area. Moderate potential for occurrence in Offshore Study Area. Closely associated with the seafloor and commonly found at depths of 100 to 200 m where soft sediments are present. Spawning occurs in April/May. Larvae may be present in the water column between May and June. This species was once highly abundant
American plaice (Newfoundland and Labrador population)		Threatened	Low potential for occurrence in Nearshore Study Area. High potential for occurrence in Offshore Study Area. Closely associated with the seafloor, and found at 100 to 200 m where soft sediments are present. The Newfoundland and Labrador population is located from the Grand Banks north to the northern tip of Newfoundland
Cusk	*Brosme brosme*	Threatened	Low potential for occurrence in Nearshore and Offshore Study Area. Rare species that occurs in deep waters between the Gulf of Maine and southern Scotian Shelf. Rare along the continental shelf off Newfoundland and Labrador
Atlantic Salmon (South Newfoundland population)	*Salmo salar*	Threatened	Moderate to high potential for occurrence in Nearshore and Offshore Study Areas. Juvenile Atlantic salmon migrating from freshwaters streams to the North Atlantic may occur in Placentia Bay or on Grand Banks
American Eel	*Anguilla rostrata*	Threatened	Moderate potential for occurrence in Nearshore and low potential for occurrence Offshore Study Areas. Adult American eels migrate from freshwater streams to the Sargasso Sea. Juveniles and adults may occur on the continental shelf
Spiny Dogfish (Atlantic population)	*Squalus acanthias*	Special Concern	Low potential for occurrence in Nearshore Study Area and moderate to high potential for occurrence in Offshore Study Area. Commonly found from the intertidal zone to the continental slope in water depths up to 730 m. Most abundant between Nova Scotia and Cape Hattaras, less common in Newfoundland waters
Blue Shark (Atlantic population)	*Priomace glauca*	Special Concern	Moderate potential for occurrence in Nearshore and Offshore Study Areas during summer and late fall. Low potential for occurrence at other times of year. Commonly found in pelagic waters in water depths up to 350 m. Most abundant along the coast of Nova Scotia and offshore Scotian Shelf

Common Name	Species Name	COSEWIC Assessment	Occurrence in Relation to the WREP
Basking Shark (Atlantic population)	*Cetorhinus maximus*	Special Concern	Low potential for occurrence in Offshore Study Area. Low to moderate potential for occurrence in Nearshore Study Area during summer; usually present in surface waters of Newfoundland bays feeding on plankton from May to September. Found in offshore waters and coastal waters of Newfoundland, concentrated between Port aux Basques and Hermitage. May be present feeding on plankton from May to September
Roughhead Grenadier	*Macrourus berglax*	Of Special Concern	Low potential for occurrence in Nearshore Study Area. Moderate to high potential for occurrence in Offshore Study Area. Demersal species that occur in deep water
Thorny Skate	*Amblyraja radiata*	Of Special Concern	Moderate potential for occurrence in Offshore Study Area and moderate to high potential for occurrence in the Nearshore Study Area. Occurs from 50 to 1,000 m, with depth preference varying spatially
Northern Bottlenose Whale (Davis Strait-Baffin Bay-Labrador Sea population)	*Hyperoodon ampullatus*	Special Concern	No potential for occurrence in the Nearshore Study Area. Moderate potential for occurrence in the Offshore Study Areas. Found most commonly in deep water around 1,000 m deep, only found in the North Atlantic
Killer Whale	*Orcinus orca*	Special Concern	Moderate potential for occurrence in the Nearshore Study Area. Moderate to high potential for occurrence in the Offshore Study Areas. Prefers deep water but often found in estuaries, shallow bays and inland seas
Harbour Porpoise	*Phocoena phocoena*	Special Concern	High potential for occurrence in the Nearshore Study Area. Low to no potential for occurrence in the Offshore Study Area. Found most commonly in harbours and bays
Loggerhead Sea Turtle	*Caretta caretta*	Endangered	Low potential for occurrence in the Nearshore Study Area. Low potential for occurrence in the Offshore Study Areas. Widely distributed in the Atlantic Ocean, with juveniles routinely found in Atlantic Canadian waters. Usually associated with warmer offshore waters of the Gulf Stream, most often on the Scotian Shelf, Scotian Slope, Georges Bank, and the Grand Banks
Sowerby's Beaked Whale	*Mesoplodon bidens*	Special Concern	Low potential for occurrence in Nearshore Study Area. Moderate potential for occurrence in Offshore Study Areas. Distribution is poorly known, but only found in the North Atlantic. Range offshore from Davis Strait to Cape Cod in the Northwest Atlantic ocean, and rarely seen in coastal waters
Red Knot *rufa* subspecies	*Calidris canutus rufa*	Endangered	Low potential for occurrence in the Nearshore Study Area; it does not occur offshore. It prefers open sandy beaches, often with rotting kelp piles and extensive mud flats, for feeding. Such habitats occur sparingly in Placentia Bay. Red Knot may occasionally occur in small numbers at various locations on the coast of Placentia Bay during fall migration in August to October

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)**.

Husky Response: Comment noted. Thank you.

> ***DFO Response:*** *Does Husky Energy accept the proposed changes to Table 12-3? Will the table be revised?*

Husky Response: Revised Table 12-3 is provided as Table 7. The underlined text has also been added to the second paragraph on Page 12-40:

This species is considered to have low potential for occurrence near the Offshore Study Area during May to September, and is unlikely to occur at other times of the year and is considered to have low to moderate potential for occurrence in the Nearshore Study Area, usually present in surface waters of Newfoundland bays feeding on plankton from May to September.

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)**.

Husky Response: Comment noted. Thank you.

> ***DFO Response:*** *Does Husky Energy accept the proposed changes to Table 12-3? Will the table be revised?*

Husky Response: Revised Table 12-3 is provided as Table 7. The underlined text has been added to the second paragraph on Page 12-44:

On the Grand Bank (NAFO Division 3LNO), catch data suggests concentrations were more widespread during 1970s and 1980s, but abundance declined in late 1990s, and since then has been more concentrated on the southwest Grand Bank (Kulka et al. 2004). There is moderate to high potential for occurrence of thorny skate in the Nearshore Study Area, and moderate potential for occurrence in the Offshore Study Area. Skate is fished in Placentia Bay, and the species primarily caught is thought to be thorny skate.

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.

Husky Response: Comment noted. Thank you.

> ***DFO Response:*** *What were the specifics of the ROV survey?*

Husky Response: It should be noted that the ROV survey was not intended to confirm species presence/absence, but to characterize the affected habitat.

The following text is from the report on Marine Habitat Characterization, Argentia, Newfoundland (Husky 2012), submitted to DFO on September 27, 2012:

For the purpose of the ROV survey, the placement of underwater transects in the Project Area was divided into three survey sites (refer to Figure 8-1 in the WREP environmental assessment), according to the proposed dredging areas:

1. Site A - the area adjacent to the proposed graving dock site;
2. Site 1A Tow-Route - the smaller of the two proposed tow-route sites that require dredging, also referred to as Corridor 1; and
3. Site 1B Tow-Route - the larger of the two proposed tow-route sites, also referred to as Corridor 2.

Two ROV surveys were undertaken for Site A, the first in November 2011 and the second survey in March 2012. Sites 1A and 1B tow-routes were surveyed between February and April 2012.

Weighted rope transects marked in 5 m increments were placed on the seabed for the ROV to follow. The ROV video images of the seabed covered an approximate area of 16 m^2 for each 10 m section of transect line; habitat classifications were conducted in 10 m increments. The transect lines were positioned using a global positioning system uploaded with a digital marine chart to track between the pre-determined transect start and end points. The distribution and arrangement of the transects and survey points were selected to maximize video coverage of the area currently being considered for dredging.

The ROV camera, which was situated approximately 1.0 m above the seabed, recorded continuous video footage as the ROV travelled along and above each transect. Water depth was measured using a depth gauge attached to the ROV, which was present in the video frame and recorded. The ROV followed parallel transects in a grid pattern as described in Part III of Kelly et al. (2009) for video surveys.

Field observations were recorded on standardized data sheets, with additional notes/comments recorded in field notebooks. The marine benthic habitat was described according to substrate type, water depth, vegetation cover and species present as per Kelly et al. (2009).

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.

Husky Response: Comment noted. Thank you.

> ***DFO Response:*** *Does Husky Energy accept the proposed changes?*

Husky Response: The underlined text has been added to the second paragraph on Page 12-11:

Spawning in the northwest Atlantic is thought to occur between April and October. Females are highly fecund, laying up to 30,000 large eggs in a nest on the seafloor (Simpson and Kulka 2002). The <u>adult male of each mated pair guards and aerates the resultant egg mass (i.e., "nest") until hatching</u> and after hatching larvae are pelagic (Simpson and Kulka 2002; Kulka et al. 2007). Little is known about the reproduction of northern wolffish, but spawning is thought to occur late in the year (DFO 2004c).

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.

Husky Response: Figures 12-1, 12-2, 12-3, 12-6, 12-7, 12-12, 12-14, 12-15 and 12-18 have been updated and are provided as Figures 28 to 36 at the end of the DFO comment tables. Figures 12-5, 12-9, 12-10, 12-11 and 12-16 are up to date.

DFO Response: *Recent data is available for Roughhead Grenadier (Figure 36). It was last assessed for NAFO 2+3 in 2010 by NAFO and interim reports have been issued for 2011 and 2012.*

Husky Response: The original figure (12-18) in the WREP environmental assessment was from Kulka et al. (2003). The replacement figure (36) in the Addendum is from COSEWIC (2007). These figures were not generated by Husky and can therefore not be updated. We have reviewed the NAFO scientific council documents on roughhead grenadier as suggested by the reviewer. These documents provide information at the NAFO Division level related to weight and lengths of fish caught at different depth strata. They do not contain any geographic distributional information.

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.

Husky Response: Comment noted. Thank you.

DFO Response: *Does Husky Energy accept the proposed changes? Will the text be updated?*

Husky Response: The underlined text has been added to the third paragraph on Page 12-22:

Porbeagle is the only directly targeted shark species in Canada, though currently participation in the fishery has dropped to five to eight active vessels due to a small TAC (DFO 2006d). Like other elasmobranchs, the porbeagle is long-lived (estimated 25 to 46 years) (O'Boyle et al. 1998; Campana et al. 2001), has low natural mortality, late sexual maturity, low fecundity and a long gestation period. These characteristics make the porbeagle vulnerable to increased mortality (Jensen et al. 2002). Fisheries data and population models suggest the abundance of this species has declined by 89 percent between 1961 (prior to porbeagle fishing in Canada) and 2001 (Campana et al. 2001). There have also been size changes and declines in the proportion of mature porbeagle sharks on the mating grounds (Campana et al. 2002; COSEWIC 2004). It is uncertain if reductions in fishing will allow for recovery. Porbeagle are also caught as bycatch in other fisheries (Campana et al. 2011), <u>such as cod, lumpfish, monkfish/skate, white hake, Greenland halibut and turbot (Benjamins et al. 2010). From 2011 to 2003, Benjamins et al. (2010) estimated a total of 566 porbeagle shark (weighing a total of 744 kg) were taken as incidental catch in the nearshore and a total of 161 (weighing a total of 2,361 kg) were taken in the offshore. An estimated 115 porbeagle shark were taken as bycatch in the Newfoundland nearshore gillnet fishery (Benjamins et al. 2010).</u>

In 2004, COSEWIC assessed the species as Endangered in Canada. However, to date, the species has not gained federal protection under SARA.

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**).

Husky Response: The figure is from Kulka et al. (2003). Comment noted. Thank you.

DFO Response: *Will this section be reviewed in light of the reference to DFO RV survey in Div. 3L for 2010 and 2011?*

Husky Response: The underlined text has been added to the second paragraph on Page 12-26:

In the Offshore Study Area, both the Acadian and deepwater redfish occur at depths of 100 to 700 m, but their occurrence is patchy and varies spatially and temporally according to Kulka et al. 2003 (Figure 12-9). However, DFO RV surveys in Division 3L in 2010 and 2011 concluded that deepwater redfish was the dominant species by weight in both years (see Table 8-3, page 8-34). They are more common in NAFO Division 3L in spring surveys than in fall surveys (Kulka et al. 2003). Spawning occurs on the northeastern edge of the Grand Banks during June at more than 200 m depth. Larvae have been abundant during summer pelagic surveys of the Grand Banks (Anderson et al. 1999). The Southwest Shelf Edge and Slope EBSA has been identified as an important area for redfish spawning (DFO 2007b), and this area occurs within the Offshore Study Area (refer to Section 13.3.2.1).

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.

Husky Response: Comment noted. Thank you.

DFO Response: *Does Husky Energy accept the proposed changes? Will the text be updated?*

Husky Response: The first paragraph is revised to read:

Atlantic salmon are an anadromous species that inhabit freshwater rivers until age three or four and then migrate seaward. Atlantic salmon are ecologically important in both freshwater and marine systems, and are also valued by Aboriginal peoples and recreational fisheries in Canada (DFO and MRNF 2009). Atlantic salmon require rivers that are clear, cool and well-oxygenated, and prefer bottom substrates with gravel, cobble and boulder (COSEWIC 2010c). Older juvenile and adult Atlantic salmon generally return to their natal river or tributary each year for spawning, although some do stray from their natal river, and not all adults are anadromous (Hendry and Beall 2004). While at sea, adult salmon are known to occur mainly in the upper portion of the water column and to undertake long migrations that include the Nearshore and Offshore Study Area (Figure 12-13) (Reddin 2006). Tagging studies of post-smolts also indicated they spend most of their time near the surface, but also undergo deep dives, likely in search of prey (Reddin et al. 2004).

The second paragraph is revised to read:

The South Newfoundland population has a moderate to high potential to occur in the Nearshore and Offshore Study Areas year-round. This population has been assessed as Threatened by COSEWIC (2010c); however, it is not currently listed under SARA. This population is found from Cape Ray and along the south coast of Newfoundland. The numbers of both small and large salmon in this population have declined over the last three generations (COSEWIC 2010c).

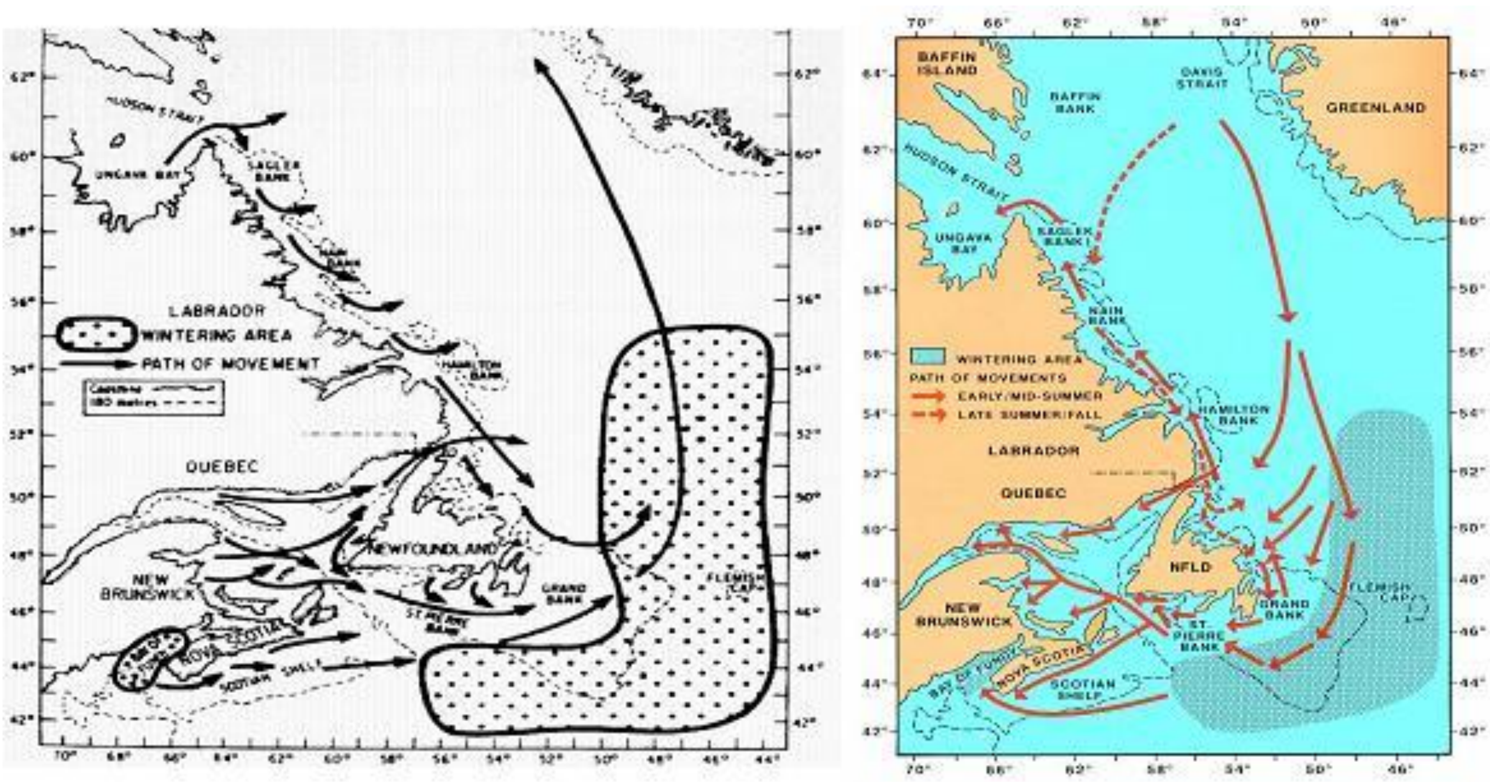
The fifth paragraph is revised to read:

To counter declines, restrictions on commercial Atlantic salmon harvests were first initiated in the 1970s, and additional measures were implemented in the 1980s. Commercial fisheries were closed in 1984 in the Maritimes and portions of Quebec, and a moratorium on commercial fishing for insular Newfoundland occurred in 1992, followed by Labrador fisheries in 1998, and finally, all commercial fisheries for Atlantic salmon were closed in eastern Canada in 2000 (COSEWIC 2010c). From 1992 to 1996, salmon stocks on the south coast of Newfoundland declined by 20 percent for small salmon and by 11 percent for large salmon (DFO 1997).

The sixth paragraph is revised to read:

There are five identified salmon rivers at the head of Placentia Bay: Come By Chance River; Watson River; North Harbour River; Black River; and Pipers Hole River. Measures have also been put in place for recreational fisheries, including daily and season bag limits, mandatory catch and release of large (in some cases all) individuals, and direct closures in parts of Maritimes. Within Newfoundland and Labrador, there are 15 Atlantic salmon management areas, known as Salmon Fishing Areas 1 to 14B, and the salmon in Placentia Bay are part of Salmon Fishing Areas 10. Surveys of abundance of salmon in insular Newfoundland from 2005 to 2010 indicate considerable variation from year to year, with 2010 being a stronger year than the previous five-year mean, including in Salmon Fishing Areas 10 (Robertson et al. 2011).

The caption for Figure 12-13 is revised are provided as Figure 7.



Source: COSEWIC 2010c (modified from Reddin 2006)

Figure 7 Revised Figure 12-13 Migratory Routes of Post-smolt (left) and Returning Adults (right) in Atlantic Canada

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).

Husky Response: Comment noted. Thank you.

DFO Response: Does Husky Energy accept the proposed changes? Will the text be updated?

Husky Response: The third paragraph is revised to read:

Like other elasmobranch species, thorny skate have a low reproductive output as they have slow growth, are long lived, low fecundity, and long reproductive cycles (Templeman 1987), which make them vulnerable to increased levels of mortality. Survey data suggest thorny skate have experienced severe population declines over the southern part of their Canadian distribution and that their range has shrunk (Simpson et al. 2011). Bycatch of thorny skate is not well known because skate bycatch is typically reported without specifying species. A study by Gavaris et al. (2010) estimated bycatch from total discard rates of skate. Declines in thorny skate have continued in their southern range despite reductions in fishing mortality in recent decades. In contrast, abundance of thorny skate has been increasing in their northern range to population levels observed in the 1970s (Simpson et al. 2011). Due to the observed declines in its southern range, thorny skate was assessed as Special Concern in the Northwest Atlantic by COSEWIC in May 2012 (COSEWIC website), but does not have SARA status at this time.

The underlined text has been added to the fourth paragraph:

On the Grand Bank (NAFO Division 3LNO), catch data suggests concentrations were more widespread during 1970s and 1980s, but abundance declined in late 1990s, and since then has been more concentrated on the southwest Grand Bank (Kulka et al. 2004). There is moderate potential for occurrence of thorny skate in the Nearshore Study Area, and moderate potential for occurrence in the Offshore Study Area. Thorny skate dominates the composition of commercial catches of skates (which consist of several skate species). In Canadian commercial catches, thorny skate comprise approximately 95 percent of the Canadian commercial skate catch (Simpson and Miri 2012). Skate is fished in Placentia Bay, and 95 percent of the skate catch is thorny skate.

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*".

Husky Response: Comment noted. Thank you.

DFO Response: *Does Husky Energy accept the proposed changes? Will the text be updated?*

Husky Response: The underlined text has been added to the fourth paragraph on Page 12-120:

At-risk marine mammals are not considered to be at high risk from the effects of oil exposure. However, sea turtle carcasses are often found after a spill, but leatherback sea turtles are uncommon in the Nearshore Study Area, especially outside of summer and fall. At-risk baleen whales appear to be less susceptible to spills than delphinids, as dolphins are often found stranded after an oil spill. Thus, delphinids that occur in the Nearshore Study Area at the time of the spill are most susceptible to fouling. 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. <u>It should be noted that given the apparent small size of the Northwest Atlantic killer whale population, the loss of one or two animals could represent a "population-level effect" even if the number of known individuals reaches 100 (DFO, pers. comm.).</u>

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.
Husky Response: Revised Figure 13-1, with the three CPAWS special Marine Areas identified is provided in Attachment 2.

DFO Response: *Figure 13-1 is not included in the Attachment*

Husky Response: Revised Figure 13-1 is provided as Figure 8.

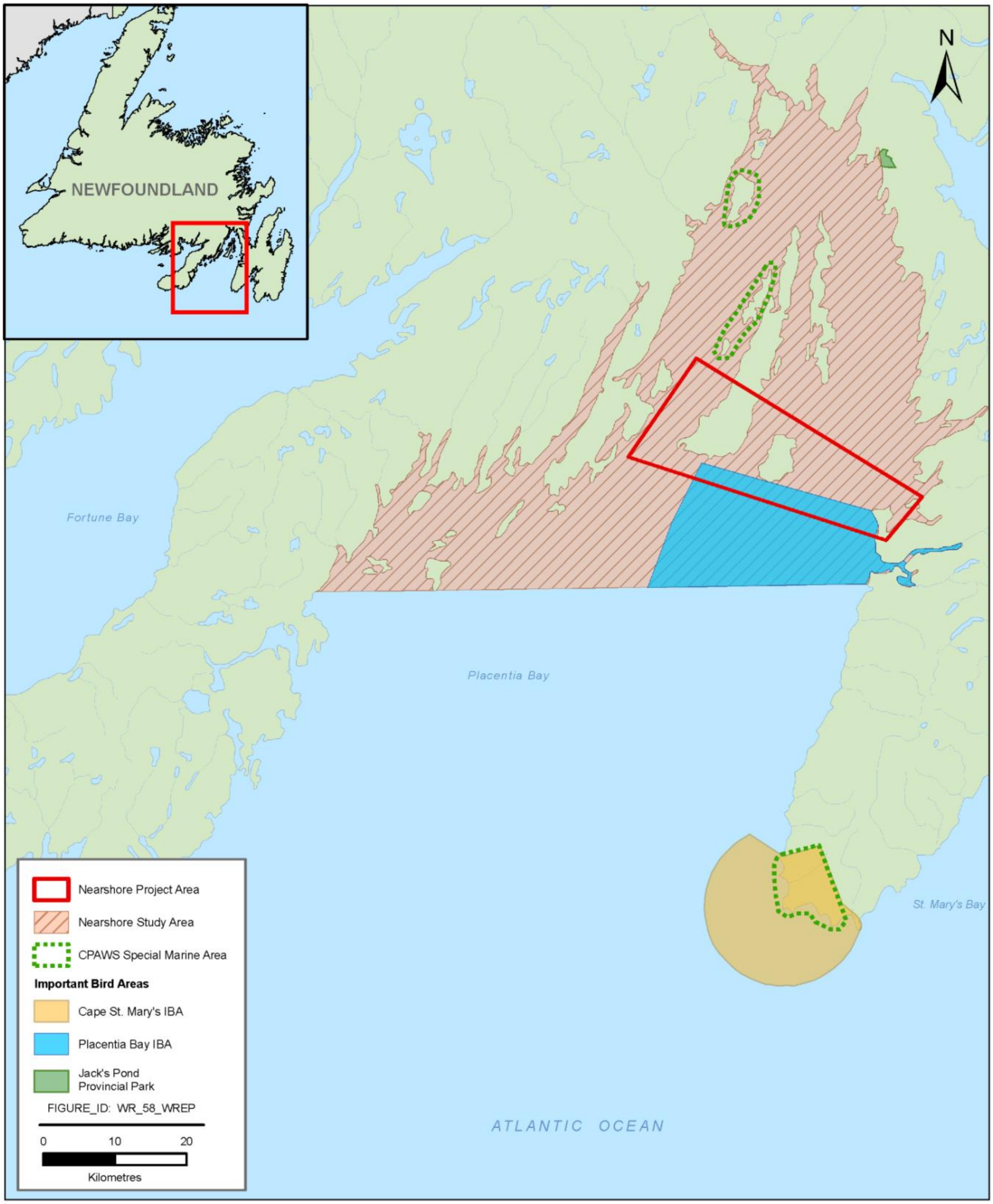


Figure 8 Revised Figure 13-1 Nearshore Sensitive Areas

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).

Husky Response: Both comments are noted. Thank you.

> ***DFO Response:*** *Does Husky Energy accept the proposed changes? Will the text be updated?*

Husky Response: The underlined text has been added to the second paragraph on Page 13-6:

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. <u>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 (see Section 13.3.2.1).</u> The geophysical and biological characteristics of Placentia Bay has been characterized by Catto et al. (1997, 1999), which provides a framework for describing the area. Catto et al. (1999) classified Placentia Bay based, in part, on the distribution of important indicator species and habitat features, including: eelgrass; salt marsh; barachois estuaries; capelin spawning beaches; rockweed; and seabird-dominated shores. Placentia Bay is highly industrialized, but is well flushed and levels of contamination are generally low; although moderate levels of persistent organic pollutants have been detected in marine birds, harbour seals, and fish (Sjare et al. 2005).

The third paragraph on page 13-16 is revised to read:

As part of the Integrated Management Plan for PBGB-LOMA, DFO has identified EBSAs in the area that may require specific management measures. EBSAs are identified according to pre-established criteria, including uniqueness, aggregation, fitness consequences, resilience and naturalness (DFO 2004e). In total, 11 EBSAs have been identified within the PBGB-LOMA. Five of these 11 EBSAs are located within the Offshore Study Area (Figure 13-2): Lily Canyon-Carson Canyon; Northeast Shelf and Slope; Southeast Shoal and Tail of the Banks; Virgin Rocks; and Southwest Shelf Edge and Slope. In the ranking scheme for DFO priorities, the Southeast Shoal and Tail of the Banks EBSA was given the highest ranking, and the Southwest Shelf Edge and Slope EBSA ranked third. The other three EBSAs being considered within this section were ranked in the bottom 4 of the 11. The five EBSAs being considered are described in greater detail in the follow sections.

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.

Husky Response: Comment noted. Thank you.

> ***DFO Response:*** *Response adequate – However, DFO would like to discuss monitoring of drill cutting dispersion for the EEM Program*

Husky Response: Husky would be pleased to meet with DFO to discuss monitoring of drill cuttings dispersion.

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.

Husky Response: Comment noted. Thank you.

> ***DFO Response:*** *Does Husky Energy accept the proposed changes? Will the text be updated?*

Husky Response: The bullet list is revised to read:

Husky will develop a site-specific environmental protection plan (EPP) for the activities associated with graving dock excavation and CSG construction at Argentia under the WHP development option, including those activities requiring compliance monitoring pursuant to legislation and guidelines. Such legislation and guidelines include, but are not limited to:

- *Fisheries Act* Section 36
- *Fisheries Act* Section 32
- *Migratory Birds Convention Act*, 1994, Section 35
- *Canada Shipping Act*, 2001, *Vessel Pollution* and *Dangerous Chemicals Regulations*
- Section 35(2) *Fisheries Act* Authorization for Works or Undertakings Affecting Fish Habitat (issued by Fisheries and Oceans Canada) (likely be required for the nearshore dredging component)
- Newfoundland and Labrador Water Resources Act Permit to Alter a Body of Water
- Newfoundland and Labrador *Environmental Control Water and Sewer Regulations* for waste water discharge
- NLDEC Guidance Documents on Dredge Spoils Disposal (GD-PPD-028.1) and Leachable Toxic Waste, Testing and Disposal (GD-PPD-026.1).

2.3.2 Husky Energy White Rose Extension Project Drill Cuttings and WBM Operational Release Modelling

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.

Husky Response: Comment noted. Thank you.

> ***DFO Response:*** *Does Husky Energy accept the proposed changes? Will the text be updated?*

Husky Response: The fifth paragraph on page 38 of the drill cuttings modelling report is revised to read:

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: as noted by Cranford (2005) these additives have greater potential to affect filter feeding organisms as they remain suspended in the bottom boundary layer. Smothering of benthic organisms may also result from the release of WBMs.

New References for Additional Responses

Benjamins, S., D.W. Kulka and J. Lawson. 2010. Recent incidental catch of sharks in gillnet fisheries of Newfoundland and Labrador, Canada. *Endangered Species Research*, 11: 133-146. doi: 10.3354/esr00268.

Simpson, M.R. and C.M. Miri. 2012. Assessment of Thorny Skate (*Amblyraja radiata* Donovan, 1808) in NAFO Divisions 3LNO and Subdivision 3Ps. *NAFO DRAFT Science Council Report Document*, 12/28: 32 pp.

2.4 Transport Canada

EPP – White Rose Extension Project – Argentia Site, Section 6.4 Page 61 – Contingency Procedures No. 1 – states '…in accordance with CCG regulations.". TC suggests updating this statement to "…in accordance with CCG and TC regulations." because TC is responsible for the *Canada Shipping Act* and the *Navigable Waters Protection Act*.

Husky Response: The first procedure in the list of contingency procedures in Section 6.4 of the EPP – White Rose Extension Project – Argentia Site will be revised to read:

1. All stationary hazards, such as moored platforms or vessels, will be marked in accordance with CCG and Transport Canada regulations.

2.5 Canada-Newfoundland and Labrador Offshore Petroleum Board

2.5.1 White Rose Extension Project Environmental Assessment

Page 1-11, Section 1.5.2: Need temporal scope.

Husky Response: The WREP schedule has been revised since the environmental assessment was prepared. The changes to the schedule do not affect the environmental assessment significance predictions nor the mitigations planned for the project. In the case of the WHP development option, site preparation, installation of the WHP and initial production/maintenance will occur in 2017. The WHP will be decommissioned and abandoned in accordance with standard practices at the end of its production life, which is anticipated to be 25 years. The subsea drill centre option is scheduled to begin construction in 2014, with first oil expected in 2016. Under this option, the wells will be plugged and abandoned at the end of its production life (anticipated to be 20 years), and the subsea infrastructure removed or abandoned in accordance with relevant regulations.

> ***C-NLOPB Response****: While this response is generally acceptable, we note that the temporal scope for operations offshore exceeds the original White Rose temporal scope. The SeaRose FPSO and original subsea infrastructure have not been assessed for a life beyond 2020.*

Husky Response: Noted. Thank you.

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?

Husky Response: The original White Rose Environmental Assessment (Husky Energy 2001) contemplated 3 to 4 subsea drill centres being constructed within the White Rose field. Three drill centres (Centre, Southern and Northern), were constructed prior to an assessment of five additional drill centres in the Husky White Rose Development Project: New Drill Centre Construction and Operations Program Environmental Assessment - EA Addendum (LGL 2007). To date, only the North Amethyst and South White Rose Extension drill centres have been constructed of the five assessed during the period from 2007 to 2015.

The current WREP Environmental Assessment re-assessed the effects of construction and operation of up to three drill centres during the life of the project. The productive life of the subsea infrastructure is estimated at 20 years, the productive life of the WHP is estimated at 25 years. The potential environmental effects of the operation of the *SeaRose FPSO* have not been assessed past 2020, the original projected life of the White Rose field.

Husky Energy will complete environmental assessments as required to review potential effects and mitigation opportunities prior to the expiry of current approvals.

> ***C-NLOPB Response****: This response is generally acceptable. We note that the current "Approvals" include the DPA, which doesn't expire per say, but which will be made inactive by expiry of the original project EA scope. The C-NLOPB won't be able to issue any "Authorizations" for production operations at the SeaRose FPSO beyond 2020 until the environmental assessment issue is resolved.*

Husky Response: Noted. Thank you.

Page 2-12 – Discussion of Subsea Drill Centre, The MODU and its subsystems have been omitted and should be included here

Husky Response: Comment noted. Thank you.

> ***C-NLOPB Response****: Not an acceptable response. Provide information on the MODU and its subsystems at a level comparable to the WHP.*

Husky Response: The following is added as new Section 2.4.4:

2.4.4 MODU Systems

A typical MODU has the following key equipment and systems:

- Storage capacities
- Propulsion/thrusters
- Mooring system
- Watertight integrity
- Ballast and bilge systems
- Power supply systems
- Drillstring equipment
- Well control/subsea equipment
  - marine riser system
  - subsea support system
  - bop control system
  - subsea control system
  - acoustic emergency bop control system
- High-pressure mud system
- Low-pressure mud system
- Bulk system
- Casing equipment
- Cement equipment
- Drilling instrumentation at driller's position
- Internal rig communication system
- Environmental instrumentation
- Production test equipment
- Sprinkler system
- Gas/fire/smoke detection
- Fire-fighting equipment
- Survival equipment
- Pollution prevention equipment
  - sanitary and food waste
  - garbage compaction
  - garbage disposal/grinder
  - machinery space waste oil drainage and storage
  - bilge, deck drain oily water treatment/storage
  - rig floor, cellar deck, piperack oily water treatment/storage

WBM and SBMs cuttings will be released from the MODU at estimated volumes as indicated in Table 2-6 (Section 2.4.3).

Page 2-49 White Rose Extension Project Operations 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?

Husky Response: The base plan is to drill two cuttings reinjection wells for cuttings disposal purposes. In addition, the WHP design currently envisions a secondary cuttings dryer system to lower synthetic based mud on cuttings (SOC) to a target level of 6.9 percent SOC. This is consistent with technology currently employed by MODUs operating in the area. This secondary dryer would be employed until the cuttings reinjection (CRI) system is functional. This secondary system would also be employed in the event of difficulties with the CRI system. Prior to having a CRI system in place, and in the event of CRI system failure, following processing with the secondary dryer, cuttings would be discharged overboard.

Current drilling authorizations allow for the discharge of cuttings while drilling with an SBM fluid, at discharge limits specified in the facilities Environmental Protection Plan. The discharge of mud and cuttings and their limits for the WREP will be described in the WREP Environmental Protection Compliance and Monitoring Plan and submitted as part of the authorization application. While using an SBM fluid system, the WHP intends to handle cuttings in a similar manner as a MODU until the CRI system is operable, as well as in the event the CRI system experiences a failure. Once the CRI system is operable, these cuttings will be reinjected downhole.

> **C-NLOPB Response**: *The Proponent should model these discharges or explain why modeling is considered not necessary.*

Husky Response: Under the Subsea option (Section 3.2.1), the scenario of 16 wells drilled from a MODU at the West White Rose location (WWRX1) was modelled with the release of all treated SBM cuttings. The volume of cuttings released from the 16 MODU wells would be greater than the volume released from wells drilled prior to commissioning the CRI system and is therefore considered worst-case scenario for purposes of the environmental assessment.

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?

Husky Response: The original White Rose Environmental Assessment (Husky Energy 2001) contemplated three to four subsea drill centres being constructed within the White Rose field. Three drill centres (Centre, Southern and Northern), were constructed prior to an assessment of five additional drill centres in the Husky White Rose Development Project: New Drill Centre Construction and Operations Program Environmental Assessment - EA Addendum (LGL 2007). To date, only the North Amethyst and South White Rose Extension drill centres have been constructed of the five assessed during the period from 2007 to 2015.

The current WREP Environmental Assessment re-assessed the effects of construction and operation of up to three drill centres during the life of the project. The productive life of the subsea infrastructure is estimated at 20 years, the productive life of the WHP is estimated at 25 years. The potential environmental effects of the operation of the *SeaRose FPSO* have not been assessed past 2020, the original projected life of the White Rose field.

Husky will complete environmental assessments as required to review potential effects and mitigation opportunities prior to the expiry of current approvals.

> **C-NLOPB Response**: *Acceptable response. We note that only the drill centres identified in the WHP EA will be reviewed in this regard.*

Husky Response: Noted. Thank you.

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.

Husky Response: Neither Husky nor its drilling contractor records particle size distribution from SBM drilling operations. AMEC used sieve analysis results from modeling of the Hibernia well K-18 (AGAT Laboratories 1993), which is the same information used for the Hibernia, Terra Nova and White Rose cuttings modeling (Hodgins 1993; Hodgins and Hodgins 1998, 2000). Hebron drill cutting models also used these grain size data as inputs (AMEC 2010). These estimates of percentage pebbles, coarse sand, medium sand and fines are the best available source of information.

> **C-NLOPB Response**: *Husky could have collected the data but chose not to. Using data from the current White Rose drilling program would have been more representative of the grain size. Husky should remodel using more applicable data.*

Husky Response: Husky will design a drill cuttings particle size sampling plan to be executed at the next opportunity. The samples will be analyzed for particle size and those data will be compared to the data used for input into the WREP environmental assessment cutting dispersion model (AMEC 2012). If the particle size data sets are not comparable, the cutting dispersion model(s) will be re-run and the results used to re-assess and adjust the associated environmental assessment predictions, as necessary.

Drill cutting dispersion model predictions will be validated in situ by monitoring the thickness of cutting piles on the seafloor once the White Rose EEM program is revised to accommodate operation of the WREP. This additional EEM monitoring would serve to validate the associated environmental assessment predictions.

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.

Husky Response: IAOGP (2010) is referenced in this report, and is used as a primary source for data. Scandpower (2000) is not used as a primary source of data so the 2006 update was not included.

C-NLOPB Response: This is not an acceptable answer. Scandpower (2000) is used as a primary source of data, as the EA report says on page 3-62, "All three issues are covered thoroughly in Scandpower (2000), and this source is used in the following analysis" and by reference as primary source in Table 3-50, Table 3-52, Table 3-53.

The proponent is directed to Scandpower (2011), *Blowout and well release frequencies based on SINTEF offshore blowout database 2010 (revised). Scandpower report No. 19.101.001-3009/2011/R3*

Husky Response: A more recent analysis by Scandpower (2011) does not allow a comparison for each of the operations listed in Table 3-50, but confirms the overall blow-out frequency as 2.37×10^{-5} for normal-pressure development wells and 1.47×10^{-4} for high-pressure high-temperature (HPHT) wells. These values are consistent with the values used for predictive purposes in the WREP Environmental Assessment.

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: $70 \times 1.5 \times 10^{-5} = 1.1 \times 10^{-3}$, 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: $70 \times 5.9 \times 10^{-5} = 4.1 \times 10^{-3}$ 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 = $300 \times 5.7 \times 10^{-6} = 1.7 \times 10^{-3}$ 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 = $300 \times 1.4 \times 10^{-5} = 4.2 \times 10^{-3}$ 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 $1/85{,}796 = 1.16 \times 10^{-5}$ 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 $\times 1.16 \times 10^{-5}$ 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 $(4/85{,}796) = 4.66 \times 10^{-5}$ spills/well
- The predicted number of very large hydrocarbon spills from blowouts during a drilling operation, based on exposure of wells drilled: 70 wells $\times 4.66 \times 10^{-5}$ spills/well= 3.26×10^{-3} spills
- The frequency of extremely large hydrocarbon spills from production/workover blowouts is $2/350{,}000 = 5.71 \times 10^{-6}$ spills/well-year
- The predicted number of extremely large hydrocarbon spills from the WREP based on well-years is calculated as 300 well-year $\times 5.71 \times 10^{-6}$ spills/well-year=1.7×10^{-3} spills
- The frequency of very large hydrocarbon spills (including extremely large) from production/workover blowouts is $8/350{,}000 = 2.28 \times 10^{-5}$ blowouts/well-year,
- The predicted number of very large hydrocarbon spills (including extremely large) based on an exposure of well-years = 300 well-years $\times 2.28 \times 10^{-5}$ blowouts/well-year = 6.8×10^{-3} spills

I also provide the following note by way of explanation and not for inclusion in a response from the operator…

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 4.66×10^{-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.

Husky Response: The above bullet list provided by the reviewer is correct, however, the following edits are made to reflect 60 wells rather than 70:

With respect to the WREP, there will be approximately ~~70~~ 60 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 x 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~~ 60 wells x1.16 x 10^{-5} spills/well = ~~8.2~~ 7.0 x 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 x 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~~ 60 wells x 4.66 x 10^{-5} spills/well= ~~3.26~~ 2.8 x 10^{-3} spills;
- The frequency of extremely large hydrocarbon spills from production/workover blowouts is 2/350,000 = 5.71 x 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 x 10^{-6} spills/well-year= 1.7 x 10^{-3} spills;
- The frequency of very large hydrocarbon spills (including extremely large) from production/workover blowouts is 6~~8~~/350,000 = ~~2.28~~ 1.71x 10^{-5} blowouts/well-year; and
- The predicted number of very large hydrocarbon spills (including extremely large) based on an exposure of well-years = 300 well-years x ~~2.28~~ 1.71 x 10^{-5} blowouts/well-year = ~~6.8~~ 5.1 x 10^{-3} spills

Indeed, binomial probability could be used as an alternate method to make the calculations, but we believe that the calculation of spill frequency is an acceptable quantification of the risk of blowouts and spills, as required in the WREP Scoping Document (C-NLOPB 2012), and as previously deemed acceptable. We acknowledge there were inconsistencies in the well count used and that there is some confusion in the presentation of results. The probabilities in Table 3-60 have been corrected to reflect re-calculation using the binomial probability proposed by the reviewer. Revised Table 3-60 is provided as Table 7.

Table 7 Revised Table 3-60 Predicted Probability of Blowouts and Spills for the White Rose Extension Project

Event	Historical Frequency	White Rose Exposure [(a)]	Probability over the Project Life
Blowouts			
1. Deep blowout during development	4.8 x 10^{-5} / wells drilled	60 wells drilled	0.29%
2. Blowout during production involving some hydrocarbon discharge >1 bbl	2.8 X 10^{-5} / well-years	300 well-years	0.83%
3. Development drilling blowout with hydrocarbon spill >10,000	4.7 x 10^{-5} / wells drilled	60 wells drilled	0.28%
4. Development drilling blowout with hydrocarbon spill >150,000 bbl	1.2 x 10^{-5} / wells drilled	60 wells drilled	0.072%
5. Production / workover blowout with hydrocarbon spill >10,000	1.7 x 10^{-5} / well-year	300 well-years	0.51%
6. Production / workover blowout with hydrocarbons pill >150,000	5.7 x 10^{-6} / well-year	300 well-years	0.17%
Platform Spills (b) (including blowouts)			
7. Hydrocarbon spill >10,000 bbl	5.5 x 10^{-6} / well-year	300 well-years	0.17%
8. Hydrocarbon spill >1,000 bbl	1.5 x 10^{-5} / well-year	300 well-years	0.45%
9. Hydrocarbon spill 50 to 999 bbl	4.8 x 10^{-4} / well-year	300 well-years	13%
10. Hydrocarbon spill 1 to 49 bbl	1.2 x 10^{-2} / well-year	300 well-years	3.6 spills over the life of the Project
11. Hydrocarbon spill 1 L to 1 bbl (159 L)	0.23/well-year	300 well-years	69 spills over the life of the Project
12. Hydrocarbon spill less than 1 L	0.46/well-year	300 well-years	140 spills over the life of the Project

(A) White Rose Exposure is the number of events over the life of the Project. This is either defined as number of well-years for production-related activities, or number of wells drilled for drilling-related activities.
(B) Platform spills greater than 150,000 bbl are not included on the table as it would simply duplicate the statistic for blowouts greater than 150,000 bbl.
(C) Probabilities estimated using binomial probability

C-NLOPB Response: *In the previous round of comments the binomial probability approach and the simpler use of the formula was posited to calculate the probabilities of spills, not as an alternative method but as the correct method. As previously stated, for low probability events the practice of multiplying historical frequency by exposure calculates the predicted number of occurrences, which approximates, numerically, the likelihood of occurrence over the project life but which is mathematically and statistically insupportable as a calculation of probability.*

For additional clarity, the last column of table 3-60 as calculated in the original report did not contain the probability of occurrence of a spill but the most likely number of spills over the life of the project, as becomes evident in lines 10, 11 and 12 of that table. I have revisited the table again with appropriate edits and notes below.

No.	***Event***	***Historical Frequency***	***White Rose Exposure***	***Most Probable Number of Events (n) over project life (1)***	***Likelihood of Occurrence over project Life (2) (i.e., n≥1)***
Blowouts					
1	*Deep blowout during development*	*4.8 x 10^{-5} / wells drilled*	*60 wells drilled*	*0.0029*	*0.0029*
2	*Blowout during production involving some hydrocarbon discharge >1 bbl*	*2.8 X 10^{-5} / well-years*	*300 well-years*	*0.0084*	*0.0084*
3	*Development drilling blowout with hydrocarbon spill >10,000*	*4.7 x 10^{-5} / wells drilled*	*60 wells drilled*	*0.0028*	*0.0028*
4	*Development drilling blowout with hydrocarbon spill >150,000 bbl*	*1.2 x 10^{-5} / wells drilled*	*60 wells drilled*	*0.00072*	*0.00072*
5	*Production / workover blowout with hydrocarbon spill >10,000*	*1.7 x 10^{-5} / well-year*	*300 well-years*	*0.0051*	*0.0051*
6	*Production / workover blowout with hydrocarbons pill >150,000*	*5.7 x 10^{-6} / well-year*	*300 well-years*	*0.0017*	*0.0017*
Platform Spills (b) (including blowouts)					
7	*Hydrocarbon spill >10,000 bbl*	*5.5 x 10^{-6} / well-year*	*300 well-years*	*0.0017*	*0.0017*
8	*Hydrocarbon spill >1,000 bbl*	*1.5 x 10^{-5} / well-year*	*300 well-years*	*0.0045*	*0.0045*
9	*Hydrocarbon spill 50 to 999 bbl*	*4.8 x 10^{-4} / well-year*	*300 well-years*	*0.14*	*0.13*
10	*Hydrocarbon spill 1 to 49 bbl*	*1.2 x 10^{-2} / well-year*	*300 well-years*	*3.6*	*0.97*
11	*Hydrocarbon spill 1 L to 1 bbl (159 L)*	*0.23/well-year*	*300 well-years*	*69*	*1*
12	*Hydrocarbon spill less than 1 L*	*0.46/well-year*	*300 well-years*	*138*	*1*

Notes:
(1) Calculated as (Historical Frequency) x (Exposure) = Most Probable Number of Events.
(2) Calculated as $P_{k\geq 1} = 1 - (1-p)^n$*, the probability of at least one event.*
(3) The reader should note that the frequency presented for platform spills >10,000 bbl (i.e., 5.5 x 10^{-6} spills/well-year) is almost four times smaller than the frequency for production blowout spills >10,000 bbl (i.e., 1.7 x 10^{-5}). This is a practical impossibility because the platform spills include the blowout spills. However, the data for platform spills >10,000 bbl is from the US record, which includes only oil wells and not gas wells. The source of the production blowouts was the world-wide record, which includes events that would not be counted in the US record.

Additionally, the reader should note that for scenarios where the probability of an event is higher and the predicted most probable number of events is greater than 1, the calculated number of events represents the central position of a spill probability distribution. Based on an assessment of the cumulative distribution of probabilities, the 95% confidence interval around that central position for spills between 1 litre and 159 litres is between 54 and 83 events over the life of the WHP. For spills of 1 litre or less the 95% confidence interval is 121 to 154 spill events.

Husky Response: Thank you for the clarification.

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.

Husky Response: The original White Rose Environmental Assessment (Husky Energy 2001) contemplated three to four subsea drill centres being constructed within the White Rose field. Three drill centres (Centre, Southern and Northern), were constructed prior to an assessment of five additional drill centres in the Husky White Rose Development Project: New Drill Centre Construction and Operations Program Environmental Assessment - EA Addendum (LGL 2007). To date, only the North Amethyst and South White Rose Extension drill centres have been constructed of the five assessed during the period from 2007 to 2015.

The current WREP Environmental Assessment re-assessed the effects of construction and operation of up to three drill centres during the life of the project. The productive life of the subsea infrastructure is estimated at 20 years, the productive life of the WHP is estimated at 25 years. The potential environmental effects of the operation of the *SeaRose FPSO* have not been assessed past 2020, the original projected life of the White Rose field.

Husky Energy will complete environmental assessments as required to review potential effects and mitigation opportunities prior to the expiry of current approvals.

> ***C-NLOPB Response**: This response is generally acceptable. We note that the current "Approvals" include the DPA, which doesn't expire per say, but which will be made inactive by expiry of the original project EA temporal scope. The C-NLOPB won't be able to issue any "Authorizations" beyond 2020 until that issue is resolved.*

Husky Response: Noted. Thank you.

2.5.2 Supporting Document: Drill Cuttings and WBM Operational Release Modelling (AMEC June 2012)

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).

Husky Response: A description of expected mud and cuttings volume and release locations are provided on the tables 2-2 and 2-3 of the Drill Cuttings and WBM Operational Release Modelling (AMEC 2012). The discharge of mud and cuttings and their limits for the WREP will be described in the WREP Environmental Protection Compliance and Monitoring Plan and submitted as part of the authorization application.

> ***C-NLOPB Response****: The tables do not show any release of SBM, leaving the assumption that there will be no release of SBM even if a MODU is used. If there is to be SBM released from a MODU then a response to this comment is still required.*

Husky Response: Tables 2-2 and 2-3 of the Drill Cuttings and WBM Operational Release Modelling report (AMEC 2012) estimate the volume of SBMs cuttings and mud released for both the WHP and subsea development option for the WREP, as highlighted below.

Table 8 Revised Drill Cuttings Modelling Report Table 2-2 Drill Cuttings Volumes and Release Locations

Well Hole Section	WHP		Subsea Drill Centre	
	Volume (m^3)	Release Location	Volume (m^3)	Release Location
Conductor	107	shale chute (A)	79	seafloor (B)
Surface	188	shale chute (A)	188	seafloor (B)
Intermediate	--	treat and inject	192	sea surface (C)
Main	--	treat and inject	77	sea surface (C)

Notes:
(A) Elevation of chute exit from WHP estimated at 20 m above seafloor: to be confirmed during WHP design
(B) WBM cuttings for top two sections estimated release at 10 m above seafloor
(C) SBM cuttings treated prior to release. Estimated release at 20 m below sea surface
Source: J. Swain pers. comm.

Table 9 Revised Drill Cuttings Modelling Report Table 2-3 Drill Mud Volumes and Release Locations

Well Hole Section	WHP		Subsea Drill Centre	
	Volume (m^3)	Release Location	Volume (m^3)	Release Location
Conductor	214 WBM	shale chute [(A)]	158 WBM	seafloor
Surface	470 WBM	shale chute [(A)]	440 WBM	seafloor
Intermediate	--	SBM returned to surface: treated and re-injected	26 SBM on cuttings	sea surface [(B)]
Main	--	SBM returned to surface: treated and re-injected	14 SBM on cuttings	sea surface [(B)]

Notes:
(A) Elevation of chute exit from WHP estimated at 20 m: to be confirmed during WHP design
(B) There is no discharge of SBM on its own. On release is residual SBM left on cuttings after treatment.
Source: J. Swain pers. comm.

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.

Husky Response: Cuttings particle size, distribution and the aggregations used are presented in Section 3.2.2, including the basis for their selection and corresponding references. For well depths, please see comment "Section 2 Drilling Program, pg 3 – "Well lengths assumed.

> ***C-NLOPB Response**: Current drilling discharges at White Rose would be more indicative of the White Rose Field than one Hibernia well. Husky should use information from actual drilling at White Rose or show that the difference between the Hibernia well and the well to be drilled for the White Rose Extension are similar.*

Husky Response: Husky will design a drill cuttings particle size sampling plan to be executed at the next opportunity. The samples will be analyzed for particle size and those data will be compared to the data used for input into the WREP environmental assessment cutting dispersion model (AMEC 2012). If the particle size data sets are not comparable, the cutting dispersion model(s) will be re-run and the results used to re-assess and adjust the associated environmental assessment predictions, as necessary.

Drill cutting dispersion model predictions will be validated in situ by monitoring the thickness of cutting piles on the seafloor once the White Rose EEM program is revised to accommodate operation of the WREP. This additional EEM monitoring would serve to validate the associated environmental assessment predictions.

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.

Husky Response: Neither Husky nor its drilling contractor records particle size distribution from SBM drilling operations. AMEC used sieve analysis results from modeling of the Hibernia well K-18 (AGAT Laboratories 1993) . Which is the same information used for the Hibernia, Terra Nova and White Rose cuttings modeling (Hodgins 1993; Hodgins and Hodgins 1998, 2000). Hebron drill cutting models also used these grain size data as model inputs

(AMEC 2010). These estimates of percentage pebbles, coarse sand, medium sand and fines are the best available source of information.

> ***C-NLOPB Response****: Husky could have collected the data but chose not to. Using data from the current White Rose drilling program would have been more representative of the grain size. Husky should remodel using more applicable data.*

Husky Response: Husky will design a drill cuttings particle size sampling plan to be executed at the next opportunity. The samples will be analyzed for particle size and those data will be compared to the data used for input into the WREP environmental assessment cutting dispersion model (AMEC 2012). If the particle size data sets are not comparable, the cutting dispersion model(s) will be re-run and the results used to re-assess and adjust the associated environmental assessment predictions, as necessary.

Drill cutting dispersion model predictions will be validated in situ by monitoring the thickness of cutting piles on the seafloor once the White Rose EEM program is revised to accommodate operation of the WREP. This additional EEM monitoring would serve to validate the associated environmental assessment predictions.

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.

Husky Response: Neither Husky nor its drilling contractor records particle size distribution from SBM drilling operations. AMEC used sieve analysis results from modeling of the Hibernia well K-18 (AGAT Laboratories 1993) . Which is the same information used for the Hibernia, Terra Nova and White Rose cuttings modeling (Hodgins 1993; Hodgins and Hodgins 1998, 2000). Hebron drill cutting models also used these grain size data as inputs (AMEC 2010). These estimates of percentage pebbles, coarse sand, medium sand and fines is the best available source of information. Please see Section 3.2.2 of the AMEC for an explanation of settling rates used.

> ***C-NLOPB Response****: Husky could have collected the data but chose not to. Using data from the current White Rose drilling program would have been more representative of the grain size. Husky should remodel using more applicable data.*

Husky Response: Husky will design a drill cuttings particle size sampling plan to be executed at the next opportunity. The samples will be analyzed for particle size and those data will be compared to the data used for input into the WREP environmental assessment cutting dispersion model (AMEC 2012). If the particle size data sets are not comparable, the cutting dispersion model(s) will be re-run and the results used to re-assess and adjust the associated environmental assessment predictions, as necessary.

Drill cutting dispersion model predictions will be validated in situ by monitoring the thickness of cutting piles on the seafloor once the White Rose EEM program is revised to accommodate operation of the WREP. This additional EEM monitoring would serve to validate the associated environmental assessment predictions.

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 reinjected (*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.

Husky Response: The base plan is to drill two cuttings reinjection wells for cuttings disposal purposes. In addition, the WHP design currently envisions a secondary cuttings dryer system to lower synthetic-based mud on cuttings (SOC) to a target level of 6.9 percent SOC. This is consistent with technology currently employed by MODUs operating in the area. This secondary dryer would be employed until the cuttings reinjection (CRI) system is functional. This secondary system would also be employed in the event of difficulties with the CRI system. Prior to having a CRI system in place, and in the event of CRI system failure, following processing with the secondary dryer, cuttings would be discharged overboard. Current drilling authorizations allow for the discharge of cuttings while drilling with an SBM fluid, at discharge limits specified in the facilities Environmental Protection Plan. The discharge of mud and cuttings and their limits for the WREP will be described in the WREP Environmental Protection Compliance and Monitoring Plan and submitted as part of the authorization application. While utilizing an SBM fluid system, the WHP intends to handle cuttings in a similar manner as a MODU until the CRI system is operable, as well as in the event the CRI system experiences a failure. Once the CRI system is operable, these cuttings will be reinjected downhole.

> ***C-NLOPB Response****: The Proponent should model these discharges or explain why modeling is considered not necessary.*

Husky Response: Under the Subsea option (Section 3.2.1), the scenario of 16 wells drilled from a MODU at the West White Rose location (WWRX1) was modelled with the release of all treated SBM cuttings. The volume of cuttings released from the 16 MODU wells would be greater than the volume released from wells drilled prior to commissioning the CRI system and is therefore considered a worst-case scenario for modelling and environmental assessment.

Section 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.

Husky Response: Neither Husky nor its drilling contractor records particle size distribution from SBM drilling operations. AMEC used sieve analysis results from modeling of the Hibernia well K-18 (AGAT Laboratories 1993). Which is the same information used for the Hibernia, Terra Nova and White Rose cuttings modeling (Hodgins 1993; Hodgins and Hodgins 1998, 2000). Hebron drill cutting models also used these grain size data as inputs (AMEC 2010). These estimates of percentage pebbles, coarse sand, medium sand and fines is the best available source of information.

> ***C-NLOPB Response****: Husky could have collected the data but chose not to. Using data from the current White Rose drilling program would have been more representative of the grain size. Husky should remodel using more applicable data.*

Husky Response: Husky will design a drill cuttings particle size sampling plan to be executed at the next opportunity. The samples will be analyzed for particle size and those data will be compared to the data used for input into the WREP environmental assessment cutting dispersion model (AMEC 2012). If the particle size data sets are not comparable, the cutting dispersion model(s) will be re-run and the results used to re-assess and adjust the associated environmental assessment predictions, as necessary.

Drill cutting dispersion model predictions will be validated in situ by monitoring the thickness of cutting piles on the seafloor once the White Rose EEM program is revised to accommodate operation of the WREP. This additional EEM monitoring would serve to validate the associated environmental assessment predictions.

Section 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.

Husky Response: Average durations are as follows, based upon average duration for seven recent Husky subsea wells, and used as the basis for WHP time estimations. Durations are inclusive of skidding, drilling, casing, cementing, completions and associated ancillary operations:

- Conductor section (1,067 mm hole OD) = 5.0 days;
- Surface section (406 mm hole OD) = 12.5 days;
- Production section (311 mm hole OD) = 22.2 days;
- Production liner section/completion (216 mm hole OD) = 43.5 days;

Considering only durations in which cuttings are being generated, the following average times apply. Note that there are periods within these times provided that cuttings are not returned;

- Conductor section (1,067 mm hole OD) = 2.0 days;
- Surface section (406 mm hole OD) = 8.9 days;
- Production section (311 mm hole OD) = 17.3 days;
- Production liner section/completion (216 mm hole OD) = 22.1 days.

> ***C-NLOPB Response****: These durations are much longer than described in Table 3-1. The Proponent should consider if the durations described in Table 3-1 are representative of the times over which cuttings are discharged and adjust the model accordingly.*

Husky Response: As noted, the periods provided are durations for cutting generation, and there are periods within each estimate in which cuttings are not returned. The Table 3-1 durations have been revisited and reconsidered: they are judged from our experience to be representative approximations of the duration of discharge, so that no model adjustment is required.

Section 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.

Husky Response: Neither Husky nor its drilling contractor records particle size distribution from drilling operations. The quoted sources are currently the best available data for modelling inputs.

> ***C-NLOPB Response****: Husky could have collected the data but chose not to. Using data from the current White Rose drilling program would have been more representative of the grain size. Husky should remodel using more applicable data*

Husky Response: Husky will design a drill cuttings particle size sampling plan to be executed at the next opportunity. The samples will be analyzed for particle size and those data will be compared to the data used for input into the WREP environmental assessment cutting dispersion model (AMEC 2012). If the particle size data sets are not comparable, the cutting dispersion model(s) will be re-run and the results used to re-assess and adjust the associated environmental assessment predictions, as necessary.

Drill cutting dispersion model predictions will be validated in situ by monitoring the thickness of cutting piles on the seafloor once the White Rose EEM program is revised to accommodate operation of the WREP. This additional EEM monitoring would serve to validate the associated environmental assessment predictions.

Section 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.

Husky Response: a) In response to the question "Whose experience and what is the basis of that experience?", as noted with the personal communication reference at end of that paragraph it is the experience of Chris Mazerolle, Drilling Engineer Advisor, Chevron Canada Resources, Calgary, AB. b) In response to "Please see Brandsma, 1996 ..." Comment noted. Thank you.

> ***C-NLOPB Response**: The Proponent needs to revisit its assumptions on cuttings dispersion and adjust the model accordingly.*

Husky Response: Husky will design a drill cuttings particle size sampling plan to be executed at the next opportunity. The samples will be analyzed for particle size and those data will be compared to the data used for input into the WREP environmental assessment cutting dispersion model (AMEC 2012). If the particle size data sets are not comparable, the cutting dispersion model(s) will be re-run and the results used to re-assess and adjust the associated environmental assessment predictions, as necessary.

Drill cutting dispersion model predictions will be validated in situ by monitoring the thickness of cutting piles on the seafloor once the White Rose EEM program is revised to accommodate operation of the WREP. This additional EEM monitoring would serve to validate the associated environmental assessment predictions.

Section 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.

Husky Response: Reference for cuttings drilled with SBM (first sentence, paragraph before Table 3-2) is (pers. comm. with Suncor drilling superintendent and MI Swaco personnel, January 2011).

***C-NLOPB Response**: The reference provided does not appear in the first sentence before Table 3-2. Husky should explain where the precise numbers provided in the paragraphs, as per the personal communications, came from.*

Husky Response: As noted. The personal communication (pers. comm.) reference should follow the end of the first sentence. The numbers were provided in the pers. comm. It is a pers. comm. from drilling personnel who know this subject matter/practice.

The other numbers in the paragraph follow by simply equating the volumes (rectangular to spherical particle). The final set of numbers (percent of different sizes) was confirmed as reasonable by Husky drilling personnel.

2.5.3 Supporting Document: SBM Accidental Release and Dispersion Modelling (AMEC June 2012)

7.1 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.

Husky Response: The discharge of mud and cuttings and their limits for the WREP will be described in the WREP Environmental Protection Compliance and Monitoring Plan and submitted as part of the authorization application.

> ***C-NLOPB Response****: Husky could have collected the data but chose not to. Using data from the current White Rose drilling program would have been more representative of the grain size. Husky should remodel using more applicable data.*

Husky Response: Husky will design a drill cuttings particle size sampling plan to be executed at the next opportunity. The samples will be analyzed for particle size and those data will be compared to the data used for input into the WREP environmental assessment cutting dispersion model (AMEC 2012). If the particle size data sets are not comparable, the cutting dispersion model(s) will be re-run and the results used to re-assess and adjust the associated environmental assessment predictions, as necessary.

Drill cutting dispersion model predictions will be validated in situ by monitoring the thickness of cutting piles on the seafloor once the White Rose EEM program is revised to accommodate operation of the WREP. This additional EEM monitoring would serve to validate the associated environmental assessment predictions.