

GENERAL COMMENTS

1. For the discussion on sea ice/icebergs and accidental events, it appears that most of the information was taken from the White Rose Comprehensive Study Report, without an attempt to provide an update to the data. For instance, sea ice and iceberg data set consulted for the Drill Centre EA includes only data up to 2001. The data set used in the discussion of accidental events only covers spills up to 2000. Recent data, for sea ice/icebergs and spill events, up to at least 2005 should have been referenced in the EA report. In addition, spill information for the Newfoundland and Labrador Offshore area is now available on the C-NLOPB website. This data set should be referenced in discussing spill probability in the NL offshore area.
2. Section 5.3.14 of the Scoping Document (C-NLOPB 2006) does not appear to be addressed in its entirety. For instance, "...the EA should address...whether any elements of that project...are additional or supplementary to the project already assessed." Please clarify if this requirement of the scoping document has been satisfied within the EA Report.
3. Chemicals used in the offshore will be screened according to the Offshore Chemical Guidelines (NEB *et al.*, 1999), but the EA provides no information on the matter.
4. Care should be taken when information extracted from the Jeanne d'Arc Basin exploratory drilling project report is incorporated into this document. Instead of stating the White Rose New Drill Centre Construction project, the exploratory drilling project is stated.
5. In some sections, a list of organizations is inserted to show who was involved in consultations. Some of these lists present One Ocean and the Fish, Food and Allied Workers on the same line. Please separate these two organizations in *all* sections.
6. Figures are used quite often in the document, but they are usually hard to read or interpret. These figures should be larger to be much more effective.
7. Sediment excavation will remove 155,540 m³ of sediment in a zone of 70 X 70 meters for each glory hole. In addition to direct habitat/sediment removal, suspension of sediment will occur. In light of bottom currents, the zone of influence has the potential to be greater than 70m X 70m. Has the actual zone of influence been modeled or assessed to this point?
8. Produced water discussion. Throughout the document, the discussion of produced water appears to focus on the discharge associated with drilling activities. Produced water is typically not encountered during drilling activities. It is, however, a primary waste associated with production activities. This is not evident in the EA report. In addition, in the effects assessment sections, for each of the VECs, the discussion of produced water and the potential effects associated with its discharge is insufficient. In addition, cumulative effects discussion does not address the discharges from other production installations.
9. The coverage of Species at Risk is dismissive and thus, inadequate. Evaluation of SAR is basically a description of the various listed species without the benefit of any added measures to ensure the protection of those species – something that should be the main component of the document. While the report addresses legal aspects of SARA by

considering listed species, it is a minimum requirement and DFO recommends that the report fully acknowledge the rarity of all species at risk and that due caution will necessarily need to be exercised. Finally, the report, in assessing effects of both routine and accidental events, avoids directly assessing effects on SAR by stating: *“The details of potential effects...on relevant marine animals species...have been discussed in previous sections...”*. For SARA listed species with low estimated populations, a detrimental effect on individuals may translate into a significant effect at the population level. Given their importance, these sections are not adequate and a better effects analysis and specific mitigations for SAR should be presented. The SAR assessment should clearly identify adverse effects and significant adverse effects on listed SAR, and propose and describe mitigation and monitoring to address the adverse effects. Where applicable, the proponent should refer to listed SAR recovery strategies/action plans to ensure that proposed mitigation is consistent with the applicable strategies/plans.

10. This document often refers the reader to the White Rose Oilfield Comprehensive Study Report and other previous EA reports for details on effects assessment. DFO reiterates that it is inefficient to expect reviewers to refer to other EA documents for detailed information on the biophysical environment and on effects assessment. The report should present a summary of the information and original references to support it.
11. DFO has produced a review of the potential hydrophysical-related issues in Canada, risks to marine mammals, and monitoring and mitigation strategies for seismic activities (Lawson and McQuinn, 2004) that it recommends for referral as it is relevant to both this assessment and to other places in Canada. This reference, as well as others is attached to this document.
12. There are spelling and typographical errors throughout the document.
13. Table of Contents: A “Personal Communication” section has not been included in the document.
14. Table of Contents: Appendix 2 (List of People Consulted) has not been included in the document.

SPECIFIC COMMENTS

15. §1.0, page 1, 3rd paragraph, line 1: Summer is identified for construction to begin. Fall is identified later in the document.
16. §3.0, page 6: Anchorage of a rig is not discussed, demonstrating the size, type and number of anchors typically used. This would be interesting to know to add to the disturbance or dredging of the sea floor from certain styles of anchors and chains.
17. §3.0, page 6, 1st paragraph: It is stated that the currently active drill centres are shown on Figures 1.1 and 1.2. It is not obvious on these figures.
18. Page 8. The use of jack-up drilling rigs is not discussed in the this section. If there is a possibility that jack-up rigs could be used throughout the life of the project, then they should be included in the EA report.

19. §3.7, page 11: It should be the “Department of Fisheries and Aquaculture” not the “Department of Fisheries, Food and Aquaculture”.
20. §3.8, page 12. In the discussion of the number of well per drill centre, it is stated that the SWR drill centre will have up to 8 wells. However, in the “White Rose Development Plan Amendment – South White Rose Extension Tie-back” (Husky 2006) a maximum of 16 wells in the SWR Drill Centre is contemplated. The information presented in the EA report should be consistent with that presented in the Development Plan Amendment. As such it is required that the EA be modified to include an assessment of environmental effects associated with a maximum of 16 wells in the SWR drill centre.
21. Table 3.1, page 13. A potential schedule of activities is presented in Table 3.1, and the temporal scope of the EA for the drilling activities is indicated as a four-year period, to end in 2011. Husky is proposing to drill 30 wells in approximately 48 months. However, the effects assessment indicates a drill time of 60 days per well. Therefore, for 30 wells, it will take approximately 60 months, a full year beyond project estimates. If drilling is required to be undertaken beyond 2011, these activities will be outside the scope of project/scope of assessment and will require an additional environmental assessment.
22. §3.8.4, page 15. The 3rd paragraph in this section indicates that a discharge of approximately 0.330 m³ of oily residue will be discharged during subsea equipment installation. In the discussion of environmental effects with respect to production activities, the effects associated with tie-back to the FPSO, including the above, and mitigations to reduce or eliminate effects, are not included. The EA report should include a discussion of environmental effects for all phases of the project, including tie-back/hook-up to the existing FPSO.
23. §3.9, page 23: The *Offshore Waste Treatment Guidelines* (NEB et al., 2002) place an onus on operators to review and implement pollution prevention measures that minimize waste generation and discharge. Consideration of pollution prevention measures has important implications for the nature and extent of environmental impacts from offshore activities. Nonetheless, the discussion of pollution prevention opportunities is limited in the EA. Similarly, consideration of alternative means of carrying out the project is essentially restricted to a brief paragraph on rig type and a sentence on the use of vertical wells (p. 10). Examples of pollution prevention opportunities which could be considered in revisions to the EA include the following:
- opportunities to recover water-based mud as opposed to a bulk release at the end of the well;
 - alternative means of managing synthetic-based muds such as measures that reduce drilling mud volumes, reduce or substitute the toxic constituents of drilling muds, and other means of managing the resulting waste (e.g., re-injection of cuttings, transport to shore) recognizing that technology is being developed to remove oil from cuttings);
 - substitute drilling additives; and
 - options related to the length and/or diameter of the surface-hole section.
24. §3.9.2.2, page 23: The maximum amount of produced water associated with increased production from the new drill centres, and that already estimated from existing production should be stated. If this amount is anticipated to exceed that assessed in the White Rose Comprehensive Study, the Drill Centre EA report should include a assessment of effects associated with the additional produced water.

25. §3.9.8.1, page 24: The EA states that the target discharge concentration for chlorine in cooling water is 0.5 ppm. Chlorinated wastewater effluent through once-use coolant systems is listed as a toxic substance under CEPA. It is recommended that the EA include a discussion of alternatives to chlorine use and whether these are feasible for the proposed project. If chlorine is to be employed, the proponent should indicate which chlorine product has been selected for use and consider the potential for the dechlorination of cooling water prior to discharge. The Pest Management Regulatory Agency should be contacted with respect to the applicability of the *Pest Control Products Act* and use of chlorine in any non-closed-loop cooling water systems.
26. §4.0, page 28: There is no effects assessment of the environment on the project, as stated later in the document. Section 5.3.4 of the Scoping document states that the EA report is to include effects of the environment on the Project. However, no such assessment is provided in the EA report. The effects of the project on the environment assessment piece should be consistent, in terms of information presented and analysis undertaken as is provided for the VECs, and include all project activities.
27. §4.0, page 28: The EA references a detailed report by Oceans Ltd (2005) provided in Appendix 1. Sections 1 and 2, and Appendices A and B of this Oceans Ltd report, are nearly identical to the wind and wave information presented in Section 4.2, Climate, and Appendices A & B, in LGL (2005a). It would be clearer to refer to LGL (2005a) in the EA report rather than Oceans Ltd (2005), since the wind and wave information in LGL (2005a) has been more widely distributed and reviewed. Response to the EC review comments on the wind and wave climate and its effects on the project, are contained in LGL (2005a), should be incorporated into this document.

The EA did not include any mention of long-term or decadal climate variation or change as it relates to the marine climate in this area, even though this project includes a production program scheduled out to 2020. Most climate studies to date have not yet definitely shown an increasing trend in winds and waves over the Grand Banks or the Scotian Shelf. In fact, some studies have shown a flat or slightly decreasing trend. However, projections from coupled atmosphere-ocean climate models show that an increasing trend is expected in the future. While the effects of long-term climate change may or may not impact the area by that date, the time period is long enough to include variations due to inter-annual or decadal variability. It is recommended that current atmospheric circulation patterns, such as the North Atlantic Oscillation or the Pacific-North America pattern, how they vary over a decadal scale, and how they relate to marine climate over the Grand Banks, be discussed.

28. §4.0, page 28: There is no discussion of the iceberg scour environment, seabed sediments, or the character of the sediments that will be dredged.
29. §4.0, page 28: Physical Environment - In general, the material as it relates to the physical environment is acceptable. However, the ocean current models commonly used for spill trajectory tracking in the NL Region are inadequate. In this report, the International Ice Patrol map of mean currents is used; but these do not contain any fluctuations about the mean and miss much of the horizontal and temporal variability present in real currents. At some point, a future trajectory exercise should be conducted with a modern model that simulates the real ocean more closely.

30. §4.2.3, page 31: This section lists the databases used to derive the marine climate statistics in recent assessments of the Project Area. In addition to the AES40 hindcast database, it lists the marine weather and sea state observations by ships and platforms archived by ICOADS; marine weather observations from Husky programs on the Grand Banks during the 1980s and 1990s; and wind observations, waverider buoy data, and ocean current data, from a number of drilling programs on the Grand Banks from 1980-1989. It does not appear that any of the databases of observations or measurements were used in the derivation of the wind and wave climate, despite what is suggested in this section. The EA report itself contains almost no specific information on climatological wind and wave statistics for the area. Instead it refers to Oceans Ltd. (2005), contained in the Appendix. The wind and wave information in Oceans Ltd. (2005) is based entirely on the AES40 dataset of hindcast values.

The assessment of the physical environment would be much enhanced by the analysis of the observations mentioned in this section. ICOADS observations are available directly from the ICOADS website, which allows downloading of subsets of data defined by specific areas. Waverider data are available directly from the MEDS website.

The wind sources listed in this section come from marine reports, which include a 10-minute mean wind. However, aviation observations include a 2-minute mean wind, which is of more use for design (platform selection) and operational considerations. Aviation reports and other instrument measurements, including waverider data, would be available from industry archives. Specifically, the Hibernia platform has been in place and transmitting 3-hourly marine reports, since November 1997. The Henry Goodrich and the GSF Grand Banks semi-submersible platforms have been operating in the area for the past several years, and have sent marine reports on a 3-hourly basis. As mentioned in this section, a waverider has usually been located near a drilling platform. The Terra Nova FPSO has been operating in the area since January 2002 and the Sea Rose FPSO has been on site at White Rose since August 2005. While these FPSOs have not sent marine reports, they would have aviation observation programs in support of helicopter operations to each ship, and this data would be available in industry archives.

It is recommended that recent aviation and marine observations of winds and waves from platforms and waverider buoys operating in the area in recent years also be analyzed and results presented and compared to the AES40 hindcast results. This would be of particular value as there have been a number of very extreme storms in the last 10 years, and given that the AES40 hindcast wind is a somewhat different quantity than what is observed by platforms.

31. §4.2.4, page 33: This section requires elaboration. Even if the physical environment is described in a separate report, pertinent details should be summarized in the EA report. As it stands, the EA does not provide specific values, other than that maximum monthly wind speeds exceed 30 m/s in February. This value represents the maximum one-hour mean wind speed at 10 m, but this was not stated. The kind of wind speed should be defined in terms of averaging period and equivalent anemometer height as it makes a significant difference, as noted below.

The anemometer height affects the mean wind speed value, and higher peak values are expected for shorter averaging periods. The AES40 hindcast winds represent a one-hour mean wind speed. Peak values from one-hour mean winds will be lower than peak values from the 10-minute means in marine reports and lower than the peak values from the one

to two-minute means used for aviation. Anemometers are generally well above 10 m, around 80 m for drilling platforms, as indicated in Section 4.2.3, or as high as 139 m at Hibernia. The 2005 reports gives 10-minute and 1-minute mean equivalents to the 1-hour mean, for the extremal analysis winds. These are determined by increasing the one-hour maximum values by 1.06 and 1.22, respectively. A maximum one-hour mean wind speed of 30 m/s (58 kt) would correspond to a maximum 10-minute mean wind of (31.8 m/s) 61 kt, for example. References to the adjustment factors should be given. There are also methods to adjust the winds for height. The accuracy of these statistical or empirical adjustment methods is uncertain and dependent on actual conditions in the marine surface layer. The 2005 Oceans Ltd. report indicates that the wind speeds are based on gridded data at 6-hourly intervals, and may be slightly underestimated, and that it is highly probable that some of the peaks in the wind speed have been missed by the hindcasting methodology.

It would be prudent to analyze winds that have been measured for marine reports and for aviation, by platforms located near the area of interest for more than 2 decades, in some cases. These results, including description of peak events, should be presented.

There does not appear to be any consideration of extreme winds and waves that might be experienced during passage of a tropical, transitioning, or post-tropical cyclone during the summer and fall. This analysis should be conducted or previous studies applicable to this area should be referenced and summarized. Although the passage of tropical, transitioning, or post-tropical cyclones over this area is relatively rare, the EA should include some consideration of the possible conditions should one occur.

Description of the climate typically includes descriptions of the means, maximum values, and some indication of the frequency distribution of the field of interest. Wind roses, frequency distribution (percent exceedance) plots, and joint frequency distribution tables of wind speed and direction, on an annual and monthly basis, are provided in Appendix 1 of the EA report. These are useful ways of describing typical climate conditions. However, the wind roses, frequency distribution plots, and joint frequency distribution tables are not usually adequate to describe the top 10 percent or so of the wind speed distribution. The extreme values occur too infrequently to appear on diagrams or in tables giving percent frequency of occurrence to the hundredths decimal place. These will not show the most extreme values.

For any additional analyses of wind climate that may be undertaken for this EA, such as for observed data, it is recommended that additional means of showing the frequencies of the more extreme values be explored. For example, this could include box plots showing the 75th, 90th, and 99th percentile values, and peak values, of wind speed, by wind direction.

32. §4.2.4.1, page 33: There is no quantitative information presented in the main body of the EA. The relevant information should either be presented in this section or summarized from the appendix or other sources.

The EA should include an analysis of hourly significant wave height and peak period measurements made by waverider buoys in the area. This should include presentation of means, peak values, and frequency distributions. This may show useful wave information for the local area that cannot be obtained from the AES40.

As recommended for the section on wind, any additional analyses of wave climate that may be undertaken for this EA, such as for measured waves, should explore methods of showing the frequencies of the more extreme values of the wave height and period distributions.

33. §4.4.1, page 36: This section should be retitled as either Wind and Wave Extremal Analysis or Wind and Wave Extreme Value Analysis. The EA only refers to the analysis in LGL (2005a), but does not include a summary. Pertinent results should be summarized. There is no reference to the extremal analysis presented in the appendix (as noted, it is the same as in LGL 2005a).

The appendix gives extremal analysis results for one-hour mean wind speeds, and gives those values adjusted to 10-minute mean and 1-minute mean equivalent extreme values. For 10-minute mean winds, at 10-m, the 1-yr, 10-yr, 25-yr, and 100-yr return period wind speeds are 50kt, 57kt, 60kt, and 64kt, respectively. However, observed wind speeds during extreme storms in recent years have exceeded these values. Examination of storm summaries for the North Atlantic in the Mariners Weather Log, produced by NOAA (US National Oceanic and Atmospheric Administration) shows that the Hibernia platform winds have reached or exceeded 75kt in each of the last 5 autumn/winter seasons, when the anemometer height was 139 m. If an adjustment factor of .77 is used to reduce these winds to 10 m (assuming neutral stability and a logarithmic profile), that corresponds to a wind at 10 m of 58kt. This is more than the AES40 10-yr return period value. A sustained southwest wind of 97kt was measured at the Hibernia platform on 11 February 2003. Reduced by 0.77, this would correspond to a 10 m wind of 75kt. This exceeds the AES40 100-yr return period value. Reports from the Henry Goodrich semi-submersible platform or other platforms, when available, tend to confirm the validity of these extreme values. As indicated in the Mariners Weather Log, these very high wind speeds are also sometimes confirmed by QuikScat satellite-sensed wind speeds.

Summary values from the extreme value analysis of AES40 hindcast data should be given in the body of the EA report and compared to the extreme wind speeds measured by platforms in recent severe storms over the Grand Banks. The wind comparison should include adjustment of values to a standard reference height, using air and sea temperature observations if possible. Peak one-hour mean hindcast wind values should be adjusted to be equivalent to the shorter averaging periods corresponding to observed peak values, using the best methods available.

Standard adjustment methods for wind, to account for height and averaging period, are empirical and/or statistical. Research and analysis of continuous wind measurements obtained and archived by the offshore industry at various heights from various platforms under extreme conditions might result in improved adjustment methods that could be tailored to the conditions and the platforms on the Grand Banks. In addition, analysis of continuously measured winds speeds would allow assessment of the frequency of rapid wind direction changes at high wind speeds, a particular concern for FPSOs (the kind of vessel planned for use in the production phase of this project). This kind of analysis of rapid wind changes is not possible from 3 or 6-hourly values. Both of these types of research would make valuable contributions to improved understanding of the severe climate in the area and its effects on offshore structures.

During the 11 February 2003 storm mentioned above, a waverider in the area measured a significant wave height of 14.66 m. This is close to the AES40 50-yr return period wave

height of 14.5 m. Peak significant wave heights from other recent extreme storms have been measured between 7 and 13 m, which were in the same ball park as the AES40 hindcast values. It is recommended that the EA present peak significant wave heights measured by waverider buoys, and compare them to AES40 hindcast waves, and to the extreme value analysis wave heights.

34. §4.5, page 36: The information on ice and icebergs is a succinct summary of what was used in previous reports on Jeanne-d'Arc Basin. In section 4.5.1, it is stated that sea ice cover occurs for an average of four weeks once every three years. Based on the Canadian Ice Service (CIS) report, "Sea Ice Climatic Atlas East Coast of Canada 1971-2000", there have been occurrences of ice in the area 1-15% of the years from the end of January to the end of April, and 16-33% of the years between the end of February and the end of March.

In section 4.5.2, the first sentence mentions that in the "last ten years" an average of 900 icebergs reached the Grand Banks each year. It should be specified what period is implied by "the last ten years" (not 1997-2006).

35. §4.5.1, page 36: The following sentence requires clarification and/or rewording: "The thickness of most of the sea ice that occurs on the Grand Banks ranges from 30 to 100 cm, based on CIS ice chart data for periods of ice coverage (1985-2001) **that exceeded four weeks duration**".
36. §5.2, Figure 5.1, page 38: The Important Bird Area at Quidi Vidi is Quidi Vidi Lake, not Quidi Vidi Harbour as stated in the document.
37. §5.3, page 37: Although the Ivory Gull is still legally listed as Special Concern, it has been upgraded by COSEWIC to Endangered.
38. §5.3, Table 5.1, page 40": The Fin Whale is COSEWIC-listed as Special Concern and should be included in the table. Please refer to Lawson, 2006, for preliminary information on distribution and abundance and population estimates of fin whales in waters off Newfoundland and Labrador. Also, the scientific name for the Ivory Gull is *Pagophila eburnea*, the `n` should be removed from *eburnean* in the table.
39. §5.5.2.2.3, page 50: The level of detail is not consistent with the rest of the report.
40. §5.5.3, page 50: In terms of depth distribution of the 3 wolffish species, it appears that there might be some confusion between spotted and northern wolffish. Northern wolffish is the deepest residing species, based on Kulka *et al.*, 2004. Otherwise the descriptions are accurate.
41. §5.5.3.2, page 52: "The Northern Cod has been called one of the least productive of the major cod stocks (Brander 1994)". This statement seems to downplay the importance of Northern Cod. Updated information on cod should be used here.
42. §5.5.3.2, page 52: An additional recommended reference is Rose and Kulka, 1999 who showed that just before final collapse, cod hyper-aggregated just north of the project study area, meaning it is possible that it is an area critical for recovery. This important aspect should be noted in this report.

43. §5.5.3.2, page 54: Cod boxes should be illustrated on figures/maps, i.e. *Hawke Channel & Bonavista Corridor*. A map is needed on page 54, or at least make reference to one.
44. §5.5.3.3, page 54: The authors should make note of the Porbeagle Recovery Potential Proceedings (on the CSAS website under publications/ Proceedings/2005). A key point missed with regard to the Grand Banks is that the area, including White Rose is the pupping ground for this species at risk and therefore a very ecologically important area. As well, the Grand Banks was once a major fishing ground for porbeagle. These are important details that should be mentioned.
45. §5.5.3.4, page 55: White sharks are very rare in Canadian waters and sightings are recorded mostly in the Bay of Fundy area. They are extremely rare as far north as the White Rose area. This should be noted.
46. §5.5.3.5 & 5.5.3.6, page 55: Shortfin Mako and blue shark are common in the area and used to be taken in both the porbeagle and the swordfish fishery. Blue is the most common shark species in the world although both have shown decline. Both mako and blue are commonly seen on the banks and even in the bays, a point which should be mentioned.
47. §5.5.3.7, page 55: It should be noted that cusk are at the extreme northern fringe of their range on the southern Grand Bank and would only be itinerant in the White Rose area.
48. §5.6.2, page 58: The Unit Areas should be included on a figure in this section even though they are identified on Figure 5.1.
49. §5.6.3.3, page 74, line 4. Should 2005 be 2006?
50. §5.7, 2nd paragraph, page 87: The first letter of each word should be capitalized when spelling Programme Intégré de Recherches sur les Oiseaux Pélagiques out in full.
51. §5.7, Table 5.8, page 88: Some of the scientific names are missing from the table: Sooty Shearwater – *Puffinus griseus* and Red-necked Phalarope – *Phalaropus lobatus*. It is not clear how the categories Common, Uncommon, Scarce and Rare occurrence are designated. These categories should be quantified.
52. §5.7, Figure 5.33, page 89: Please provide a reference for this figure.
53. §5.7, 1st paragraph, page 90: It is stated that there are increased bird numbers along the continental shelf edge from July to September, however, Figure 5.33 (page 89) does not support this conclusion. There is an increasing pattern of effort from July to September but comparisons between blocks for which there is both summer and winter data, for example, show similar patterns of abundance along the shelf edge.

It should be noted that Baccalieu Island is not only the largest Leach's Storm-Petrel colony in Atlantic Canada (p. 90), but is the largest in the world.
54. §5.7, page 90, 3rd paragraph, line 2: Table 5.10 lists marine mammals not seabirds.
55. §5.7, page 90, 4th paragraph: The last sentence describing what an IBA is should be moved up to follow the first sentence in that paragraph where the term IBA is introduced.

56. §5.7.1.2, page 94: The correct spelling for the title of this section should be Hydrobatidae.
57. §5.7.1.6.1, page 97: The Dovekie breeding area listed as “Nova Zemlya” is spelled incorrectly. The correct spelling is Novaya Zemlya. Other breeding sites that could be added to the list include Severnaya Zemlya and Svalbard.
58. §5.7.1.6.3, page 97, 2nd paragraph, line 6 & last sentence: It states that “Thick-billed Murre is common from October to May” and it also states “Thick-billed Murre is uncommon in the Study Area between October and April”.
59. §5.7.2.2, page 99: Storm-Petrels also feed on fish (myctophids, cod, rockfish), squid and octopus.
60. §5.7.3.1, page 100, 1st paragraph, line 4: It states that “More information on the Ivory Gull can be found in the Species at Risk section”. Information on the Ivory Gull is not presented in the SAR section. However, the SAR section should be updated to include a discussion of all SAR (Schedule 1 and COSEWIC listed, as per the Scoping Document).
61. §5.8, page 100: The sentence “Husky’s 3D seismic program...observation along” is not finished.
62. §5.8, page 101, Table 5.10: The last column should be split into two columns (COSEWIC and SARA).
63. §6.2, page 115, 1st paragraph: There is no “Appendix 2” in the document.
64. §6.5.2.1, page 119: The “White Rose Operational Area” is not identified on Figure 1.1.
65. §6.6.5, page 123: The Scoping Document states that “Aboriginal Fisheries” should be considered in the cumulative effects assessment.
66. §6.8, page 125: This very short section states that wind, ice, waves, and currents, particularly extreme events, that have effects on the Project, are described in detail in Section 4. This is an incomplete statement, since there is very little information in Section 4 itself. The details are in the Appendix. As it stands, Section 4 of the EA does not even include a summary of specific significant values likely to affect the project.

There is no description of how the environment could impact on the project, and there is no justification for the statement that effects of the environment on the Project are expected to be not significant. EC has prepared a short document entitled, “Guidance on the Consideration of the Effects of the Environment on a Drilling Project”, which could provide some guidance in developing the appropriate justification for EA conclusions.

In the EA, the assessment of effects of the environment on the project should include a very brief description of threshold and extreme values likely to impact operations, both in the drilling phase and in the production phase. This would allow assessment of potential downtime. Environmental conditions would have more impact on the production phase, since this would include the wind and wave sensitive offloading from the FPSO to shuttle tankers. Also, FPSOs are more sensitive to severe wind and wave conditions than semi-submersibles, so different thresholds would be required.

The assessment of this factor should also include description of weather and wave impacts and methods to mitigate against impacts, under various worst case scenarios for the different platforms and vessels to be used for the project. For example, in the rare event of a blow-out, severe winter weather could hamper or delay efforts to cap a well. Weather at the thresholds of normal operating conditions could increase the risk of a collision between the shuttle tanker and the FPSO. Severe sea states could impact on the ability of the platform to disconnect safely from the well.

67. §7.0 – For fish habitat and fish tables that summarize the environmental effects, the tables indicate negative effects that occur at a continuous frequency. More clarity is needed when you identify these effects as reversible. What is the time frame for disturbed habitat restoration and for negatively affected fish species to rehabilitate?
68. In the discussion of environmental effects with respect to production activities, the effects associated with tie-back to the FPSO, and mitigations to reduce or eliminate effects, are not included. The EA report should include a discussion of environmental effects for all phases of the project, including tie-back/hook-up to the existing FPSO.
69. §7.0, Table 7.1, page 127: This table does not include several activities which could have important effects, including well spudding and vertical profiling (during which airgun arrays or a single airgun would be used), and well severance during decommissioning (during which explosive charges might be used). These noise-producing activities should be included in the table especially as they are discussed later in Section 7.5
70. Table 7.1. Footnote ‘b’ states (i.e., concurrent drill of some wells). Is there a possibility that more than one drilling unit will be operating at the same time? If concurrent drilling is planned, then it must be addressed in the EA report, particularly in regards to potential cumulative effects.
71. §7.0, Table 7.1, page 128: The first subheading “Glory Hole Excavation and TGB Installation” should be “Subsea Production Equipment Installation”?
72. §7.4, page 131, 1st paragraph: Change the reference list from Payne, et al., 2000 to Payne *et al.*, 2001a, Payne *et al.*, 2001b, Andrews *et al.*, 2004. (See attached references).
73. §7.4, page 131, 4th paragraph, last sentence: This conclusion is also supported by the studies carried out on fish health and fish habitat over a three year period at the Terra Nova site where 6 wells were drilled using a combination of water-based and synthetic based muds (Mathieu *et al.*, 2005; Deblois *et al.*, 2005).
74. §7.4.2, page 133: Synthetic Based Muds supposedly “biodegrade relatively rapidly in certain conditions.” Expand on this, outline ideal conditions.
75. §7.5, Table 7.4, page 135: Supply Boats sound levels are not included for normal operation. This only shows the changes from the extra use of propeller nozzles and bow thrusters. There is no level presented to compare with other vessels and installations.
76. §7.5, Table 7.4, page 135: The table does not include data on the use of vessels with large dynamic positioning thrusters (e.g., larger thrusters than on a typical supply vessel). If data are available on these sources, then they should be included here as applicable.

77. §7.6.1.5.1, last paragraph, last line, page 144: *“In fact, many project effects on benthic communities observed at other development areas have not been observed at White Rose”*. Please specify what development areas are being referred to – e.g. Offshore Newfoundland and Labrador, or development elsewhere. Also, please provide further explanation as to what effects are being referred to.
78. §7.6.1.5.5, page 145: The final paragraph downplays cumulative effects by comparing the affected area to the total area of the Grand Banks. This is not necessary to make cumulative effects deem/seem *not significant*.
79. §7.6.1.7, page 150: The project will result in the release of greenhouse gas (GHG) emissions, including emissions from blowdowns, maintenance activities, leaks, and accidents and malfunctions. The current federal government has committed to developing a plan to reduce GHGs and ensuring clean air, land, water and energy for Canadians.

Several GHGs contribute to climate change. The main anthropogenic contributor is carbon dioxide (CO₂) and the second major contributor is methane (CH₄). Methane is also the primary component of natural gas. Although annual anthropogenic emissions of methane are less than (CO₂) methane is a more effective heat-trapping gas. Each kilogram of methane warms the earth about 23 times more than the same mass of carbon dioxide.

Minimizing GHG releases is important from an environmental and economic perspective. It is generally easier to reduce emissions by implementing best practice options at the project planning and design stage rather than after project construction. Estimates of the quantity and composition of GHG emissions can provide a basis for comparing the project with industry profiles, evaluating reduction opportunities and verifying the effectiveness of the measures implemented.

GHGs are a cumulative, global issue and reducing GHG emissions from all sources, both large and small, should be considered. Environment Canada continues to encourage consideration of best practices in an effort to reduce GHGs.

The proponent is encouraged to take the following steps in planning the project:

- estimate GHG emissions from all project phases (e.g., installation, commissioning, operation, maintenance) and sources; and
 - consider and implement best practices available for GHG emissions reduction and verify the effectiveness of these efforts.
80. §7.6.1.7, page 150: For greater clarity and certainty, the proponent should include the following considerations in an assessment of impacts to air quality:
- emission estimates for SO₂, NO_x, H₂S, PM, PM_{2.5}, PM₁₀, and VOCs according to source;
 - potential local effects and contributions to atmospheric loadings as they pertain to ambient air quality objectives in the immediate area; and
 - a demonstration of how every reasonable effort to adopt best available technologies and best management practices is being taken so as to minimize emissions of air pollutants.

Dispersion modeling is the appropriate method for estimating local air pollutant concentrations as a result of the project.

81. Table 7.9, page 154. Small transfer spills have a frequency of 5 (more than 200), yet this is ranked negligible. BOP fluid is released at a frequency of 6 (continuous), and is also *negligible*. Why? Some clarification regarding these releases, in terms of rationale for their occurrence should be provided. Can mitigations be implemented to reduce their frequency? Please clarify.
82. §7.6.2.1, page 157. What scientific evidence, or reference is available to support the statement that safety zones are a 'safe haven for fish' and therefore be a 'positive effect'?
83. §7.6.2.4, page 158: Small spills occur quite frequently in flaring operations. According to Figure 7.9, the occurrence is over 200 times a year. Please explain how this is considered *negligible*.
84. §7.6.2.6.9, page 163. It is implied that any produced water encountered during production operations is sent to the flare. This is incorrect and should be restated.
85. §7.6.2.11, page 165: This section refers back to previous tables, illustrating that ROV work has a frequency of less than 11 times a year. Does this number reflect the frequency of actual maintenance from past experience? How often are ROV's used for observation purposes?
86. §7.6.3, page 165: The report appears to provide an accurate assessment of the fisheries and harvesting activities in the project area. However, there is no mention of potential effects on species under moratorium (Cod, American Plaice, etc.) and how the proposed activities might impact on recovery efforts for these species.
87. §7.6.4.3, page 181: In the second paragraph, Storm-petrels should read Storm-Petrels.
88. §7.6.4.3, page 181: The report states that birds in one area would not be attracted to other areas where offshore operations would be present. The proponent should indicate if there is any evidence to support the claim that birds present in one area are not attracted to others. The draft EA also indicates that the extent of the effects of light on birds is 1-10km². The rationale for using this range should be explained, as it is likely that flares and lights would be visible at distances greater than 10km.
89. §7.6.4.4, page 183, 4th paragraph: The effect of flaring during the drilling phase is rated but what about the effect of flaring during the production phase?
90. §7.6.4.14, page 188: The Canadian Wildlife Service (CWS) of EC has developed a pelagic seabird monitoring protocol that is recommended for all offshore oil and gas projects. One version of the protocol is for individuals who have experience conducting seabird surveys. A guide sheet to the pelagic seabirds of Atlantic Canada is available through the CWS office in Mount Pearl.

The protocols are a work in progress and the CWS would appreciate feedback from the observers using them in the field. A report of the seabird monitoring program, together with any recommended changes, should be submitted to CWS upon completion.

91. §7.6.4.14, page 188, 2nd paragraph, line 2: “Husky has” should be changed to “Husky will”.
92. page 189. Will a seabird and marine mammal observation program be undertaken?
93. §7.6.5 & 7.6.6, pages 189 & 203: In light of a vessel-strike incident associated with offshore oil production in 2004, DFO would like to reiterate the necessity to estimate potential impacts of ship strikes on marine mammals and sea turtles. There are computer models for these impacts which are freely-available and which would allow some assessment of the risk caused by the increased number of larger vessels moving through the study area.

Geohazard and VSP surveys will collect high resolution seismic, side scan sonar, sub bottom profiler, and multi-beam bathymetric data as needed during well operation. This variety of sound sources could output sound energy at a variety of frequencies and amplitude such that more than one species of marine organism might be impacted. For instance, higher frequency sources would be a concern for the beaked whales, whereas airgun sounds would be more of a concern for baleen whales. Each type of sound source should be considered separately. Additionally, trailing suction dredge vessel and operations will produce significant and long-duration underwater noise due to propeller cavitation and thruster operations, plus propagated dredge pump noise and material passage up and down pipes. These sound sources should be considered and reflected in the document.

94. §7.6.5.3, Table 7.17, page 190: Why is there a question mark in this table for frequency of BOP Fluid? In Figure 7.9, the frequency shows: 6-continuous.
95. §7.6.5.8, page 197 (and relevant sections following): DFO would like to emphasize previously expressed concerns about the potential for displacement and temporary hearing sensitivity changes possible from activities such as seismic profiling, large-scale DSP thrusters, and well severance explosives. In all cases the DFO recommends that standard mitigation measures be adopted, and that these measures account for all marine mammal species and sea turtles.
96. §7.6.5.8.5, page 201, 2nd paragraph, line 3: A reference should be provided for the statement “It is highly unlikely that there will be overflights of seals that are pupping or moulting **as few, if any, seals will be hauled out (either on ice or land) along the flight route to the Project Area during these critical times or at other times of the year**”.
97. §7.6.5.8.6, paragraph 2, page 202: There is a recent paper that studies construction-related noise on ringed seal (responses to helicopter sound, Blackwell *et al.*, 2004) that should be referenced and included.
98. §7.6.7 – the discussion of environmental effects on SAR is insufficient. The Scoping Document, section 5.3.11, clearly indicates that the EA report provide an assessment of effects, including cumulative effects. This has not been undertaken in this EA Report.
99. §7.6.7, page 204: The Ivory Gull is listed as a species of special concern on Schedule 1 of SARA. However, the Committee on the Status of Endangered Wildlife in Canada (COSEWIC) has recently assessed the Ivory Gull as endangered. In the event that the Ivory Gull is uplisted to endangered on Schedule 1 of SARA during construction or

operation of the proposed new drill center, the applicable SARA requirements and regulations must be considered.

100. §8.0. The discussion of accidental events, including dispersion modelling, probability assessments, and impact assessment are primarily focused on drilling activities (blowouts, small spill from rigs, fuel transfer operations, etc.). This section must include all project phases and activities (construction, tie-back/hook-up to FPSO, drilling, production and abandonment) in its discussion and in the assessment of effects.
101. The 2004 spill at Terra Nova was not included. Why?
102. The CWS report regarding the estimated bird mortality from the Terra Nova Spill was not referenced. Why?
103. §8.3.4, page 232: It is stated that a "detailed discussion of pack ice distribution" is found in Appendix 1. No reference to ice can be found in Appendix 1.
104. Effects assessment sections – statements such as "...it is predicted that these will be no significant effects...from an accidental release...at exploration drilling sites." This is not an effects assessment of accidental events from exploratory drilling operations. It is supposed to be an assessment of effects from all project activities (see comment 96). Section 8 requires revisions.
105. §8.7.2, page 236: Should this be Section 8.7.1?
106. §8.7.3.2, paragraph 3, 3rd sentence, page 250: The effects of polycyclic aromatic hydrocarbons on fish have been reviewed more recently (Payne *et al.*, 2003).
107. §8.7.4, page 251: The section mentions mitigation of an oil spill only in the context of financial compensation for fishers. This is most certainly a short-term solution and does not include the potential harm of a major accidental event to the future fishery in the area. Please revisit and revise accordingly.
108. §8.7.5, page 253: Even small spills of oil can have very serious effects on migratory birds. Therefore, every effort should be taken to ensure that no oil spills occur in the area. The proponent should ensure that all precautions are taken by the contractors to prevent fuel leaks from equipment, and that a contingency plan in case of oil spills is prepared. Furthermore, the proponent should ensure that contractors are aware that *Section 5.1 of the Migratory Birds Convention Act* prohibits persons from depositing harmful substances in waters or areas frequented by migratory birds.
109. §8.7.5.4, page 255: In the third paragraph, it should be noted that adult alcids are also flightless during moult.
110. §8.7.5.7, page 258, 5th paragraph: Do you mean the "New Drill Centre Construction and Operations Program" instead of the "delineation/exploratory drilling program"?
111. §8.7.6.1.5, page 265, 1st paragraph after Table 8.29, last line: Should it be "exploratory drilling sites"?

112. §8.7.6.1.5, Table 8.31, page 267: Regardless of the intended interpretation of this table (i.e. the likelihood of occurrence of an event factored into the significance rating), the lack of data and uncertainty presented in the accompanying text does little to justify a rating of 3 (high level of confidence) to a significance rating of NS (Not Significant). This is particularly relevant for potential impacts to species at risk. A discussion regarding how this level of confidence is derived is warranted.
113. §8.7.8, page 271: The level of detail is not consistent with the rest of the report.
114. §8.7.8, page 271: Further to a point previously mentioned, the conclusion of the effects of an accidental event on species at risk as *Not Significant*, (even in keeping within the definition of high magnitude, greater than one year and over 100 km²), given with a high level of confidence, is questionable considering the sensitivity to harm for some of these species. As well, it is also debatable whether the definition of *Significant Effect*, as applied throughout the report is even appropriate for the assessment of potential impacts on species at risk. DFO recommends a more thorough discussion of the potential for harm due to accidental events on species at risk.
115. §8.7.8, page 272: The document states that any effects of an accidental spill event on the Ivory Gull may be significant, but will be reversible over time at the population level. Evidence or a reference for this statement should be provided.
116. §9.1, page 273: SARA is not discussed.
117. §9.2, page 273: Cumulative effects estimations cannot be expressed with such certainty as we know very little about effects of industry on marine mammal distribution and abundance – or even basic information on marine mammal distribution and abundance itself. Given these two sources of uncertainty, DFO would like to see cooperation, in the future, on large-scale baseline surveys to assess abundance and distribution of marine megafauna over larger areas of the region.
118. §S 9. This section indicates the proponent's commitment to conduct a spill-specific EEM program to test specific hypothesis as part of the oil spill response plan (OSRP). However, the latest version of the OSRP on file at EC (dated 2004 05 20) contains the following elements:
- the use of aerial surveys (although these were found to be inadequate based on responses to recent actual spill events); and
 - activation of the full EEM sampling program for spills >20 m³ (the annex, which describes that program, contains only a note that the emergency EEM is to be completed before production)
- Therefore, if there is a more recent version of the OSRP, please provide a copy including the EEM annex for review and any revisions in light of recent experience.
119. Appendix 1, TOC: The appendices are not listed for this document.

Recommended Additional References

Andrews, C., French, B., Fancey, L., Guiney, J. and Payne, J.F. 2004. Chronic toxicity study on snowcrab exposed to drilling fluid being used on the Grand Banks (abstract) Proc. 31st Annual Aquatic Toxicity Workshop: October 24-27, 2004, Charlottetown, Prince Edward Island. Can. Tech. Rep. Fish. Aquat. Sci.: 2562. 138 p.

Blackwell, S.B., J.W. Lawson, and M.T. Williams. 2004. Tolerance by ringed seals (*Phoca hispida*) to impact pipe-driving and construction sounds at an oil production island. Journal of the Acoustical Society of America, 115 (5, Pt. 1): 2346-2357.

Deblois, E.M., Leeder, C., Penney, K.C., Murdoch, M., Paine, M.D., Power, F., and Williams, U.P. 2005. Terra Nova environmental effects monitoring program: from environmental impact statement onward. In: Offshore Oil and Gas Environmental Effects Monitoring: Approaches and Technologies. Edited by S.L. Armsworthy, P.J. Cranford and K. Lee. Batelle Press, Columbus, Ohio. Pp 475-491.

Lawson, J.W. and I. McQuinn. 2004. Review of the potential hydrophysical-related issues in Canada, risks to marine mammals, and monitoring and mitigation strategies for seismic activities. DFO Canadian Science Advisory Secretariat Research Document. Ottawa, ON, Department of Fisheries and Oceans: 53p + iv. (available on the CSAS web site).

Lawson, J.W. 2006. Preliminary information on distribution and abundance of fin whales (*Balaenoptera physalus*) in Newfoundland and Labrador, Canada. SC/14/FW/21-SC/M06/FW21. Joint NAMMCO/IWC Scientific Workshop On The Catch History, Stock Structure And Abundance Of North Atlantic Fin Whales. Reykjavik, Iceland, 23-26 March, 2006. 12 p.

Mathieu, A., Melvin, W., French, B., Dawe, M., Deblois, E.M., Power, F., Williams, U.P. 2005. Health effects indicators in American plaice (*Hippoglossoides platessoides*) from the Terra Nova development site, Grand Banks, NL, Canada. In: Offshore Oil and Gas Environmental Effects Monitoring: Approaches and Technologies. Edited by S.L. Armsworthy, P.J. Cranford and K. Lee. Batelle Press, Columbus, Ohio. Pp 297-317.

Payne, J.F., Mathieu, A. and Collier, T.K. 2003. Ecotoxicological studies focusing on marine and freshwater fish. In: PAHs: an Ecotoxicological Perspective. Edited by P.E.T. Douben, John Wiley and Sons, London. Pp 191-224.

Payne, J.F., Andrews, C., Whiteway, S. and Lee, K. 2001a. Definition of sediment toxicity zones around oil development sites: dose response relationships for the monitoring surrogates Microtox® and amphipods, exposed to Hibernia source cuttings containing a synthetic base oil. Can. Man. Rep. Fish. Aquat. Sci. No. 2577, 10p +vi.

Payne, J.F., Fancey, L., Andrews, C., Meade, J., Power, F., Lee, K., Veinott, G. and Cook, A. 2001b. Laboratory exposures of invertebrate and vertebrate species to concentrations of IA-35 (Petro-Canada) drill mud fluid, production water and Hibernia drill mud cuttings. Can. Man. Rep. Fish. Aquat. Sci. No. 2560, 27p +iv.

Rose, G. A. and D. W. Kulka. 1999. Hyper-aggregation of fish and fisheries: how CPUE increased as the northern cod declined. Can. J. Fish. Aquat. Sci. 56p.