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January 17, 2011

File No.: 4572-10

Ms. Elizabeth Young
Canada Newfoundland Offshore Petroleum Board
Fifth Floor, TD Place
140 Water Street
St. John's, NF A1C 6H6

Dear Ms. Young:

**RE: Hebron Development Project – Comprehensive Study Report EAS 2009-056H
Information Response Part 1 Comments**

As requested in your December 2, 2010 letter, Environment Canada (EC) has reviewed the Comprehensive Study Report (CSR) Response to Review Comments, Part 1 for the Hebron Project.

It is understood that the Part 1 response is not intended to address comments on chapter 14. Please ensure that as stated in the introduction to the Information Response, EC comments 48 and 55 will be addressed in Part 2. I would like to draw your attention to EC Comment 46 regarding the need for effects monitoring on marine birds. In EC's view, this is a necessary follow-up requirement in order to verify predictions in the CSR.

If you have any questions, do not hesitate to contact me at 902-426-3593 or Glenn Troke (709-772-4087, Glenn.Troke@ec.gc.ca) who is coordinating the department's participation in the comprehensive study.

Yours truly,

I.R. Geoffrey Mercer
Regional Director
Environmental Protection Operations Directorate Atlantic

Attachment

cc G. Troke
J. Corkum

Canada

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**Hebron Development Project – Comprehensive Study Report Information
Response Part 1 Comments**

Comment 6: EC 01

Environment Canada is satisfied with this response.

Comment 11: EC 02

The Proponent has indicated that they are still too early in the design stage to provide quantitative detail regarding process system venting and flare design. EC is satisfied with this response at this stage; however, we would like to see these items identified for further review when the detailed design is available.

Comment 15: EC 03

The proponent has indicated that the precise location of an ocean disposal site (or sites) is not known at present and this is reasonable given the nature of the project. The CSR has satisfactory descriptions of the general areas in which these sites might be located and has provided discussions of the expected environmental effects and mitigations.

If an application is made for a disposal at sea permit under these circumstances, the information in the CSR, together with details provided in the permit application, may prove sufficient to satisfy the requirements of an assessment which is triggered by the permit application. The proponent's response to Comment 15 is satisfactory.

Comment 17: EC 04

Environment Canada is satisfied with this response.

Comment 19: EC 05

Environment Canada is satisfied with this response.

Comment 20: EC 06

Environment Canada is satisfied with this response.

Comment 21: EC 07

Environment Canada is satisfied with this response.

Comment 22: EC 08

Environment Canada is satisfied with this response.

Comment 23: EC 09

Environment Canada is satisfied with this response.

Comment 24: EC 10

See Appendix A

Comment 25: EC 11

Environment Canada is satisfied with this response.

Comment 26: EC 12

Environment Canada is satisfied with this response.

Comment 27: EC 13

Environment Canada is satisfied with this response.

Comment 28: EC 14

EC-14-a and b. The inclusion of additional information and revised/updated wave statistics as requested is appreciated. ICOADS was used as the source of platform wind data. **REQUEST:** Please explain why the presumably more complete archives of the operator or C-NLOPB (please describe) are not used for the analysis of platform winds, for the more long-term platforms. It should be noted that use of the ICOADS trimming flags, both the standard (as indicated in the Oceans Ltd report) and even the enhanced, will exclude a significant percentage of valid extreme wind observations measured by platforms. This flagged data should be considered in future analyses. Note that in the two tables in this response for wave data from Hibernia, it may not be appropriate to combine the 1988-1989 wave radar data with the earlier wave buoy data as the two different observation systems give somewhat different wave distributions. This should be considered for future analyses.

28-EC-14-c. **REQUEST:** Please include a full reference for Berek and Wang 2009, given the important result that increases the extreme wave criteria. Also please elaborate on the source of the wave data that was used to calibrate the MSC50 significant wave heights.

28-EC-14-d. The response asked about White Rose data post August 2007 – however the original comment did not intend to imply data existed beyond that date but that within the 2003-2007 period there were additional observations. These seem to have been accessed in the revised tables given in this response. The response also says that other Hibernia platform data do not appear to be online. While the MIROS wave radar data do not seem to be archived at ISDM, the wave radar is apparently still in use. It was presumably the source of the wave data included in the ICOADS archive for the Hibernia GBS, with results given in the response to section f. **REQUEST:** Please clarify the source of the later wave data in the MANMAR reports from Hibernia archived in ICOADS, and explain the reason that operator or C-NLOPB archives are not accessed for the platform wave data, when it is not available in the ISDM archives.

28-EC-14-f. The response indicated that data from buoy 44153 when it was deployed near Hibernia, winter 1997/1998, was not used because much of the wave data are flagged as erroneous. This flagging was because of a wave processing error in the onboard wave processor which affected the band-averaged spectral data from which ISDM calculates significant wave height (archived as VCAR), but the error did not affect the buoy-reported significant wave height, archived in ISDM as VWH\$. The VWH\$ values are useable and may be helpful for any further analysis undertaken for the area.

Comment 35: EC 15

Environment Canada is satisfied with this response.

Comment 36: EC 16

Environment Canada is satisfied with this response.

Comment 37: EC 17

Environment Canada is satisfied with this response.

Comment 38: EC 18

Environment Canada is satisfied with this response.

Comment 46: EC 22

Environment Canada is satisfied with this response.

Comment 47: EC 25

Environment Canada is satisfied with this response.

Comment 48: EC 23

Environment Canada is satisfied with this response.

Comment 49: EC 19

Environment Canada is satisfied with this response.

Comment 50: EC 26

Environment Canada is satisfied with this response.

Comment 51: EC 27

Environment Canada is satisfied with this response.

Comment 55: EC 24

Environment Canada is satisfied with this response.

Comment 57: EC 28

Environment Canada is satisfied with this response.

Comment 58: EC 31

Environment Canada is satisfied with this response.

Comment 59: EC 29

Environment Canada is satisfied with this response.

Comment 60: EC 20

Environment Canada is satisfied with this response.

Comment 62: EC 21

Environment Canada is satisfied with this response.

Comment 61: EC 30

EC is looking for information related to emissions from upset scenarios of a more catastrophic nature (i.e. major blow out that might burn for some days)

Comment 63: EC 32

Environment Canada is satisfied with this response.

Comment 68: EC 34

Environment Canada is satisfied with this response.

Comment 79: EC 36

Environment Canada is satisfied with this response.

Comment 81: EC 35

Environment Canada is satisfied with this response.

Comment 82: EC 37

The response should be clarified as follows: "SBM cutting reinjection is not technically feasible for MODU drilling and SBM cuttings will be discharged overboard after treatment in accordance with the OWTG. "

Comment 95: EC 38

CWS is satisfied with this response.

Comment 96: EC 39

CWS is satisfied with this response.

Comment 98: EC 40

CWS is satisfied with this response.

Comment 99: EC 41

CWS is satisfied with this response.

Comment 101: EC 42

CWS is satisfied with this response.

Comment 104: EC 43

CWS is satisfied with this response.

Comment 115: EC 45

CWS is satisfied with this response.

Comment 119: EC 47

A review of the avian toxicology literature cited below demonstrates that the CSR statement "**It appears that direct, long-term sublethal toxic effects on marine birds are unlikely**" (made in section 9.5.4.3) is not scientifically accurate or defensible. The citations provided in that paragraph of the CSR are out-of-date. The entire paragraph should be re-written to reflect the literature below, or removed entirely.

Alonso-Alvarez, C., Munilla, I., López -Alonso, M., Velando, A., 2007. Sublethal toxicity of the Prestige oil spill on yellow-legged gulls. *Environment International* 33, 773-781.

Balseiro, A., Espí, A., Márquez, I., Pérez, V., Ferreras, M.C., García Marín, J.F., Prieto, J.M., 2005. Pathological features in marine birds affected by the Prestige's oil spill in the north of Spain. *Journal of Wildlife Diseases* 41, 371-378.

Bernanke, J., Köhler, H.-R. 2009. The impact of environmental chemicals on wildlife vertebrates. *Reviews of Environmental Contamination and Toxicology* 198: 1-47.

Briggs, K.T., Gershwin, M.E., Anderson, D.W. 1997. Consequences of petrochemical ingestion and stress on the immune system of seabirds. *ICES Journal of Marine Science* 54 (4) : 718-725.

Briggs, K.T., Yoshida, S.H., Gershwin, M.E. 1996. The influence of petrochemicals and stress on the immune system of seabirds. *Regulatory Toxicology and Pharmacology* 23 (2): 145-155.

Carls, M.G., Heintz, R., Moles, A., Rice, S.D., Short, J.W. 2005. Long-term biological damage: What is known, and how should that influence decisions on response, assessment, and restoration? 2005 International Oil Spill Conference, 4389-4393.

Esler, D., Trust, K.A., Ballachey, B.E., Iverson, S.A., Lewis, T.L., Rizzolo, D.J., Mulcahy, D.M., Miles, A.K., Woodin, B.B.R., Stegeman, C.J.J., Henderson, J.D., Wilson, B.W., 2010. Cytochrome p4501a biomarker indication of oil exposure in harlequin ducks up to 20 years after the Exxon valdez oil spill. *Environmental Toxicology and Chemistry* 29, 1138-1145.

Gentes, M.L., McNabb, A., Waldner, C., Smits, J.E.G., 2007. Increased thyroid hormone levels in tree swallows (*Tachycineta bicolor*) on reclaimed wetlands of the Athabasca oil sands. *Archives of Environmental Contamination and Toxicology* 53, 287-292.

Giese, M., Goldsworthy, S.D., Gales, R., Brothers, N., Hamill, J., 2000. Effects of the Iron baron oil spill on little penguins (*Eudyptula minor*). III. Breeding success of rehabilitated oiled birds. *Wildlife Research* 27, 583-591.

Holmes, W.N., Cavanaugh, K.P. 1990. Some evidence for an effect of ingested petroleum on the fertility of the mallard drake (*Anas platyrhynchos*). *Arch. Environ. Contam. Toxicol.* 19 (6): 898-901.

Iverson, S.A., Esler, D., 2010. Harlequin Duck population injury and recovery dynamics following the 1989 Exxon Valdez oil spill. *Ecological Applications* 20, 1993-2006.

Jane Harms, N., Fairhurst, G.D., Bortolotti, G.R., Smits, J., 2010. Variation in immune function, body condition, and feather corticosterone in nestling Tree Swallows (*Tachycineta bicolor*) on reclaimed wetlands in the Athabasca oil sands, Alberta, Canada. *Environmental Pollution* 158, 841-848.

Jessup, D.A., Leighton, F.A., 1996. Oil pollution and petroleum toxicity to wildlife. In: Fairbrother, A., Locke, L.N., Hoff, G.L. (eds.) *Noninfectious diseases of wildlife*, 2nd ed., Iowa State University Press, Ames, Iowa. pp. 141-156.

Kamata, R., Takahashi, S., Shimizu, A., Morita, M., Shiraishi, F. 2006. In ovo exposure quail assay for risk assessment of endocrine disrupting chemicals. *Archives of Toxicology* 80, 857-867.

Leighton, F.A. 1993. The toxicity of petroleum oils to birds. *Environmental Review* 1 (2): 92-103.

Leighton, F.A. 1986. Clinical, gross, and histological findings in herring gulls and Atlantic puffins that ingested Prudhoe Bay crude oil. *Vet. Pathol.* 23 (3): 254-263.

Mearns, A.J., Reish, D.J., Oshida, P.S., Buchman, M., Ginn, T., Donnelly, R., 2009. Effects of pollution on marine organisms. *Water Environment Research* 81, 2070-2125.

Munilla, I., Velando, A., 2010. Oiling of live gulls as a tool to monitor acute oil spill effects on seabirds. *Ibis* 152, 405-409.

Newman, S.H., Anderson, D.W., Ziccardi, M.H., Trupkiewicz, J.G., Tseng, F.S., Christopher, M.M., Zinkl, J.G. 2000. An experimental soft-release of oil-spill rehabilitated American coots (*Fulica americana*): II. Effects on health and blood parameters. *Environ. Pollut.* 107 (3): 295-304.

Oropesa, A.L., Pérez -López, M., Hernández, D., García, J.P., Fidalgo, L.E., López -Beceiro, A., Soler, F. 2007. Acetylcholinesterase activity in seabirds affected by the Prestige oil spill on the Galician coast (NW Spain). *Science of the Total Environment* 372, 532-538.

Pérez, C., Munilla, I., López -Alonso, M., Velando, A., 2010. Sublethal effects on seabirds after the Prestige oil-spill are mirrored in sexual signals. *Biology Letters* 6, 33-35.

Rattner, B.A., 2009. History of wildlife toxicology. *Ecotoxicology* 18, 773-783.

Rattner, B.A., Eroschenko, V.P., Fox, G.A. 1984. Avian endocrine responses to environmental pollutants. *J. Exper. Zool.* 232 (3): 683-689.

Smits, J.E., Wayland, M.E., Miller, M.J., Liber, K., Trudeau, S., 2000. Reproductive, immune, and physiological end points in tree swallows on reclaimed oil sands mine sites. *Environmental Toxicology and Chemistry* 19, 2951-2960.

Smits, J.E., Williams, T.D., 1999. Validation of immunotoxicology techniques in passerine chicks exposed to oil sands tailings water. *Ecotoxicology and Environmental Safety* 44, 105-112.

Troisi, G., Borjesson, L., Bexton, S., Robinson, I., 2007. Biomarkers of polycyclic aromatic hydrocarbon (PAH)-associated hemolytic anemia in oiled wildlife. *Environmental Research* 105, 324-329.

Trust, A., Esler, D., Woodin, R., Stegeman, J., 2000. Cytochrome P450 1A induction in sea ducks inhabiting nearshore areas of Prince William Sound, Alaska. *Marine Pollution Bulletin* 40, 397-403.

Velando, A., Álvarez, D., Mouriño, J., Arcos, F., Barros, Á., 2005. Population trends and reproductive success of the European shag *Phalacrocorax aristotelis* on the Iberian Peninsula following the Prestige oil spill. *Journal of Ornithology* 146, 116-120.

Wolfaardt, A.C., Williams, A.J., Underhill, L.G., Crawford, R.J.M., Whittington, P.A., 2009. Review of the rescue, rehabilitation and restoration of oiled seabirds in South Africa, especially African penguins *Spheniscus demersus* and Cape gannets *Morus capensis*, 1983-2005. *African Journal of Marine Science* 31, 31-54.

Wolfaardt, A.C., Underhill, L.G., Nel, D.C., Williams, A.J., Visagie, J., 2008. Breeding success of African penguins *Spheniscus demersus* at Dassen Island, especially after oiling following the Apollo Sea spill. *African Journal of Marine Science* 30, 565-580.

Zuberogoitia, I., Martínez, J.A., Iraeta, A., Azkona, A., Zabala, J., Jiménez, B., Merino, R., Gómez, G. 2006. Short-term effects of the prestige oil spill on the peregrine falcon (*Falco peregrinus*). Marine Pollution Bulletin 52, 1176-1181.

Comment 127: EC 44

EC is satisfied with this response.

Comment 129, EC 46

EC is concerned about the response to several comments which outline the need to include marine bird monitoring in the EEM. Although the response makes it clear that EEM planning is only in the beginning stages, the proposed text change to **"Based on the environmental effects assessment for marine birds, a marine bird EEM component is not contemplated at this stage"** is the core of our general concerns. EC recommends that marine bird monitoring for the following reasons:

In the report, attraction to illumination on structures and vessels during all phases of the Project are predicted to be "...*low in magnitude, geographic extent, duration, frequency when mitigation measures are practiced*". Also, The effects of "...*accidents, malfunctions and unplanned events...*" are predicted to be "...*significant...*", but "...*reversible at the population level*". An EEM that includes marine birds will determine the accuracy of these predictions. Specifically, more data on the distribution and abundance of marine birds in the vicinity of the study area are essential for assessing the accuracy of these predictions. Globally significant concentrations of marine birds are known to use the Grand Banks, and may concentrate in the vicinity of the proposed development site. Although there will be an emphasis on accident prevention, data on marine birds are required from the development site in order to assess risk and mortality should an accident occur.

Comment 198: EC 33

Environment Canada is satisfied with this response.

EC 48-55:

To be addressed in Part 2 of Proponent Response

APPENDIX A

**Hebron Project
Comprehensive Study Report
Response to Review comments, Part 1
November 2010**

**Evaluation of Responses to
Comments on Sea Ice and Iceberg sections**

***Canadian Ice Service, Environment Canada
December 2010***

*Trudy Wohlleben, PhD
(Senior Ice Forecaster)*

1. Evaluation of Responses to sea ice and iceberg comments made by CIS (Section 8 of Response Document – Appendix A – Comments on Sea Ice and Iceberg Sections)

A. Responses to Comments on SECTION 3 of CSR

Response to Comment A-1: unsatisfactory.

Although the requested change from “cyclical” to “variable” was made, a later comment (Comment A-3) asked that the error in the indicated data span “1983-2008” be corrected everywhere to “1971-2000” so that it is consistent with the cited data source, and this was not corrected here in the response to comment A-1.

Response to Comment A-2: satisfactory.

Response to Comment A-3: unsatisfactory.

While the text changes made to the indicated paragraph are satisfactory, the portion of the comment requesting that the error in the indicated data span “1983-2008” be corrected everywhere to “1971-2000” so that it is consistent with the cited data source has not been addressed.

Response to Comment A-4: satisfactory.

Response to Comment A-5: satisfactory.

Response to Comment A-6: partly satisfactory.

The graph 3-13 now contains even more errors than before. *The ice chart data were not re-checked and the graph data were simply randomly shifted (in the wrong direction).* The correct data are indicated in the table below.

The graph 3-14 is correct. There are a couple of minor differences in interpretation with respect to the table of values given below, but these are acceptable given the ambiguity of the chart data in some cases.

date	Frequency of presence of sea ice (max % for category)		Derived ice thickness (max cm for category)	
	bottom	mouth	bottom	mouth
Jan 01	0	0	0	0
Jan 08	0	15	0	10
Jan 15	0	15	0	15
Jan 22	15	15	10	15
Jan 29	15	33	10-15	15
Feb 05	33	50	10	15
Feb 12	33	50	10	15
Feb 19	33	50	10	15
Feb 26	50	66	10	30
Mar 05	50	66	15	30
Mar 12	50	50	15	120
Mar 19	33	50	120	120
Mar 26	15	33	120	120
Apr 02	33	33	120	120
Apr 09	15	33	120	120
Apr 16	15	33	120	120
Apr 23	15	33	120	120
Apr 30	15	33	120	120
May 07	15	15	120	120
May 14	15	15	120	120
May 21	0	15	0	120
May 28	0	15	0	120
Jun 04	0	0	0	0

Response to Comment A-7: satisfactory.

Response to Comment A-8: unsatisfactory.

Figure 3-14 has been modified to reflect the upper limit of the 70-120cm thickness range. However, the sentence in the text "The bay experiences first-year ice from mid-March through early May, which can range in thickness from 70 to 120 cm." has not been corrected to explain that the 70-120cm range represents *medium* first year ice, but that there is no way to determine from the CIS ice charts that medium first year ice prevails over the thin (30-70cm) or thick (>120cm) first year ice categories.

The sentence "The bay experiences first-year ice from mid-March through early May, which can range in thickness from 70 to 120 cm." should be modified to something like: "The bay experiences first-year ice from mid-March through early May, **which can range in thickness from 30 cm to greater than 120 cm.**"

****Additionally, based on the graphs, the sentence "As with the offshore area, most sea ice that occurs within the bay is formed off southern Labrador and drifts south to enter the bay around the mid-March timeframe." is incorrect. While the thickest ice occurs from mid-March to mid-May, the greatest frequency of sea ice begins near the end of February and lasts until mid-March, indicating that the ice enters the bay towards the end of February.**

****Additionally, the sentence "This analysis includes the sea ice at the mouth and bottom of the bay over the same 25-year period." has not been corrected according to comment A-3. The erroneous 1983-2008 period may represent 25 years, but the Atlas data is actually for 1971-2000 or 30 years.**

Response to Comment A-9: satisfactory.

Response to Comment A-10: satisfactory.

Response to Comment A-11: satisfactory.

Response to Comment A-12: satisfactory.

Response to Comment A-13: satisfactory.

Response to Comment A-14: satisfactory.

Response to Comment A-15: satisfactory.

Response to Comment A-16: satisfactory.

Response to Comment A-17: mostly satisfactory.

The table is much improved but there is still an error in the 4th row of the table. White ice is thin first year ice, not "young" ice as indicated in the first column of that row. Also, the table now omits any mention of medium and thick first year ice. I would suggest the following changes (indicated in blue):

Table 3-50 Characterization of Sea Ice by Type, Thickness and Age

Ice Type / Stage of Development	Thickness (cm)	Age / Period of formation
New Ice	<10	Seasonal ice: Earliest stage of development
Young (Grey) Ice	10 to 15	Seasonal ice: generally early season
Young (Grey-White) Ice	15 to 30	Seasonal ice: generally early to mid-season
Thin First-year (White) Ice	30 to 70	Seasonal ice: generally mid- to late-season
Medium First-year Ice	70-120	Seasonal ice: generally late-season
Thick First-year Ice	>120	Seasonal ice: generally late-season
Second-year / Multi-year / Old Ice	>120	Perennial ice
Source: Meteorological Service of Canada Canadian Ice Service MANICE (2005)		

Response to Comment A-18: satisfactory.

Response to Comment A-19: satisfactory.

Response to Comment A-20: satisfactory.

Response to Comment A-21: satisfactory.

Response to Comment A-22: partly satisfactory.

While the figure caption has been corrected to say "within 28 km", the text on page 3-65 (second to last paragraph) needs to be corrected as well, as indicated in the comment.

Response to Comment A-23: unsatisfactory.

While the noted error regarding the computed means of the data values was satisfactorily addressed, **several more errors were noticed**. 1) The Source of the data listed under the table is: CIS Ice Charts and Field Observations 2000-2008 and yet the table contains data for 1972-2008. 2) Also, going back and spot-checking the dates/concentrations in the table against the CIS online chart data indicates that the values in this table do not correspond very well or at all with the archived CIS chart data and must come either from somewhere else or the person going through the charts misinterpreted the dates and concentrations in many places. I do not have time to re-do this entire table for the consulting company. Please re-check the source, the chart dates, the derived data, etc.

Response to Comment A-24: partly satisfactory.

Again, as noted above for A-22, besides the changes already made, the text in this paragraph needs to be corrected from "15 km" to "28 km".

Response to Comment A-25: satisfactory.

Response to Comment A-26: satisfactory.

Response to Comment A-27: partly satisfactory.

In the response, it is not indicated whether the issue of the inconsistent reference for Figure 3-36 was addressed. It is not clear if the figure was replaced or just supplemented with additional figures. If the figure and its related text were retained, then the comment "In the text it says the study was conducted over the period 1984-87 by Seaconsult Ltd. (1988), but in the figure itself it says "Data: February through April 1985" and references "Fissel et al. (1985)". needs to be addressed.

The addition of the ARGO float data study is an improvement and addresses the second part of comment A-27. However, the proposed figures and accompanying text contain an error and also could be made clearer.

For example, the first sentence says "A verification study was carried out by Provincial Airlines Environmental Services Division ... ". A verification study of what – surface currents? To verify potential iceberg drift speeds and directions? This should be made clear up front. And note that it is now **Provincial Aerospace Ltd**, not Provincial Airlines. There is still a Provincial Airlines for commercial operations, but since the mid-2000's the part of the company that carries the Environmental Services is Provincial Aerospace. (Note: The term "Provincial Aerospace" was correctly used in the paragraph addressed in comment A-38 ... why was it not referred to correctly here?). Also, when using an acronym like DFO, this needs to be spelled out somewhere so that people know it means Department of Fisheries and Oceans.

In the second paragraph, the sentence "The drift speed (Figure 3-X) was observed to be marginally higher overall, ..." is unclear. Do you mean the drift speeds determined by PAL were higher than those of Fissel?

Response to Comment A-28: unsatisfactory.

The response to this comment does not correct the problem at all. In fact, the paragraph: "Frequency of presence of sea ice concentrations for the Grand Banks south of 49°N are fairly consistent at approximately 6/10ths coverage. Ice concentrations of greater than 5/10ths are evident by early February and continue through to mid-April, after which they slowly decrease to 2/10ths coverage as per Figure 3-37." is just plain wrong and still confuses frequency with concentration in the second sentence.

The section is called "Concentrations" not "Frequency of Presence". You cannot just change the text from concentrations to frequency because you used the frequency charts ... you need to go back and look at the median concentration charts or the ice graphs of ice coverage. The ice graphs referred to in comments A-20 and A-21 show that for the Grand Banks as a whole and for the Hebron study area, seasonal averaged ice coverage is generally less than 10% or less than 1/10 concentration (this is also indicated by the actual median concentration charts in the CIS East Coast ice atlas). The ice graph referred to in comment A-29 indicates that when ice is present in the

Hebron study area, sea ice coverage can reach greater than 6/10 during years with large incursions.

Additionally, no attempt has been made to address the last part of comment A-28, which stated: "Also, it is not clear how the information in this paragraph, which purports to describe the seasonal variation in sea ice concentrations over the Grand Banks, relates to Figure 3-37 (whose data is not divided into monthly periods) as indicated in the last sentence. This needs to be amended."

Response to Comment A-29: satisfactory.

Response to Comment A-30: satisfactory.

Response to Comment A-31: partly satisfactory.

The revised sentence should spell out "... Canadian Ice Service (CIS) ..." and not just use the acronym CIS on its own, unless it was recently described elsewhere.

Also, ice charts from the Canadian Ice Service date back to 1968 at the very earliest. So where do the dates 1964-1987 in the second sentence come from?? This needs to be re-checked and corrected.

Response to Comment A-32: satisfactory.

Response to Comment A-33: partly satisfactory.

Yes, it is understood that PAL/IIP data were used, that is not the point of this comment. The point is that the data you present only goes up to 2008 when data up to 2009 are available. Why were the data from the last year not included in this study?

Response to Comment A-34: partly satisfactory.

Most of this comment was addressed satisfactorily, however the sentence "This trend for light iceberg distribution ..." also needs to be revised since 2010 was a very light iceberg year (as per the figure that is now being included) and so **the light iceberg conditions did not end with the 2008 season as indicated.**

Response to Comment A-35: satisfactory.

Response to Comment A-36: ... the number 36 was accidentally skipped in numbering the comments that came from CIS ...

Response to Comment A-37: satisfactory.

Response to Comment A-38: satisfactory.

Response to Comment A-39: satisfactory.

Response to Comment A-40: satisfactory.

Response to Comment A-41: satisfactory.

B. Responses to Comments on SECTION 13 of CSR

Response to Comment A-42: unsatisfactory.

Although the requested change from "cyclical" to "variable" was made, a previous comment (Comment A-3) asked that the error in the indicated data span "1983-2008" be corrected everywhere to "1971-2000" so that it is consistent with the cited data source, and (similar to the case of comment A-1 and elsewhere) this was not corrected here in the response to comment A-42.

Response to Comment A-43: unsatisfactory.

The proposed correction to the sentence is incorrect (and I think table 3-50 not table 3-10 is what is being referred to). First, ice that is less than 30cm thick is not called first year ice, it is called young ice. Also, your own graph (Figure 3-14) shows that mid-March to early May ice thicknesses can reach up to 120cm, not just 70cm. Also, it is noted that the ice thicknesses referred to in graph 3-14 represent the tops of the 30-70cm and 70-120cm thickness ranges for thin first year and medium first year ice respectively. Please rephrase the sentence to read:

"From mid-March through to early May, the bay experiences first year ice which can range in thickness from 30 to 120 cm."

Response to Comment A-44: satisfactory.

Response to Comment A-45: satisfactory.

Response to Comment A-46: satisfactory.

2. Evaluation of Responses to sea ice and iceberg comments NOT made by CIS (Section 3 of Response Document)

No time was available to ensure that the responses to comments made by other agencies regarding sea ice and icebergs are correct. However, at first glance, it appears there may be issues in some places (see the one response discussed below).

A. Responses to Comments on SECTION 3 of CSR

Comment 31 (pdf p.35) ... not checked by CIS

Comment 32 (pdf p.35) ... not checked by CIS

Comment 33 (pdf p.36) ... not checked by CIS

Comment 34 (pdf p.36) ... not checked by CIS

Comment 193-Alder-4 (re : Figure 3-39) (pdf p.122-123) ... not checked by CIS

B. Responses to Comments on SECTION 13 of CSR

Response to Comment 140 (p.95 of 152) (pdf p.97):

The response to comment 140 is incorrect and does not incorporate the requested changes made by CIS on this issue. The proposed response contains phrases "The duration of the data is 1983 to 2008 inclusive (CIS Ice Charts)." and "These statistics are based on Environment Canada CIS's Sea Ice Charts (1983 to 2008)." *These have not been corrected to 1971-2000 as requested.* **Regarding this issue, CIS commented that** "After reviewing the data in your graphs (Figures 3-13 and 3-14), it appears that you used the Ice Atlas data from 1971-2000 and not the 25-year 1983-2008 chart data that you mention in the text. **This needs to be corrected in the text and in the Sources listed under the Figures.**"

More comments in this section ... not checked by CIS