Environmental Stewardship Branch
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January 19, 2007 File No.: 4194-10

Ms. Kim Coady
Canada Newfoundland and Labrador Offshore Petroleum Board
Fifth Floor, TD Place
140 Water Street
St. John's, NF A1C 6H6

Dear Ms. Coady:

RE: ConocoPhillips Laurentian Subbasin Exploration Drilling Program EA Report, Offshore NFLD **EAS 2005-465B**

As requested in your letter of November 9, 2006, Environment Canada has reviewed the EA Report for the ConocoPhillips Laurentian Subbasin Exploration Drilling Program. From the information provided it is understood that the proponent intends to drill an initial exploratory well and up to 7 exploration/appraisal wells in exploratory licenses 1087, 1081, 1085, and/or 1086 in the Laurentian Channel at the offshore entrance to the Gulf of St. Lawrence. Vertical seismic profiling and geohazard surveys may also be conducted.

The following EC comments stem from the department's mandate under the *Migratory Birds Convention Act* (MBCA) and Section 36 of the *Fisheries Act.* Pertinent EC expertise, and related comments, also originate with the *Canadian Environmental Protection Act* (CEPA), the *Canadian Wildlife Act,* and the *Species at Risk Act* as well as *Department of the Environment Act.*

Air Emissions

In general, there is little consideration of air emissions and the associated environmental effects. There is no consideration of how air emissions from the proposed drilling program could interact with emissions from other projects in the study area and beyond.

The EA does not estimate emissions from proposed activities and the potential to reduce these or other emissions has not been considered. Overall, the potential for effects on air quality is dismissed in the EA as negligible, but no data on background contaminant levels or expected emissions are provided to substantiate this claim.

The following comments are offered to help the CNLOPB direct the proponent in preparing a substantive accounting of air emissions, and a reasonable assessment of potential environmental effects and necessary mitigation and follow-up monitoring measures:

- Revisions to the EA should identify expected air emissions (e.g., CO_2, CH_4, PM, SO_2, VOCs, PAHs) from project activities (i.e., up to 7 wells) in conjunction with their sources (e.g., flaring, on-board power generation, transportation, fugitive emissions). Emission estimates should use specific emission factors and referenced data, or be calculated from emissions from similar projects, where available. Professional judgment may be used where data are insufficient.

- Depending on the quantity of estimated emissions, the use of numerical dispersion models to predict ambient air quality changes from project emissions may be warranted. Comparisons to baseline levels for the region and to national and provincial ambient air quality objectives for specific pollutants should be provided in revisions to the EA, where possible.
- The discharge of air pollutants could contribute to the occurrence of negative effects on human health and well-being and discharge of persistent and/or toxic chemicals, especially if hazardous air pollutants are emitted. It is therefore recommended that all discharges of hazardous air pollutants that could result from project activities be documented and assessed (e.g., hazardous air pollutants could occur as a result of the incomplete combustion of hydrocarbons). A consideration of the persistence of hazardous air pollutants in the environment and their ability to bioaccumulate in living organisms will be important to the analysis.
- The EA should clarify how long each flaring episode during well testing could last (p. 12-13). What is the expected emission rate per day from flaring and what would be the maximum amount of emissions produced? What is the expected composition of the flare based on previous operations in the area?
- Revisions to the EA should describe the potential for hydrogen sulphide to be included as a constituent of the gas stream.
- It is recommended that revisions to the EA describe how best practices will be implemented so as to minimize emissions (e.g., an inspection program could reduce fugitive emissions from seals and valves). If such measures are not considered to be appropriate for the project, an explanation should be provided.
- From the information provided in the EA, it is assumed that there will be no incineration as part of project activities. If incineration is proposed, waste separation procedures, the incineration system, associated emissions and any measures that will used to reduce these emissions should be described in revisions the EA, along with a justification of why on-board incineration should be permitted.
- The EA should include a discussion of potential emissions resulting from malfunctions and accidental events in conjunction with estimated duration times.

Greenhouse Gas Release

An accounting of greenhouse gas (GHG) releases from project activities is absent from the EA. At a minimum, revisions to the EA should provide an inventory of GHG emissions, in equivalent amounts of carbon dioxide, along with a discussion of measures that have been considered and/or are proposed to reduce or monitor GHG emissions. It would also be desirable to include a discussion of emissions in the context of the proponent's operations and of its Voluntary Challenge and Registry (VCR) commitment, if any. If possible, a comparison of the above information with an estimate of the total contribution from the province of Newfoundland and Labrador, as well as that of the industry sector in Canada should be provided.

Guidance on the assessing the effects of GHG emissions on the environment can be found in the document entitled, *Incorporating Climate Change Considerations in Environmental Assessment: General Guidance for Practitioners* (Federal-Provincial-Territorial Committee on Climate Change and Environmental Assessment, 2003).

Consideration of Pollution Prevention for Discharges and Emissions

The *Offshore Waste Treatment Guidelines* (NEB et al., 2002) place an onus on operators to review and implement pollution prevention[1] measures that minimize waste generation and discharge[2]. 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, waste management and timing (p. 9)[3]. 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[4] 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[5], transport to shore) recognizing that technology is being developed to remove oil from cuttings[6]);
- substitute drilling additives; and;
- options related to the length and/or diameter of the surface-hole section.

Physical Environment

Section 3.2.1 General Description of Weather Systems

This section gives an overview of the types of weather patterns in the area. While it mentions the winter storms that bring severe conditions to the Atlantic Provinces and offshore areas, there is nothing equivalent to the next section which gives peak wind speeds associated with tropical storms or hurricanes, even though storm force and hurricane-force winds (and the associated extreme waves) occur much more frequently in winter extratropical cyclones. There should also be examples of the severity of the winter extratropical cyclones. For example, during the N. Atlantic Storm of December 26-29, 2004, the Banquereau Bank buoy measured its record high significant wave height since it was first deployed in 1988, of 12.9 m, with an associated peak wave period of 17.1 s. This storm also provides an example of the extremely rapid wave growth that can occur in both extratropical and tropical cyclones in this area of the northwest Atlantic: significant wave heights grew 4 m in one hour, from 8.8 m to 12.9 m.

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[1] Pollution prevention is defined in the *Canadian Environmental Protection Act* as "[t]he use of processes, practices, materials, products, substances or energy that avoid or minimize the creation of pollutants and waste, and reduce the overall risk to the environment or human health".

[2] *Offshore Waste Treatment Guidelines* require applications for Drilling Program Authorizations to describe "specific pollution prevention measures the operator plans to implement to reduce waste generation and discharge" (NEB *et al*., 2002, 3). As the operator is aware, OWTG "describe minimum standards for the treatment and disposal of specific waste streams and in no way should be viewed as detracting from the expectations outlined above" (NEB *et al*., 2002, 3).

[3] It is recognized that consideration of alternative means of carrying out a project is not a requirement for screenings under the *Canadian Environmental Assessment Act*. However, Canadian Environmental Assessment Agency guidance states that "(responsible authorities) are encouraged to consider alternative means in a screening, particularly for larger, more complex projects" (www.ceaa-acee.gc.ca/013/0002/addressing_e.htm).

[4] Although it is stated in the EA that the regulatory limit for synthetic-based muds is 6.9 percent oil on cuttings; this should be recognized as a minimum discharge standard in Atlantic Canada.

[5] While it is recognized that re-injection may not be appropriate for all exploration wells, there are projects for which the re-injection of cuttings may be preferred.

[6] For example, see Williamson, B., C. Gilbertson, R. Roberts, and D. Florance. 2004. Offshore Hammerdrill process meets OSPAR discharge limit. *Oil and Gas Journal*. May 10, 2004. Pages 41– 43. The EA could review best practical technologies to remove oil from cuttings to levels lower than 6.9 percent.

Section 3.2.2 Tropical Cyclones

The note at the bottom of Table 3.1, Statistics on Tropical Cyclones passing within 65 nm of Grid point 5400 45.00°N, 55.83°W (1950-2004), contains an erroneous statement. The note says that wind speed refers to the maximum sustained 1-minute mean wind recorded during the life of the tropical cyclone and not the wind speed at the time it passed near the Laurentian Sub-basin. In fact it appears that the wind speed given in the table with each tropical cyclone or hurricane is the maximum speed on the date given, which is when the cyclone centre passed closest to the point of interest. The source for data in this table was NOAA Coastal Services Centre, which is based on the HURDAT dataset. HURDAT is the official record of tropical storms and hurricanes for the Atlantic Ocean, Gulf of Mexico and Caribbean Sea, and is available from the US NOAA's Atlantic Oceanographic and Meteorological Laboratory website [http://www.aoml.noaa.gov/hrd/hurdat/Data_Storm.html]. The HURDAT values for the particular tropical cyclones listed in the table include the latitude and longitude every 6 hours along the track, along with the maximum wind speed, central pressure, direction and speed of movement, and classification at the corresponding date and time. The highest wind speed is 115 knots in Hurricane Ella, on 4 September 1978. When Hurricane Luis moved through the Project Area maximum winds were 80 kt.

The range for the search of tropical cyclones passing near the location of interest does not include the entire Project Area. The radius of 65 nm of AES40 grid point 5400 does not include the western sections of the Project Area. A more representative description of the tropical cyclone statistics would come from examining a larger area. For example, Hurricane Michael tracked northeastward, just west of the western edge of the Project Area on 19 November 2000. The area of strongest winds (87 knots) would have moved over the Project Area. The Project Area is covered by the Banquereau Bank marine forecast area (one of the Meteorological Service of Canada's marine forecast areas). Tropical cyclone statistics for the Banquereau Bank marine forecast area are available on CD from the Environment Canada's publication "A Climatology of Hurricanes for Canada – Improving Our Awareness of the Threat", distributed in the summer of 2005. This climatology is based on NOAA's HURDAT data set. During the period 1950 to 2000, 34 tropical storms or hurricanes passed through the Banquereau Bank marine area, including 5 with wind speeds of 80 knots or more. It gives an average speed of movement for these systems, of 33 knots.

This section does not given any information about the extreme waves generated in tropical storms or hurricanes. The AES40 database, described in Section 3.2.4, Wave Climate, could have been used. Also, wave observations of tropical storms or hurricanes reported by Environment Canada's network of moored weather buoys should be used. Archived reports are available from the Marine Environmental Data Service, Fisheries and Oceans Canada. Two buoys are located near the Project Area: the Banquereau Bank buoy, ID 44139, within about 50 km of the southwestern corner of the Project Area; and the SW Grand Banks buoy, ID 44138, about 100 km east of the southeastern corner of the Project Area. For example, with the passage of Tropical Storm Florence, 13 September 2006, the SW Grand Banks buoy measured peak significant wave heights of 9.8 m with a corresponding peak wave period of 17.1 s.

Section 3.2.3 Wind Conditions

This section is entirely based on the AES40 wind data set, which represents a one-hour mean wind at 10 m above sea level, every 6 hours. The data set is based on a long period, over 50 years, and when input to the wave model gives modelled waves that verify fairly well with measurements. However it should not be the only source of marine climatological wind information; observations (usually one-minute means for aviation or 10-minute means for marine reports) should be presented as well. Other sources of wind climate information include ICOADS, the International Comprehensive Ocean-Atmosphere Data Set of archived ship, rig, and buoy marine reports, and also QuikScat (satellite-sensed) winds.

This section on Wind Conditions gives directional information, which is useful. It also gives monthly means, standard deviations, and maximum speeds, and it gives highest (one-hour mean, 10 metre) wind speeds by month and direction at the area of interest. The highest wind speed is 30 m/s. The discrepancy between this value and the previously mentioned maximum wind speeds associated with hurricanes moving through the area (which represent one-minute mean winds at 10 metres) should be addressed, but it is not.

Section 3.2.4 Wave Climate

This section is entirely based on the AES40 wave data set. Again, this analysis should be enhanced by presentation of other sources of available wave data, which includes the two nearby moored buoys mentioned earlier – the Banquereau Bank buoy, ID 44139, and the SW Grand Banks buoy, ID 44138. The Marine Environmental Data Service archives the reported wave data, including significant wave height, peak wave period, maximum individual wave height, and the wave spectra. Although the period of record is shorter, and there are gaps in the data, when reports are available they are hourly and represent instrumental measurements. Some mention should be made of published validation studies of the AES40 wave height and wave period data. The highest AES40 significant wave heights are 13.0 m. It should be noted that the SW Grand Banks buoy measured a peak significant wave height of 14.1 m during a rapidly intensifying extratropical cyclone on 5 January 1989.

The MSC50 hindcast wind and wave dataset is described by Swail *et al.* in proceedings of the 9th International Workshop on Wave Hindcasting and Forecasting September 25-29, 2006 in Victoria, BC: "The MSC50 Wind and Wave Reanalysis". It is planned to have this dataset available from the Marine Environmental Data Service early this year. This will improve upon the AES40 dataset in a number of ways including higher temporal and spatial resolution, a larger model domain, inclusion of shallow water wave physics, and inclusion of additional wind information in the development of the wind fields. It is recommended that any additional wave analysis for this project include the MSC50 if it available in time, or subsequently when it becomes available.

Table 3.6 gives a useful bivariate histogram of significant wave height and mean wave direction. However, as it gives frequency to the nearest hundredths, extremely infrequent events are not represented. As an example, the highest significant wave height category is 11 – 11.99 m, even though Table 3.7 gives two monthly peak values that exceed that category. Similarly Table 3.9 gives the percent frequency of occurrence of significant wave height and peak wave period: the highest category is 12 m. The wave period corresponding to the 12 m category is 15 s. It should be noted that moored buoy wave observations sometimes report peak wave periods 2 to 3 seconds longer than corresponding AES40 values during storm events.

Section 3.2.5 Interannual Variability and Short Term Climate Trends

It seems appropriate to include some discussion of interannual variability and a comparison of trends in winter North Atlantic Oscillation atmospheric circulation indices and in climatological winds and waves, as is done here. However the North Atlantic Oscillation apparently does not explain or describe a significant amount of the summer atmospheric patterns, so presentation of summer average indices may not be appropriate.

It would be very useful to include mention of the relationship between the El Nino Southern Oscillation (ENSO) and North Atlantic tropical cyclone frequency, with reduced (enhanced) tropical cyclone frequency in El Nino (La Nina) seasons. Also it should be noted that in general over the North Atlantic Basin, and over the Canadian Atlantic waters as well, there has been an increase in frequency in tropical cyclones in the decade of the 1990's, and continuing into recent years, compared to the decades of the 1960's and 1970's (see the Climatology of Hurricanes for Canada, mentioned earlier).

Section 3.5 Wind and Wave Extremal Analysis
It would facilitate comparison between earlier sections describing the wind and wave climate if this section was located immediately after the section on Wave Conditions, rather than coming after several other sections. The first paragraph contains a typographical error and a wording error that have occurred before in earlier environmental assessments and have been commented in each case. This includes reference to NCEP-CSAR (should be NCEP-NCAR) and mention of "hindcast wind fields closely resembled the waves measured…." rather than "hindcast wave fields closely resembled the waves measured…" which was apparently intended. As requested earlier, some specifics should be given on the validation of wave height and peak wave period. Again, when the MSC50 Wind and Wave Reanalysis is available, as noted earlier, this should also be examined in terms of the extremal analysis. The higher resolution of the MSC50 dataset, both in time and space, may improve the results.

Section 3.5.1 Extreme Value Estimates for Winds
This section does not refer to the peak winds associated with tropical storms or hurricanes that passed near the area, or discuss the differences between the values presented here and those in the earlier section. Such discussion should use the same units for wind speed. It would be useful to include examples of some of the most extreme events that have occurred in the past few decades which have been accompanied by measurements from ships, rigs, moored buoys, and satellites.

Section 3.6 Extreme Value Estimates for Waves, and Section 3.6.1 Joint Probability of Extreme Wave Heights and Spectral Peak Periods
The section numbering seems a bit odd, given that the title of Section 3.5 is Wind and Wave Extremal Analysis. The units of the 100-year extreme significant wave height of 13.9 m was given as m/s (3rd sentence of Section 3.6). Section 3.6.1 notes that the 100-year extreme wave height using the alternative method presented here gives a higher value, of 14.4 m. There seems to be a disagreement between the peak periods in Table 3.19 and the corresponding values plotted in Figure 3.48. The figure suggests values that would be longer; e.g.16 s instead of 14.9 s, for the wave period corresponding to the 100-year significant wave height.

The extreme values of significant wave height and corresponding peak wave period for return periods of 1, 10, 25, 50, and 100 years from the AES40 should be compared to corresponding values from the MSC50, when available, to assess the level of confidence in the values presented here.

Section 3.7.3 Icebergs
In Figure 3.53, the labeling of the x and y axes is reversed (x-axis should be "Number of sightings" and y-axis should be "Year").

Migratory Birds

Seabird Monitoring Protocol

CWS has developed a pelagic seabird monitoring protocol that we are recommending for all offshore oil and gas projects. Two versions of the protocol and a blank data sheet have been provided under separate cover. One version of the protocol is for individuals that have experience doing seabird surveys. These protocols are a work in progress and we would appreciate feedback from the observers using them in the field. A guide sheet to the pelagic seabirds of Atlantic Canada is available through CWS in Mount Pearl.

A report of the seabird monitoring program, together with any recommended changes, is to be submitted to CWS upon completion of the proposed program.

Migratory birds, their nests, eggs, and young are protected under the *Migratory Birds Convention Act* and *Regulations*. The proponents should be reminded that they are expected to comply with the *Migratory Birds Convention Act* and *Regulations* during all project phases. Migratory birds include those species listed in the CWS Occasional Paper *Birds protected in Canada under the Migratory Birds Convention Act*.

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 proponents 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.

The Responsible Authority should be reminded that the Species at Risk Act (SARA) amends the definition of “environmental effect” in subsection 2(1) of the Canadian Environmental Assessment Act (CEAA) to clarify, for greater certainty, that EAs must always consider impacts on a listed wildlife species, its critical habitat or the residences of individuals of that species.

SARA also requires that the person responsible for a federal EA must, without delay, notify the competent minister(s) in writing if the project being assessed is likely to affect a listed wildlife species or its critical habitat. Notification is required for all effects, including adverse and beneficial effects, and the requirement to notify is independent of the significance of the likely effect. The person must also identify adverse effects of the project on listed species and their critical habitat. And if the project is implemented, the person must ensure that measures are taken to avoid or lessen adverse effects and that effects are monitored. Mitigation measures must be consistent with recovery strategies and action plans for the species.

The complete text of SARA, including prohibitions, is available at www.sararegistry.gc.ca. For guidance on SARA and EA, the proponents may wish to make use of the *Environmental Assessment Best Practice Guide for Wildlife at Risk in Canada* available at: http://www.sararegistry.gc.ca/virtual_sara/files/policies/EA%20Best%20Practices%202004.pdf

Section 4.1 Species at Risk
In response to the last sentence on page 107, the proponent is still required to adhere to the prohibitions regarding the species found within the legislation SARA [s.32 - 36] regardless of whether there are presently prepared recovery strategies or management plans or not.

Two additional species at risk, the Roseate Tern and Ross’s Gull may be found in the study area. Although their occurrence would likely be extremely rare, they should be acknowledged in the EA.

Section 4.8 Seabirds
In general, the report accurately describes migratory bird resources present in the Laurentian sub-basin. Some of the information on seabird breeding population sizes provided is slightly out of date, so a list of updated references is provided below. Specifically, there have been recent surveys of Leach’s Storm-petrel colonies off the Burin Peninsula, and more up to date information is available on the Manx Shearwater colony at Middle Lawn Island. Field crews found evidence of breeding for 13 pairs of Manx Shearwater on Middle Lawn Island in the summer of 2006 (not 100 as indicated in

the Table). However, the general size and relative importance of these colonies has not changed greatly, so the wording of the text is generally appropriate.

Leach's Storm-Petrel:
Robertson, G. J., J. Russell and D. Fifield. 2002. Breeding population estimates for three Leach's Storm-petrel colonies in southeastern Newfoundland, 2001. Canadian Wildlife Service Technical Report Series No. 380. Atlantic Region.

Stenhouse, I. J., G. J Robertson and W. A. Montevecchi. 2000. Herring Gull *Larus argentatus* predation on Leach's Storm-Petrels *Oceanodroma leucorhoa* breeding on Great Island, Newfoundland. Atlantic Seabirds 2: 35-44.

Northern Fulmar:
Stenhouse, I. J., and W. A. Montevecchi. 1999. Increasing and expanding populations of breeding Northern Fulmars in Atlantic Canada. Waterbirds 22: 382-391.

Manx Shearwater:
Robertson, G. J. 2002. Current status of the Manx Shearwater, *Puffinus puffinus*, colony on Middle Lawn Island, Newfoundland. Northeastern Naturalist 9: 317-324.

The information on winter distribution of seabirds is sparse for this area, although CWS has collected some information on recent cruises in spring and fall. Regardless, the inferences made about the winter occurrences of important species seem reasonable.

Section 5.6.2 Potential Effects on Seabirds of Lights and Flaring
In addition to the stranded petrel mitigation measures outlined, operators should be aware that reporting the fate of all birds handled is a requirement of the permit. Forms are available from CWS for this purpose.

Section 5.6.3 Potential Effects on Seabirds of Drill Muds and Cuttings
Operators should be aware that an ESRF sponsored study in underway to examine the impact of sheens on seabirds. Proponents should adhere to the recommendations stemming from this study.

Effects of the Environment on the Project

Section 5.2 Effects of the Environment on the Project
It would be useful if this section described how the marine forecasts would be used by the rig operators in the event of forecast extreme conditions. What actions would be taken to mitigate the effects of extreme conditions, under different scenarios? What forecast lead times are required under the different scenarios? It would be helpful if the forecast lead times were discussed in relation to the very rapid increase of severe wave heights that have been observed in a small number of recent extreme extratropical and tropical cyclones (related to rapid intensification and/or dynamic resonance between the speed of the system and the speed of the waves).

It would be helpful if this section described the combinations of environmental loading conditions that could cause the environment to have significant effects on the project, specific to each type of platform being considered. What are the significant thresholds of wave height and wave period combinations, for example, relevant to semi-submersible platforms? Without that information it is more difficult to assess the importance of climatological frequencies presented in earlier sections.

There is little evidence that due diligence was carried out in reaching the conclusion that the icing-related environmental loadings are likely to be relatively small and within the operational capabilities of their procedures and systems. There are published maps of potential spray icing frequency in the East Coast Marine Atlas as well as summary information on the frequency of occurrence of atmospheric icing but none of the literature is cited and the description of the actual environmental conditions in the proposed drilling area is vague.

A list of references summarizing icing conditions off the east coast is below. Most of these references can be found in the C-CORE library.

Brown, R.D. and T.A. Agnew, 1985: Characteristics of marine icing in Canadian waters. Proceedings International Workshop on Offshore Winds and Icing, T.A. Agnew and V.R. Swail, Eds., Halifax, 78-94.

Brown, R.D. and P. Roebber, 1985: The Ice Accretion Problem in Canadian Waters Related to Offshore Energy and Transportation. Canadian Climate Centre Report No. 85-13, Downsview, 295 pp (unpublished manuscript).

Brown, R.D. and P. Mitten, 1988: Ice accretion on drilling platforms off the east coast of Canada. Proceedings Polartech '88 Conference, Trondheim, Vol. 2, 409-421.

Chung, K.K. and E.P. Lozowski, 1996: Offshore Drilling Platform Icing: A Review. Final Report to National Energy Board of Canada, 117 pp.

Mortsch, L.D., T. Agnew, A. Saulasleja and V.R. Swail, 1985: Marine Climatological Atlas - Canadian East Coast. Canadian Climate Centre Report No. 85-11, 343 pp (unpublished manuscript).

Zakrzewski, W.P., R. Blackmore and E.P. Lozowski, 1987: Mapping the ice growth rates on sea-going ships in waters east of Canada. Proceedings 2nd Canadian Workshop on Operational Meteorology, Halifax, 77-99.

Also, the RIGICE marine icing model was upgraded by Ed Lozowski at the University of Alberta in 2004 and should be publicly available to any consultant who wishes to use it for EA purposes.

An icing bibliography is also attached for further references.

Section 5.2.4.1 Physical Environmental Monitoring and Forecasting Program
It is noted with appreciation the detailed description of the physical environmental monitoring program that is planned, and the intent to send 3-hourly marine reports in real-time to MSC. That would help to improve not just the local site-specific forecasts, but also the numerical weather prediction model output and the marine forecasts issued by MSC. It would also help to improve the knowledge of the climatology of the area.

I trust that this information will be of assistance in your review of this assessment. If you wish to discuss these comments or have further questions, please do not hesitate to contact me at your convenience.

Yours truly,

Original Signed by Glenn Troke

Glenn Troke
Environmental Assessment Coordinator
Environmental Protection Operations Directorate
EPB/NL

Attachment

cc K. Power
B. Jeffrey