

Jeanne d'Arc Basin Exploration/Delineation Drilling Program 2006 EA Update Review Comments

1. EC-7, 8, 9, 12, 13, 14, 15, 23, 26, 27, 28, 29, 31 In general, where comments have been accepted, it would be preferable to see a revised EA with changes incorporated into the original text, rather than solely in an Appendix.
2. EC-11 - Figures 4.3 and 4.4 were redone and included in the EA Update, but the captions still have an omission: the wind is described as a "10-metre wind speed", but should say an "hourly mean 10-metre wind speed".
3. EC-16 - EC does not agree with part of the response this comment, whereby the proponent claims that it is not valid to adjust 10-m winds to a greater height using the logarithmic profile and the assumption of neutral stability. The height adjustment model that accounts for stability in the surface layer is based on Monin-Obukov similarity theory. Under this theory, the stability in the surface layer, the lowest part of the atmospheric boundary layer, approaches near neutral conditions in very strong winds (Walmsley, Atmosphere-Ocean, 1988¹). This is so even if the overall stability of the atmospheric boundary layer is not neutral, or the air-sea temperature difference is not zero. There would certainly be exceptions in very stable or extremely unstable conditions when the theory does not apply. This would increase the error or uncertainty in the adjustment based on neutral conditions. However, it is standard practice in the meteorological research community to make this assumption when temperature information is not available, in preference to making no adjustment for height.

Adjusting for the measured or forecast height of a wind speed is as important as for the wind averaging period, for estimating the load on vessels or platforms in extreme conditions. In Table 4.17 of the 2005 EA, the extreme wind speeds for 1, 10, 25, 50, and 100-yr return periods are given for 1-hr, 10-min, and 1-min mean winds. The 1-hr mean wind extremes are based on extremal analysis of the 1-hr mean winds of the AES40 hindcast. The 10-min mean values are 1.06 multiplied by the 1-hr mean values. The 1-min mean values are 1.22 multiplied by the 1-hr values. In comparison, the height adjustment factors for typical helideck heights of a drill ship (25 m) or of a semi-submersible (45 m), are 1.10 and 1.16, respectively

4. EC-24 - The proponent indicates that they will change "AES composite ice chart data for 1964 to 1998" to "Canadian Ice Service's regional ice chart data". However, the CIS regional ice charts began in 1968, so it is still unclear what dataset was used.
5. EC-25 - The proponent did not specify the start and end years of the period referred to as "the last ten years" as was requested in EC's original submission.
6. EC-41 - The proponent's response is reasonable in view of the frequency and severity of superstructure icing in the drilling area. Regarding Section 6.2, the proponent should note that under severe spray icing conditions, it may be necessary to retreat further offshore to get into warmer waters and air temperatures.

¹ Walmsley, John L., 1988. On Theoretical Wind Speed and Temperature Profiles Over the Sea With Applications to Data from Sable Island, Nova Scotia. *Atmosphere-Ocean* **26** (2), 203-233.

7. EC-58 - The proponent indicates that the treatment of low volume water cooling streams is not a practical or cost effective option in light of the negligible risk posed to the environment. In consideration of the importance attached to this issue under *CEPA* the proponent should provide a statement indicating the options that were considered and why they were rejected.
8. The proponent relies heavily on the spill trajectory work already carried out for nearby White Rose (and Hibernia and Terra Nova) and which has been accepted by review panels. Although it may be difficult to argue with this approach, the industry should be advised that other models of the oceans circulation exist that are much better than those being used. DFO expects a more modern treatment of current in oil spill trajectory modelling and hopes that future assessment documents will recognize and consider these.
9. Section 4.3 (Water Masses) – With the exception of the effects of ambient temperature on drilling fluids, lubricants, and spilled oil, the magnitude and distribution of temperature and salinity do not have much effect on drilling activities. Consequently, the purpose of a discussion of water masses (curves on a plot of T vs. S) should be to paint an overall picture of the marine environment useful for a discussion of currents, and perhaps, icing. Such a discussion is one of the most basic of physical oceanographic descriptions, and it must be presented adequately. The discussion must be clear, and the information presented must contribute to the overall picture or describe conditions near the proposed drilling site(s). The original (2005) comments regarding Section 4.3 were meant as examples of what was lacking in a poorly written description. Unfortunately, the authors seem not to have understood the purposed and have addressed examples on an individual basis.

The classical view of water masses is that they are mixtures of water types which have (almost) a fixed temperature and salinity. This means that the upper layer of the ocean which is subject to solar heat, radiative cooling, evaporation, and ice melt and formation are normally excluded from discussion. This makes discussion of water masses in a shallow area like the Grand Banks somewhat problematical.

DFO must question why the report dealt with water masses at all. A section discussing water properties and showing horizontal sections of T and S would have been more beneficial. The one useful conclusion that the report could have drawn is missing: as shown in Fig. 4-12, the offshore branch of the Labrador Current does not have much influence in the Study Area. Meanders of the offshore branch which would wash over the study area are not evident in the water property data presented.

10. DFO-10 – ice is important as it affects salinity and thus density. Its role should be discussed. The reference to advection referred to upstream effects, i.e. Labrador-Newfoundland Shelf is one in which advection is very important.
11. DFO-11 – If the authors had consulted the original document (Pepin, P. and Helbig, J. A. 1997. Distribution and drift of Atlantic Cod (*Gadus morhua*) eggs and larvae on the northeast Newfoundland shelf. *Can. J. Fish. Aquat. Sci.* 54: 670-685) they would have found the original version of Fig. 4-15. This version extends to the study area and shows the presence of the offshore branch of the Labrador Current. That is the source of the ‘intensified flow.’
12. DFO-12 – The quoted statement is not elaborated upon in the remainder of the paragraph. The authors used the term ‘dominant’ and they should justify this usage. De Tracey and Tang is probably the most important reference quoted for currents in the study area. It deserves greater attention.

13. DFO-15 0 It is a fact that the observed extreme currents were related to storms or just that they were observed in the fall?
14. DFO-16 – This comment was not addressed in the document, as the proponent has suggested in their response.
15. DFO-17 – The major axis gives the magnitude of the tidal constituent along the major axis; it provides no information about the magnitude along the minor axis. For a given major axis, the kinetic energy at a point varies by a factors of 100% depending on the value of the minor axis.
16. DFO-21 – This was not a request for analysis . Rather it was a request that the plots could be more fully discussed.
17. DFO-22 – By composite, it is meant that the individual progressive vector diagrams from the closely spaced moorings be overlaid, not that the data themselves be composited. . This would give some indication of variability with time. DFO apologizes for the confusion.
18. DFO-23 – This comment has not been addressed satisfactorily and a thorough investigation of the data would be required, as suggested in the response.
19. DFO-33 – This comment was not addressed in the document, as the proponent has suggested in their response. Table 5.2 does not represent the comment/response.