Canada-Newfoundland and Labrador Offshore Petroleum Board

EMCP Response to Comments from Regulatory Authorities, July 19, 2011

EMCP Comment 141: C-NLOPB 37

2) Response not acceptable. The wording "…the chances of …are very small" has been retained on page 14-17.

14) Response not acceptable. The sentence has not been deleted. It appears in Section 14.1.2.3.

EMCP Comment 143: C-NLOPB 39

It is possible that there may not be a rig locally available to drill a relief well. EMCP should discuss the scenario where a drill rig would need to be brought in.

EMCP Comment 144: EC 49

Response not acceptable. The July 20th response and the text in the revised Section 14.1 are different (i.e. 14 spills greater than 1 l and 10 spills greater than 1 l).

EMCP Comment 152: C-NLOPB 45

The proponent has adopted a probability of occurrence of 4.5 x 10 exp (-5) per well drilled (see page 14-10 of the CSR). This number is taken from the OGP Report No. 434-2 published March 2010 (see page 3 of that document) and is for operations of North Sea standard. This frequency is based on Scandpower Report No. 90.005.001/R2 published 2006.

OGP Report No. 434-2, on page 7 and 8 states that the Scandpower Report No. 90.005.001/R2 uses the most recent 20 years of data available; that their report explains how the analysis is done; that they eliminate irrelevant incidents; and that they make an adjustment for trend over time.

The proponent has indicated that the "reference to trend has been removed" and "prediction is based on the 20 year record to 2005..." but this is clearly not consistent with OGP document Report No. 434-2 which indicates that Scandpower adjusts for trend. C-NLOPB's April 19, 2011 comment indicated that Scandpower Report No. 90.005.001/R2 does not address, nor has the proponent explained, the statistical basis for the trend adjustment.

The proponent has not indicated whether or not Scandpower Report No. 90.005.001/R2 is the most recent available from Scandpower (although OGP states that Scandpower reviews this data annually). The proponent should determine whether or not there is a more recent report available from Scandpower.

Having the most recent Scandpower report in hand, the proponent should:
(1) Determine the most recent probability of occurrence applicable; and

(2) Either discuss the methodology used by Scandpower to adjust for trend (including the mathematical/statistical basis for determining the trend), or compare the adjusted and unadjusted frequencies to determine relevance.

EMCP Comment 154: C-NLOPB 47
See new comments provided on the revised Section 14.1.

Comprehensive Study Report - Section 14.1 (revised, track changes) July 2011

#	Section	Subsection	Page	Comment
1	14	14.1	14-3	Table 14-2 Typo: Note, line 4: "ferquencies".
2	14	14.1.1	14-4	Last Paragraph - The proponent states "…"extremely large" spills two of which occurred during development drilling…" but Table 14-3 shows only one during development drilling.
3	14	14.1.1.1	14-4 & 14-5	The proponent states "There have been two extremely large spills during offshore development drilling, so the frequency up to 2010 is (2/66,469) 3.0 x 10-5 spills per well drilled…" but Table 14-3 which only shows one extremely large hydrocarbon spill from a blow-out during development drilling. Likewise, on page 14-5, the proponent states "Up to 2010, five development-drilling blow-outs have produced spills in the very large spill category…" but Table 14-3 shows only 4 very large (including extremely large) hydrocarbon spills from a blow-out during development drilling.
4	14	14.1.1.2	14-5	The proponent states "…five very large hydrocarbon spills from blowouts during production and workovers (Table 14-3)" but, since Table 14-3 shows only 4 in the very large category it is not clear if this includes extremely large or not.
5	14	14.1.1.3	14-5	Paragraph 2 still refers to the 1979 Ixtoc I blowout as "the largest hydrocarbon spill in history". The statement should be revised in consideration of the 2010 Macondo blowout.
6	14	14.1.1.3	14-6	Paragraph 2 says that "a spill of the magnitude of the Deepwater Horizon blow-out is unprecedented." Given that the Ixtoc I spill was of the same order of magnitude (although, perhaps, lesser in

				absolute volume) this statement could be improved upon.
7	14	14.1.1.3	14-6	In the bulleted list, where the proponent says "frequency" they mean something different. For example, the thing they've calculated in the first bullet is not "a 0.12 percent chance over the drilling period" but a deterministic expected occurrence of 0.12 spills for the 40-well drilling period of 30 years. Of course this is not a realistic number since the real occurrence must be expressed as a whole number (0,1,2…). The rate in "event per year" is more useful and would be 0.12 ÷ 30 or $4x10^{-3}$ events/year.
8	14	14.1.2	14-7	The proponent states that "The number of blow-outs from development drilling is 63 (with four blow-outs from sulphur drilling remove)…" but I count 87 (91 reported less 4 sulphur) from the "Totals" line in Table 14-4.
9	14	14.1.2.2	14-10	Last Paragraph - The proponent says that, based on Table 14-4 "55 blow-outs occurred during production, workovers and completions" then calculates the frequency of occurrence as "76 blow-outs ÷ 235,000 well years" while I count 78 blow-outs in Table 14-4, and so does the proponent in the third paragraph on page 14-11.
10	14	14.1.2.3	14-11	Where the proponent says the predicted number of deep blowouts is 1.92×10^{-3} events, the conversion to a probability of 1-in-520, is not particularly meaningful. It would be appropriate to say a probability of $6.4x10^{-5}$ events/year (based on $1.92 \times 10^{-3} \div 30$).
11	14	14.1.3	14-12	Regarding "large spills" - the proponent states "In addition to the five from blow-outs noted in Table 14-3" but this does not agree with Table 14-3 for spills >10,000 bbl.
12	14	14.1.3	14-13	The final sentence of Paragraph 2 states that "spills occur less frequently in US waters compared with t e rest of the world". Either the reference/ justification for the statement should be provided, or the statement should be deleted.
13	14	14.1.6	14-16	Table 14-15 should be modified to include annualized probabilities for each type of event.
14	14	14.1.6	14-17	2nd Paragraph -The proponent has said things like "…over the 30 year production period…one very large oil well blow-out expected every 7,500 years of production" which I think means

				that they calculated a probability of a very large spill from a production blow-out over the life of the project was 1.333×10^{-4} events/year. That number can be calculated from line 6 in Table 14-15 if one divides the "life of project probability" (which is actually the probable number of occurrences for the project) by 30. This type of language (i.e. one event expected every 7,500 years) is not recommended, as it implies that the occurrence is expected once in 7500 years, whereas the reality is that the probability at any time is 1.333×10^{-4} occurrences/year.

Fisheries and Oceans Canada

Hebron Project Comprehensive Study Report – Spill Trajectory Modelling: ECMP Response to Comments from Regulatory Authorities

DFO Response – General Comments (Page 12)

- With regards to the statement: "*Non-linear effects are due to bottom stress or advection term. These terms are only significant in shallow water. Trinity Bay is generally too deep for these terms to become a dominant feature except near shore, where spatial scales are too small to consider.*" Despite the fact that Trinity Bay is deep, non-linear terms are important in strong horizontal gradients and strong currents. This occurs where there is upwelling along the northwest shore of Trinity Bay (for a southwesterly wind direction). Upwelling creates cold surface water (0°C) which contrasts starkly with summer surface temperatures of 10-14°C.

- In EMCP's response, the statement is made that: "*Spill simulations were not performed using storm event winds; however, the MSC50 wind hindcast includes storm generated winds in its hindcast data*". This is a short coming of the report. As the report does not cover oil spill scenarios under strong winds, there is potential to under predict maximum drift scenarios in Trinity Bay.

- With regards to the statement: "*Bay-wide oscillations in the circulation would have too high a frequency for the time scales considered in the oil trajectory modelling*", it is not a question of frequency, but a question of how far oil could be carried in one inertial oscillation period of roughly 16 hours. If this length scale is too small, it would be reassuring to see a quick calculation showing that inertial oscillations are not a factor.

Hebron Project Comprehensive Study Report Nearshore Bull Arm Spill Trajectory Modelling Report July 2011 Revision with Track Changes

General Comments

- Although a number of issues have been addressed thus improving the document, the main issue remains with the nearshore drift modelling from Bull Arm. The model applied is too simplistic and does not include coastal effects, even when the location in question is within the first baroclinic Rossby Radius of influence from shore (i.e., 5-10 km depending on seasonal stratification). Non-linear terms are not included in the ocean model and are considered a significant absence in the modelling activity.

  The validation plots with the observed currents in Bull Arm are very informative and helpful. It does show however, that the model error with respect to observations can range from 10 - 50 cm/s, which would translate into an additional transport of oil drift of 10 to 50 km per day. This leads to the conclusion that model results should be treated cautiously and that in the absence of more accurate modelling for Trinity Bay, the oil from an oil spill could potentially land on shore anywhere within the bay.

Specific Comments

Executive Summary (Page ii)

- The third paragraph in this section states that: "*Wind driven current simulations were conducted for eight wind directions, each using a constant wind speed of* 8 *m/s. During simulations, the wind forced currents were scaled depending on the actual wind speed and direction for each simulation time step, these scaled wind forced currents were added to the tidal current simulation to create a combined current*". This statement is confusing as the first sentence states that wind is constant at 8 m/s, however, the newly added second sentence indicates that actual wind speed was used, leading the reader to believe that the wind is variable. Please clarify.

Section 2.4 (Page 4)

- In the sentence, "*Wind data for near shore model simulations were obtained from two sources, a model hindcast near the Study Area, and observations from a previous GBS construction program near the Study Area*", it is suggested that "*model hindcast*" be replaced with "*output from grid point located near the study area from a large scale model hindcast*".

Section 2.5 (Page 15)

- In the second paragraph on this page it is stated that: "*Non-linear effects that may, for example, result in advection of momentum of other effects due to bottom stress are only significant in shallow water. Trinity Bay is generally too deep for these terms to become a dominant feature except near shore where spatial scales are too small to consider*". Contrary to this statement, non-linear effects can be a factor in Trinity Bay. Non-linear effects such as the advection of tracers like salinity and temperature are important particularly where there are strong currents and strong horizontal temperature and salinity gradients. This occurs in Trinity Bay during upwelling conditions on the northwest shore in the summer.

Figure 2.5-7 (Page 18)

- Model currents very closely follow wind. This is indicative of a linear relationship to wind, and does not seem realistic in Bull Arm where coastal trapped waves under varying wind scenarios would be expected. Additionally, there appears to be no "land effect" in the resulting model predicted circulation; this seems unrealistic in a sheltered cove such as Bull Arm.

Figure 2.5-9 (Page 20)

- It would be valuable to have these two plots overlaid so it can be seen how the model fits the data. By superimposing the print out versions, one can see model-data differences up to 50 cm/s for an event near January 21st. Model-data discrepancies appear to be around 10-20 cm/s leading to drift errors of 10-20 km per day.

Environment Canada

Environment Canada contingently accepts the oil spill trajectory modeling in order to complete the Comprehensive Study Report. This contingent acceptance is based upon Environment Canada having the opportunity to participate in the Oil Spill Contingency Planning exercise once the environmental assessment is completed.