Review Comment	Response
	In response to the comments provided on Section 14.1, we have provided a track changes version of a revised section 14.1 that addresses many of the regulatory review comments.
EMCP Comment 141: C-NLOPB 37	
***C-NLOPB 37 a)*:** 1) The original C-NLOPB comment was that "*Statistical background data and its treatment should be in one section and exposure calculations should be in a different section (i.e. Drilling, Production/Maintenance).*" EMPC responded that "The statistical background data are used in determining exposure calculations. These exposure calculations are discussed in Sections 14.1.1.1 (Blow-outs during Drilling) and 14.1.1.2 (Blow-outs during Production and Workovers)." Some additional detail or clarity may be appropriate here.	1) Revised Section 14.1 should provide additional clarity. The data are presented in a manner to assess the probability of spills occuring during the life of the Hebron Project.
2) The proponent persists in using qualifying words (ex. unlikely, small) without defining them. This is inappropriate and can only lead to misunderstanding on the part of the public. For example, on page 14-1 the proponent says the following, "*An oil spill could also occur, although unlikely, during offloading and/or transfer of crude oil at the offshore loading system (OLS)*." However, the term " unlikely" is not defined in terms of a probability of occurrence either by activity or for the project life. These types of spills have occurred in C-NLOPB jurisdiction and are not considered a remote possibility by the C-NLOPB.	2) Qualifying words have been removed.
3) On page 14-7 the proponent writes that there is *"…an extremely low risk of a deep blowout…"* but has not defined what that means. The proponent's calculated probability of a deep	3) The phrase **"the chances of having an hydrocarbon discharge associated with the blowout are extremely low"**

Review Comment	Response
blowout is "*9.6 x 10^{-3}, or a probability of 1-in-100*" on page 14-9, followed by "…*the chances of having an hydrocarbon discharge associated with the blowout are extremely low*." The proponent should either clearly define these qualifying words or delete them wherever they occur in relation to spills.	has been deleted.
4) EMPC should consider bringing Table 14-3 data into tables in 14.1.1.1 and 14.1.1.2 separately for drilling and production phases (EMPC has improved this table… see EMPC response to comment 148).	4) The Table has been revised to include Duration and Intervention Method.
5) Table 14-2 and Table 14-4 contain general information about spills from blowouts and should be discussed under 14.1.1 rather than 14.1.1.1. However, the information from 14-4 may be brought forward to separate tables under 14.1.1.1 ad 14.1.1.2.	5) Table 14-4 provides a listing of small spills in the US GOM and is appropriate for section 14.1.2, which discusses small spills.
6) In section *14.1.1.1 Blowouts During Drilling* on page 14-8 of the CSR the proponent, in the first paragraph starting on that page (line 5 of the text on that page), begins a discussion of the probability of accidental hydrocarbon spills associated with production, workovers and wireline operations. This discussion continues for 6 paragraphs, is followed by two paragraphs discussing blowout risks during drilling, and then another 3 paragraphs about risks during production. This jumble is difficult to interpret, especially since the discussion of blowout frequency during production and workovers belongs in 14.1.1.2.	6) These paragraphs have been revised.
7) Is the title of Table 14-7 meant to read "Deep" instead of "Shallow." The discussion in the last paragraph on page 14-7 suggests that Table 14-6 is derived from the data in Table 14-7 and, as such, Table 14-7 and its discussion should precede Table 14-6 and its discussion.	7) The text is correct as stated. Table 14-6 compares North Sea to U.S., establishing a lower rate for the North Sea and Canada (based on the two-barrier rule). Table 14-7 establishes a decline in rate over time and the subsequent paragraph confirms this and establishes the frequency number to be used for Hebron.

Review Comment	Response
8) Section 14.1.1.2 repeats some of the background "production related" discussion provided in 14.1.1.1. EMPC should rewrite 14.1.1.1 and 14.1.1.2 so that the information is located in the appropriate sections. EMPC should review the production related discussion in 14.1.1.1 and 14.1.1.2 to ensure they are consistent and redundancy is removed.	8) The text has been modified to address this comment.
9) The title of section 14.2 in inappropriate since "Major" is not a word defined by the proponent. The proponent should either use defined terms (see Table 14-2) or qualify the term major in the first sentence of this section (i.e. Major includes spills >1000 bbl)	9) The title of Section 14.1.2 has been changed to "Large," which is defined as > 1000 bbl.
10) In section 14.1.2, the proponent has relied heavily on MMS OCS data for frequency of spills >1000 bbl. Is there no information available from other sources (i.e. UK and Norwegian North Sea)?	10) The MMS OCS data set is more comprehensive than other data sets. Other sources of data do not provide the data to the same level of detail. U.S. statistics are appropriate as there is a comparable level of regulatory scrutiny, and similar practices to those in Canada.
11) The discussion in section 14.1.2 is all brought forward in terms of "spills/well-year" and it is unclear that this includes or excludes spills during drilling which have been expressed in "spills/well".	11) The exposure variable used here is well-year, based on the MMS statistics. It does not include drilling-related spills. The text has been modified to note this.
12) The use of "to present" in the table titles throughout 14.1 is inappropriate as there is some actual cut-off date that the proponent has used for this data. The reader is left to infer this date.	12) Table titles (and data) have been modified to year-end 2010.
13) In section 14.1.4, the Table 14-14 is confusing and does not effectively summarize the data. The >150,000 bbl class of spills is omitted. It is unclear if the >10,000 bbl class includes the >150,000 bbl class (which it should if the >150,000 bbl class is omitted from the table). The some blowout frequencies are	13) The table has been revised to include the smaller spill classes. The table summarizes the probabilites for blowouts and includes all spill class sizes. Spill statistics are compiled based on the activities ongoing on a plaform. For the Hebron Platform this

Review Comment	Response
expressed in rate per well drilled while some blowout frequencies and the platform spills are expressed in rate per well-year. The conversion to annualized probability is not easily understood since the "probability over the project life column is omitted". Spills of less than 1 barrel and less than 1 litre are omitted from the table although they will be the most frequent incidents.	includes drilling and producing operations. For drilling operations, blow-out probability estimates are typically expressed as rate-per-well-drilled. For producing operations, spill statistics are typically expressed as rate-per-well-year. For Platform spills, it includes all spill class sizes up to 10,000 barrels. Spills greater than 150,000 barrels are not included as it would duplicate the statistic for blowouts >150,000. See response to Comment C-NLOPB 37 b) (below) regarding very small spills.
14) The last sentence of section 14.1.4 should be deleted.	14) The last sentence has been deleted
***C-NLOPB 37 b)*:** The original C-NLOPB comment was that "*There does not appear to be a discussion of small (<1 bbl) spills.*" EMPC responded that "The historical record small spills in NL waters, with categories for "Spills Greater Than 1 L and Less Than 159 L (1 bbl)" and "Spills of 1 L and Less", for the years 1997 through 2009, is presented in Table 14-13. **The text on page 14-13 (June 2010 CSR) will be revised as follows:** "The C-NLOPB also provides a statistical record of spills of greater than 1 L but less than 1 bbl (159 L), and of spills of 1 L and less. These are presented in Table 14-13. As in the previous category of spill size, a disproportionate number of these spills occurred in the first three years of operations, so it is reasonable to focus on the more recent years of production experience – *2000 to 2010*. For these years (*2000 to 2010*), there were a total of *452* producing well-years, with *86* spills in the 1 to 159 L category, and *218* spills less than 1 L. Note that the totals in Table 14.3 indicate all spills from 1997 to *2010*."	The revised Section 14.1 includes a discussion of small spills referenced in the comment and the summary table (Table 14-15) includes the probability summary for small spills.

Review Comment	Response
The section 14.1.3 discussion of spills <1000 barrels is incomplete and the proponents proposed revision of February 22, 2011 is not sufficient. The probability of spills of size range ≤ 1 litre and 1 litre to <1000 litres should be explicitly stated in comparable units (spills/well-year). This information should be included in Table 14-14.	
EMCP Comment 143: C-NLOPB 39 The original C-NLOPB comment was that "*The CSR should not only consider how long it may take to drill a relief well but also the time required to mobilize a rig.*" EMPC responded "See response provided in 142-C-NLOPB 38." The spill scenario described in the response to Comment 142 is based on a drilling rig being available locally. The implication from this statement is that the proponent will ensure it has access to a suitable drilling rig through out the life of the project. If a drilling rig will not always be available locally, the proponent should expand the scenario to include the time it would take to secure and for the rig to arrive at location and begin drilling a relief well.	Neither the CEAA nor the RAs have prescribed a blowout scenario in support of environmental assessment. For the purposes of the Hebron Project CSR, the Operator selected a plausible low-probability spill scenario for the purpose of oil spill trajectory modelling. The Proponent concedes that different scenarios could be theoritically contemplated. However, we are confident that the scenario described represents a reasonable basis for undertaking an environmental assessment. The selected scenario should not be intepreted as commitment by the Operator to a specific response plan. The Operator intends to develop, in accordance with regulatory requirements, contingency plans to address offshore spill events.
EMCP Comment 144: EC 49 The original C-NLOPB comment was that "*There have been at least 6 incidents in 2008-2009 of spills involving the OLS from the 3 active oil fields off Newfoundland. The proponent should quantify the risk associated with potential incidents involving the OLS."* The proponent has not quantified the risk associated with spills from the OLS in units comparable to other parts of Section 14 (spills/well-year). They have not expressed a likelihood of such spills over the life of the project.	OLS spills are now included in Section 14.1, but are not included in the "predictive" analysis. It is difficult to make predictive analyses with a very small data set (one spill greater than 1 bbl, zero spills greater than 1,000 bbls, and 14 spills greater than 1 l, as per C-NLOPB spill statistics up to 2010).

Review Comment	Response
EMCP Comment 146: C-NLOPB 40 The original C-NLOPB comment was "*Is the concept safety analysis (CSA) being prepared.* *A)The spill/blow-out frequency estimates from the CSR should agree with the CSA.* *B) The data on wells drilled with ExxonMobil as operator from 1999-2009 should be presented to give a snapshot of spill/blow-out performance.* Response a) is acceptable. The C-NLOPB will review CSR and CSA for consistency. Response b) should be incorporated into Section 14 of the CSR.	A) Noted. We compared the probability analysis in both reports and offer the following comparison. A similar analysis on blowout frequency was undertaken in the Part 2 document of the Development Plan - the Concept Safety Analysis (CSA). There are some differences in the data presented in the CSA compared to the CSR, primarily related to a basic difference in their objectives. The purpose of the CSA is to provide a safety assessment, and therefore includes separate blowout frequencies for the drilling phase, the production phase, and for various unit well operations (i.e., completions, workovers, wirelining) during production. The main data source is IAOGP (2010), which summarizes North Sea and worldwide accident statistics. The focus of the accident analysis in the CSR was on the environmental threat of drilling and production operations, and provides estimated frequencies of spills during drilling and production operations. The frequencies are expressed for various spill sizes as spill magnitude and is of interest for spill impact assessment. IAOGP (2010) does not provide a breakdown of accidents by spill size, so various other data sources are used. The following provides a brief comparisons between the two analyses. **Accidents during Development Drilling**: Based on data in IAOGP (2010), the CSA estimates a blowout frequency of 4.8×10^{-5} per well drilled for Non-HPHT (high pressure, high temperature) Oil Wells. This compares well with the data presented in the CSR, based on Scandpower (2000) and Scandpower (2006); therefore, the same frequency is used in the CSR for the overall frequency of blowouts during development drilling. **Accidents during Drilling Categorized by Spill Size**: The

Review Comment	Response
	data contained in IAOGP (2010) does not allow such a breakdown per spill size; therefore, the analysis in the CSR is based on the overall blowout record worldwide. This analysis is likely conservative, as it is not restricted to operations conducted according to what is referred to in the CSA as the North Sea Standard (which is observed in Canada) and does not reflect declining spill rates in recent decades. The data indicate a spill frequency during development drilling of 7.5×10^{-5} per well drilled with a spill volume of greater than 10,000 barrels, and 3.0×10^{-5} per well drilled for greater than 150,000 barrels. This is similar to the overall blowout frequency of 4.8×10^{-5} per well drilled and is likely conservative for the reasons stated above. **Accidents during Production Categorized by Spill Size:**. The CSA contains data from IAOGP (2010) with accident frequencies per unit operation, but with frequencies expressed per operation (i.e., per well completed, per workover, per wireline job). For the analysis in the CSR, the raw data in IAOGP (2010) is combined and averaged over the entire record of well years, and indicates a total blowout frequency of 1.85×10^{-4} blowouts per well year as a result of these unit operations. For production / workover blowouts per spill size, actual worldwide accident statistics are used to estimate 2.0×10^{-5} accidents per well-year with a spill volume of greater than 10,000 barrels, and 8.0×10^{-6} per well-year for greater than 150,000 barrels. Again, this probability is likely conservative for the reasons stated in the previous paragraph. B) The CSR will include the text, as referenced in the comment, in Section 14

Review Comment	Response
EMCP Comment 147: C-NLOPB 41 The original C-NLOPB comment was "*Please provide the reference for the definitions in Table 14-2. Also, SI units (i.e. m^3) should be used and intervals should be reported as ranges (i.e. large = >1000 bbl to <10,000 bbl).*" The response should be incorporated into Section 14 of the CSR.	The text (and table) have been incorporated into the CSR.
EMCP Comment 148: C-NLOPB 42 The original C-NLOPB comment was "*Is this data set up to date? Table does not appear to be broken down by classes set out in Table 14-2.*" The response should be incorporated into Section 14 of the CSR.	The text (and table) has been incorporated into the CSR.
EMCP Comment 149: C-NLOPB 43 The original C-NLOPB comment was "*Please review for agreement with Table 14-3.*" The response should be incorporated into Section 14 of the CSR.	The text has been incorporated into the CSR.
EMCP Comment 150: C-NLOPB 44 The original C-NLOPB comment was "*Data are poorly reference. Please refer to Chevron work for that year. The data should be better documented or links to all base data should be provided for verification.*" The response should be incorporated into Section 14 of the CSR.	The text has been incorporated into the CSR.
EMCP Comment 152: C-NLOPB 45 The original C-NLOPB comment was "*The CSR should expand the data set used for blow and spill analysis to include data as close to 2010 as possible. Also, the statistical analysis showing*	The data have been updated to include Scandpower (2006), as summarized in IAOGP (2010). The data are based on the 20-year record to 2005. These are the most recent data available, as referenced in the IAOGP (2010).

Review Comment	Response
that population is different statistically should be provided." Page 4 of the Scandpower (2006) report states; "The time period in focus is 01.01.84 - 31.12.03 for the frequency calculations." The proponent has improved the data set by including two more years of data. There is potentially an additional 7 years of data that could have been included in the analysis. The proponent has not satisfactorily addressed the request to expand the data set to include data as close to 2010 as possible.	
The Scandpower report cited does not address, nor has the proponent in its response explained the statistical basis on which the adjustment due to trend is based. Without an understanding of the basis for trend adjustment based on years it is difficult to see how the formula can be used to show there is a decreasing trend. As per the request, the proponent should provide supporting information or conduct a documented statistical analysis to show a decreasing trend. A documented statistical analysis is one which shows the mathematical and statistical basis on which the analysis is based.	Reference to this trend has been removed. The prediction is based on the 20-year record to 2005, summarized in IAOGP (2010).
The proponent states in their response that: "A more recent analysis by Scandpower (2006), summarized in IAOGP (2010), confirms the reduced frequencies in recent years." The proponent should reference exactly where in the cited documents that this conclusion is made. A definite conclusion of reduction of frequencies was not found in either document.	Reference to this trend has been removed. The prediction is based on the 20-year record to 2005, summarized in IAOGP (2010).
Please properly reference where the statement: "The data, based on the 20-year record to 2005, indicate a deep blow-out frequency of 4.8×10^{-5}.", is in the reports. Whenever figures or statistics are quoted, they need to be properly referenced as to not only the source but also the page number in that source.	**Reference**: International Association of Oil & Gas Producers. 2010. Blowout frequencies. Report No. 434-2. Page 3. The above reference will be noted in the CSR text as a footnote.

Review Comment	Response
The proponent states: "Using this figure results in a probability of one blow-out for every 21,000 wells drilled." What figure is being referred to and where does the one in 21,000 come from?	One in 21,000 is the inverse of 4.8×10^{-5}, as stated in the text.
How is the 1-in-520 probability derived? Either quote the source where the figure is obtained or show how the probability was derived.	One in 520 is 1-in-21,000 times 40 (wells), as stated in the text.
How did the proponent arrive at 1/16,000 for item one of table 14-5?	The table has been revised to include the life of Project probability and not the annual probability.
What is meant by "virtually no chance of hydrocarbon release?"	This text has been deleted.
EMCP Comment 153: C-NLOPB 46 The original C-NLOPB comment was "*Previously mentioned statistical testing is required to allow use of 0.51 factor and 64% as a useable ratio.*" See response to Comment 152.	The reference "0.51 factor and 64%" have been removed.
EMCP Comment 154: C-NLOPB 47 The original C-NLOPB comment was "*The calculations here may be supported in the data but the presentation is not easily followed (i.e. A table corresponding to classes in Table 14-2 with frequency numbers). The probability of a gas blow-out is 0.0234 over life of project. 1 in 1,300 per year is a bit disingenuous.*" The EMCP response is responsive but the comments provided under C-NLOPB 37 may still apply.	Section 14.1 has been revised to reflect comments received and is attached.
EMCP Comment 155: C-NLOPB 48 The original C-NLOPB comment was "*What is a "major" platform spill. Define "major" or use one of the classifications from Table*	Noted.

Review Comment	Response
14-2." EMCP responded that "Section 14.1.2 will be renamed as follows: Large Platform Spills". Even with the use of "Large", the titles of 14.1.2 and 14.1.3 are not consistent with what they represent. Perhaps *Platform Spills >1000 bbl* and *Platform Spills < 1000 bbl* would be more appropriate	
EMCP Comment 166: C-NLOPB 54 The original C-NLOPB comment was "*It should be stated if the vessel used for the project would be pollution class and not allude to possibilities.*" Does "meet current pollution class standards" mean vessels will be certified to pollution class standard?	The Operator will ensure that vessels contracted to provide platform stand-by duties have an oil recovery class notation.
Comment 179-DFO F6) This response is considered adequate.	Noted.
Comment 179-DFO G) This response is considered <u>adequate, provided the following comments are addressed</u>: As new information becomes available on the events in the Gulf of Mexico, it is important that ExxonMobil commits to taking this information into consideration during future plans concerning the protection of fish and fish habitat, as appropriate.	The Operator will review information that may be available regarding the Macando spill in the Gulf of Mexico and will consider this information, where appropriate, in terms of protection of fish and fish habitat in oil spill response planning for the Hebron Project.
Comment 179-DFO G2) This response is considered adequate.	Noted.

Review Comment	Response
Hebron Project Comprehensive Study Report: Nearshore Spill Trajectory Modelling Report	
DFO Response – General Comments	
The assumptions used during the modeling of ocean circulation in the area causes concern regarding validity of the results for retention of an oil spill in Trinity Bay. For instance, there is no reference to any *in situ* oceanographic measurements taken to validate or justify the modeling approach in HYDROMAP. Furthermore, there are numerous important features regarding regional oceanographic circulation that are not mentioned in the document, and therefore it is assumed that they were not incorporated in the circulation modeling. These features include: • Realistic water column temperature and salinity stratifications in Trinity Bay and Conception Bay during winter and summer. (This affects the strength of circulation at the surface of the water column); • Non-linear terms in the equations of motion, specifically advection of momentum. (This can create gyre circulation features in Trinity Bay that would affect residency times of oil within the bay. They also enhance upwelling and downwelling effects due to wind forcing by displacing surface water); • Surface wind generated waves that induce Stokes drift. (This could move oil particles to shorelines quickly); • Realistic wind scenarios, including strong summer southwesterly wind events; and • Inertial oscillations caused by variable winds. Inclusion of these features may alter the modeling results. Please provide a rationale as to why these features were not incorporated and why the modeling approach was not validated	A comparison of the Bull Arm hydrodynamic model predictions with the current data collected by Seaconsult at the site of the Hibernia GBS in January and February 1991 has been undertaken and is presented in the final ASA technical report. No current data from Trinity Bay have been identified for model comparison. Lack of major river flow in the region means that stratification is mainly from solar heating. Such stratification may develop in summer, yet the effect is not significant for accurately simulating the trajectory and fate of surface oil spills. 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. The SIMAP model calculates Stokes drift using the wind field specified for the spill simulation. In this case, the winds come from the MSC50 time series. Spill simulations were not performed using storm event winds; however, the MSC50 wind hindcast includes storm generated winds in its hindcast data Bay-wide oscillations in the circulation would have too high a frequency for the time scales considered in the oil trajectory modelling. The revised report will provide more information regarding hydrodynamic model validation.

Review Comment	Response
with observations.	
DFO Response - Specific Comments	
Section 2.4: Wind Data Although downscaling methodology for wind from MSC50 grids to the Bull Arm location is reasonable, there is no mention of the MSC50 winds being used in model simulations. Please provide clarification.	The MSC50 winds were used in the spill modelling. This has been clarified in the report.
Figure 2.4-2 Please provide the location of M6012874 on a map.	This location is shown in the Bull Arm modelling report, Figure 2.4-1.
Appendix C: Figure C5 The main figure and the accompanying inset map do not appear to match up. Please correct this error.	The wrong inset map was included. The correct map is included in the revised report.
Hebron Project Comprehensive Study Report: Offshore Spill Trajectory Modelling Report	
C-NLOPB Response	
1. Generally the subject report is a superior effort to that originally submitted with the CSR.	Noted.
2. Additional information should be provided to explain the well blowout rates chosen as input to the model simulations.	**The following text, will be included in the Oil Spill Trajectory Modelling Report.** Two blow-out scenarios were included in the spill trajectory modelling: a platform case; and a subsea case. The scenarios presented consider the rate at which oil could flow under a well blow-out scenario for the Hebron field. This rate was derived based on existing knowledge of Hebron crude

Review Comment	Response
	properties, known reservoir properties for the Hebron field and assumptions made for specific well conditions at the time of the blowout. Reservoirs differ greatly from one to another and their properties (pressure, volume, oil / gas ratio, etc.) are unique to each reservoir. Therefore, the flow rates described below reflect the properties of the Hebron Field. Historical flow rates from other spill events are not predictive of what would happen in other reservoirs; however, they can be used to put specific events into perspective. Flow rates for Hebron platform wells were estimated at 5,600 m^3/d (approximately 35,000 bbl/d) based on the Hebron reservoir properties, assuming a blow-out to atmosphere (e.g., approximately 70 m above mean sea level) and accounting for the viscous (thick - difficult to flow) nature of the oil from this reservoir. Flow rates for MODU wells were estimated at 3,200 m^3/d (approximately 20,000 bbl/d) based upon the properties of its reservoir, a subsea blow-out (approximately 90m below sea level) and a lighter, less viscous oil. ExxonMobil's well control philosophy is focused on prevention using safety / risk management systems, management of change procedures and global standards. ExxonMobil has a mature Operations Integrity Management System (OIMS) that emphasizes relentless attention to Safety, Well Control and Environmental Protection. This includes proper preparation for wells (well control equipment inspections / tests), detecting the influx early, closing-in the well efficiently (personnel training / drills) and circulating out the kick with kill weight mud in a controlled manner. In the event of a blow-out, ExxonMobil's primary objective would be to stop the flow as quickly as possible. For both surface and subsea wells, this would involve shutting in at the wellhead and

Review Comment	Response
	killing the well through the wellhead. Relief well drilling, and the subsequent dynamic kill, is considered a back-up strategy in the event shut-in and/or killing through the wellhead is not possible or is unsuccessful.
3. Further information is required to explain the rationale for the number of stochastic model runs performed for each simulation.	Each simulation of the spill scenarios using the stochastic model consisted of 100 individual runs of the spill model, each with a randomly selected start time so that a different time slice of wind data was used for each model run. In order to demonstrate that 100 simulations is sufficient to obtain an adequate sample of the wind within each of the seasons, plots of the wind data from the entire 30 year wind record are compared with plots of the wind data sampled by the stochastic model for each season. These wind plots, shown in Figures 3.1-1 through 3.1-3, demonstrate that the 100 stochastic model simulations performed for each spill scenario adequately sampled the relevant environmental data within the season the spill began, but also within the subsequent season. For example, in Figure 3.1-3, the bottom two wind roses show good agreement between the entire wind record and the wind sampled by the spill model for the spring months for the 120 day spills started in the winter.
4. It is unclear why the stochastic model runs were not performed for a longer period to correspond with the predicted persistence of Hebron crude in the receiving environment. The rationale for this approach should be explained in detail	Extended period stochastic model simulations have been completed as follows: • 30 day blowout run for additional 200 days • 100 day blowout run for additional 200 days • 120 day blowout run for additional 200 days The results from these simulations provide a prediction of the fate of all oil remaining on the surface at the end of the blowout discharge. The attached document, “Addendum – Results from Simulations of Oil Spills at the Hebron Well Site” provides additional information regarding these extended run simulations.

Review Comment	Response
	The results of these extended simulations (up to 10.5 months) demonstrate that: • Surface oil within the model domain decreases to zero within 2 to 4 months after flow stops • There is a low probaility for a small amount of oil (up to 0.7% of total oil spilled) to reach the Newfoundland shoreline as a 0.01 mm sheen between 22 and 275 days following start of flow.
5. The rationale for choosing TAR Code G (0.01 mm thickness) for the thickness cut-off of the stochastic simulations requires considerable justification. This is considerably thicker than "sheen" thickness and potentially could considerably underestimate the area over which seabirds could be affected.	The 0.01 mm (10 micron) surface oil thickness was selected because it is sufficient to provide a lethal dose to seabirds provided they move through the slick a minimum distance (French-McCay, 2009). Smaller surface oil thicknesses that may result in a sub-lethal dose to seabirds were not considered. French-McCay (2009) provides a good summary of recent work and discusses the details of wildlife oiling from surface slicks. French-McCay, D., 2009. State of the Art Research Needs for Oil Spill Impact Assessment Modeling. Proceedings of the 32nd AMOP Technical Seminar on Environmental Contamination and Response, Emergencies Science Division, Environment Canada. Pages 601-653.
DFO Response	
Although the Spill Trajectory Model used in the offshore may have been validated in other regions, it has not been validated for the Newfoundland Shelf and adjacent deep ocean. The report does not provide any validation of the model ocean	The SIMAP model has been validated against actual spill events. Reports describing that validation can be provided. The purpose of a model is to be able to make predictions where spills have not occurred. Every reasonable effort is made to use

Review Comment	Response
currents for the study area or how winter ice was dealt with in the circulation model. Furthermore, insufficient detail is provided on how the model output was used and which HYCOM model data was used.	the best available environmental data to drive the model and to validate those data where possible. A more complete description of the HYCOM model ocean currents, current and sea ice interactions and how the HYCOM model data were implemented in the oil spill model have been included in the revised modeling report.
DFO would like to request the following information: • The frequency and resolution of the HYCOM ocean model run output used, (i.e. full model resolution and daily averaged output or hourly output)	The study employed the full resolution of the HYCOM model ($1/12^{th}$ degree spacing) with daily averaged currents. These details are included in the final technical report
• More detail regarding how the runs were implemented. This is needed before DFO is able to comment on the acceptability of the approach used for these oil spill fate models	It is not clear what is specifically being asked; howevermore details on the selection of the input data, specification of the spill scenarios and important assumptions have been included in the revised oil spill trajectory modelling report.
• Justification as to why MSC50 winds were used as opposed to the original HYCOM wind forcing. Using the original HYCOM wind forcing would have made for a more consistent approach	ASA's approach is to use the best data available and the MSC50 wind data are the best for the purposes of spill risk assesment in eastern Canadian waters. They have superior coverage to the HYCOM data, especially near shore and have better temporal and spatial resolution within the Canadian east coast region. There is nothing inconsistent with the approach taken.

• More detail on the model drift runs, specifically with regards to:
  • The number of simulations run;
  • How the HYCOM system was used, (i.e. static currents or variable currents);
  • If a wind driven ocean component of drift was
	• The stochastic model simulations consisted of 100 runs for each spill scenario. A comparison of the wind data obtained from the MSC50 database with the data sampled in the stochastic model runs have been provided in order to demonstrate that wind data were adequately sampled by the oil spill model.
	• The HYCOM currents employed were spatially and

Review Comment	Response
added to the HYCOM model output; • What defines the characteristics of a SIMAP model run in winter and summer; • Define how runs were set up in detail; and • How ice was incorporated in the SIMAP model runs.	temporally variable and consisted of a daily mean current values on the full resolution HYCOM grid with 1/12th degree spacing. • The SIMAP model incorporates forcing from a spatially and temporally varying wind and current field to advect surface oil. The winds are from the MSC50 database and cover a 30-year period. • Additional details on the spill scenarios and the various model input parameters have been provided in the final technical report.
Figure 2.6.1 It appears that this figure includes information for the Gulf of St. Lawrence, a portion of SW Newfoundland Shelf, Scotian Shelf and Gulf of Maine only, therefore it cannot represent the situation for the entire east coast.	This figure shows ice coverage for eastern mainland Canada but excludes the eastern Newfoundland coast. The appropriate figure have been provided in a revised report showing the same trend in ice coverage.