TERRA NOVA 2010 ENVIRONMENTAL EFFECTS MONITORING (EEM) PROGRAM REVIEW

Context

Science Branch (NL Region) has been asked by the Marine Habitat Protection Section, Ecosystems Management Branch, to review the report entitled "*Terra Nova 2010 Environmental Effects Monitoring (EEM) Program*". The Terra Nova EEM program was established to fulfill commitments made in the Terra Nova Environmental Assessment (EA). The main goals of the program have been to assess the accuracy of predictions made during the EA and determine the zone of influence of project contaminants. The first, second, third, fourth, fifth and sixth EEM Programs were conducted in 2000, 2001, 2002, 2004, 2006 and 2008. This report discusses the results of the seventh EEM Program, conducted in the summer and fall of 2010, and relates these to findings of previous EEM years (2001, 2002, 2003, 2005, 2007, 2009) and to the baseline (1997) program.

The findings of the SSRP will assist to formulate a response from the Marine Habitat Protection Division to the Canada-Newfoundland Offshore Petroleum Board (CNLOPB), on the submission of the results of the seventh EEM Program.

The Marine Habitat Protection Section (NL Region) sent a request to Science Branch on December 6, 2011 and a response was requested by January 9, 2012. A Science Special Response Process (SSRP) was used due to the short deadline for advice.

The objectives of the review were 1) to provide an expert scientific review of the 2010 EEM report for accuracy, completeness, and issues in the context of the previous EEM reports for this program, 2) to determine if the conclusions outlined in the 2010 EEM report are valid, justifiable and defensible based on the data presented 3) to the extent possible using information presented in the current report, relate and comment on the findings of the 2010 EEM report to data obtained in the baseline study and previous six EEM submissions 4) outline any suggested changes, errors and/or deficiencies in the 2010 report.

The monitoring program itself was found to be comprehensive and detailed while the results and their interpretation were clear and well founded. No significant issues and no substantive omissions were noted in the document, and it was recommended that future monitoring be continued in line with the proposed recommendations.

This Science Response report is from the Fisheries and Oceans Canada, Canadian Science Advisory Secretariat, Regional Science Special Response Process (SSRP) of December 6, 2011 to January 9, 2012 on the Science review of the Terra Nova EEM Program 2010.

Analysis and Responses

Focusing on water and sediment indices as well as fish health and quality of fish products, the Terra Nova EEM Program continues to be comprehensive and detailed. The methods are clearly explained which helps ensure the reader understands both the results and the interpretation. The statistical analyses of the samples from the 2010 EEM program have been carefully done and are appropriate for a monitoring program of this complexity. The report finds that little effect of ecological or fisheries significance has been observed to date at the Terra Nova site. The interpretation of the results and statements of the report are supported by the findings and are in line with literature.

Similar to studies in other regions, localized disturbances have been found on sediment biota, with the abundances of some organisms increasing and others decreasing. However, overall biomass appears not to be affected. Even if affected in a positive or negative sense, given the small area of disturbance, any effects on fish productivity would be expected to be negligible. There appears to be no evidence to date to suggest that produced water is affecting sediment biota. Further monitoring will be of interest in this regard.

Given results in 2010, it will also be of interest in future EEM surveys to observe if chlorophyll is increased somewhat towards the centre of the development. Likewise if the induction of Mixed Function Oxygenase (MFO) in fish continues to be commonly found at a low level. Both of these indices may be influenced by produced water and thus represent useful biomarkers for such discharges.

The magnitude and extent of measurable drilling waste components in sediments have decreased as have the levels of >C10-C21 hydrocarbons associated with the synthetic drilling fluids in scallop viscera. Interestingly the levels of barium in scallop viscera and muscle tissue still appear to be increasing even though >C10-C21 hydrocarbons have deceased. These differences may reflect the fact that the PureDrill IA35-LV base oil fluid is decomposing as expected while the barium associated with the drill wastes is being dispersed but remains elevated within the study area. The difference between the extent of measurable effects in sediment and scallops may also be a function of the different spatial scales for the sample programs. Sediments are collected according to a gradient to background design while scallops are collected in transects around the fisheries exclusion zone.

Of key importance from a socio-economic fisheries perspective is the noted lack of effects on fish health and fish product quality, with any deterioration of the latter having severe ramifications for fisheries.

SUNCOR has obtained a considerable body of data in their surveys, and the recommendations for future monitoring programs are appropriate and should be implemented or continued. Given ongoing expansion of oil and gas development in the world's oceans, program results would be of considerable interest to industrial and regulatory principals and public bodies in other jurisdictions. Equally, there is a large body of data which would be of ecological, environmental and toxicological interest for other jurisdictions in general and the Northwest Atlantic in particular. Much of this data would be a valuable contribution to the open scientific literature.

Conclusions

The review of the Terra Nova 2010 EEM Program resulted in the following conclusions:

The EEM Program was noted as comprehensive and detailed, with no significant issues or substantive omissions in the document. The interpretation of the results from the 2010 EEM program were found to be well presented and explained, and in line with the literature.

The recommendations for future monitoring programs are appropriate and should be implemented or continued. The results of this continued monitoring will be of interest in a number of areas including the effect of produced water on sediment biota, changes in levels of chlorophyll as well as Mixed Function Oxygenase which may serve as useful biomarkers

It was also suggested that with increasing oil and gas development, the results of this ongoing EEM program would be of interest to other jurisdictions as well as of general interest to the scientific community.

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Sources of information

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