

OEER Georges Bank Review: Summary Document

Background

Georges Bank is located along the continental shelf of Eastern North America between the southern tip of Nova Scotia and Cape Cod, Massachusetts. The Bank is a biologically productive ecosystem that supports important commercial fisheries in Canada and the United States and provides habitat to a wide range of marine fish, mammals, corals, and other organisms.

In 1988, a moratorium was placed on offshore petroleum activities on the Canadian portion of Georges Bank until the year 2000. This decision was primarily driven by concerned local fishing interests and residents. Based on recommendations made by an independent review panel, the Minister of the Nova Scotia Petroleum Directorate and the Minister of Natural Resources Canada announced on December 22, 1999, that the Georges Bank moratorium would be extended until December 31, 2012. This decision was made following a review of scientific studies that had been commissioned following the 1988 decision, and an extensive public review process. Earlier this year the government of Nova Scotia extended the moratorium until 2015 and more recently announced it is considering legislation that might put a permanent moratorium in place.

The federal and provincial governments recently launched independent science and technical reviews of the potential effects of oil and gas activities on Georges Bank. These reviews were intended to update government decision-makers on the current state of knowledge on the science and issues that led to the 1999 Panel's recommendation to extend the moratorium. It should be noted that these reports do not take into consideration the recent Deepwater Horizon incident, as the research was substantially completed prior to this major environmental incident occurring on April 20, 2010 in the Gulf of Mexico.

OEER Research

OEER Association (OEER) is an independent, not-for-profit association dedicated to fostering research and development related to offshore petroleum and renewable energy resources and their interaction with the marine environment. Consistent with this mandate, OEER contracted Stantec Consulting Ltd. to review decision factors that led to the 1999 Panel's recommendation to extend the moratorium and to reassess these factors in light of:

- new scientific knowledge of the Georges Bank ecosystem;
- changes to the socio-economic environment;
- updates to the regulatory framework which govern offshore petroleum activities;
- new scientific knowledge of environmental and socio-economic effects pertaining to offshore petroleum activities;
- progress in mitigation of potential effects; and
- existing and emerging technologies.

The 1999 Georges Bank Review Panel approached the issue of the moratorium extension as a yes-or-no question. This current OEER research assignment involved considering the factors that led to the 1999 decision to extend the moratorium which:

- Could now be mitigated;
- Could not now be mitigated; or
- Might be mitigated pending additional research.

The distinction between these two approaches is that the OEER research focused more on specific issues and potential research and mitigation which may result in potential co-existence of the fishing and petroleum industry on the Bank. The OEER research culminated in two documents: *A Preliminary Review of Environmental and Socio-economic Issues on Georges Bank* and *A Preliminary Review of Existing Technologies and Their Mitigative Potential in Offshore Petroleum Developments*. A summary of each is provided below.

A Preliminary Review of Environmental and Socio-economic Issues on Georges Bank

Since 1999, there has been scientific research focused on the Georges Bank ecosystem. There have also been numerous developments in technical procedures and practices employed by the offshore petroleum industry, as well as new regulations and guidelines in Atlantic Canada and other jurisdictions. These new developments in scientific knowledge, coupled with evolving environmental and socio-economic conditions, provide the background for an opportunity to reassess the risks of petroleum exploration and development on Georges Bank. In addition to reviewing the current state of knowledge on the Georges Bank ecosystem, and considering current socio-economic conditions of the region compared to 1999 conditions, specific issues associated with petroleum exploration and development were examined, including the following:

- Physical and behavioural effects on marine species from seismic noise;
- Drill muds and cuttings;
- Produced water;
- Accidental discharges (spills and blowouts);
- Loss of access and overcrowding;
- Greenhouse gas emissions and climate change; and
- Transportation issues (pipelines and tankers).

New scientific knowledge of the Georges Bank ecosystem was derived primarily from preliminary research conducted by Fisheries and Oceans Canada (DFO) and non-governmental agencies, and the fishing industry. A significant advancement in the knowledge of the Georges Bank ecosystem is the relatively recent multibeam bathymetric mapping of the Georges Bank moratorium area. Although these data are not publicly available at this time, applications related to this data, such as habitat mapping, represent a substantial advancement in the identification and protection of sensitive habitats.

In terms of the socio-economic conditions of southwest Nova Scotia, the fishing industry continues to be the single largest source of industrial employment and income in southwest Nova Scotia. The scallop fishery on Georges Bank remains the most important fishery in terms of landed value, accounting for 75% of total landed value of all fishing activity on Georges Bank in 2008.

Key updates to the regulatory framework since 1999 include updates to the Offshore Waste Treatment Guidelines, which resulted in more stringent disposal limits for drill waste and produced water. These guidelines continue to be reviewed and updated on a regular basis. Also subject to ongoing review and revision is the Statement of Canadian Practice with respect to the Mitigation of Seismic Sound in the Marine Environment. The Statement of Canadian Practice, which is a culmination of a scientific review of regulators and technical experts, was developed as a national code of conduct that sets out minimum standards for seismic surveys to minimize effects on marine species. The proclamation of the *Species at Risk Act* in 2002 and continuous updates to the *Canadian Environmental Assessment Act* also have implications for the planning, environmental assessment, and management of offshore petroleum activities.

Relevant research documents, socio-economic data, environmental assessments, environmental effects monitoring (EEM) results, and scientific research papers were reviewed to identify advances in scientific knowledge regarding potential environmental and socio-economic effects of offshore petroleum activities.

Results from EEM programs conducted offshore Atlantic Canada over the past ten years provide evidence of smaller zones of influence of environmental effects on the marine environment, than previously considered in the 1999 Panel Report. This is particularly true with regards to the extent of environmental effects associated with drill mud and cuttings and produced water discharges, which were predicted in the Panel Report using predominantly laboratory and modeling studies.

Information on the progress of mitigation related to these issues was also derived from environmental assessments and environmental effects monitoring plans, as well as through informal discussions with regulators and industry representatives.

Another major component of this study was to consider the economics of Georges Bank, both in terms of the fisheries and potential benefits associated with offshore petroleum activities. The estimated direct and spin-off economic impact of the fishing industry (harvesting and processing) was compared to the economic impact of the offshore oil and gas industry (development and production) at a provincial level. The total product value of fish processed in Nova Scotia was approximately \$789 million. The final product value of Georges Bank processed fish was \$179 million in 2008, accounting for 23% of the total provincial product value.

In 2008, the direct and spin-off gross domestic product values for oil and gas development was \$17 million and oil and gas production was \$1.3 billion at a provincial level, respectively.

Currently, the oil and gas industry has little direct impact on the economy of southern Nova Scotia, but numerous studies have provided some measure of its impact in the province as a whole.

Stantec completed a report in 2009, reviewing the impact of 12 years of natural gas production in Nova Scotia, which predicted royalties from the Sable Offshore Energy Project at between \$2.2-billion and \$3-billion over the lifetime of the project.

Following a review of the key issues and advances, recommendations for additional research were made. Key research recommendations include: site-specific studies which would further the knowledge of the Georges Bank ecosystem (*e.g.*, processing of multibeam data to assist in the protection of sensitive habitats and minimize resource conflicts; field surveys to document distribution of marine mammal species on Georges Bank); research to reduce uncertainty surrounding environmental effects of petroleum activities (*e.g.*, monitoring of seismic effects on marine mammals, fish and invertebrates); and advancement of effluent monitoring and predictive modeling techniques. Another area of uncertainty is related to accidental spills. Reviews of the April 2010 Deepwater Horizon blowout in the Gulf of Mexico, and the resulting oil spill, will provide lessons learned in spill prevention, spill response and effects monitoring.

A Preliminary Review of Existing Technologies and Their Mitigative Potential in Offshore Petroleum Developments

The objective of this research was to conduct an assessment of technologies and practices in offshore exploration, drilling and production that have been developed or are emerging since the 1999 Georges Bank Panel Review. Building on the risks identified in the 1999 Georges Bank Review Panel Report and reference documents, these technologies and practices were examined in terms of their suitability for application in the Georges Bank area.

Recent publications, environmental assessments, monitoring studies, regulations, policies, and discussions with technical experts pertaining to Georges Bank and/or technology in the offshore petroleum sector were used to characterize the technological advances, including progress in mitigation of potential effects.

Key issues raised in the Panel Report with respect to technological advances included the following:

- Seismic Surveys
- Drilling (Muds and Cuttings)
- Production (Produced Water)
- Air Emissions
- Petroleum Transportation
- Accidental Events

In the past decade, seismic technology has become more sophisticated resulting in improved drilling success, but concerns regarding environmental effects including interactions with commercial fishing remain. Innovations in alternative sound technology have occurred, but airguns are expected to remain the standard energy source in the seismic industry at least for the next decade. Advances in drilling practices include the replacement of oil-based drilling muds with synthetic-based drilling muds. Drill cuttings treatment technologies continue to be developed, allowing for compliance with more stringent regulatory limits for discharge at sea, however, many of alternative treatment methods are not yet considered to be commercially viable. Fate and transport models for the dispersion of drill muds and cuttings, as well as produced water

discharges have advanced, leading to an improved understanding of dispersion and effects. However, in the case of produced water, there is a need to develop cost-effective and sensitive monitoring protocols for regulatory use in environmental effects monitoring programs, in order to identify contaminants of in produced water streams which are rapidly dispersed in the open ocean environment. With respect to air emissions, the focus has been on minimizing greenhouse gas emissions through carbon removal and capture technology. There has been little progress to date on alternative energy sources for offshore use. Significant improvements in seabed mapping capabilities, through the use of multibeam and other survey methods, can improve pipeline routing to reduce engineering risks and avoid sensitive habitats. Additional work is required to refine the data that has been collected in the Georges Bank area such that it could be used to refine habitat mapping.

In spite of this declining trend, large blowout and spill events can still occur. On April 20, 2010, a fire and explosion occurred on Transocean's Deepwater Horizon drilling rig, killing 11 workers, while drilling an exploration well on BP's Mississippi Canyon Block 252, approximately 66 km offshore Louisiana in the Gulf of Mexico. At the time of writing this report, the cause of this incident was under investigation; initial efforts were focused on spill response and countermeasures. It is likely that monitoring programs will be conducted for years to come before the effects of the spill are fully understood.

Summary and Conclusions

Although the key issues identified by the 1999 Review Panel remain relevant ten years later, those same issues could be reasonably mitigated due to advances in scientific knowledge, mitigation and regulatory requirements in addition to technological advances. It is important to note that it is not realistic to assume that all risks can be mitigated by technological advances alone. As best available technology continues to evolve, improvements in regulatory requirements and research and development in the context of environmental effects and mitigation also serve to minimize risks and issues of concern. It is important to note as well that the intent of the studies was to gather information on issues related to Georges Bank that have emerged since the 1999 GB Review Panel Report and to assess the current state of knowledge. The review does not take into

consideration the recent Deepwater Horizon incident as the research was substantially completed prior to this major environmental incident occurring.

The last decade has brought considerable oil and gas experience to Atlantic Canada in the form of exploration and production activities, resulting in technological and scientific advances and regulatory improvements. Environmental effects monitoring programs for existing petroleum exploration and development projects have, in particular, led to an improved understanding of environmental effects in Atlantic Canada and have not demonstrated any significant environmental effects to the marine ecosystem, or on species at risk and their critical habitat. As best available technology continues to evolve, improvements in regulatory requirements and research and development in the context of environmental effects and mitigation will further serve to minimize risks and issues of concern.

Subsequent to the preparation of these reports, the provincial and federal governments decided to renew the moratorium for another three years without a public review. The information contained in the OEER research documents may be used to inform further management and decision-making surrounding key scientific and technological research areas that may continue to evolve during the moratorium period.

About OEER

OEER is an independent not-for-profit association dedicated to fostering offshore energy and environmental research and development including examination of renewable energy resources and their interaction with the marine environment. Members of the Association include Acadia University, St. Francis Xavier University, Cape Breton University and the Nova Scotia Department of Energy. Funding for OEER activities and research comes from grants from the Nova Scotia Department of Energy.