

**Ocean Energy Task Force
Subcommittee on Oil and Gas**

Friday, February 13, 2009

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**Maine Geological Survey
Augusta, Maine**

1) Update on assessments for Maine's Outer Continental Shelf and Georges Bank

Marvinney provided an overview of the potential for oil and gas reserves in the Gulf of Maine. In most of the Gulf of Maine (from the coast to the northern edge of the Georges Bank) the geology is an extension of New England's rockbound coast: high-grade metamorphic rocks and igneous intrusions that represent an unlikely province for hydrocarbon accumulations. These rocks have been heated well beyond the optimum conditions for hydrocarbon generation and preservation.

The geology of the Georges Bank shares many characteristics with the production areas on the Scotia Shelf, including general stratigraphy and geologic history. Ten exploration wells completed in the 1970s and 1980s were drilled to basement (the hard crystalline substrate beneath sedimentary units), but discovered no hydrocarbons. Summary reports by the Minerals Management Service (MMS) from that period indicated that most potential source rocks were thermally immature, those potential source rocks that were thermally mature were lean in organic carbon, and potential reservoir rocks had less than optimum porosity characteristics. During the same period, several exploration wells on the OCS off New Jersey had measured flows of gas.

Marvinney provided an update on OCS oil and gas assessments by the Minerals Management Service. The most recent MMS assessment of undiscovered reserves was completed in 2006 and indicates median values of 1.91 billion barrels oil and 17.99 trillion cubic feet of natural gas for the entire North Atlantic Planning Area, which extends from the border of Delaware to the border with Nova Scotia. Most of this potential is likely in the southern part of this planning area, given the exploration results summarized above.

2) Overview of Canadian OCS interests and jurisdictional questions

The government of Nova Scotia is very interested in continued exploration for and development of oil and gas reserves on the Scotian Shelf. Through a revenue sharing arrangement with the national government, Nova Scotia derives around \$500 million annually in royalties from gas production at Sable Island. Reserves there are steadily declining, and exploration has thus far been unsuccessful in adding significant new discoveries to proven reserves.

The eastern portion of the Georges Bank is in Canadian waters. A moratorium on oil and gas drilling there is set to expire on December 31, 2012, and the governments are expected to make a decision in 2010 whether or not to extend this moratorium. Some geological reports suggest that this Canadian portion of the Georges Bank may have a greater potential for undiscovered oil and gas. Some of the deeper water, continental slope areas of the Georges Bank and Scotian Shelf have valid exploration leases, although they have seen little exploration activity.

3) Latest technology for O&G exploration and development

Since the 1970s and 1980s, there have been monumental improvements in exploration techniques in two areas: Seismic data acquisition and processing; exploration drilling.

Seismic analysis involves the introduction of controlled sound into the substrate, where it is reflected from geological layers back to recording geophones at the surface. The analysis of the travel time and strength of reflected sound allows geologists and geophysicists to construct interpretations of the nature and distribution of geological units beneath the surface. The work of the 70s and 80s generated single lines of information that geologists interpreted, mostly on paper, making it difficult to analyze multiple lines simultaneously. The capabilities have now advanced, such that an intensive 3-dimensional seismic survey is now processed almost autonomously by powerful computers with enhanced graphics capabilities that allow scientists to look at any view or slice of the survey area. Processing techniques have improved that greatly reduce noise, allowing more subtle features of the sub-bottom geology to be imaged. These advances all improve the likelihood of success in identifying oil and gas deposits.

Directional drilling techniques allow a much larger footprint of the sea bottom to be accessed from one location. It is now possible to drill targets several miles from a single platform, thereby greatly reducing the cost of advanced exploration and production, and reducing the impact on the environment of the sea bottom.

4) Potential benefits and costs of O&G development

Benefits: There are many potential economic benefits of OCS oil and gas exploration/production. Exploration brings with it the need for materials, specialized ships for surveys, and crews. Seismic exploration ships would likely come from other parts of the country and would use port facilities proximal to the Georges Bank. Crews might also be drawn from the local population. Given the geographic setting of the Georges Bank, the likely support ports for exploration activity are in Massachusetts and Rhode Island. There would likely be only small benefits to Maine in terms of jobs.

Should exploration advance to the stage of drilling, vessels for this purpose would likely come from the Gulf of Mexico or Canada. Specialized crews would probably come from those areas as well, but some support crews might come from local sources. There will be support needs at ports, as well, but likely in MA and RI. At least one Maine company has demonstrated an ability to provide materials for oil and gas exploration and production. Cianbro recently completed in Maine and delivered offshore drilling platforms for deployment off Brazil and is currently delivering refinery components to Texas.

Should discoveries be made and put into production, there may be other benefits. Gas processing facilities would be developed on shore, near production areas. This would likely be in Massachusetts, which is also the market area for gas. If oil was discovered, refining would likely be in New Jersey, which already has extensive refinery capability, or perhaps at St. John, New Brunswick, which also has capability. With the correct characteristics, some crude oil might piped from Portland harbor to Montreal for refining.

Regardless of where exploration and production activities receive their support, all coastal New England states could benefit from revenue sharing, following the recent example in the

Gulf of Mexico. The Gulf of Mexico Energy Security Act of 2006 specifies that 37.5% of revenues from leasing and royalties from certain areas in the Gulf be allocated to producing states and 12.5 % to the Land and Water Conservation Fund. Some of the funds to producing states go directly to coastal communities. Currently there are no provisions for revenue sharing on other portions of the OCS.

Costs: The conflict with New England's most valuable fishing ground is a significant concern. The Georges Bank ground fishery generates \$140 million in economic activity, and with proper stewardship, could generate much more. The scallop fishery generates \$225 million in economic activity. Thanks to the Georges Bank fisheries, one Massachusetts port has been the nation's most highly valued fishing port and another ranks among the top ten. This highly valued fishery is stressed and susceptible to disruption from other activities, potentially from the footprint of oil and gas production activities.

A significant concern is the potential for releases of hydrocarbons into the environment by oil and gas exploration and production activities. The National Research Council report of 2003, *Oil in the sea III: Inputs, fates, and effects*, summarizes the sources of hydrocarbons in the marine environment. While not universally applauded, this report is the best available unbiased summary on the topic. This report identifies natural petroleum seeps as responsible for 60% of the petroleum products in North American waters, although this value is among the most difficult of all in the report to quantify. Such releases tend to be chronic and dispersed. The remaining 40% of input is from anthropogenic activities. Petroleum development activities account for 3% of the total volume released by anthropogenic activities, but these tend to be catastrophic and concentrated in nature. These releases are particularly devastating near shore. Marine transportation of petroleum products accounts for 9% of the releases by volume, and like those from extraction, can be catastrophic because of their concentrated nature. Petroleum consumption accounts for more than 85% of the anthropogenic releases to the marine environment in North America. These tend to be small and diffuse spills related to transportation and urban runoff.

Sea bottom impacts from exploration, development, and transportation are other concerns. The Georges Bank is a significant spawning ground for commercial species – any disruption may have an impact.

Some studies indicate that the sound sources used in seismic surveys are disruptive to marine organisms. More work should be done to quantify this impact and to outline ways in which sound sources might be altered or surveys timed to minimize this impact.

5) Compatibility of O&G exploration/development with existing and new uses

The broad goals of the State of Maine with regard to energy are to:

- Increase energy independence and security;
- Limit Maine's vulnerability to unpredictable costs and supplies of fossil fuels;
- Reduce greenhouse gas emissions;
- Stimulate ocean energy-related opportunities.

The production of natural gas from the OCS is sensible as part of a national strategy to reduce the vulnerability of foreign sources. However, given the long time line to bring on line and the questionable quantity of the resource in New England waters, it does not seem

likely that this resource can make a significant contribution to energy independence. Other OCS areas in the nation have more potential resource and readily accessible support facilities that can contribute significantly to this national goal. Gas production can reduce dependence on coal, which is far greater emitter of greenhouse gases. The footprint of potential oil and gas activities on the Georges Bank generally does not conflict with the potential areas for wind, tidal, or wave energy systems, which are all situated within 50 miles of the Maine coast.

Meeting Participants

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