



U.S. Department of the Interior
Minerals Management Service
Gulf of Mexico OCS Region

Special Information

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*Understanding the Processes that Maintain the Oxygen Levels
in the Deep Gulf of Mexico: Synthesis Report*

OCS Study MMS 2005-032

The Minerals Management Service (MMS), Gulf of Mexico OCS Region, announces the availability of a new study report, *Understanding the Processes that Maintain the Oxygen Levels in the Deep Gulf of Mexico: Synthesis Report*.

With the increase of oil and gas activities in the deepwater Gulf of Mexico, the MMS, Gulf of Mexico OCS Region, seeks a greater understanding of the environment in Gulf waters deeper than 400 m to aid in making decisions about the protection of the marine environment. Because discharges of oil or gas can consume oxygen during their degradation, this study considers what is known about the distribution of oxygen and processes that control it, what the information gaps might be, and how those gaps might be filled. The study area is that part of the Gulf of Mexico in water depths greater than or equal to 400 m. Vertically, it extends from the sea surface to the seafloor. The four project components were:

- conduct a data search, synthesis, and reanalysis of available historical oxygen data collected from water depths greater than 400 m throughout the entire Gulf of Mexico basin (note 200 m was used to encompass the entire area offshore of the shelf edge)
- develop a simple box model that describes the sources and sinks of oxygen in the deep Gulf and that can be used to evaluate inputs from oil and gas activities, using parameters and constants determined from item 1
- identify data gaps including an evaluation of the quality of the data and how representative data are of the Gulf's basin environment; and
- propose methods, which could include field work, for filling the data gaps.

The dissolved oxygen database, covering the period 1922-2001, is adequate to study basin-scale distributions in the Gulf of Mexico but not local distributions or anthropogenic effects thereon. Sources of dissolved oxygen are air-sea exchanges at the sea surface and local contributions from photosynthesis in the photic zone (the upper 100-200 m). For deeper waters, the major source is transport of relatively dense, oxygen-rich water masses through the Yucatan Channel into the Gulf interior. The major sink of oxygen in the Gulf at all depths is oxidation of organic matter. Because the deep waters are well ventilated by transport processes, the Gulf of Mexico basin is in no danger of becoming anoxic because of either natural processes, oil and gas production, or other anthropogenic effects. Decreased oxygen levels, however, could occur in localized areas. Comparison of datasets by decade indicates there has not been any discernible change in the vertical or horizontal distribution of dissolved oxygen, suggesting that the transport mechanisms that replenish the oxygen are adequate to balance the oxygen consumption from the decay of organic matter, including that from oil seeps and anthropogenic sources.

This report is available only in compact disc format from the Minerals Management Service, Gulf of Mexico OCS Region, at a charge of \$15.00, by referencing OCS Study MMS 2005-032. The report may be ordered through the Minerals Management Service's on-line ordering system at <http://www.gomr.mms.gov/WebStore/front.asp>. You will be able to obtain this report also from the National Technical Information Service in the near future. Here are the addresses. You may also inspect copies at selected Federal Depository Libraries.

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Telephone requests may be placed at

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MMS, part of the U.S. Department of the Interior, oversees 1.76 billion acres of the Outer Continental Shelf, managing offshore energy and minerals while protecting the human, marine, and coastal environments through advanced science and technology research. The OCS provides 30 percent of oil and 23 percent of natural gas produced domestically, and sand used for coastal restoration. MMS collects, accounts for, and disburses mineral revenues from Federal and American Indian lands, with Fiscal Year 2004 disbursements of approximately \$8 billion and more than \$143 billion since 1982. The Land and Water Conservation Fund, which pays for cooperative conservation, grants to states, and Federal land acquisition, gets nearly \$1 billion a year.

MMS Main Website: www.mms.gov
Gulf of Mexico Website: www.gomr.mms.gov

*** MMS: Securing Ocean Energy and Economic Value for America ***

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