

Studies Development Plan

FY 2004-2006

MINERALS MANAGEMENT SERVICE

Environmental Studies Program



Gulf of Mexico OCS Region
Environmental Sciences Section

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SECTION 1. Programmatic Overview	1
1.1. Introduction to the Region.....	1
1.2. Map of the Planning Area.....	2
1.3. Projected OCS Activities.....	2
1.3.1. Gulf of Mexico Region	2
1.3.2. Atlantic Region	3
1.4. Identification of Information Needs.....	3
1.4.1. Physical Oceanography.....	3
1.4.2. Atmospheric Sciences.....	4
1.4.3. Fates and Effects.....	4
1.4.4. Biology.....	4
1.4.5. Protected Species	5
1.4.6. Social Sciences and Economics	5
1.4.7. Gas Hydrates.....	5
1.4.8. Other Studies.....	6
SECTION 2. Proposed Study Profiles	7
2.1 Introduction	7
2.2 Profiles of Regional Studies Proposed and on the FY 2004 NSL Gulf of Mexico Region Proposed Studies and Ranking for FY 2004.....	9
<i>Deepwater Program: Survey of Deepwater Currents in the Eastern Gulf of Mexico</i>	<i>11</i>
Year 2005 Gulfwide Emissions Inventory Study	13
Information Transfer Meetings and other Workshops.....	15
Literature Search and Data Synthesis of Biological Information for use in Management Decisions Concerning Decommissioning	17
Reanalysis of Available MMS Databases for New Insights.....	19
Long-term Monitoring at the East and West Flower Garden Banks 2004-2008	21
Marine Debris Point Source Investigation: Padre Island National Seashore, March 2004 through September 2005	23
Synthesis of Physical and Geological Oceanography Knowledge from 1970 to Present.....	25

2.3 Profiles of Regional Studies Proposed for FY 2005 and Beyond	
Gulf of Mexico Region Proposed Studies for FY 2005 and Beyond	27
<i>Deepwater Program: Physical Oceanography of the Slope and Rise (POSAR).....</i>	<i>29</i>
Long-term Effects of Oil and Gas Activities on the Mississippi and Alabama Shelf	31
Distribution of Natural Seepage in the Gulf of Mexico.....	33
<i>Deepwater Program: Investigations of Chemosynthetic Communities on the Lower Continental Slope of the Gulf of Mexico</i>	<i>35</i>
<i>Deepwater Program: Monitoring Industry Labor Needs, 2005-2010</i>	<i>37</i>
Petroleum-Involved Ports and Port Communities: An Assessment of Ports, Their Activities, and Their Economic and Social Effects on Related Communities (Comparative Community Study)	39
Exploratory Integrated Modeling of a Coastal Ecosystem	41
Evaluation of Potential Environmental Impacts from Subsea Processing.....	43
Environmental Monitoring of a Development Site.....	45
Evaluation of Noise from Platform Operations	47
Gulf of Mexico Ozone Modeling Analysis.....	49
Data Gap and Satellite Remote Sensing Data Retrieval for Air Quality Modeling in the Gulf of Mexico Region	51
<i>Deepwater Program: Improving Oil Spill Models by Increasing the Understanding of Gas Hydrates</i>	<i>53</i>
Improved Environmental Data Concerning Support Vessel Usage by the OCS Oil and Gas Industry	55
SECTION 3. Topical Areas for FY 2006	57
3.1. Deepwater	57
3.2. Fates and Effects Studies	57
3.3 Gas Hydrates.....	57
3.4 Decommissioning	57
SECTION 4. Literature Cited	59

SECTION 1. Programmatic Overview

1.1. Introduction to the Region

In managing Outer Continental Shelf (OCS) activity, the Minerals Management Service (MMS) has two core responsibilities, safe offshore operations and environmental protection. Our safety goal is to ensure incident free minerals exploration and development on Federal Offshore Leases. Our environmental responsibilities are to ensure that all activities on the OCS are conducted with appropriate environmental protection and impact mitigation.

The MMS New Orleans Regional Office conducts all leasing and resource management functions on the Outer Continental Shelf (OCS) for the Gulf of Mexico and the Atlantic OCS areas, a total of 415 million acres in seven planning areas (see map in Section 1.2). The Gulf of Mexico OCS Region's (GOMR) three planning areas along the Gulf Coast contain 40 million acres under lease (as of 02-04-2003). There are 3,456 offshore production platforms active in the search for natural gas and oil on the Gulf OCS (as of 02-04-2003); these contribute significantly to the Nation's energy supply.

The Minerals Management Service (MMS) Environmental Studies Program (ESP) was established in 1973 as a means to gather information to support decision making for offshore oil and gas leasing. The program (then under the Bureau of Land Management) evolved with changes in the geographic areas of concern, in environmental issues, and in study priorities and policies. In 1994, the MMS Atlantic OCS Regional Office was closed and its responsibilities transferred to the Gulf of Mexico Region (GOMR). In the GOMR, the ESP addresses issues from prelease through postlease operations. In the Atlantic Region, the ESP has been limited to prelease descriptive and process-type investigations since there has been no production in that area.

The Gulf of Mexico is anticipated to remain the Nation's primary offshore source of oil and gas. Initiatives to emphasize the use of "environmentally friendly" natural gas further promote the production from the Gulf's gas fields. Advances in offshore technologies (e.g., directional drilling; deepwater structures such as sub-sea completions, spar, and tension-leg platforms; sub-salt prospecting; three-dimensional geophysical profiling; and down-hole instrumentation) ensure that exploration and development will continue in the Gulf for decades to come.

In 1992 the MMS entered into a partnership with the Louisiana State University (LSU) to establish the first Coastal Marine Institute (CMI). This partnership was developed as part of an initiative to cultivate new State-Federal cooperative agreements on environmental and socioeconomic issues of mutual concern. These projects are designed to help answer questions regarding the potential impacts from oil and gas and marine minerals activities.

The establishment of the Biological Resources Division (BRD), a division of the U.S. Geological Survey, in 1996, provided the MMS with new opportunities for partnership in biological research. The BRD has procured and is conducting several studies for the GOMR. This partnership will continue and several projects are described in this plan anticipating the involvement of the BRD.

Because there has been a dramatic increase in deepwater oil and gas activity in the Gulf of Mexico, the MMS sponsored a deepwater workshop in April 1997. Conducted under a cooperative agreement with LSU, the workshop focused on physical oceanography and the environmental and sociological sciences. The recommendations and issues identified in the workshop proceedings (Carney, 1997) are being used to design the studies needed by the MMS in the preparation of environmental assessments, other NEPA documents, and deepwater regulations to oversee oil and gas activities. A follow-up workshop to discuss the results of these studies was held in May of 2002. The information gathered since the first workshop was presented. Since most of the studies are still ongoing, it was determined that any planning for follow-up studies wait until the results and recommendations of the ongoing studies are available.

1.2. Map of the Planning Area



1.3. Projected OCS Activities

1.3.1. Gulf of Mexico Region

Since the Gulf of Mexico Region is the most active OCS area, all activities associated with oil and gas exploration and production in U.S. are occurring here. These activities

include leasing, exploration, development, removal of platforms, and laying of pipelines. The five-year (2002 – 2007) environmental impact statement includes one lease sale per year in each of the central and western planning areas. The first lease sale in the eastern planning area since 1988 was held in December 2001. Two additional eastern planning area lease sales are proposed in the next five years in the same area as Lease Sale 181.

The number of rigs drilling in deepwater in the Gulf of Mexico rose to a record high of 40 in December 2000. Seven of the 40 wells were being drilled in water depths greater than 1500 m. While activities have decreased during 2002, the increase in the price of oil is expected to encourage more drilling in 2003. In addition, 27 structures and 82 subsea completions are in place presently and more are expected. Exploration continues on the shelf as a result of improved seismic data and drilling capabilities as well as incentives to pursue deep gas.

The number of production platforms should continue to increase in deepwater while the continental shelf should remain static or decrease. During 2000, 84 structures were installed on the shelf and 95 structures were removed. Pipeline segments are installed between connections and can be any length. Last year, the installation of approximately 400 pipeline segments was approved.

1.3.2. Atlantic Region

The last lease sale within the Atlantic Region occurred in 1983. On November 17, 2000, the interests in the last remaining 8 natural gas and oil leases active in the Federal waters offshore North Carolina were relinquished. There are now no oil and gas leases in existence off the Atlantic Coast.

1.4. Identification of Information Needs

With the dramatic increase in offshore oil and gas activities in the deepwater of the Gulf of Mexico, environmental and socioeconomic information needs have increased as well. The Gulf of Mexico Region has approximately 100 ongoing studies divided among all areas of interest. We are proposing studies in the following topics to meet our information needs.

1.4.1. Physical Oceanography

The Region has already conducted numerous studies along the continental shelf. We held a workshop in September 2000 to plan the acquisition of information in deepwater. An exploratory study is under way to examine current structures in the central Gulf. Results from the study will be used to plan future research in FY 2005 and beyond. Physical oceanographic processes do not stop at the Exclusive Economic Zone (EEZ) and a full understanding requires inclusion of information from Mexican waters. We are working with Mexican researchers to collect information in Mexican Waters. A second study is in the process of being procured to examine the current structure of the western Gulf. This study is in response to recommendations from the Scientific Advisory Committee.

1.4.2. Atmospheric Sciences

Two air emissions data collection activities are complete. One is in the Breton Sound area and the other is Gulfwide. A modeling effort of SO₂ and NO_x is underway for Breton Sound. A repeat of the Gulfwide inventory is planned for the year 2005 to coincide with data collection activities by other State and Federal agencies. As a part of modeling efforts, meteorological information is required, and at this time meager for the Gulf. We are considering the use of satellite imagery to enhance the data set.

1.4.3. Fates and Effects

In the mid-1970s, the first major offshore environmental survey in the Gulf of Mexico was conducted in response to questions about the effects of oil and gas activities on the continental shelf. This study, "MAFLA", examined physical, chemical, and biological parameters along the Mississippi, Alabama, and Florida shelf. Parts of the Mississippi and Alabama shelf were revisited in the late 1980's for similar analyses as part of "MAMES". We are proposing a third visit to the same areas as examined under "MAFLA" with the intent to investigate the environmental effects of increased activities along the shelf over the past 25 years.

Oil fields on the shelf are relatively old and it is anticipated that over the next ten to twenty years, more structures will be removed than installed. These platforms have provided a hard substrate for the development of small ecosystems. A critical issue is the effect on the overall ecosystem of the Gulf should the platforms be removed. The MMS has sponsored many small studies to examine the role that platforms play in the ecology, but none have stepped back and looked at the big picture. We are proposing an initial study to synthesize the relevant literature on platform ecology, synthesize the information, and evaluate the effects of the removal of a large number of platforms.

In the near future, a new technology, subsea processing, may be introduced into the Gulf of Mexico. This technology is being used in the North Sea. We are proposing to investigate the potential environmental impacts from this new technology.

A study is also proposed to monitor the effects from a production facility before and after installation. The proposed study would be conducted in the Eastern Planning Area and could potentially be a joint venture with industry.

1.4.4. Biology

A major study of the deep-sea benthic community is in the final year and is yielding interesting information about the trends and distribution of benthic fauna. We are continuing to support a program to monitor the Flower Gardens. Chemosynthetic communities have been studied extensively at depths less than 1000 meters. The extent of these communities at greater depths is still unknown and a study is proposed to investigate this new area.

1.4.5. Protected Species

A major study of the effects of seismic activities on marine mammals is presently underway and the first year of data collection is completed. This project will continue for the next two years.

1.4.6. Social Sciences and Economics

The Gulf of Mexico Region has a very active program in social sciences and economics. During FY 2004, much of the effort will go toward synthesizing the results of many recently completed studies. This effort will focus on three related areas.

First, emphasis will be placed on refining agency projections of sale- and project-level socioeconomic effects. This will include synthesizing industry expenditure and employment data collected from several studies including an OMB-approved, industry-wide, labor-needs questionnaire. These data will be used to improve estimates of direct industry effects and IMPLAN-based projections of indirect effects. The agency also plans to improve its demographic projection procedures. Finally, a workshop will review the results of the labor-needs questionnaire to prepare for revising the survey. Beginning in 2007, MMS plans to use this methodology to collect industry data at 5-year intervals.

Second, emphasis will be placed on improving the socioeconomic analysis in sale-level EISs. This includes an ongoing study “audit” of the documents will be used to address questions concerning the socioeconomic sections, analysis, and information to be part of agency assessments. This also includes the synthesis of accumulated studies data. This effort will focus on changes in onshore effects due to industry reorganization and deepwater, on the geographic distribution and variability of the industry and its onshore effects (including Environmental Justice), and on ports.

Third, emphasis will be placed on a synthesis of study information and related materials that supports the assessment of cumulative effects. This effort addresses State of Louisiana concerns that sale-level assessments do not reflect the total impacts of the OCS program and the NRC’s observation that the GOMR is a “natural laboratory” for understanding petroleum-related effects. This effort should also help identify significant information gaps to be addressed by future MMS studies.

1.4.7. Gas Hydrates

Interest in gas hydrates has waxed and waned over the past 30 years. With the spike in natural gas prices in early 2001 and interest in alternative fuel sources, interest is again focused on gas hydrates. If hydrates do become an economically viable resource, environmental assessments will require an understanding of the location and distribution of the resource. The MMS joined the Chevron Texaco Hydrate Joint Industry Project, which will conduct research into gas hydrates in the Gulf of Mexico using funding from the Department of Energy (DOE). The DOE is funding \$11 million and industry is

adding \$2 million to study and characterize gas hydrates in the Gulf of Mexico. The project is focusing on hydrates as a geohazard as well as a resource.

1.4.8. Other Studies

The MMS and its predecessor have funded close to \$200 million dollars worth of research in the Gulf of Mexico. Much of the information is only available in MMS reports. We are proposing two syntheses of the physical and geological knowledge of the Gulf of Mexico to be published in book form and more available to the public. Also, much of the data has not been fully analyzed, either due to limited resources or because the data is spread between several studies. We are proposing a broad agency announcement to encourage researchers to make more use of this data. Finally, with all the information that has been collected, it is time to integrate this knowledge through advanced, coupled modeling procedures with the result of taking large datasets and turning them into useful management tools.

SECTION 2. Proposed Study Profiles

2.1 Introduction

The following sections focus on the proposed studies for FY 2004, FY 2005, and beyond. Most of the ongoing studies in the Gulf of Mexico Region can be found on the web at:

http://www.gomr.mms.gov/homepg/regulate/environ/ongoing_studies/gom.html

Additional information about recent MMS funded deepwater research, in particular research cruises, can be found at:

<http://www.gomr.mms.gov/homepg/regulate/environ/deepenv.html>

Websites subject to current availability.

**2.2 Profiles of Regional Studies Proposed and on the FY 2004 NSL
Gulf of Mexico Region Proposed Studies and Ranking for FY 2004**

Page #	**	Title	Rank
11	PO	<i>Deepwater Program:</i> Survey of Deepwater Currents in the Eastern Gulf of Mexico	1
13	OT	Year 2005 Gulfwide Emissions Inventory Study	2
15	OT	Information Transfer Meetings and other Workshops	3
17	BIO	Literature Search and Data Synthesis of Biological Information for use in Management Decisions Concerning Decommissioning	4
19	OT	Reanalysis of Available MMS Databases for New Insights	5
21	BIO	Long-term Monitoring at the East and West Flower Garden Banks 2004-2008	6
23	FE	Marine Debris Point Source Investigation: Padre Island National Seashore, March 2004 through September 2005	7
25	PO	Synthesis of Physical and Geological Oceanography Knowledge from 1970 to Present	8
**	PO = Physical Oceanography PS = Protected Species	FE = Fate & Effect SE = Social & Economic	BIO = Biology OT = Other
***	Rank 1 = highest		

ENVIRONMENTAL STUDIES PROGRAM: Studies Development Plan FY 2004-2006

Region: Gulf of Mexico OCS Region

Planning Area(s): Eastern Gulf of Mexico

Type: Competitive Cost Reimburse

Title: *Deepwater Program: Survey of Deepwater Currents in the Eastern Gulf of Mexico*

Period of Performance: FY 2004-2008

Description:

Background Recent deepwater leases in the eastern Gulf of Mexico extend beyond water depths of 1,600 m. The presence of these leases implies a potential for exploration by the oil and gas industry, which currently includes exploratory wells in the Lloyd Ridge area. The eastern Gulf is a location strongly influenced by the Loop Current, its frontal eddies, and where Loop Current rings form. Our most recent current data in the eastern Gulf reaches only to 1,300 m near the DeSoto Canyon. In order for MMS to fulfill its regulatory function proactively, more current data in this area is definitely desirable. This proposed study would collect current and hydrographic measurements in the eastern Gulf in water depth over 1,500 m that will allow identification of processes present in the region and help design future oceanographic studies. Successful completion of this study will also ensure that our understanding of the deep eastern Gulf is ahead of future exploration and development trends.

Objectives The objectives of this study are 1) to conduct a survey of deepwater currents in the eastern Gulf of Mexico using moorings to increase our database in this region; 2) to improve our understanding of the regional oceanography to help design future studies, assist calculation of horizontal and vertical trajectories of release oil and its dispersion, and 3) provide an oceanographic framework to help with interpretation of biological observations.

Methods Deploy three deepwater moorings along a line across the Lloyd Ridge area at selected depths. Hydrographic data will be collected during the deployment, servicing, and recovery cruises.

Products An expanded current and hydrographic database in the eastern Gulf of Mexico, identification of relevant processes and recommendation for future oceanographic studies in this region.

Importance to MMS This study will fill an important data gap with huge implications for physical and biological understanding of the deep Gulf.

Date Information Required: This study must be completed in four years after award.

Revised date: 8/29/2003

ENVIRONMENTAL STUDIES PROGRAM: Studies Development Plan FY 2004-2006

Region: Gulf of Mexico OCS Region

Planning Area(s): Western and Central Gulf of Mexico

Title: Year 2005 Gulfwide Emissions Inventory Study

Period of Performance: FY 2004-2007

Description:

Background The collection and compilation of an emissions inventory is one of the tasks that MMS conducts to assure coordination of air pollution control regulations between OCS offshore sources and sources onshore (as per Section 328 of the 1990 FCAA). Additionally, MMS regulations require MMS to provide states with emissions inventory data for OCS sources. This study will provide an emissions inventory of OCS sources for the year 2005. The emissions will include, at a minimum, estimates of carbon monoxide, sulfur dioxide, nitrogen oxides, particulate matter and hydrocarbons. These air pollutants influence the ambient concentration of photochemical smog and regional haze.

The 1990 Federal Clean Air Act Amendments (FCAA) specifies that states are to prepare periodic emission inventories every three years, starting in 1996. These inventories are used to determine how well states are progressing in controlling emissions and in turn improving the air quality. The emission inventories are also used to conduct air pollution dispersion modeling, especially for those regions that are having difficulties in controlling emissions and/or improving air quality. There are a number of such regions along the coast of the Gulf of Mexico that are using these periodic emission inventories to address their emissions and/or air quality difficulties. To date these regions have had to use the 1992 emissions inventory developed for OCS sources. Shortly, with the completion of the Gulf-wide Offshore Activity Data System (GOADS) project, MMS will be able to provide these regions with an updated year 2000 emissions inventory. Although the year 2000 emissions inventory of OCS sources promises to provide an improved estimate in emissions from the OCS, the year 2000 does not correspond to one of the onshore periodic emissions inventory (e.g., year 2002). The next opportunity for MMS to develop an emissions inventory commensurate with an onshore periodic emissions inventory will be for the year 2005.

Objectives The purpose of this study is to develop a year 2005 emissions inventory of OSC sources. A Year 2005 emissions inventory will be commensurate with an onshore periodic emissions inventory. Since, it is likely that many of the regions along the coast of the Gulf of Mexico will still be having difficulties in controlling emissions and/or improving air quality in 2005, the year 2005 emissions inventory will be used to conduct modeling. Thus, the collection and compilation of an emissions inventory for OCS sources in 2005 provides MMS with the opportunity to enhance its assurance of coordinating air pollution control regulations between offshore and onshore sources.

Methods A contractor will be used to collect and compile surveys and activity data from OCS facilities. Facilities include any installation (e.g., production platforms) or device having the potential to emit any air pollutant. In addition, emissions from any vessel used to support a facilities operation shall be considered part of the facility. The surveys and activity data will be collected using the MMS's emissions activity software. The contractor will quality assure the surveys and activity data, and notify MMS of any survey or data problems. MMS will work with OCS facility operators to resolve survey or data problems and then forward the corrected information to the contractor.

Products The contractor shall provide the MMS with electronic files of the quality assured survey and activity data collected from OCS facilities. In addition, the contractor shall provide the MMS with a quality assured emissions inventory in an electronic format as required by MMS's emissions activity software.

Importance to MMS The new ozone standard and regional haze regulations recently promulgated by EPA will require states to use a year 2005 emissions inventory for developing air pollution control regulations. MMS must provide States with suitable emissions on OCS activities to allow states to develop strategies for controlling emissions of air pollutants that adversely impact coastal areas. Since the 1992 emissions inventory is outdated and obsolete, MMS has not been able to fully meet their obligation to States. In addition, although the year 2000 OCS emissions inventory will provide states a more up to date and improved estimate of OCS emissions, MMS needs to provide emission inventories that are contemporary with similar emission inventories for onshore sources. In this way, MMS can meet its obligation to States. In addition, MMS can use the OCS emissions inventory to support Environmental Impact Statements and Assessments. Further, to assure coordination of onshore and offshore air pollution regulations, MMS can use the OCS emissions inventory to assess the need for additional emission controls in the OCS.

Date Information Required: A contractor needs to be ready to start the collection and compilation of survey and emissions activity data on January 1, 2005. In order to accommodate this start date for the collection and compilation phase of the study, it is anticipated that six months lead-time will be needed. During this lead-time, the contractor will finalize a work plan, conduct at least two workshops to educate OCS facility operators in responding to the surveys and logging emissions activity data. A workshop would be held for each of the Western and Central Planning Areas in a convenient location (e.g., Houston, New Orleans).

Revised date: 2/17/2003

ENVIRONMENTAL STUDIES PROGRAM: Studies Development Plan FY 2004-2006

Region: Gulf of Mexico OCS Region

Planning Area(s): Gulfwide

Title: Information Transfer Meetings and other Workshops

Period of Performance: FY 2004-2008

Description:

Background The purpose of the Information Transfer Meeting (ITM) is to foster sharing of information among participants about current research, accomplishments, or issues of concern to the Minerals Management Service (MMS). Presentations at the ITM pertain to the MMS Gulf of Mexico OCS oil and gas program, as well as regional environmental, social, or economic concerns, or current OCS industry activities or technologies. The MMS has held 22 meetings and the resultant proceedings are used as information sources for ongoing studies. The meetings were held annually, a decision was made to hold the meetings every other year to reduce replication of information and focus on results of studies.

The MMS occasionally sponsors workshops with specific topics. These workshops are used to discuss the state of knowledge of the specific topic and to plan future directions within the studies program for those specific topics. The workshops are conducted over a two to three day period. Examples of past workshops include the topics of marine mammals, fisheries, and deepwater physical oceanography. These workshops are most productive when handled by a contractor, in a location separate from the MMS offices, and with the production of proceedings from the workshop. Following is a list of possible topics for workshops to be held in the next two to three years:

1. Gulf of Mexico Cold Seep Chemosynthetic Communities: What has been Learned and Future Directions?
2. Midwater and offshore pelagic biology
3. Benthic/benthopelagic community structure and function
4. Sperm Whale Seismic Study workshop after field work
5. Physical Oceanography Numerical Modeling
6. Socioeconomic Review and Analysis
7. Exchange of Information with Mexican Scientists

Objectives The objective of this study is to conduct meetings for exchange of information, either through broad, general topics or specific topics.

Methods Information Transfer Meetings will be held in January 2005 and January 2007. Other topic specific meetings will be held according to need and priority.

Importance to MMS The MMS uses meetings and workshops to foster the exchange of information and to plan future study endeavors. These meetings and workshops are critical to the planning and executing of the studies program.

Date Information Required: The ITMs will be held in January 2005 and January 2007. The information will be used immediately following the meetings. The other workshops will occur as needed and the information will be used immediately after the workshop.

Revised date: 2/17/2003

ENVIRONMENTAL STUDIES PROGRAM: Studies Development Plan FY 2004-2006

Region: Gulf of Mexico OCS Region

Planning Area(s): Gulfwide

Title: Literature Search and Data Synthesis of Biological Information for use in Management Decisions Concerning Decommissioning

Period of Performance: FY 2004-2006

Description:

Background Over the 50 years of offshore oil and gas activities, there has been a steady increase in the number of structures in the offshore environment. Presently, there are approximately 4,000 structures, not all of these large production facilities. About 100 new structures are installed each year, which is balanced by the removal of about 100. The oil fields on the shelf are relatively old, and very soon, the number of structure removals will exceed the installations. The structures have provided a hard substrate for the growth of biological communities in an otherwise barren, muddy landscape. Some structures remain in place or are toppled to form artificial reefs. While the Minerals Management Service has funded numerous small studies to examine the ecological role of these structures in the Gulf, there is no broad overview of the impacts of these structures and the effects on the environment should a large number be removed.

Objectives With emphasis on the continental shelf, this study will (1) review the literature for studies of the ecology of platform structures, artificial reefs and natural reefs; (2) evaluate the overall biological impact of the structures; (3) evaluate the potential impacts from removing the structures; and (4) identify information gaps for future study plans.

Methods The contractor will conduct a standard literature search of all publicly available documents on the subject. The information will be synthesized and estimates of the biological impact will be made by methods recommended by the contractor.

Products A final report.

Importance to MMS This information will be used to make management decisions about the removal of structures. The impacts to the environment have not been assessed as a whole and this study will compile all the available information.

Date Information Required: The information will be used over the next ten to twenty years for making decisions about the removal of structures.

Revised date: 2/17/2003

ENVIRONMENTAL STUDIES PROGRAM: Studies Development Plan FY 2004-2006

Region: Gulf of Mexico OCS Region

Planning Area(s): Gulfwide

Title: Reanalysis of Available MMS Databases for New Insights

Period of Performance: FY 2004-2007

Description:

Background The MMS has invested millions of dollars to conduct field studies that yield extensive and high quality datasets, e.g., LATEX, DeSoto Canyon study, SCULP, Chemical Oceanography and Hydrography, Deepwater Reanalysis and Synthesis. These databases were examined relative to the objectives of the specific studies, however, time and resources prevented further analyses. We believe these datasets are rich in information about processes occurring in the Gulf of Mexico, which could be analyzed to obtain further insights and information. Some reanalysis has been completed through the Coastal Marine Institute, e.g. Current (1999), but the full potential has not been realized.

Objectives The objective of this study is to solicit from researchers ideas for reanalysis of these datasets in order to extract the maximum possible information available.

Methods The methods for extracting and analyzing the data will be determined by the researchers and best suited to the chosen dataset. The specific datasets will also be chosen by the researchers.

Products The study will result in final reports and journal publications.

Importance to MMS A wealth of understanding has not been gleaned from many datasets thus far. The information and interpretations would be used in decision documents, such as Environmental Impact Statements and Assessments, to make a better assessment of potential impacts from oil and gas activities.

Date Information Required: The information would be used as soon as it becomes available.

Revised date: 2/17/2003

ENVIRONMENTAL STUDIES PROGRAM: Studies Development Plan FY 2004-2006

Region: Gulf of Mexico OCS Region

Planning Area(s): Western

Title: Long-term Monitoring at the East and West Flower Garden Banks 2004-2008

Period of Performance: FY 2004-2008

Description:

Background This is a continuation of a series of previous monitoring efforts developing a long-term database related to the environmental health of the East and West Flower Garden Banks. This study is important for validating the decision to relax the lease-stipulated requirement on the offshore industry to monitor exploratory or development and production activities within the 1-mile zone of the banks. Oil and gas activity in the area has continually increased in recent years. The East and West Flower Garden Banks have received an increasing variety of protective special area designations including Habitat Area of Particular Concern (HAPC) for Essential Fish Habitat (EFH) by National Marine Fisheries Service (NMFS) and Special Ocean Site (SOS) by the Environmental Protection Agency.

Objectives This effort will continue the long-term monitoring at the East and West Flower Garden Banks to detect any subtle, chronic effects from natural and man-induced activities that could potentially endanger community integrity.

Methods The monitoring will be consistent with past MMS topographic features monitoring, as well as the previously required lease stipulation monitoring for activities located within the 1-mile zone of the Flower Garden Banks. Techniques are similar to most all other coral reefs monitoring studies. Observations shall be made to evaluate coral colonies, accretionary growth, and general community health. Continuously recording water quality instrumentation was added to the ongoing study in 2001. These instruments will be maintained and data analyzed for a variety of water quality parameters.

Products An annual narrative report, videotapes and datasets, peer-reviewed, and scientific publications.

Importance to MMS Ongoing monitoring at the Flower Garden Banks is important to validate and to sustain our contention that the lease stipulations provide effective mitigation of impacts to the offshore environment and particularly, these sensitive and unique biological features.

Date Information Required: Continuation of the proposed study is important to validate the decision to relax the lease-stipulated requirement on the offshore industry to monitor exploratory or development and production activities within the 1-mile zone of these topographic features.

Revised date: 8/29/2003

ENVIRONMENTAL STUDIES PROGRAM: Studies Development Plan FY 2004-2006

Region: Gulf of Mexico OCS Region

Planning Area(s): Gulfwide

Title: Marine Debris Point Source Investigation: Padre Island National Seashore, March 2004 through September 2005

Period of Performance: FY 2004-2005

Description:

Background Marine trash and debris pose a threat to the marine environment, may pose hazards to boating interests, and are an eyesore and a hazard on public and private beaches that must be cleaned, generally at public expense. Several laws (e.g., MARPOL-Annex V and the Marine Plastic Pollution Research and Control Act), and agency regulations (i.e., USCG and EPA) prohibit intentional jettisoning of trash and require proactive steps to prevent accidental loss of solid waste into the marine environment. The offshore oil and gas industry is further regulated through 30 CFR 250.300 and NTL No. 2003-G11 which requires marine trash and debris awareness training, recordkeeping, and certification requirements for all offshore personnel.

The offshore oil and gas industry's adherence to the laws and regulations have greatly reduced their share of the trash and debris deliberately jettisoned into the Gulf of Mexico. However, there is still concern about the accidental loss of items from platforms and support vessels. Recently, a NOAA Fisheries biological opinion (Consultation No. F/SER/2002/01264) stated that debris ingestion is an ongoing threat to sea turtles and marine mammals and that OCS activities may result in the injury or mortality of some sperm whales, sea turtles, smalltooth sawfish, or Gulf sturgeon by incidental ingestion or entanglement. Consequently, MMS is seeking to better understand the sources and magnitude of the contribution of OCS activity to the marine trash and debris problem.

With over 4000 structures on the Gulf of Mexico OCS and the associated crews and vessel support, the oil and gas industry contributes to the trash and debris problem of the Gulf waters and coastline; a previous study on Padre Island National Seashore indicates the contribution may be 13 percent of the total. This project aims to quantify the OCS-related trash and debris that accumulates on Padre Island National Seashore, and assess the change in quantity and types of trash and debris since the previous investigation (March 1994 to September 1995).

Objectives With emphasis on a 16-mile stretch of beach in the Padre Island National Seashore, this study will (1) quantify the trash and debris on the beach attributable to OCS activities; (2) compare the results with the previous study (the methods and items surveyed must be the same); (3) present the oil and gas industry with a realistic estimate of its contribution to trash and debris in the Gulf of Mexico; and (4) identify specific trash and debris items that pose a chronic problem for the oil and gas industry so that a waste management plan can be developed to address the problem.

Methods The contractor will follow the methods developed during 10 years of marine debris research by the National Park Service at Padre Island National Seashore and described in (Miller et al., 1995). This will entail an 18-month study that will involve a 7 day/week survey of 16 miles of shoreline for 42 specific marine debris items.

Although the methods and items surveyed will be identical to the previous study, the contractor will also work with MMS and the OOC to reassess the debris items attributed to offshore oil and gas operations. The objective of this assessment is to more clearly define marine debris that is attributable to OCS operations and produce a realistic estimate of OCS debris. The previous study will be analyzed based on this assessment and a report will be included on the change in the amount of OCS-related marine debris since the previous survey.

Products A final report.

Importance to MMS This information will be used to make management decisions about the solid waste management plans of offshore operators, their personnel, and their contractors.

Date Information Required: MMS needs this information to help it meet the requirements of a recent NOAA Fisheries Biological Opinion.

Revised date: 7/17/2003

ENVIRONMENTAL STUDIES PROGRAM: Studies Development Plan FY 2004-2006

Region: Gulf of Mexico OCS Region

Planning Area(s): Gulfwide

Title: Synthesis of Physical and Geological Oceanography Knowledge from 1970 to Present

Period of Performance: FY 2004-2007

Description:

Background The Minerals Management Service and Industry have supported many studies in physical and geological oceanography of the Gulf of Mexico since 1970. However, this knowledge is mostly contained in reports and other literature, which is either not easily available to researchers or documents that can not be referenced. This vast amount of knowledge represent ten's of millions of dollars of investments by all involved.

Objectives The objective of this study is to synthesize in a single source the knowledge accumulated since 1970 in the Gulf of Mexico in the form of extensive review papers so it is available to professional and nonprofessionals.

Methods Prepare extensive and detailed review papers that are peer reviewed in physical and geological oceanography in the Gulf of Mexico.

Products Two books containing the review papers.

Importance to MMS This study will allow the foremost experts in physical and geological oceanography in the Gulf of Mexico to review and summarize the knowledge since 1970. Such synthesis will help plan future studies, evaluate the Agencies contributions, and help define our path for the future of the Environmental Studies Program.

Date Information Required: This study will produce two books in a one year period.

Revised date: 2/17/2003

2.3 Profiles of Regional Studies Proposed for FY 2005 and Beyond Gulf of Mexico Region Proposed Studies for FY 2005 and Beyond

Page #	**	Title
29	PO	<i>Deepwater Program: Physical Oceanography of the Slope and Rise (POSAR)</i>
31	FE	Long-term Effects of Oil and Gas Activities on the Mississippi and Alabama Shelf
33	FE	Distribution of Natural Seepage in the Gulf of Mexico
35	BIO	<i>Deepwater Program: Investigations of Chemosynthetic Communities on the Lower Continental Slope of the Gulf of Mexico</i>
37	SE	<i>Deepwater Program: Monitoring Industry Labor Needs, 2005-2010</i>
39	SE	Petroleum-Involved Ports and Port Communities: An Assessment of Ports, Their Activities, and Their Economic and Social Effects on Related Communities (Comparative Community Study)
41	OT	Exploratory Integrated Modeling of a Coastal Ecosystem
43	OT	Evaluation of Potential Environmental Impacts from Subsea Processing
45	OT	Environmental Monitoring of a Development Site
47	OT	Evaluation of Noise from Platform Operations
49	OT	Gulf of Mexico 8-Hour Ozone Modeling Analysis
51	OT	Data Gap and Satellite Remote Sensing Data Retrieval for Air Quality Modeling in the Gulf of Mexico Region
53	OT	<i>Deepwater Program: Improving Oil Spill Models by Increasing the Understanding of Gas Hydrates</i>
55	OT	Improved Environmental Data Concerning Support Vessel Usage by the OCS Oil and Gas Industry
**	PO = Physical Oceanography PS = Protected Species	FE = Fate & Effect SE = Social & Economic BIO = Biology OT = Other

ENVIRONMENTAL STUDIES PROGRAM: Studies Development Plan FY 2004-2006

Region: Gulf of Mexico OCS Region

Planning Area(s): Gulfwide

Title: *Deepwater Program: Physical Oceanography of the Slope and Rise (POSAR)*

Period of Performance: FY 2006-2011

Description:

Background Initial observations of deepwater currents in the Gulf by a Minerals Management Service study in the mid 1980's revealed weak to moderate currents driven by Topographic Rossby Waves (TRW). These currents were essentially barotropic below ~1,000 m and varied at time scales of 15 days. However, observational and modeling studies similar to the recently completed LATEX or the ongoing Northeastern Gulf of Mexico Physical Oceanography Program have not been conducted in the deep Gulf. Recent data (Minerals Management Service and proprietary records) have shown that strong currents, 1-2 knots (50-100 cm/s), occur in the deepwater of the Gulf of Mexico. The processes responsible for causing such strong flows are not known. Also, the Loop Current and its eddies are very active in the deep Gulf.

Known processes that need to be studied included the interaction of Loop Current eddies with the bottom topography, generation and evolution of eddy-like features, topographic steering of flows, mid-water jets, inertial currents, and wind-driven flows. Also, more information is needed concerning the currents near the Mississippi Canyon where newly separated eddies begin their westward voyage across the deep Gulf. The bottom relief on the slope and rise is extremely rough and can drive different physical processes that are little understood or studied.

Objectives The objectives of this study are (1) to deploy arrays of moorings to collect oceanographic observation across the entire water column and (2) to analyze and interpret these measurements using existing theories relevant to the oceanographic processes identified. Among potential processes to be examined are: interaction of LC eddies with the topography; generation and evolution of cyclonic features; topographic steering of flows; and wind driven circulation.

Methods This effort will deploy moorings and conduct oceanographic cruises at suitable time intervals to resolve relevant temporal and spatial scales. Remote sensing data will also be employed to examine the synoptic thermal and sea surface topography of the area. Detailed surveys of important features will be conducted to investigate their characteristics. Because of its complexity and relevance, a planning workshop was conducted on September 2000 in New Orleans. This workshop helped focus the study objectives and design.

Products A final report and CDs containing raw data.

Importance to MMS The results from this study will provide information regarding the interactions of LC eddies with the topography; generation and evolution of eddy-like features;

topographic steering of flows; wind driven circulation; and mid-water column jets. The study will support other ongoing studies by identifying the relevant physical processes and increase the understanding of them and their interactions, and by providing data for numerical model verification. These results should provide MMS with values of the seasonal and annual variabilities of the physical processes studied. The results will also be available for completing risk assessments used by MMS for preparation of NEPA documents. These results will also help understand sediment transport and recently discovered erosional mega-furrows (Bryan et al., 2000) and as ancillary information for analysis of biological data.

Date Information Required: The participants of the physical oceanography session of the MMS “Workshop on Environmental Issues Surrounding Deepwater Oil and Gas Development” (Carney, April 1997) recognized this project’s priority and recommended it begin after completing the “Deepwater Physical Oceanography Reanalysis and Synthesis of Historical Data” and “Study of Physical Processes Over the Slope and Rise Using Numerical Models” studies. However, the participants of the September 2000 Workshop recommended starting this study after completion of an exploratory study which is in planning.

Revised date: 8/29/2003

ENVIRONMENTAL STUDIES PROGRAM: Studies Development Plan FY 2004-2006

Region: Gulf of Mexico OCS Region

Planning Area(s): Gulfwide

Title: Long-term Effects of Oil and Gas Activities on the Mississippi and Alabama Shelf

Period of Performance: FY 2005-2008

Description:

Background The opportunity to study the long-term effects of oil and gas development on the Mississippi-Alabama-Florida shelf is now possible. Baseline measurements were made during extensive studies in the mid-1970s. It is now possible to evaluate the effects of oil and gas activities on this dynamic shelf and compare the results with those collected almost 30 years ago. An initial study was conducted by the State University System Institute of Oceanography from 1974-1975 and completed by Dames and Moore in 1976-1977. The general findings were that the shelf area was relatively pristine with some influence from the Mississippi discharge. Part of the study area was revisited in the late 1980s as part of the MAMES project. Oil and gas activities have increased along the shelf since the initial study and it is time to revisit the area and evaluate whether these activities have resulted in cumulative contamination of the continental shelf.

In contrast, the Florida shelf, which was also sampled during the MAFLA study, has not been affected by oil and gas activities. This is an opportunity to compare a region that has had ever increasing oil and gas activities with a region that has not. Of course, other activities may have altered the pristine Florida shelf, but these could not be attributed to oil and gas activities, which have been restricted for the past 30 years.

Objectives The objectives of this study are (1) to collect and analyze water, sediment, and biological samples from the Mississippi-Alabama-Florida shelf using the same parameters as previous studies and (2) to compare the results with the studies from the 1970s and 1980s to see if there has been any degradation to the marine environment as a result of oil and gas activities.

Methods A single sampling cruise of designated sites located in the same place as those from the previous MAFLA study. The same parameters would be analyzed, including trace metals, petroleum hydrocarbons, benthic and fish composition, and general hydrodynamic information. The results would be compared to the previous study and an evaluation of the effects (or lack of effects) would be made.

Products A final report.

Importance to MMS The MMS is constantly faced with defending oil and gas activities as environmentally sound. This study would provide data where activities have been occurring for decades and where previous studies were performed. The information could be used to support

future development in as yet undeveloped areas where it can be reasonably demonstrated that no long-term effects from oil and gas activities occur.

Date Information Required: The information is needed within the next few years to support future development in as yet undeveloped areas.

Revised date: 8/29/2003

ENVIRONMENTAL STUDIES PROGRAM: Studies Development Plan FY 2004-2006

Region: Gulf of Mexico OCS Region

Planning Area(s): Gulfwide

Title: Distribution of Natural Seepage in the Gulf of Mexico

Period of Performance: FY 2005-2008

Description:

Background As industry moves operations to deepwater, the Minerals Management Service (MMS) needs to more fully understand slicks from natural seepage in order to effectively distinguish and analyze spill risk associated with deepwater operations. It is estimated that seeps are responsible for over 60 percent of the petroleum entering North American waters, mainly in the Gulf of Mexico and offshore southern California. By comparison, petroleum extraction activities introduce roughly 3 percent of the petroleum entering North American waters through blow outs, platform surface spills, produced water, and drill cuttings.

By identifying the natural slick patterns in areas where surface slicks are common, the MMS can better discern between natural conditions and a contamination problem. For example, in shallow water, when an unknown slick is sighted, the Coast Guard notifies the MMS and operators in the vicinity check their operations for leaks. Sometimes, industry must shut in their operations until the leak source is found. By knowing if there is a natural source of slicks in the area, the MMS will be able to better respond to any spill or non-spill event.

Estimates of the flux of hydrocarbons from natural sources are based on approximate values and better values are needed to make a more accurate assessment of the relative contributions from seeps and human activities.

Objectives The objectives of the study will be to (1) map the occurrence of slicks on the surface, (2) relate the surface signature to bottom features, and (3) make better estimates of the volume of oil seeping into the Gulf of Mexico.

Methods The study will use a combination of several remote sensing tools to verify the origin and quantities of natural seepage. Remote sensing tools can include high frequency fathometer surveys, 3-D seismic seafloor amplitude mapping, and satellite imagery. Direct surface and subsurface sampling may be necessary to calibrate the remote observations.

Products A report and digital maps linking surface slick locations with seafloor natural seep activities.

Importance to MMS This information is frequently requested by the public, is critical to our EIS cumulative analysis of sources of hydrocarbons, and will assist district staff in their accident investigation responsibilities.

Date Information Required: The information will be used as soon as it is available.

Revised date: 2/25/2003

ENVIRONMENTAL STUDIES PROGRAM: Studies Development Plan FY 2004-2006

Region: Gulf of Mexico OCS Region

Planning Area(s): Western and Central Gulf of Mexico

Title: *Deepwater Program: Investigations of Chemosynthetic Communities on the Lower Continental Slope of the Gulf of Mexico*

Period of Performance: FY 2005-2008

Description:

Background In 1984, the first dense chemosynthetic communities were discovered in the northern Gulf of Mexico. Recognized as unique and sensitive biological communities, the first mitigation protecting them from oil and gas activity impacts was established through Notice to Lessees (NTL) 88-11 (now NTL 2000-G20). The MMS subsequently supported two major studies of these ecosystems. The successful MMS-sponsored *Chemosynthetic Ecosystems Study* and following study that ended in 2002, *Stability and Change in Gulf of Mexico Chemosynthetic Communities* have provided important detailed information on several very different chemosynthetic communities on the continental shelf of the central Gulf. All of the sites from these two studies are located at water depths shallower than 700 m. There are at a minimum, several hundred perennial hydrocarbon seeps in the Gulf originating in water depths deeper than 1,000 m as well as abundant 3D seismic geophysical data indicating signatures of hydrocarbon seepage represented by both low amplitude returns as well as hard bottom authigenic carbonate. These signatures, as well as a few discoveries of chemosynthetic communities as deep as 3,200 m in the Gulf, indicates that there may be many more undiscovered high-density communities in deeper areas of the Gulf, particularly between 1,000 and 2,000 m in depth. Differences in bottom sediment regimes, water temperatures, and hydrate stability compared to the upper slope may radically alter the abundance and composition of lower slope communities.

Objectives This program will expand the study of Gulf of Mexico chemosynthetic communities to include the entire continental slope. The area of interest would focus on water depth intervals between 1,000 and 2,000 m. Although largely exploratory, continuation of major components of previous studies will be considered including process-related studies.

Methods Access to the only manned deep submergence facility, the submarine *Alvin* will be limited, and therefore this study will focus on the use of deep ROV systems. Modern ROVs can be outfitted with the capability for collection of a wide variety of sample types including sediment, water, or biota. Other study methods could include long-term deployment of instrumentation to measure processes and *in situ* and laboratory experiments similar to previous studies. The first two years will involve field sampling; the last two years include potential laboratory work, data analysis, and synthesis.

Products Reports, imaging products, GIS layers/maps, archived data sets, and peer-reviewed scientific publications.

Importance to MMS Information on the deepwater environment and its biota is needed because the oil and gas industry is moving into deeper and deeper water in their continuing search for extractable reserves. Knowledge of the distribution, relative abundance, and population structures of deepwater organisms, particularly the high-density chemosynthetic communities, will provide critical information to estimate of the potential effects of deepwater exploration and production and allow refinement of mitigation measures for this deeper continental slope area. Our current basic understanding of chemosynthetic communities is limited to the study sites chosen by previous projects that were limited by the depth capabilities of available submersible technology, *i.e.*, the *Johnson Sea Link* submersibles with a depth limit of 1,000 m. Little is presently known about the potential occurrence of lower slope communities or their characteristics and sensitivity to impacting factors.

Date Information Required: The information will be used immediately and over the next ten to twenty years for making decisions regarding the protection of chemosynthetic communities throughout all areas of the Gulf of Mexico continental slope.

Revised date: 2/17/2003

ENVIRONMENTAL STUDIES PROGRAM: Studies Development Plan FY 2004-2006

Region: Gulf of Mexico OCS Region

Planning Areas: Gulfwide

Title: *Deepwater Program: Monitoring Industry Labor Needs, 2005-2010*

Period of Performance: FY 2005-2009

Description:

Background Purchasing, contracting, and hiring of wage and salaried workers are the major avenues through which industries, including mineral extraction companies, affect communities and regions. The type, quantities and location of purchases, the scale of contracting, the number of workers hired, their job skills and wage rates are all critical to understanding the magnitude and location of industrial effects. For example, to understand the economic effects of the industry, one must know what was purchased, and where. Assessments and projections are more accurate if one knows what kinds of job skills are needed by the oil and gas deepwater industry, how those skills have changed over time, and whether employees are long-time community residents, have recently migrated to it, or commute long distances to work. Understanding such factors over time is critical to predicting and mitigating adverse socioeconomic effects of deepwater-related activities.

An earlier study, *Assessing and Monitoring Industry Labor Needs*, developed and tested sampling frames and OMB-approved questionnaires to gather measures of purchasing, contracting, and hiring by the OCS oil and gas industry. After the questionnaire results were analyzed, a workshop was held to assess the methodology, to identify weaknesses, and suggest improvements. MMS seeks to refine the data-gathering methodologies developed by this earlier study and to use it to gather systematic industry data at regular 5-year intervals beginning in 2007.

Objectives This study has four objectives (1) to refine the methodology developed under the earlier study to gather valid and reliable measures of purchasing, contracting, and hiring by the OCS oil and gas industry; (2) to collect information on activities, hiring and scheduling, purchases and contracting, and plans of companies active on the OCS and on companies that support these activities; (3) to collect relevant demographic and job-related information on individuals employed by these companies. MMS uses this methodology to gather longitudinal data on the industry; and (4) to analyze the results.

Methods This study uses several approaches to meet the objective of developing a system to collect valid and reliable measures over time. First, the study will develop and administer a random questionnaire to firms and to employees of firms. Second, it will identify available, industry-generated data on purchasing, contracting, and hiring to supplement the questionnaire data. Besides developing and evaluating the instruments and sample design, the study administers the surveys, develops a database, and analyzes the data to identify trends and unique aspects of the oil and gas industry. This study requires OMB approval for the surveys.

Products Methodology and questionnaire, OMB approval package, study databases, study reports.

Importance to MMS This study will serve as the primary instrument used to collect information related to industry reporting requirements. Besides providing MMS and stakeholders with measures of the magnitude and distribution of industry purchases and employment, it will provide the agency with data used to update estimates of the direct and indirect economic benefits of the program. Information will be used for EIS's, EA's and other permitting activities. Information on the available labor force is also useful to industry when planning future projects. Such information is not available from current data gathering efforts, such as the U.S. Census. Deepwater activities and industry reorganizations have led to rapid changes in the distribution of onshore activities. This study will develop the database needed to assess, monitor, and project such effects.

Date Information Required: The information will be used for preparing the 5-year environmental impact statement and other NEPA documents as soon as it is available.

Revised date: 3/4/2003

ENVIRONMENTAL STUDIES PROGRAM: Studies Development Plan FY 2004-2006

Region: Gulf of Mexico OCS Region

Planning Area(s): Gulfwide

Title: Petroleum-Involved Ports and Port Communities: An Assessment of Ports, Their Activities, and Their Economic and Social Effects on Related Communities (Comparative Community Study)

Period of Performance: FY 2005-2007

Description:

Background Recent MMS studies and scoping reports have underscored the importance of ports to the socioeconomic impact assessment of the OCS leasing program. Many OCS-related activities center on ports including labor-intensive shipbuilding and fabrication. As intermodal transportation hubs, ports concentrate OCS-related traffic, materials, and personnel as well as many associated but non-OCS activities such as foreign oil imports and drill-rig exports. Because of the roles ports play, they are also sensitive to changes in the offshore industry - to economic ups and downs, reorganizations, new technologies, shifts in location. Finally, and extremely important for socioeconomic impact assessment, ports develop and operate in physical, economic, political, and social association with communities. Ports concentrate certain OCS-related social and economic effects in particular towns and cities.

Ports are also unique. Each has its own mix of activities, physical attributes and possibilities, fiscal limitations, and relationships with surrounding communities. Just as ports vary greatly, their social and economic effects on communities vary greatly. Several MMS studies address one or more ports and aspects of their impacts. However, the sum of these studies will not provide a description of the GOM ports that are significantly involved in OCS-related activities or provide an analysis of the socioeconomic effects of their involvement on their associated communities.

Objectives (1) This study will describe GOMR OCS-involved ports. Each port description will discuss its development and trends, its current organization, fiscal regime, infrastructure, operations, and limitations (e.g., fiscal, physical), and likely future developments and trends. Each port description will discuss the role the petroleum industry plays in its past, present and likely future. (2) This study will describe the communities associated with GOMR OCS-involved ports. Each community description will discuss its past growth and development as well as current conditions, paying particular attention to links (e.g., influences, causal relationships) between community and port. The description will identify and analyze the benefits (e.g., job creation) and burdens (e.g., infrastructure demand) placed on communities as a result of OCS-related port operations. (3) This study will analyze port/community relationships to assess the range and magnitude of port-concentrated effects, their geographic distributions (e.g., differences among states), and their causal associations.

Methods Literature search and synthesis, analysis of available data, discussions with local experts and public officials.

Products Study reports, literature review.

Importance to MMS This study will increase agency ability to analyze local socioeconomic effects of the program and will significantly increase the knowledge of program effects in coastal Texas, an area becoming increasingly important with deepwater development. It will also help address State of Louisiana concerns about the importance of its wetlands to the program.

Date Information Required: Information from this study will be used for programmatic planning and environmental assessments as it becomes available.

Revised date: 3/3/2003

ENVIRONMENTAL STUDIES PROGRAM: Studies Development Plan FY 2004-2006

Region: Gulf of Mexico OCS Region

Planning Area(s): Central Gulf of Mexico

Title: Exploratory Integrated Modeling of a Coastal Ecosystem

Period of Performance: FY 2005-2007

Description:

Background The Central Gulf of Mexico continental shelf is an ecologically heterogeneous marine ecosystem. The shelf region is bounded onshore by a number of estuaries and bays acting as nutrient sources and serving as fertile nursery areas. Offshore is a continental margin with active salt tectonics creating a complex geological and biological environment. The Mississippi River strongly influences both the ecosystem and the shelf's circulation. The health of the shelf ecosystem depends on physical habitat, environmental and climatic factors, nutrient availability, and oceanographic processes. These physical processes link to the biotic components of the ecosystem. Numerous studies funded by MMS and others have collected data on the physical, chemical, and biological processes occurring offshore of Louisiana. However, the information would be of greater value to decision makers, if it were integrated.

The integration of studies on physical and biological processes has been applied to the management of estuarine and bay ecosystems for over two decades. The result is an improved scientific understanding of the natural ecosystem and the ability to better assess human influences. The challenge is to apply modeling frameworks to an entire ecosystem where processes occur on a variety of scales, involve a wide range of natural and human activities, and has inherent uncertainties. Also of concern for oil and gas activities, are the cumulative effects of these activities on the ecosystem.

Objectives This project represents a pilot study into the linking of data already gathered and models that already exist to develop an integrated approach to understanding the shelf marine ecosystem.

Methods A possible first step is to use deterministic models such as the coupling of hydrodynamic models to both sediment transport models and benthic-pelagic biogeochemical model. Where possible, the study will use existing models for physical oceanography, biogeochemical processes, larval transport, etc. to integrate the information. This study will use all available information/data collected by the MMS-funded projects in the area such as the LATEX studies. River discharges, nutrients, currents, and other ancillary data will be used to establish the links/transport between deepwater, coastal, and shelf areas. These data will be used to evaluate the model output.

Importance to MMS The MMS has spent over \$200 million dollars to study the environment of the Northern Gulf of Mexico. These studies have been topic specific that yield rich data and

preliminary analyses and interpretations. To be useful to decision-makers, this information needs to be integrated. One method of integration is the use of linked models.

Date Information Required: The information will be used as soon as it becomes available.

Revised date: 2/17/2003

ENVIRONMENTAL STUDIES PROGRAM: Studies Development Plan FY 2004-2006

Region: Gulf of Mexico OCS Region

Planning Area(s): Gulfwide

Title: Evaluation of Potential Environmental Impacts from Subsea Processing

Period of Performance: FY 2005-2006

Description:

Background Subsea processing involves the placement of separation equipment on the seafloor rather than on a platform or floating production, storage, and offloading (FPSO) vessel. Water is separated from the oil and re-injected into a separate well. Additionally, gas may be re-injected, eliminating the need for flaring. The process involves a large template and a variety of equipment placed on the seafloor. A flow line transports the oil back to a platform or FPSO. This would be a new technology in the Gulf of Mexico and the potential environmental impacts from this type of process need to be evaluated.

Objectives The objective of this study is to evaluate the potential environmental impacts from subsea processing.

Methods Information about the technology and any studies conducted to review the potential environmental impacts would be reviewed and synthesized. The possible environmental impacts would be determined and evaluated. Additional information needs would also be assessed.

Products The study will result in final report.

Importance to MMS The potential environmental impacts from new technologies need to be assessed prior to their use.

Date Information Required: The information would be used as soon as it becomes available.

Revised date: 3/7/2003

ENVIRONMENTAL STUDIES PROGRAM: Studies Development Plan FY 2004-2006

Region: Gulf of Mexico OCS Region

Planning Area(s): Eastern Gulf of Mexico

Title: Environmental Monitoring of a Development Site

Period of Performance: FY 2005-2007

Description:

Background The Minerals Management Service (MMS) has the authority to require monitoring of the environment before, during, and after an activity has occurred on the federal Outer Continental Shelf (OCS). The specific type of monitoring is dependent upon the surrounding environment. Monitoring can include studying physical, chemical, or biological parameters specific to the local environment and can involve both spatial and temporal surveys. The MMS can either require the operator to conduct a monitoring program or the program could be funded jointly.

The Eastern Planning Area has as yet to be developed, but recent leasing activities suggest that development will occur within the next five years. This area is an ideal location for monitoring and evaluating the effects of development, since pre-development locations are relatively pristine.

Objectives The objective of this study is to monitor the environment around a development site, both pre and post development.

Methods Surveys would be conducted before and after the development of a site. Samples of water, sediment, and biota would be collected and analyzed for appropriate parameters. The initial focus would be on a deepwater site in the Eastern Planning Area.

Products The study will result a series of monitoring reports.

Importance to MMS The assessment of potential environmental impacts from development activities will be used in determining appropriate mitigations.

Date Information Required: The information would be used as soon as it becomes available.

Revised date: 3/7/2003

ENVIRONMENTAL STUDIES PROGRAM: Studies Development Plan FY 2004-2006

Region: Gulf of Mexico OCS Region

Planning Area(s): Gulfwide

Title: Evaluation of Noise from Platform Operations

Period of Performance: FY 2005-2006

Description:

Background Interest in noise in the sea has increased over the last several years, particularly as a result of the stranding of marine mammals after man-made acoustic events. The National Research Council (2003) recently released a report on noise in the sea and reported that there is a lack of knowledge on the subject. There are many sources of noise, both natural and man-made. With over 4000 structures on the Outer Continental Shelf in the Gulf of Mexico, there is a question of how much noise is created during operations. Other sources of noise include shipping as well as supply boats and recreational vehicles. In addition to the intensity or loudness, the frequency of the noise is also important. Platforms producing oil and gas are often continuously operated for years to decades. The amount of noise contributed by these operations and the contribution relative to other sources is unknown.

Objectives The objective of this study is to evaluate the noise levels around a variety of structures in the Gulf of Mexico.

Methods The amount of noise generated from various types of structures will be directly measured at various distances from the structure. These measurements will then be compared to other sources of noise to evaluate the relative magnitude and frequency to evaluate the contribution to the overall noise in the sea.

Products The study will result in final report.

Importance to MMS The relative contribution of noise from platforms is important to the overall assessment of noise in the sea. The results could lead to mitigations to reduce the noise, should it be determined that the contribution is significant.

Date Information Required: The information would be used as soon as it becomes available.

Revised date: 3/7/2003

ENVIRONMENTAL STUDIES PROGRAM: Studies Development Plan FY 2004-2006

Region: Gulf of Mexico OCS Region

Planning Area(s): Gulfwide

Title: Gulf of Mexico Ozone Modeling Analysis

Period of Performance: FY 2005-2007

Description:

Background This study updates the primary goal of the Gulf of Mexico Air Quality Study (GMAQS) (completed in August 1995) to estimate the impacts of emissions from Outer Continental Shelf (OCS) activities upon ozone. Because of changes in the National Ambient Air Quality Standard for ozone (from a 1-hour standard to an 8-hour average standard), references to the 1-hour standard in the GMAQS are no longer relevant to current air quality requirements. This study will apply the new model selection criteria and modeling protocols and thereby allow relevant comparisons to the new 8-hour ozone standard.

The Gulf of Mexico Air Quality Study was completed in 1995 based on the 1-hour O₃ standard. The Boundary Layer Study of the Central and Western Gulf of Mexico is currently gathering field data. The Breton Aerometric Monitoring Program is expected to begin gathering field data will complete data collection in September 2001. The Gulfwide emissions inventory was completed in 2000.

Objectives The objective of this study is to quantify the NO₂, VOC, and O₃ concentrations in the Gulf coastal areas attributable to OCS production and development sources regulated by the MMS during the selected episode(s). The modeled ozone concentrations will be calculated to allow direct comparison to the 8-hour average National Ambient Air Quality Standard. Additionally, the modeling should determine if the ozone formation in the different areas is NO_x or VOC limited.

Products A final report.

Methods The study requires using the existing onshore and offshore emissions inventories, and onshore and offshore meteorological data to sufficiently depict the pollutant transport processes in the GOMR. Primarily, the existing emission inventories and meteorological data will be used for this study. Photochemical modeling is performed to determine the OCS activity related onshore O₃ and NO₂ impacts. Finally, if O₃ impacting onshore areas is determined to be NO_x limiting or VOC limiting, this information will be used so that decisions can be made as to how best to target emission control strategies. Emissions inventory and pollutant transport information under several current and proposed MMS studies, as well as, other relevant studies will be applied, and where appropriate, incorporated into this modeling effort.

Importance to MMS The information obtained will support cumulative impact analyses for NEPA documents prepared to support GOMR OCS programs. Finally, this study develops a

framework for making decisions about where and which emissions should be targeted for controls to reduce current or foreseeable significant impacts.

Date Information Required: The 8-hour ozone National Ambient Air Quality Standard went into effect on September 16, 1997. It established a three-year baseline data collection period that was completed in 2000. The 1-hour ozone standard is used in the Gulf of Mexico Air Quality Study (SAI, 1995). This 1-hour ozone standard will still apply to those areas that have not achieved the 1-hour standard. The 8-hour ozone standard will apply everywhere else. Therefore, a new ozone analysis is needed as soon as possible after the 2000 emission inventory is collected to allow the States to prepare and submit their air pollution control plans to the U.S. EPA in the year 2003.

Revised date: 8/29/2003

ENVIRONMENTAL STUDIES PROGRAM: Studies Development Plan FY 2004-2006

Region: Gulf of Mexico OCS Region

Planning Area(s): Gulfwide

Title: Data Gap and Satellite Remote Sensing Data Retrieval for Air Quality Modeling in the Gulf of Mexico Region

Period of Performance: FY 2005-2007

Description:

Background Currently, MMS is conducting air quality and meteorological modeling to investigate the impact from the OCS emission sources on the air quality in the Breton Class I area. This is a complex project. In model simulations, the initial state of the atmospheric variables is to be accurately defined. However, there is lack of routine observational data to define this atmospheric state in the Gulf of Mexico Region. These data are very sparse, or near non-existent in the Gulf of Mexico region. Yet these data are crucial for improving air quality and meteorological modeling systems. The accuracy of the model outputs strongly depends on the observational data. Satellite remote sensing can be used to fill this data gap by providing useful information on sea state and atmospheric conditions and characteristics; it can be used to derive the meteorological variables such as wind, temperature, moisture, ocean current, wave heights, and sea surface temperature. These data may also be obtained from buoy measurements. For instance, the Advanced Very High Resolution Radiometer (AVHRR) is on board the NASA polar orbiting satellite with 1 Km spatial resolution in five wavebands. This capability can be used for monitoring of surface and atmospheric conditions. Data can be used to produce analysis fields for numerical modeling or to identify fire and smoke. Surface wind can be obtained from a scatterometer. Data can be retrieved from GOES images for verifying the model performance.

In summary, it is proposed to gather additional data from remote sensing and buoy measurements, process data, analyze data, and perform data assimilation for air quality and meteorological modeling in this study.

Objectives The objectives of this study are (1) to demonstrate the feasibility and capability of the satellite remote sensing for retrieving the meteorological variables and sea state conditions or using buoy data for improving air quality or meteorological modeling system; (2) to understand the atmospheric process such as sea-breeze circulation in the coastal region in the Gulf of Mexico region; (3) to define the sea state and the state of atmospheric conditions and to collect the available data from various sources for the purpose of demonstration; (4) to make comparisons with the observational data; and (5) to make recommendations for the future study regarding the capability of using remote sensing data.

Methods Use buoy, scatterometer, and satellite remote sensing data to derive the atmospheric state or sea state variables and characteristics for improving air quality and meteorological modeling systems.

Products Databases and a summary report.

Important to MMS Routine meteorological observations to define the vertical structure of the atmospheric conditions are practically non-existence in the Gulf of Mexico Region, especially in the deepwater environment. MMS urgently needs these data for improving air quality and meteorological modeling systems or to assess the environmental impacts of the offshore operations on coastal air quality. The data can also be used for oil spill applications.

Data Information Required: There is an urgent need of this data in the next few years to gain a deeper understanding of the atmospheric process and to define the state of atmospheric conditions and sea state for air quality modeling. The data are needed for improving the air quality modeling such as NO_x and SO_x and ozone formation as well as assessing the environmental impacts from the oil and gas operations in the Gulf of Mexico Region.

Revised date: 8/29/2003

ENVIRONMENTAL STUDIES PROGRAM: Studies Development Plan FY 2004-2006

Region: Gulf of Mexico OCS Region

Planning Area(s): Gulfwide

Title: *Deepwater Program: Improving Oil Spill Models by Increasing the Understanding of Gas Hydrates*

Period of Performance: FY 2005-2007

Description:

Background Gas hydrates are cage-like structures of water with methane or other small gas or hydrocarbon molecules entrapped that form under low temperature and high pressure conditions. The thermodynamic conditions of pressure and temperature suggest that hydrate should readily form at water depths greater than 300- 400 m. However, observations of gas escaping from sediments do not show the formation of hydrates, unless captured in an inverted sampling tube. Model predictions from incidents of gas release during oil and gas exploration and development activities suggest that hydrates should form, though results from a recent experimental release of gas in deepwater did not indicate the presence of hydrates.

One potential reason for the discrepancy between experimental observations and model results is the requirement that nucleation be initiated by some mechanism before the hydrates form. Several laboratory studies have indicated that nucleation is key to hydrate formation, even under the ideal temperature and pressure conditions. A recent presentation at the Geological Society of America indicated that nucleation was important for the formation of hydrates in marine sediments.

Although observations are reported that suggest nucleation is an important process, little information has been gathered to demonstrate that it is key to the formation and presence of hydrates in the deep ocean. In addition, methods for modeling nucleation processes do not exist.

This study will include laboratory experiments that directly address the nucleation process and conditions that control the process. In addition, the possibility of mathematically describing the process will be explored.

Objectives The objectives of this study are to (1) increase the understanding of the nucleation process in hydrate formation and (2) develop mathematical techniques to describe the process so that it can be included in models.

Methods Laboratory experiments will be designed to specifically address hydrate nucleation processes.

Products A final report.

Importance to MMS The understanding of nucleation processes in the formation of hydrates is key to model development of hydrate formation in the deep ocean. The MMS will need this information to aid in assessment of hydrate location through a better understanding of the conditions under which the hydrates form.

Date Information Required: The information is needed to assist in the development of hydrate formation models that are presently included in the understanding of incidents involving the release of gas in deepwater.

Revised date: 8/29/2003

ENVIRONMENTAL STUDIES PROGRAM: Studies Development Plan FY 2004-2006

Region: Gulf of Mexico OCS Region

Planning Area(s): Gulfwide

Title: Improved Environmental Data Concerning Support Vessel Usage by the OCS Oil and Gas Industry

Period of Performance: FY 2005-2006

Description:

Background Approximately 24 types of service vessels cater to the OCS oil industry. These vessels produce noise above and under water, discharge routine wastes and bilge waters, air emissions, make waves that erode channel banks, and disturb the seafloor with anchors. In particular, they have been responsible for an increasing number of collisions and are viewed by the public as a potentially significant cause of oil spills. Deepwater OCS activities have resulted in an increased demand for service vessels and particularly those qualifying for deepwater operations. As industry moves into deeper waters, larger vessels with deeper drafts have been phased into service. Deeper access channels are needed for these vessels to reach shore bases. These vessels may carry different and more types and increased volumes of equipment and supplies in their hulls. The types and amounts of discharges and potential spills from these larger vessels should be analyzed. Navigation channel usage is currently being summarized by the Army Corps of Engineers for the MMS and can serve for analysis of channel usage. Of particular concern, information on accident occurrences that have resulted in environmental or economic damage and oil spills is unavailable.

Objectives The objectives of this study are to (1) assist the MMS in evaluating ongoing and future environmental impacts from OCS service vessel usage, (2) provide statistical support to the MMS by determining the rate, size, locations, and causes of associated accidents (oil spills and collisions) occurring due to OCS service vessel usage and compared to local and regional vessel traffic patterns, and (3) determine the effect deepwater operations will have on service vessel usage and associated impacting factors.

Methods The contractor will analyze historical data on service vessel usage, impact events, and routine effects to the environment and will conduct a fault tree analysis to determine the variables of concern relevant to service vessel usage.

Products The study will document the frequency and types of activities of OCS service vessels and the major impacting factors associated with service vessel usage. It will determine navigation usage patterns for existing and future OCS service vessels. It will project the level of expected impact or risk from these factors and how these factors vary with water depth and type of facility servicing, and will develop estimates of collision and spill rates.

Importance to MMS In preparing Environmental Impact Statements and Environmental Assessments, impacts due to support vessels is evaluated. Presently, this information is limited and out of date.

Date Information Required: The information is needed for the preparation of Environmental Impact Statements and would be used as soon as it is available.

Revised date: 2/25/2003

SECTION 3. Topical Areas for FY 2006

The GOMR is expecting a continuation of offshore oil and gas activities at its current pace. Issues that may result in future studies include industry's continued move into deepwater; biotechnology; invasive species; and understanding the chronic sublethal impacts associated with offshore development and production, that is, fates and effects.

3.1. Deepwater

Deepwater habitats are the least understood marine environments of the Gulf of Mexico. Several major deepwater studies were initiated in 2000 to broaden our limited knowledge base of the benthic ecology. Final reports from these studies are expected in 2004. The results from these studies will lead to new areas for further investigation. Investigations into the physical oceanography in the deep Gulf of Mexico are also underway. Results from these studies may lead to additional data gaps for future study.

3.2. Fates and Effects Studies

The OCS supports large and valuable commercial and recreational fisheries, and concern has been expressed that the oil and gas industry may contaminate these resources or the supporting ecosystem. Understanding the chronic, sublethal impacts that may be associated with offshore oil and gas activities is a concern to many. Questions continually arise as industry moves into deeper water and new technology is applied. The studies program is continuously addressing the information needs in this constantly evolving area and will develop new studies as the need arises.

3.3 Gas Hydrates

Exploration into the location and distribution of gas hydrates along the continental slope of the Gulf of Mexico is presently underway. Within the next five years, this could lead to the possible commercial extraction of hydrates. Should this come to fruition, an assessment of the impact to the environment from the recovery of this resource will need to be made.

3.4 Decommissioning

Over the next decade, it is expected that a large number of the over 4000 structures in the Gulf of Mexico will be removed. These structures have supplied a hard surface for organisms to flourish, creating an artificial ecosystem and affecting the distribution of species. The decision to retain or remove these structures will need to be made based on the implications to the ecosystem. An initial literature search and data synthesis is proposed in this study development plan. Results of this study could identify additional research gaps.

SECTION 4. Literature Cited

Carney, R.S. 1997. Workshop on Environmental Issues Surrounding Deepwater Oil and Gas Development, Final Report. OCS Study MMS 98-0022. U.S. Department of the Interior, Minerals Management Service, Gulf of Mexico OCS Region, New Orleans, LA. 163 pp.

National Research Council. 2003. Ocean Noise and Marine Mammals.
<http://books.nap.edu/books/0309085365/html/1.html#pagetop>



The Department of the Interior Mission

As the Nation's principal conservation agency, the Department of the Interior has responsibility for most of our nationally owned public lands and natural resources. This includes fostering sound use of our land and water resources; protecting our fish, wildlife, and biological diversity; preserving the environmental and cultural values of our national parks and historical places; and providing for the enjoyment of life through outdoor recreation. The Department assesses our energy and mineral resources and works to ensure that their development is in the best interests of all our people by encouraging stewardship and citizen participation in their care. The Department also has a major responsibility for American Indian reservation communities and for people who live in island territories under U.S. administration.



The Minerals Management Service Mission

As a bureau of the Department of the Interior, the Minerals Management Service's (MMS) primary responsibilities are to manage the mineral resources located on the Nation's Outer Continental Shelf (OCS), collect revenue from the Federal OCS and onshore Federal and Indian lands, and distribute those revenues.

Moreover, in working to meet its responsibilities, the **Offshore Minerals Management Program** administers the OCS competitive leasing program and oversees the safe and environmentally sound exploration and production of our Nation's offshore natural gas, oil and other mineral resources. The MMS **Minerals Revenue Management** meets its responsibilities by ensuring the efficient, timely and accurate collection and disbursement of revenue from mineral leasing and production due to Indian tribes and allottees, States and the U.S. Treasury.

The MMS strives to fulfill its responsibilities through the general guiding principles of: (1) being responsive to the public's concerns and interests by maintaining a dialogue with all potentially affected parties and (2) carrying out its programs with an emphasis on working to enhance the quality of life for all Americans by lending MMS assistance and expertise to economic development and environmental protection.