

Studies Development Plan

for FY 2005-2007

MINERALS MANAGEMENT SERVICE

Environmental Studies Program



Gulf of Mexico OCS Region
Environmental Sciences Section

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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 41 million acres under lease (as of 02-02-2004). There are 3,434 offshore production platforms active in the search for natural gas and oil on the Gulf OCS (as of 02-02-2004); 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 (Schroeder and Wood, 2003). 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. Activities have remained steady during 2003, but an increase in drilling on the shelf is expected in response to deep gas incentives. In addition, 31 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 2003, 91 structures were installed on the shelf and 142 structures were removed. Pipeline segments are installed between connections and can be any length. Last year, the installation of approximately 350 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. A second study is underway in the western Gulf and a third is being procured to study the eastern Gulf. Results from these studies will be used to plan future research in FY 2007 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. One current meter mooring is presently deployed in the central Gulf and a second set of moorings is planned for the western Gulf.

Models used to extend the current data collected by moorings and other instruments are initiated using hydrographic data. The most accurate data currently available was collected in the early 1960s and is presently used to initiate the models. We are proposing a new hydrographic survey of the Gulf of Mexico to collect recent data to be used in these models. The data could potentially be used to evaluate any changes over the past 40 years.

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 being procured for 2005 to coincide with data collection activities by other State and Federal agencies. At some point in the future, modeling of ozone contributions from offshore activities may be necessary. A study is planned should this be needed.

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.

Through cooperative efforts, two profilers are being deployed, one in Pensacola, Florida and one in Cocodrie, Louisiana. Meteorological data collected with these profilers will be shared with the affected States and other Federal agencies.

1.4.3. Fates and Effects

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. The Technical Assessment Research group is currently funding a study to analyze the potential risks of a spill from these types of facilities. Using this information, we are proposing to investigate the potential environmental impacts from this new technology.

The contribution of oil to the environment from natural seeps is still not well understood. This data is used to determine the relative contributions from all sources and is considered a significant unknown. We are proposing a study to use satellite data to evaluate the volume of oil.

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.

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. Data from this study will contribute to the understanding of density and types of organisms that live on the seafloor. The study also examined some of the processes that control the distribution. Results from this study will be available by the end of 2004 and should give new insights into future directions for deep-sea benthic research.

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 two years of data collection is completed. A continuation of this project is proposed to extend these investigations for an additional three years. We are also proposing a separate study to examine deep-sea squid, which are a major food source for sperm whales.

Besides noise from seismic activities, production platforms generate some noise they may or may not be contributing to the overall noise in the marine environment. We are proposing directly measuring the noise from a variety of platforms to evaluate this source within the spectrum of noise in the sea.

1.4.6. Social Sciences and Economics

The Gulf of Mexico Region has a very active program in social sciences and economics. Many studies are near completion and it is time to examine what we already know and what the next direction will be. To this end, a planning workshop was held in February 2004 to evaluate what is known and establish a direction for the next five years. Results from this workshop are being evaluated and additional studies will be proposed for FY 2005 and beyond in the next Studies Development Plan.

We are proposing one study to collect environmental data concerning support vessel usage. This data is important in evaluating the economic impacts of the industry as well as the environmental aspects of vessel traffic and the transport of both goods and wastes.

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

In the last Studies Development Plan (SDP), a proposal was made to try and integrate the large body of accumulated data into coupled physical and biological oceanographic models. After discussions, it was decided to first hold a workshop, which will bring together people already doing this type of modeling. This workshop will be held as part of the International marine Environmental Modeling Seminar, hosted by MMS, in October 2004. Results from these discussions will be incorporated into the next SDP.

SECTION 2. Proposed Study Profiles

2.1. INTRODUCTION

The following sections focus on the proposed studies for FY 2005, FY 2006, 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 2005 NSL
GULF OF MEXICO REGION PROPOSED STUDIES AND RANKING FOR FY 2005**

Page #	**	Title	Rank
11	BIO	Evaluation of Potential Environmental Impacts from Subsea Processing	1
13	SE	<i>Deepwater Program: Sperm Whale Seismic Study – Part II (SWSS II)</i>	2
15	BIO	<i>Deepwater Program: Investigations of Chemosynthetic Communities on the Lower Continental Slope of the Gulf of Mexico</i>	3
17	FE	<i>Deepwater Program: Synthetic-based Fluid Spill of Opportunity: Environmental Impact and Recovery</i>	4
19	FE	Distribution of Natural Seepage in the Gulf of Mexico	5
21	OT	<i>Deepwater Program: Comparison of Remote Technologies to Better Assess the Location of Gas Hydrates</i>	6
23	FE	Examination of Chemical Parameters in Produced Water that may Affect Seasonal Hypoxic Conditions off the Louisiana Coast	7
**	PO = Physical Oceanography	FE = Fate & Effect	BIO = Biology
	PS = Protected Species	SE = Social & Economic	OT = Other
***	Rank 1 = highest		

ENVIRONMENTAL STUDIES PROGRAM: Studies Development Plan FY 2005-2007

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.

Currently, the Technical Assessment and Research group of MMS has a contract to assess the risks of subsea processing as compared to surface processing. The study will include the possibility of component failures, which could lead to a potential spill. This proposed study will look further to the potential environmental impacts from such a failure.

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 discussing the potential impacts and recommendations for additional information needs.

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: 11/16/2004

ENVIRONMENTAL STUDIES PROGRAM: Studies Development Plan FY 2005-2007

Region: Gulf of Mexico OCS Region

Planning Area(s): Central Gulf of Mexico

Title: *Deepwater Program: Sperm Whale Seismic Study – Part II (SWSS II)*

Period of Performance: FY 2005-2007

Description:

Background As industry moves to deeper GOM waters, platforms and other operations (vessel traffic, drilling ships, platform placement/removals, seismic surveys etc.) now routinely overlap with the habitat of the endangered sperm whales and about 20 species of cetaceans. As detailed in the findings of the MMS sponsored 1999 workshop on protected species in the GOM, the leading concern was the almost total lack of information on the effects of loud sound (airguns, in particular) on, firstly, sperm whales and also all cetaceans in general. In 2000, MMS initiated a pilot study through an interagency agreement with the National Marine Fisheries Service (NMFS) to develop methods to study sperm whales and acoustics. Basic methods were established in this 2-year study along with some collection of baseline information on sperm whales diving behavior. In 2002, MMS initiated the Sperm Whale Seismic Study (SWSS) to continue collecting information on sperm whale baseline biology, habitat use, and begin testing of possible airgun effects using controlled exposure experiments (CEEs). SWSS is co-funded by the Navy, National Science Foundation, and a coalition of seismic and oil industry companies. Three field seasons were planned from FY-2002-2004 with a final report to be complete in FY2005. The controversy and information needs concerning effects of noise on marine mammals have increased during the conduct of SWSS. Through the precautionary principals inherent in the Marine Mammal Protection Act, new restrictions and mitigations on seismic operations have been implemented, though no new findings of impacts have been documented. While SWSS results to date are well situated to show more extreme concerns are unfounded, the ability to resolve more subtle concerns remains elusive. This lack of information leads to views that existing operations with mitigations fail to protect sperm whales or that mitigation measures are too extreme and are unjustified constraints.

SWSS II is proposed to continue efforts to define habitat use, determine longer-term behavior of sperm whales relative to seismic vessels and oceanographic events, and further define genetic characteristics of GOM whales. Closely coordinated studies with industry and NSF partnerships will measure sound sources in the GOM and better map the acoustic environment. In the broader view of marine mammal acoustic issues and high degree of cooperative efforts now existing among Federal Agencies and industry, SWSS II is intended to focus on the existing situation in deepwater GOM areas. In that sense, most effort will focus on habitat use, possible displacement by vessels, and monitoring for any whale responses under existing conditions. Efforts to determine a threshold of response for sperm whales and quantify that response (CEEs), if pursued, will need to be a different research arrangement, perhaps requiring testing in several worldwide locations.

Objectives SWSS II is projected to conduct two summer cruises in FY 2005 and FY 2006 with possible additional small vessel whale-following observations to monitor tagged whales. Basic tasks are to deploy improved S-tags with GPS and depth recording capabilities, upgrade passive acoustic tracking, obtain additional DNA samples and photo ID photos, maintain physical oceanographic data collection from vessel/satellite remote sensing, and conduct small vessel

surveys for enhanced behavioral data and confirm condition of tagged animals. Objectives include:

- 1) Correlation of long-term whale positions relative to physical oceanographic events and industry activities (platform and seismic vessel locations) using S-tags and, potentially, 3-D acoustic tracking.
- 2) Complete an evaluation of habitat use of sperm whales in GOM based on all SWAMP and SWSS results.
- 3) Provide an evaluation of genetic characteristics relative to world-wide sperm whale populations.
- 4) Integrate SWSS results and applicable information from seismic vessel observations and acoustic calibration efforts to estimate potential effects of seismic vessel operations on GOM sperm whales.

Methods Methods have been well established through SWSS. These include standard visual survey techniques using 25x “bigeye” binoculars, biopsy darts for DNA samples, digital photography for photo-ID, towed hydrophones, XBT’s, CTD;s and use of remote sensing satellite data for sea surface height and temperature and ocean color. S-tags will be a mix of proven designs with introduction of new GPS/depth sensing tags (developed under separate funding).

Products The key product desired is manuscripts for submission to peer-reviewed journals. For effective administration and tracking of the study, cruise plans and enhanced cruise reports will be required for years 1 and 2. A data management plan will be submitted after contract award. A final report will be produced in year 3.

Importance to MMS The possible impacts of manmade sound on marine mammals is highly contentious with few conclusive data. MMS has responded with a series a NEPA documents, petitions, and NTL’s. There is a very pressing need to obtain more informative to update and revise these products. Active monitoring and evaluation of possible effects of industry activities on marine mammals is needed in the GOM. SWSS II will both provide a very significant contribution to that effort and obtain new results toward defining acoustic effects and habitat use of sperm whales in the GOM.

Date Information Required: The information will be used as soon as it becomes available in annual and final reports.

Revised date: 11/16/2004

ENVIRONMENTAL STUDIES PROGRAM: Studies Development Plan FY 2005-2007

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 (Chemo III)*

Period of Performance: FY 2005-2009

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: 11/16/2004

ENVIRONMENTAL STUDIES PROGRAM: Studies Development Plan FY 2005-2007

Region: Gulf of Mexico OCS Region

Planning Area(s): Central and Western Planning Area

Title: *Deepwater Program: Synthetic-based Fluid Spill of Opportunity: Environmental Impact and Recovery*

Period of Performance: FY 2005-2007

Description:

Background

Synthetic-based drilling fluids are increasingly used to drill in challenging deepwater environments due to their superior performance and environmental advantages. Studies of SBFs have shown that they are not bioaccumulative, they biodegrade, and they are non-toxic in comparison to previously used drilling mud components. Furthermore, they are not soluble in water. The discharge of cuttings wetted with SBF is now permitted in the general NPDES permit for both USEPA Regions 4 and 6.

The increased use of SBFs has resulted in an increase in accidental releases. A total of 8 and 17 SBF spills occurred in 2001 and 2002, respectively, with the largest spill having a volume of 1,500 bbl. The majority of studies have examined the environmental fate of permitted discharges that contain less than 10% SBF and are deposited daily over a period of weeks or months. A spill of significant volume of either the base fluid alone or the drill fluid prior to solids removal may exhibit a somewhat different environmental fate than the daily deposition of cuttings wetted with SBF. The MMS would benefit from more detailed and actual field information about the fate and effects of unintentionally released SBFs.

Physical smothering and conversion to anaerobic sediment conditions are noted environmental effects associated with an SBF release. Data regarding the classification and enumeration of SBF-degrading microorganisms, comparative degradation rates at standard pressure and seafloor pressure for two SBF types and three sediments collected in the field, and sulfur utilization are presently under study and will provide valuable information about SBF removal.

Objectives

This study has two objectives, to determine the environmental impact and the environmental fate of a SBF spill-of-opportunity. The spill must achieve a measurable amount of SBF on the seafloor.

Methods

The research team should prepare in advance to travel to and obtain samples at the location of a spill of opportunity.

Task 1. Delineation of the spill area. Characterize the size and thickness and range of SBF concentrations of the spill. Gather appropriate data on subsequent sampling event(s) to describe the effects of the environment (biodegradation, dispersion, dilution, percolation, burial) on the spilled material. Additional information about the deterioration of the original emulsion and separation of components freed from the emulsion, or fate of any formation oil in the original emulsion are all data which would enhance the understanding of the behavior of SBF.

Task 2. Determine effects of the spilled material on the environment. Sample near and far field ambient water and sediment characteristics. Determine whether there have been prior SBF discharges in the vicinity.

Task 3. Characterize the microbial community which is living on and within the SBF over time.

Task 4. Collect more data to determine if SBF has bioaccumulated in any characteristic organisms (I put this in because Region 4, SEIS says there is not enough).

Products: A report describing the results from the sampling efforts and an assessment of the potential environmental effects.

Importance to MMS: The incident represents an excellent opportunity to study a worst case scenario of a discharge of synthetic based mud. This is not the first time that such an incident has occurred. The information will be useful to fully understand the potential environmental effects from the use of SBM during oil and gas operations and physical and biological processes which occur as the site recovers. A better understanding of the impacts and recovery process of a spill of opportunity will answer questions about both permitted discharges and accidental releases.

Date Information Required: Information is required immediately so as to establish a baseline before more facilities are placed in deepwater and more potential spills might occur.

Revised date: 11/16/2004

ENVIRONMENTAL STUDIES PROGRAM: Studies Development Plan FY 2005-2007

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: 11/16/2004

ENVIRONMENTAL STUDIES PROGRAM: Studies Development Plan FY 2005-2007

Region: Gulf of Mexico OCS Region

Planning Area(s): Gulfwide

Title: *Deepwater Program: Comparison of Remote Technologies to Better Assess the Location 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. Hydrates form under low temperature and high pressure conditions and are found in layers below the seafloor where the proper conditions exist. Hydrates could potentially be a new source of natural gas, should deposits exist in high enough concentration. The difficulty in determining where these deposits are lies in the 2-D and 3-D technologies used to explore the subsurface geology. Old technologies rely on the use of the reflection of p-waves by various strata. New technologies are now available, which use both p-waves and s-waves called four-component ocean bottom cable seismic or 4C-OBC, and may be better at locating hydrate deposits. Other technologies use high resolution deep-tow data.

The MMS is currently making an assessment of hydrates to determine the magnitude of the economic potential of this resource. In order to make this assessment, high quality data is necessary to determine spatial extent of hydrate deposits as well as the size of the deposits. Location of hydrate deposits that can be mined is also necessary before an environmental assessment can be performed.

This study will be used to compare existing data collected with 3-D seismic surveys with data collected by 4C-OBC and high resolution deep-tow data.

Objectives The objective of this study is to compare existing data collected by a variety of methods to determine which method, if any, can be best used to determine the location of hydrates on the OCS.

Methods Data will be obtained from various sources including seismic survey data, high resolution data collected by the Navy, and from others that have used this equipment. The data will be compared and evaluated for identification of hydrates. If possible, the areas surveyed will be locations with known hydrate deposits, as determined from direct observation or through drilling.

Products A final report summarizing the different methods and evaluating the data for the ability to evaluate hydrate deposits.

Importance to MMS Determining the location of hydrate deposits and their viability as a resource is the first step in preparing an environmental impact statement evaluating the potential impacts from the recovery of the resource.

Date Information Required: The information will be needed should viable deposits be found and an environmental assessment deemed necessary.

Revised date: 11/16/2004

ENVIRONMENTAL STUDIES PROGRAM: Studies Development Plan FY 2005-2007

Region: Gulf of Mexico OCS Region

Planning Area(s): Central and Western

Title: Examination of Chemical Parameters in Produced Water that may Affect Seasonal Hypoxic Conditions off the Louisiana Coast

Period of Performance: FY 2005-2006

Description:

Background

A hypoxic zone develops in the Gulf of Mexico each summer. A complex series of events triggered by the nutrient laden fresh waters of the Mississippi and Atchafalaya Rivers are widely agreed to be the foremost cause of the oxygen depletion. Discharges of produced water from offshore oil and gas to the Gulf of Mexico could be limited in the future in a regulatory effort to address the hypoxic zone.

Historically, government regulated produced water to reduce the interrelated toxicity and oil and grease content. The produced water discharge volume and outfall placement are arranged so that adequate dilution occurs within the 100 m mixing zone. The oxygen demanding characteristics of produced water have been noted but were previously considered to have less of an environmental impact than toxic constituents.

Measurement of the biochemical oxygen demand (BOD) of produced water is one of several methods to describe the dissolved oxygen used. Produced water characteristics may vary between platforms, operations being conducted, and the geological source of the water. A study of oxygen depletion and utilization is needed to collect information on the chemical and biological activities, timing, and rate of oxygen consumption. Information is needed about the pattern and volume of produced water discharge into the existing temporary seasonal oxygen depleted conditions of the hypoxic zone of the Gulf of Mexico.

Objectives The objective of this research is to further characterize the nature of the BOD of produced water, the constituents in produced water which utilize oxygen, the timing of the BOD exertion, and plume dispersion under hypoxic conditions as it relates to oxygen utilization.

Methods This study will require a combination of synthesis of existing literature and collection of new data. Information is needed on the chemical and physical composition of individual representative produced water streams and oxygen depletion and utilization characteristics.

Tasks

- (1) Investigate the use of a tracer to identify the riverine, produced water, or other source of BOD in the hypoxic zone. Compare the dilution of produced water in the stratified conditions associated with seasonal hypoxia as determined by tracer with established produced water plume dispersion modeling results.
- (2) Provide a detailed characterization of physical and chemical aspects of produced water dissolved oxygen depletion and utilization over time. Attribute oxygen depletion and utilization to instantaneous demands, delayed demands, and treatment related demands, for example, the contribution of added water treating chemicals or elevated temperature at discharge.

(3) Characterize differences in produced water composition and resultant differences in dissolved oxygen levels among sources. How different is the produced water oxygen demand of oil production compared to gas production or a new well compared to an old well?

(4) Describe the trend in produced water discharge volume in the hypoxic zone. Has well abandonment and structure removal outpaced production from new wells?

Products A final report evaluating the potential contributions to hypoxia from produced water discharges.

Importance to MMS The study may be jointly funded with industry and the Department of Energy. The results will be used to address issues raised by the Environmental Protection Agency during the renewal process of the NPDES general permit for the Central and Western Gulf of Mexico.

Date Information Required: The information will be used as soon as it is available to potentially revise the NPDES permit.

Revised date: 11/16/2004

**2.3 PROFILES OF REGIONAL STUDIES PROPOSED FOR FY 2006 AND BEYOND
GULF OF MEXICO REGION PROPOSED STUDIES FOR FY 2006 AND BEYOND**

Page #	**	Title
27	PO/BIO	Interaction of the Ocean Circulation with the Flower Garden Banks Topography
29	BIO	<i>Deepwater Program: Sperm Whale Acoustic Prey Study (SWAPS)</i>
31	PO	<i>Deepwater Program: Near Synoptic Hydrographic Surveys of the Gulf of Mexico</i>
33	FE	Long-term Effects of Oil and Gas Activities on the Mississippi and Alabama Shelf
35	OT	Environmental Monitoring of a Development Site
37	OT	Evaluation of Noise from Platform Operations
39	OT	Gulf of Mexico 8-Hour Ozone Modeling Analysis
41	OT	Satellite Remote Sensing Data Retrieval in the Gulf of Mexico Region
43	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 2005-2007

Region: Gulf of Mexico OCS Region

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

Title: Interaction of the Ocean Circulation with the Flower Garden Banks
Topography

Period of Performance: FY 2006-2008

Description:

Background The Flower Garden Banks are submerged banks on the shelf edge of the northern Gulf of Mexico that are large enough to affect the impinging flow. Topographic steering and orographic effects can substantially modify advection and transport of water and matter over corals living at the bank's tops. However, only one study in the early 1980s has examined these effects using point current meters and hydrographic observations. Since 1980, advances in knowledge and technology warrant a re-examination of topographic and orographic effects at the FGB. Knowledge of topographic-current interactions under stratification increase significantly, and 2) the technology to measure ocean currents with meters and satellite-tracked drifters improved. This project aims at examining how the banks alter the impinging flows through topographic and orographic effects.

Objectives The study objectives are 1) to increase our understanding of the topographic and stratification effects on the circulation around the FGB; 2) to use the new understanding to assess potential impacts from accidental oil release and shunting activities on the biota of the FGB; and 3) to use this new knowledge to help understand the effects of environmental conditions on the biota and larvae dispersal of the FGB.

Methods The study will conduct an intensive field experiment over a one year period. The field work will consist of deployment of ADCPs around each bank; and deployment of satellite-tracked drifters upstream and in-between the banks. During the deployments, a series of hydrographic stations will be occupied around each bank to assess the stratification and stability of the water column to study its effects on the flow field. Once the field work is completed an analysis period and report preparation period will follow. It is worth noting that NOAA has expressed interest and a desire to contribute resources for this study.

Products Current (Eulerian/Lagrangian) and hydrographic data around the FGB; technical summaries and reports; scientific articles; and trajectory maps around the two banks.

Importance to MMS The results of this study will help MMS make more informed decisions in events of accidental oil releases and help tactical decisions during response actions to oil releases. It should help evaluate the effectiveness of shunting requirements in areas near the FGB. Finally, this study will shed light on biological and environmental conditions affecting corals on topographic banks in the Gulf or elsewhere.

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

Revised date: 11/16/2004

ENVIRONMENTAL STUDIES PROGRAM: Studies Development Plan FY 2005-2007

Region: Gulf of Mexico OCS Region

Planning Area(s): Central Gulf of Mexico

Title: *Deepwater Program: Sperm Whale Acoustic Prey Study (SWAPS)*

Period of Performance: FY 2006-2008

Description:

Background While the potential impacts of seismic exploration on marine vertebrates are poorly understood, even less is known about seismic impacts to the marine invertebrate community. It is assumed that sperm whales are not randomly distributed within the ocean environment and are concentrated in areas with increased prey abundance. Negative impacts to prey populations may result in changes in sperm whale abundance, distribution and reproductive success. The Sperm Whale Seismic Study (SWSS) is collecting data on sperm whale biology, habitat use, and the possible effects of seismic airguns using controlled exposure experiments (CEEs). While these data will add to the knowledge base of GOM sperm whale populations, they will not provide information about how sperm whale distribution is related to the relative abundance and distribution of their primary prey items (cephalopods). Squid are the primary prey item in the sperm whale diet; however previous investigations have used stomach contents and/or fecal analysis for prey determination. The ability to accurately sample squid in a deep-water environment is severely limited by current methodology. The most common technique involves the use of trawls. Collections using trawls typically result in few medium to large size squid which are able to avoid capture. Identification of squid stocks with acoustic methods (developing a squid signature) would allow for rapid surveys of large areas in the GOM. These data could then be correlated with both large scale sperm whale distributions in the gulf as well as with the small-scale feeding movements of individual whales. It's been suggested that when prey is abundant, sperm whales swim in more of a zig-zag pattern over small areas, while when prey is scarce they swim in more of a straight line. However, testing this is currently impossible due to the lack of information about squid stocks in the GOM.

Objectives

- 1) Identification of squid as acoustic targets
- 2) Detection of seismic impacts on squid
- 3) Relationship of sperm whale distribution and relative abundance to the distribution of squid prey
- 4) Characterization of small-scale sperm whale movements (amount of zigzag) in relation to relative abundance of squid

Methods Sperm whales will continue to be tracked and monitored as part of the SWSS (and SWSS II) studies. Characterization of an acoustic signature for squid will be determined using a variety of acoustic techniques including echosounders and the BIOMAPPER II. These data will then be "ground-truthed" using deep water trawls, jig-sampling, and autonomous, slow-falling camera packages. Once it has been determined that squid can be accurately detected using acoustic survey methods, squid sampling will occur in areas with sperm whales present in order to determine the potential relationship of squid prey on sperm whale distribution. Small-scale movements of individually tagged (either D-tag or S-tag; under separate funding) whales will be monitored while squid acoustic sampling occurs to determine if feeding strategies are related to prey abundance. Acoustic sampling of squid will also occur concurrently with seismic

exploration to determine if squid are showing any response (either positive, negative, or neutral) to seismic activity.

Products A final report will be produced detailing the acoustic methodologies used in detecting squid. This report will also be modified and coupled with the sperm whale and seismic data for submission to a peer-reviewed journal.

Importance to MMS Acoustic disturbance (primarily seismic) resulting from industry activities in the GOM has become a major issue. While sperm whales have been the focus of prior (and present) research, the need to examine impacts to other cetacean species and their prey is becoming more important. Direct impacts (e.g. strandings, death) are easier to detect than indirect, chronic impacts which can result from changes in prey abundance and distribution. The potential effects of seismic exploration on prey species has been a recurring issue in recent Biological Opinions, as well as the Geological and Geophysical Exploration EA, and will be a consideration for future incidental take permits.

Date Information Required: The information will be used to expand our knowledge of the influences on the distribution of sperm whales. This information will be incorporated in future environmental impact statements and assessments.

Revised date: 11/16/2004

ENVIRONMENTAL STUDIES PROGRAM: Studies Development Plan FY 2005-2007

Region: Gulf of Mexico OCS Region

Planning Area(s): Gulfwide

Title: *Deepwater Program: Near Synoptic Hydrographic Surveys of the Gulf of Mexico*

Period of Performance: FY 2006-2009

Description:

Background Understanding the deepwater Gulf environment requires a holistic, synoptic, and geographically broad view, however, most MMS studies seldom go beyond the U.S. Exclusive Economic Zone. So we find ourselves working now in a severely data depauperate area. An area particularly affected, is the hydrographic characterization of the deep Gulf. The only available hydrographic data is from the early 1970's. To complicate matters, some parameters observed during these early surveys have been discarded as faulty, e.g., oxygen. This proposed study would conduct hydrographic surveys of the entire Gulf to produce data for those parameters now absent, and update those available by using state-of-the-art technologies. This proposed study will also produced a near-synoptic view of the Gulf by employing two survey vessels.

Objectives The objective of this study to conduct two (winter and summer) hydrographic surveys of the Gulf of Mexico using two vessels to produce a near-synoptic and state-of-the-art hydrographic database.

Methods Conduct hydrographic casts of the entire water column (surface to bottom) over the entire Gulf of Mexico using two vessels. The parameters to be measured include standard CTD, oxygen, nutrients, and tracers.

Products An updated hydrographic database, a near synoptic view of the circulation, fields of relevant parameters, indication of mixing through the use of tracers, and vertical profiles and horizontal maps of derived quantities. Technical reports and scientific papers will also be produced by this study.

Importance to MMS This study will fill an important data gap with implications for understanding the biology of the deep Gulf. An important result of this study is the opportunistic comparison with previous surveys to detect potential changes in the salinity and temperature fields of the deep Gulf.

Date Information Required: Information from this study will be used for deepwater assessment as soon as it is available.

Revised date: 11/16/2004

ENVIRONMENTAL STUDIES PROGRAM: Studies Development Plan FY 2005-2007

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 2006-2009

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 to: 1) collect and analyze water, sediment, and biological samples from the Mississippi-Alabama-Florida shelf using the same parameters as previous studies and 2) 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 evaluating changes in impacts since initial observations.

Importance to MMS 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 minimal 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: 11/16/2004

ENVIRONMENTAL STUDIES PROGRAM: Studies Development Plan FY 2005-2007

Region: Gulf of Mexico OCS Region

Planning Area(s): Eastern Planning Area

Title: Environmental Monitoring of a Development Site

Period of Performance: FY 2006-2008

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: 11/16/2004

ENVIRONMENTAL STUDIES PROGRAM: Studies Development Plan FY 2005-2007

Region: Gulf of Mexico OCS Region

Planning Area(s): Gulfwide

Title: Evaluation of Noise from Platform Operations

Period of Performance: FY 2006-2007

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 final report will include an evaluation of the noise from a variety of platforms and an evaluation of where this level fits into the spectrum of other noise in the marine environment.

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: 11/16/2004

ENVIRONMENTAL STUDIES PROGRAM: Studies Development Plan FY 2005-2007

Region: Gulf of Mexico OCS Region

Planning Area(s): Gulfwide

Title: Gulf of Mexico 8-Hour Ozone Modeling Analysis

Period of Performance: FY 2006-2008

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 summarizing the contributions of NO₂, VOC, and O₃ from offshore oil and gas activities to coastal communities.

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: 11/16/2004

ENVIRONMENTAL STUDIES PROGRAM: Studies Development Plan FY 2005-2007

Region: Gulf of Mexico OCS Region

Planning Area(s): Gulfwide

Title: Satellite Remote Sensing Data Retrieval in the Gulf of Mexico Region

Period of Performance: FY 2006-2008

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 6) 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 of the information in the databases.

Important to MMS Routine meteorological observations to define the vertical structure of the atmospheric conditions are practically non-existent 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: 11/16/2004

ENVIRONMENTAL STUDIES PROGRAM: Studies Development Plan FY 2005-2007

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 2006-2007

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: 11/16/2004

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; gas hydrates; decommissioning; 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. NOISE IN THE GULF OF MEXICO

The effect of seismic surveys on the marine environment has become a growing concern within the environmental, scientific, and regulatory communities. Increasing information about "noise in the ocean", impacts on marine mammals and sea turtles, and recent military activities have highlighted the need for MMS to address sound producing activities that it regulates. While the events that have triggered this concern are mostly military activities, all sources of marine noise are now "suspect" including commercial shipping, offshore drilling and production, and seismic surveys. The MMS is already conducting an intensive study of the effects of seismic survey noise on sperm whales that reside in the Gulf of Mexico. Another source of noise is the over 2300 production platforms in the Gulf as well as the other 1700 structures. The type and relative magnitude of noise produced from these structures is unknown.

3.4 GAS HYDRATES

Exploration into the location and distribution of gas hydrates along the continental slope of the Gulf of Mexico is presently underway. Currently MMS is making the first assessment of hydrates as a potential economic resource in all offshore locations. While the Gulf of Mexico is not considered the most likely viable source of gas from hydrates, other locations, such as the Blake Plateau on the Atlantic OCS, is being considered.

3.5 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 currently being procured. Results of this study could identify additional research gaps.

SECTION 4. LITERATURE CITED

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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.