## Minerals Management Service

# Our Ocean Role

MMS U.S. Department of the Interior
Minerals Management Service

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www.mms.gov

Those familiar with the Minerals Management Service (MMS) may wonder about the purpose of this document. So often we recite missions, mandates, rules, and regulations, that we miss the opportunity to emphasize our role in the Ocean. While MMS makes the energy and mineral resources of the Outer Continental Shelf available to our Nation, we are also responsible for its protection and that of the men and women working offshore.

This document was produced to draw attention to our Ocean theme. We are proud of the work we do with the Ocean. Our management, protection, research, and enforcement responsibilities are duties we take very seriously as we protect the Ocean for the generations to come.

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# MMS Overview

## The Minerals Management Service (MMS)

The MMS was formed in 1982 as an official agency within the U.S. Department of the Interior (DOI). The mission of MMS is to:

- manage the mineral resources on the Nation's Outer Continental Shelf in an environmentally sound and safe manner, and

- collect, verify, and distribute, in a timely fashion, mineral revenues generated from Federal (onshore and offshore) and most Indian lands.

The Federal Government owns a vast amount of land—both onshore and offshore—and these lands are managed for various purposes, including mineral production. Offshore lands are known as "Outer Continental Shelf (OCS) lands" and are located outside of State coastal waters. Generally speaking, OCS lands begin three geographical miles offshore coastal States, except in the case of Texas and the west coast of Florida, where OCS lands begin three marine leagues (or approximately 10.3miles) offshore.

Numerous laws have been enacted that govern leasing, development, and production on Federal lands used for mineral production. Among other things, these laws require that strict environmental standards be maintained and that the Federal Government receive a fair market return for the public resources it leases. In addition, Federal law also requires that a portion of the monies received by the Federal Government from onshore mineral production be shared with States where the minerals are being produced, and that—in the case of Indian lands—all monies collected from mineral production go back to the Indian Tribes or individual Indians who own the lands. In the case of offshore oil and gas, a portion of revenues generated within three nautical miles of State coastal waters are shared with the adjacent State. Finally, Federal laws dedicate some of the monies generated from OCS leasing and development for special uses that benefit all 50 States.

The role of MMS is to help carry out these Federal laws by ensuring that all monies derived from mineral leasing and production activities on Federal and Indian lands are collected, properly accounted for, and distributed. In addition, MMS is both the resource manager and fiscal manager for the Nation's important OCS mineral program. In that role, MMS handles everything from collecting and accounting for OCS revenues to leasing OCS lands, regulating development activities to protect the coastal and marine environment, and ensuring that, when operations are completed, the site returns to its original state.

## OCS Plays a Significant Role in the Nation's Energy Picture

- The OCS makes a significant contribution to the national energy supply, providing 25 percent of the natural gas and 30 percent of the oil produced in the United States. The MMS administers about 7,500 active leases on 40 million acres of the OCS.

- On a per-day basis, the OCS currently produces about 14.3 billion cubic feet of natural gas and about 1.5 million barrels of oil.

- To date, the OCS has produced about 143 trillion cubic feet of natural gas and about 13 billion barrels of oil.

- The OCS is estimated to contain more than 50 percent of the Nation's remaining undiscovered oil and natural gas resources.

## Onshore and Offshore (OCS) Leases Generate Sizeable Revenues*

- On average, more than $6 billion per year is collected and distributed by MMS from bonuses, rents, and royalties from Federal offshore mineral leases. This effort provides approximately:
  - ✓ $4 billion per year to the United States Treasury and the States
  - ✓ $900 million per year to the Land and Water Conservation Fund
  - ✓ $150 million per year to the National Historic Preservation Fund

- More than $1 billion per year, on average, is collected and distributed by MMS from bonuses, rents, and royalties from Federal onshore mineral leases. More than $500 million is distributed to the States each year with the remainder disbursed to the United States Treasury and the Reclamation Fund.

- As part of its trust responsibilities, MMS collected and distributed more than $200 million per year, on average, from mineral rents and royalties to American Indian Tribes and individual mineral owners.

To carry out its mission, MMS manages two very important programs — the **Offshore Minerals Management Program** and the **Minerals Revenue Management Program**.

## Offshore Minerals Management (OMM) Program

The OMM Program is headquartered in Washington, D.C., and Herndon, Virginia, and has regional offices in Louisiana, California, and Alaska. The program is responsible for all phases of OCS mineral resource management, from the initial offering of OCS lands for lease through the regulation of mineral development and lease abandonment activities. To properly manage OCS mineral resources (oil, natural gas, and hard minerals such as sand and gravel), the OMM Program:

- analyzes geologic, geophysical, and other geo-scientific data to support OCS program decisions,

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* The amount of mineral lease revenues varies yearly depending on production levels and commodity prices.

- assesses the possible effects of OCS activities on the marine, coastal, cultural, and human environments,
- Conducts research specific to issues associated with OCS mineral leasing and development
  - ✓ the Environmental Studies Program (ESP) assesses the potential environmental risks of offshore development and provides information necessary to minimize any adverse risks; and
  - ✓ the Technology Assessment & Research (TA&R) Program supports research associated with operational safety and pollution prevention as well as oil-spill response and cleanup capabilities
- develops and implements natural gas and oil leasing programs to achieve national economic and energy policy goals while protecting the environment,
- regulates all exploration, development, and production activities on about 7,500 active leases to ensure that these activities are conducted safely and in an environmentally sound manner,
- evaluates the potential of the OCS as a domestic supply source for marine minerals,
- provides scientific information and technical assistance (on a cost-reimbursable basis) to other nations regarding offshore mineral leasing, development, environmental protection, and minerals revenue management, and
- participates in international working groups to develop guidelines and standards that may directly affect the U.S. domestic offshore industry.

## Minerals Revenue Management (MRM) Program

The MMS's Minerals Revenue Management Program is headquartered in Washington, D.C., but has its primary operations located in Lakewood, Colorado, and compliance offices located in or near the major centers of the minerals industry. In addition, there are field offices located in Texas, Oklahoma, and New Mexico. The MRM processes more than 200,000 transactions each month—totaling over $300 million—from about 80,000 Federal and Indian leases.

# Ocean Resource Management

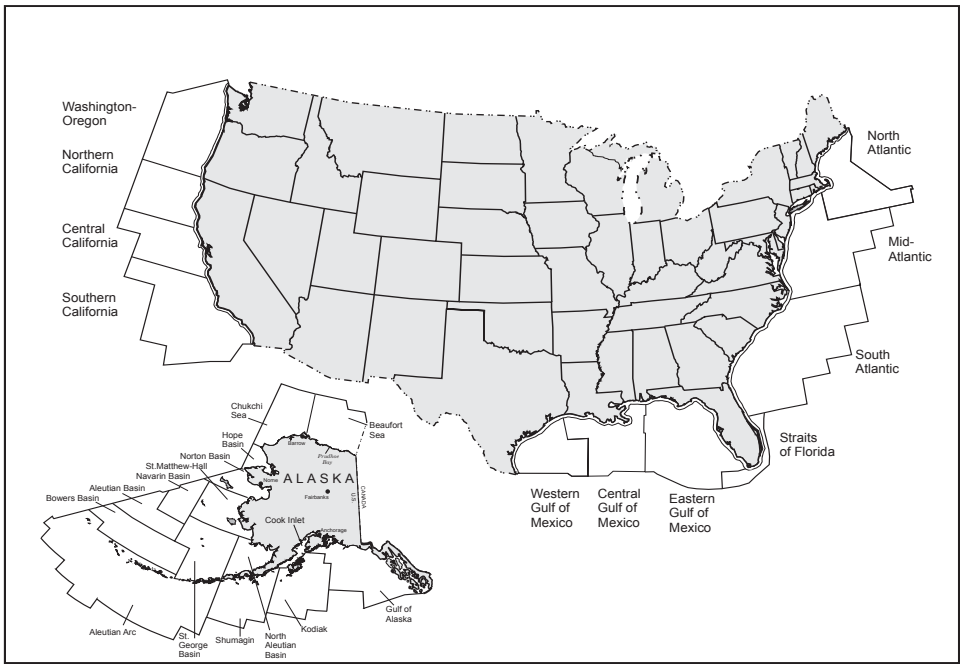
## Oil & Gas Leasing Program

### Status of 2002-2007 OCS Leasing Program

The Outer Continental Shelf Lands Act (OCSLA) (43 U.S.C. 1344 (Section 18)) requires the DOI to prepare and maintain a 5-year schedule of proposed oil and gas lease sales. On July 1, 2002, the Department put in place a new 5-year program for 2002-2007, which the MMS prepared over an 18-month period. The MMS worked in consultation with constituents to develop a program that is not only environmentally responsible, but also offers a judicious approach to OCS leasing. The program schedules lease sales in the available areas of the OCS (i.e., those not under congressional moratorium or executive withdrawal) that have the highest resource values and highest interest to industry while recognizing environmental values and competing issues and uses.

The 5-year program for 2002-2007 includes a total of 20 lease sales in 8 OCS planning areas:

- 10 annual areawide sales in the Central and Western Gulf of Mexico
- 2 sales in the portion of the Eastern Gulf of Mexico that was offered in Sale 181 in 2001
- 3 sales in the Beaufort Sea
- 2 each in Chukchi Sea/Hope Basin and Cook Inlet
- 1 in Norton Basin off Alaska



## Resource Evaluation – Oil & Gas

The Resource Evaluation (RE) Program is involved in all phases of OCS program activities. Through the acquisition and analysis of geological and geophysical (G&G) data, broad areas of the OCS (those most promising for oil and gas development) are identified. For individual lease sales, estimates of the resources likely to be discovered and produced and associated development activities are made. When a sale is conducted, RE determines fair-market values for individual tracts receiving bids. Once leases are issued, RE works with regulatory personnel to ensure that discoveries are developed and produced in accordance with the goals and provisions of the OCSLA.

The RE Program includes a G&G Data Acquisition Program, which addresses those tasks necessary to the OCS Program.

### Regulation of G&G Data Collection

The MMS is charged with developing and implementing regulations, rules, and procedures that must be followed by any party who collects pre-lease G&G data and information on the OCS for purposes related to mineral exploration. The regulations govern the permitting, data collection, reimbursement, and release of information. Adherence to these regulations ensures that exploration and research activities will be conducted in an environmentally safe manner and will not interfere with other activities occurring in the area.

### G&G Data Acquisition and Analysis

The oil and gas industry is the primary source of the G&G data and information used by the RE Program. While MMS does not directly collect data, it issues permits to industry for data collection. These permits include a stipulation allowing MMS to inspect the data and to selectively acquire portions of it at minimal cost.

Interpretations of the G&G data are used by MMS to prepare updated resource assessments, evaluate lease sale tracts, determine royalty relief, analyze information and data contained in environmental impact statements (EIS), support policy decisionmaking, and to support a variety of studies related to the OCS Program.

### Technical Information Distribution

The MMS develops important technical information regarding the hydrocarbon resources on the Federal OCS that is useful to industry, Federal and State agencies, and the general public. Reports are continually being prepared in the RE Program on technical subjects, such as the geology of OCS planning areas, certain offshore wells, G&G data acquisition, production projections, and annual reserves. The field and reservoir reserve estimates reports give a perspective on national trends of production, additions to the offshore reserves base, and drilling activity.

In addition, a team has addressed the demand, under differing price scenarios, for natural gas by the year 2010. This study examines the supply and contribution to that demand from the offshore. A document publishing the results of this study is available at *www.mms.gov*.

**Resource Modeling**

In addition to its G&G Data Acquisition Program, the RE Program also has a modeling program which addresses the following tasks:

- ***Resource Assessment*:** Resource assessments are conducted to determine the hydrocarbon potential of Federal lands. The MMS assessments have addressed vast areas, such as the entire Gulf of Mexico, Pacific Region, and offshore Alaska, as well as smaller areas, such as a particular lease sale or deferral alternatives within a proposed lease sale area. Oil and gas assessments help to focus other technical studies on the environmental and operational challenges facing future OCS activities. Resource assessments also provide information for policy decisions as leasing activity moves into new frontier areas, such as the deepwater Gulf of Mexico. The RE Program identifies geologic plays on the OCS that offer the highest potential for the development and production of oil and natural gas. Nonenergy resources, such as sand and gravel, are also considered by regional geologic studies. This analysis employs complex computer models and methodologies that incorporate specific G&G information, mathematical and statistical concepts, risk and probability theories, and a variety of assumptions pertaining to economic and petroleum engineering scenarios.
- ***Resource Estimation*:** The MMS estimates the amounts of oil and natural gas likely to be discovered and produced as a result of leasing, and generates engineering scenarios of the future industrial activities associated with development. Resource estimates and the exploration and development scenarios provide the primary basis for environmental impact statements (EIS's).
- ***Tract Evaluation*:** The MMS is responsible for assuring that the Federal Government receives fair market value (FMV) for rights to mineral resources on individual OCS tracts. Immediately prior to and continuing after a lease sale, MMS begins the bid evaluation procedures that determine whether a bid can be accepted and a lease issued. Acceptance of a bid is based on a two-phase process.

  Phase 1 is conducted on a tract-by-tract basis and is normally completed within a short time following the opening of bids. Phase 1 analysis is designed to accept those high bids where competitive market forces can be relied upon to assure receipt of FMV.

  The high bids not accepted in Phase 1 receive further evaluation in Phase 2. Geoscientists in MMS conduct detailed geologic analyses, including reservoir studies, seismic stratigraphy, and prospect mapping, which support economic evaluations of oil and gas production from these tracts. The high industry bids are then compared to MMS estimates of Net Present Value (NPV) based on engineering simulation and discounted cash flow modeling.

  Economic tract evaluation integrates G&G, engineering, and economic data in a complex computer model to derive tract values. This computer model accounts for the timing of development and production, lease terms and conditions, tax codes, variable project costs and reservoir performance, and other subjective factors such as geologic risk.

- ***Reserves Inventory*:** The MMS develops independent estimates of recoverable amounts of oil and natural gas in discovered fields by conducting field reserve studies. The estimates are revised periodically to reflect new discoveries and to incorporate development information and annual production statistics. Reserve studies are critical inputs in the review and approval of royalty relief applications. The geologic and engineering information supports other OCS program activities, Minerals Revenue Management functions, and cooperative efforts with the Energy Information Administration (EIA) and the Department of Energy (DOE).

## Marine Mineral Resources (Other than Oil and Gas)

The MMS is also responsible for the management of OCS minerals other than gas, oil, or sulfur. The major focus over the past five years has been sand resources for coastal restoration. Federal offshore sand resources are increasingly being used for shore protection projects. However, there are concerns about the environmental effects of sand dredging and beach replenishment activities, as well as spatial conflicts with other users of offshore resources. Amendments to section 8(k) of the OCSLA in 1994 provide for negotiated agreements in lieu of competitive bidding for obtaining OCS sand, gravel, or shell resources for certain public works projects. The OCSLA was amended in 1991to eliminate fees for State and local communities' uses of OCS sand for shore protection projects. The elimination of fees has resulted in increased requests to access OCS sand resources.

The MMS sand and gravel program is moving to an operational phase from what was once solely a research phase. From 1995 to 2002, MMS conveyed approximately 16 million cubic yards of OCS sand for shore protection projects. In 2003, MMS was working to convey Federal sand to areas of Virginia and Louisiana, communities in northern New Jersey, and coastal communities in Florida.

One key strategy to ensure environmental protection, safe operations, and issue resolution for decisions regarding access to OCS marine minerals is the closely coordinated partnerships among the Federal Government, coastal States, and local communities. The MMS has established cooperative agreements with Alabama, Delaware, Florida, Maryland, New Jersey, North Carolina, South Carolina, Virginia, and Texas to identify OCS sand for potential use in shore protection projects. New cooperative partnerships are actively being pursued with the States of Louisiana, California, Maine, and Massachusetts. These partnerships rely primarily on State geological surveys to identify the State's needs and to locate suitable offshore areas for study. Two types of studies are typically done: a geological analysis to determine if the quality and the volume of sand are adequate for the projected need, and environmental studies funded through the MMS ESP to determine the impact of sand removal within the identified sites.

Recently, MMS sponsored a study to design a "pilot" program/framework for environmentally sound management of offshore borrow areas along the U.S. east and Gulf of Mexico coasts. This study outlined various components of a monitoring program to examine long-term cumulative effects of dredging; it also presented options and recommendations for including Federal, State, and local governments in an overall planning process. The study provides valuable information to help MMS design an effective regional management strategy for OCS sand resources. The MMS also completed a study evaluating various regional management concepts and, accordingly, established a Louisiana Sand Management Working Group (LSMWG). The working group formalized an environmentally responsible process for assisting MMS in planning and decisionmaking relative to the use of Federal sand for beach nourishment, coastal restoration, and wetlands protection projects along the Louisiana coast, where the demand for sand is expected to be high given the scale and complexity of anticipated coastal restoration efforts.

## OCS Inspection Program

The MMS has a comprehensive program to ensure that mineral operations on the OCS are conducted in a safe and environmentally sound manner. The foundation of this program is a comprehensive set of regulations that govern all aspects of offshore mineral activities. The MMS continually reviews these regulations to update and revise them to ensure that they include the most effective requirements for promoting safety and environmental protection on the OCS.

### Plan Reviews, Permits, and Approvals

The MMS conducts detailed technical and environmental reviews of plans for exploration and for development and production. In addition, MMS issues permits for other activities such as the drilling of wells and the installation of pipelines.

### Inspections and Accident Investigations

The OCSLA authorizes and requires MMS to provide for both annually scheduled and unannounced inspection of all oil and gas operations on the OCS. The annual inspection examines all safety equipment designed to prevent blowouts, fires, spills, or other major accidents. Onsite facility inspections and enforcement actions are important components of MMS's safety program. In 2002, MMS inspectors conducted over 16,000 inspections. The

MMS has developed a sampling program that allows MMS inspectors to conduct an inspection using a random statistical sampling of facility equipment and leave the facility with a 95 percent assurance that the entire facility complies with the regulations. The time savings produced from the sampling program allows MMS to concentrate inspection resources on higher risk facilities and activities. The MMS is developing a risk-based inspection program that identifies higher risk facilities and activities. This statistical model will allow the agency to improve the efficient use of inspection resources.

The MMS and the U.S. Coast Guard (USCG) regulate safety on fixed OCS facilities. The MMS regulates the structural integrity of fixed OCS facilities, and the USCG regulates marine systems, such as lifesaving, navigation equipment, and workplace safety. In February 2002, the USCG issued a final regulation that authorized MMS to perform inspections on fixed facilities engaged in OCS activities on their behalf, and to enforce USCG regulations applicable to those facilities.

The OCSLA also requires that MMS and the USCG investigate major accidents—deaths, serious injuries, major fires, and major spillages—as well as lesser accidents. For MMS, accident investigations are a critical element of its safety strategy.

**Civil Penalties**

The goal of the Civil Penalties Program is to assure safe and clean operations on the OCS. Through the pursuit, assessment, and collection of civil penalties and referrals for the consideration of criminal penalties, the program is designed to encourage compliance with OCS statutes and regulations. A violation may be considered as posing a threat of serious, irreparable, or immediate harm or damage to human life, property, or the marine, coastal, and human environment, if there is evidence that it is causing, has caused, or could have caused harm or damage. Since 1995, just over $9 million dollars in penalties have been collected from 314 OCS cases in the United States.

In addition to the Civil Penalties Program, the MMS has developed an Operator Disqualification Procedure that provides a systematic approach to help operators improve their performance. However, if an operator is not successful in improving excessively poor, dangerous or threatening performance, MMS may remove the operator from a facility, district, or the entire OCS.

**Lessee and Operator Training Programs**

To ensure that OCS oil and gas operations emphasize operational and environmental safety, lessees must employ highly qualified and trained personnel. The MMS has developed and implemented training regulations since the late 1970's.

**Annual Operator Performance Reviews**

Recognizing the importance of holding face-to-face meetings with OCS operators to discuss operator performance, safety, and other relevant issues in 1997, the MMS announced a plan to conduct Annual Performance Reviews (APR) of each operator.

The APR process captures compliance and accident information gathered through the OCS Inspection Program and weighs that information to arrive at a final Operator Safety Index (OSI) for each operator. Individual OSI values are compared against the

Industry OSI rate to establish APR meeting frequency and priority. The MMS meets with those operators performing at the highest levels to solicit ideas for best operating practices. With the operator's concurrence, MMS shares these success stories with others through workshops, conferences, and other safety-related meetings.

**Awards Program**

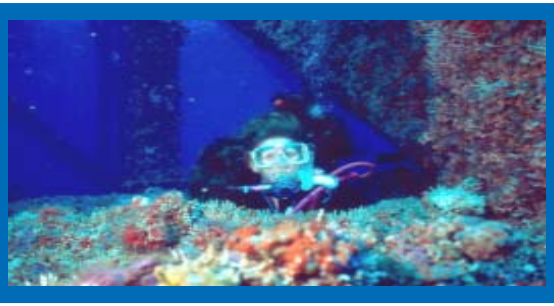
The MMS and others recognize that operational safety and environmental protection are unlikely to be achieved by regulations alone. By complementing MMS efforts with those of company management, employees, and every person at the work site, a greater protection can be achieved by having people work together with concern, not only for their own safety, but also for the safety of others and that of the environment.

In the early 1980's, MMS created an award that was for the sole purpose of promoting interest in and recognition of operational safety and environmental protection on the OCS. This award, the *Safety Award for Excellence* (SAFE), recognizes outstanding performance on the part of companies that excel in protecting the environment and maintaining a safe place to work on the OCS. In 1999, MMS added two new awards: (1) the *Corporate Leadership Award*, which recognizes individuals who have made extra efforts to further benefit industry and MMS programs, and (2) the *Safe Operations and Accurate Reporting Award*, which recognizes lessees for both outstanding operating performance and fiscal responsibility and is given on behalf of both OMM and MRM.

## MMS Rigs-to-Reefs Policy

As a result of the National Fishing Enhancement Act of 1984, the National Oceanic and Atmospheric Administration (NOAA), National Marine Fisheries Service (NMFS), developed and published a National Artificial Reef Plan. This plan set the stage for Federal endorsement of offshore artificial reef projects. In support of the National Artificial Reef Plan and in response to stakeholders, MMS adopted a national policy for "rigs-to-reefs" (RTR) — a term used for converting decommissioned offshore oil and gas structures to artificial reefs. Under this policy, and NOAA's National Artificial Reef Plan, coastal States with approved artificial reef plans can identify sites suitable for artificial reef development.

In the Gulf of Mexico, the States of Louisiana, Texas, and Mississippi administer RTR programs. The artificial reef coordinators of these States assess the State's interest in acquiring oil or gas structures, work with the owner to secure the required U.S. Army Corps of Engineers permit, negotiate an agreement for a structure donation, and accept title and responsibility for the structure as a permanent State reef. When an obsolete platform successfully becomes part of an artificial reef site, half of the monetary savings realized by the OCS industry by not having to dismantle these structures goes to the States to administer RTR programs. So far, over $20 million has gone to the States and funds fisheries conservation, research, and management.



## The National Environmental Policy Act Process on the OCS

### Environmental Impact Statement (EIS)

It is the policy of the DOI to "normally require the preparation of an EIS" for proposed 5-Year Leasing Programs and lease sales. The OCSLA (43 U.S.C. 1351(e)) requires that an EIS be prepared "at least once" for approval of a development and production plan in any area outside the Gulf of Mexico. In planning areas where two or more lease sales are scheduled during a 5-year period, MMS prepares a multi-sale EIS and reviews the National Environmental Policy Act (NEPA) coverage in an environmental assessment (EA) shortly before the sale.

Prior to beginning an EIS, the MMS institutes a "scoping" process to determine the appropriate contents (or "scope") of the document. Public participation is an integral part of scoping. The purpose of soliciting input is to properly identify as many relevant issues, alternatives, mitigation measures, and analytical tools as possible, so that they can be incorporated into the EIS. Another important objective is to identify specific elements of the environment that might be affected if the proposal is carried out.

The EIS analyzes the particular environmental concerns that were identified through scoping. A separate analysis is prepared for the proposal and each alternative. A draft EIS is made available to the public for review and comment. The principal concern in developing the final EIS is to address public comments on the draft EIS in a responsive and responsible fashion.

### Environmental Assessment (EA)

Federal agencies prepare environmental assessments (EA's) for proposed actions in accordance with NEPA regulations. The MMS prepares an EA for proposals to determine if significant impacts may occur that would require preparation of an EIS. An EA is prepared for each lease sale covered in a multisale EIS to determine if new impacts are expected that were not analyzed in the EIS. An EA is also prepared for each exploration plan outside the central and western Gulf of Mexico and for other OCS oil and gas activities on a selective basis. For example, in the central and western Gulf of Mexico, EA's are routinely prepared for proposals to remove structures and to operate near especially sensitive areas (e.g., the Flower Garden Banks).

An EA also documents the potential environmental impacts of proposals that do not require an EIS, and identifies as early as possible mitigation measures that MMS may require to avoid or minimize adverse effects of a proposal. The MMS assumes that the proposal evaluated includes mitigation required by lease stipulations, regulations, other Federal and State environmental laws, and specific measures committed to in writing by the lessee, operator, or applicant prior to completion of the EA. Mitigation measures that are not identified in the proposal may be evaluated in the EA to determine whether such measures, if approved as part of the proposal, would reduce impacts to a less-than-significant level.

### Categorical Exclusion (CE)

Categorical exclusions are "a category of actions which do not individually or cumulatively have a significant effect on the human environment . . . and for which, therefore, neither an environmental

assessment nor an environmental impact statement is required" (40 CFR 1508.4). Some of these CE's were developed based on past experience in reviewing actions for NEPA compliance. For example, hundreds of EA's were prepared for approval of certain types of oil and gas exploration and development and production plans in the central and western Gulf of Mexico. However, none of those EA's identified the need to prepare an EIS. Therefore, MMS established a CE for approval of those plans.

From time to time, exceptions to a CE may arise, so MMS uses a categorical exclusion review (CER) to determine whether a normally excluded action may have a significant environmental effect or may meet any of the Department's exception criteria (516 DM 2). If such an exception is met, at the minimum, an EA is prepared. Categorical exclusion reviews are prepared mostly for exploration and development proposals in the central and western Gulf of Mexico, and for most geological and geophysical survey permit applications in all OCS areas.

## Compliance with the Coastal Zone Management Act

Congress enacted the Coastal Zone Management Act (CZMA) to protect the coastal environment from growing demands associated with residential, recreational, commercial, and industrial uses. The CZMA provisions help States develop Coastal Management Programs (CMP) to manage and balance these competing uses. Section 307 of the CZMA gives States with federally-approved CMP's the right to review for consistency any Federal activities, licenses, and permits that affect land and water use and natural resources of the coastal zone. The OCS activities subject to this consistency review are OCS lease sales, exploration, development, and production plans, and OCS permits (such as geologic surveys and pipeline rights-of-way).

### OCS Lease Sale Activities

The MMS describes in a consistency determination (CD) how an OCS sale is consistent "to the maximum extent practicable" with the enforceable policies of the State's CMP. The MMS sends a copy of the CD to each affected State for consistency review. The State must concur with or object to the CD within a designated time period. If the State concurs, MMS can hold the lease sale. If the State objects, it must describe the inconsistency and any alternative measures that would allow the sale to be consistent to the maximum extent practicable with enforceable policies. The MMS tries to resolve any differences with the State; however, the CZMA allows MMS to proceed with the lease sale, notwithstanding any unresolved disagreements and provided MMS describes in writing the legal impediments to full consistency or finds that the lease sale activity is fully consistent with the enforceable policies. The State and MMS can ask the U.S. Department of Commerce (DOC) for mediation to work out differences.

### OCS Plans

The OCS lessee prepares a consistency certification (CC) that is submitted to MMS when filing the proposed OCS plan. The MMS provides a copy of the plan, supporting information, and consistency certification to the affected States for consistency review and decision. Each State decides whether the plan is consistent with enforceable policies of its CMP. The State must concur with or object to the lessee's consistency certification within a designated time period. If the State does not meet the

deadline, the CZMA provisions render the OCS plan consistent (conclusively presumed). If the State concurs, MMS can approve the activities described in the plan. If the State objects, MMS is prohibited from approving the activities described in the plan, and the lessee can either (1) appeal the State's consistency decision to the DOC or (2) amend the plan and resubmit it to MMS for approval and to the State for Federal consistency review.

### OCS Permits

States can review OCS permits identified in its CMP for consistency. If the State wants to review a permit that is not identified, it must request permission from the DOC. The consistency review process for OCS permits is similar to the process for OCS plans. The State must concur with or object to the lessee's consistency certification within a designated time period. If the State does not meet the deadline, the permit's consistency is presumed. If the State concurs, MMS can approve the OCS permit, and the lessee can begin activities. If the State objects, MMS is prohibited from approving the permit, and the lessee can either (1) appeal the State's decision to the DOC or (2) amend the permit and resubmit it to MMS for approval and to the State for consistency review.

## Compliance with the Fishery Conservation and Management Act

The Sustainable Fisheries Act (SFA) (P.L. 104-297) requires that each regional fishery management council identify the habitats used by all the life history stages of the species it manages. The Magnuson-Stevens Fishery Conservation and Management Act (MSFCMA), defines essential fish habitat (EFH) as those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity. These habitats must be described in narratives and identified geographically in fishery management plans (FMP). In addition, FMP's must identify ways to minimize the potential adverse impacts caused by fishing and nonfishing activities, to the extent practicable.

According to the SFA, each Federal agency must consult with the NOAA, NMFS, and the Office of Fisheries (NOAA Fisheries) with respect to any action authorized, funded, or undertaken by that agency that may adversely affect any EFH. Consultations can be for a category of actions or for specific proposals. The level of analysis and the type of consultation are commensurate with the degree of impact. Upon receipt of the consultation request, NOAA Fisheries will review the proposed activity, and if they concur that impacts may adversely affect EFH, they will provide conservation recommendations. The consulting agency (e.g., MMS) must then provide a detailed written response within 30 days of receipt of the EFH conservation recommendations. The response will include a description of measures proposed for avoiding, mitigating, or offsetting the impact of the activity on EFH. If the response is inconsistent with the EFH conservation recommendations (which are nonbonding), MMS must explain the reasons for not following the recommendations.

In 2002, NOAA Fisheries issued a Letter of Finding to MMS. It allows the MMS to use the NEPA process for consultations by submitting to NOAA Fisheries a programmatic, lease sale, or project-specific EIS or EA in lieu of a stand-alone EFH assessment. This allows completion of EFH consultations for OCS actions in a streamlined and efficient manner, and sets up a uniform national procedure. At consultation, MMS provides a description of the proposed action, an analysis of the potential adverse effects of the action on the EFH and the managed species,

conclusions regarding the effects of the action on the EFH, and proposed mitigation, if applicable.

## Protected Species

As manager of energy and nonenergy mineral resources on the OCS, the MMS has the responsibility to ensure environmentally sound exploration, development, and production activities. That responsibility is carried out in part by managing operations for the continued protection of those species and their habitats that are protected under the Endangered Species Act (ESA) and the Marine Mammal Protection Act (MMPA). This responsibility requires MMS to consult with NOAA Fisheries and the U.S. Fish and Wildlife Service (FWS) to ensure that any actions MMS permits, funds, or carries out are not likely to jeopardize the continued existence of any endangered or threatened species, or result in the destruction or adverse modification of an endangered or threatened species' critical habitat. The MMS consults on any action that may affect a listed species or designated critical habitat. A consultation process with NOAA Fisheries and FWS has been developed that permits all concerned agencies the opportunity to review and assess an entire spectrum of related activities over large areas, allowing for a broad ecosystem-oriented approach.

The MMS also coordinates with NOAA Fisheries and FWS to ensure that actions associated with energy and nonenergy mineral exploration, development, and production comply with provisions of the MMPA. This means that MMS defines how activities are carried out to minimize the potential for harassment or injury to marine mammals. The MMS analyses and guidelines serve as the basis for permitting and promulgating regulations.

Because of extensive in-house technical expertise in many areas of offshore operations, MMS has been able to identify for NOAA Fisheries and FWS mitigation and monitoring requirements for activities like seismic surveys and explosive removals of offshore structures. In addition to identifying mitigation and monitoring strategies, MMS also designs and funds research necessary to further define the impacts of OCS activities on protected species. For example, MMS (1) supports marine mammal tissue collection and archiving for a national program on environmental contaminants analysis, (2) regularly supports and participates in marine mammal and sea turtle surveys to increase awareness of protected species status and distribution, and (3) designs and supports research to define the impacts of noise on marine protected species.

## Archaeological Resource Protection

The archaeological resources on the OCS include historic shipwrecks, sunken aircraft, lighthouses, and prehistoric archaeological sites that have become inundated due to the 120-meter rise in global sea level since the height of the last ice age.

To comply with the National Historic Preservation Act, the MMS ensures that undertakings do not adversely affect potentially significant archaeological resources on the OCS through the following steps:

(1) The MMS conducts large-scale archaeological baseline studies to compile information pertinent to predicting the locations of historic shipwrecks and prehistoric archaeological sites on the OCS. Information on the locations of shoals, capes, historic shipping lanes, ports, and harbors, concentrations of known shipwrecks, and bottom sediment thickness and composition are used to predict where shipwrecks are most likely to exist. For prehistoric sites, models for offshore site occurrence are developed using information on the locations of known onshore archaeological sites. These models are used in combination with information on relative sea-level change, relict shelf topography, and the thickness, age, and composition of bottom sediments to predict where prehistoric sites are most likely to occur on the continental shelf.

(2) Prior to approving any seafloor-disturbing activities on a mineral lease within an archaeologically-sensitive area, the MMS requires lessees to conduct a marine remote sensing survey and to prepare an archaeological report based on the survey data.

(3) If the marine survey indicates any evidence of a potential archaeological resource, the lessee must either move the site of the proposed operations a sufficient distance to avoid the potential resource or conduct further investigations to identify and evaluate the resource.

In addition to the baseline studies, the MMS has funded other archaeological studies to further the basic understanding of methods and technology useful in locating and assessing archaeological resources on the OCS. The MMS also maintains a database of known historic shipwrecks and makes this database available to other Federal, State and local agencies, as well as to qualified researchers.

## Meteorology and Air Quality

The MMS meteorology and air quality program assesses the impacts of OCS air emissions on air quality and assures that OCS activities comply with air quality standards and regulations and do not adversely affect the environment. To accomplish these goals, the MMS is active in meteorological and air quality data collection programs, air quality modeling, and air quality impact studies. In all of these efforts, the MMS coordinates extensively with other Federal and State agencies and industry groups.

Air quality and meteorological studies emphasize issues in the Gulf of Mexico. This is due to the continued rapid growth in oil and gas-related activities in the Gulf as well as new regulatory standards that are being implemented by the U.S. Environmental Protection Agency (EPA). The regulatory issues driving the requirements are the Prevention of Significant Deterioration program, new ambient air quality standards for ozone and fine particulate matter, and proposed regional haze regulations. The MMS supports routine meteorological data collection from offshore NOAA buoys and conducts specialized meteorological and air quality monitoring programs. The data are used to improve the knowledge of the atmosphere over water and the movement and dispersion of air pollutants. The information is also used in the development and improvement of air quality modeling techniques.

The MMS is producing an air emissions inventory of all existing OCS oil and gas facilities in the Gulf of Mexico and is also analyzing meteorological and air quality data that were recently collected. The data will be used in photochemical modeling for compliance of adjacent coastal areas with new ozone standards. Modeling will also be performed to assess impacts from OCS emissions on the Breton National Wilderness Area off Louisiana. Other future modeling efforts will be conducted to study fine particulate matter and regional haze.

Another important aspect of MMS meteorological and air quality analyses and studies is NEPA compliance of OCS activities. These NEPA documents make extensive use of the information generated in the specialized meteorological and air quality studies.

## Oil-Spill Modeling Program

The MMS assesses oil-spill risks associated with offshore energy activities by calculating spill trajectories and contact probabilities. These analyses address the likelihood of spill occurrences, the transport and fate of any spilled oil, and the environmental impacts that might occur as a result of the spill. The MMS Oil-Spill Risk Analysis (OSRA) model combines the probability of spill occurrence with a statistical description of hypothetical oil-spill movement on the ocean surface. Modeling results are used by MMS staff for NEPA documents, other Federal and State agencies for review of EIS's and EA's, endangered species consultations, and oil industry specialists preparing the oil-spill response plans.

Paths of hypothetical oil spills are based on hindcasts (history) of winds, ocean currents, and ice in arctic waters using the best available environmental information. Output of the model includes tables of probable contact and Geographic Information System (GIS) representations of these probabilities, with and without the probability of occurrence of one or more spills. The MMS is committed to the continuous improvement of OSRA estimations and EIS analyses, and uses the results of new field and modeling studies to fulfill that commitment. As offshore activity expands into deeper waters and new geographic areas, MMS oil-spill modeling will be applied to risk assessments and validated with environmental observations.

# Environmental Research

## Environmental Studies Program

The MMS Environmental Studies Program (ESP) was initiated in 1973 (originally under the Bureau of Land Management (BLM)) to support the DOI's offshore oil and gas leasing program. The OCSLA formally established the ESP and stated that its goal is to provide the information needed for prediction, assessment, and management of impacts on the human, marine, and coastal environments of the OCS and nearshore areas that may be affected by OCS oil and gas activities. Three program objectives to meet this goal are:

(1) To establish information needed for the assessment and management of impacts on the human, marine, and coastal environments of the OCS and potentially affected coastal areas;

(2) To predict impacts on marine organisms that may result from chronic low-level pollution or large spills associated with OCS production from discharge of drilling muds and cuttings as well as pipeline emplacement, and from onshore development; and

(3) To monitor human, marine and coastal environments to provide time-series and data trend information for identification of significant changes in the quality and productivity of these environments.

In addition to the specific mandates identified in the OCSLA, there are several other pieces of legislation that influence the composition of the ESP. These include the Endangered Species Act, the Marine Mammal Protection Act, the Clean Air Act, and others.

The ESP integrates advice from a wide range of sources when formulating its research plans. Because of its highly focused mission-oriented emphasis, the planning process emphasizes communication with customers within the MMS as well as external public (academia, industry, non-government organizations) and Federal, State, and local governments. Proposed studies are evaluated for program relevance, programmatic timeliness, and scientific merit. Additional program oversight is provided by the OCS Scientific Committee, which advises MMS on the feasibility, appropriateness, and scientific value of the ESP. This Committee consists of 10 to 15 members appointed by the Secretary of the Interior for 2-year terms. Collectively, input from these sources contributes to the development of the ESP research plan.

Studies are procured through a competitive procurement process, a cooperative agreement with a State institution/university, or inter-agency agreements with other Federal Agencies.

Recognizing the importance of quickly making study results available to a diverse audience of information users, ESP investigators present the status of ongoing research at MMS Information Transfer Meetings, and regional, national, and international conferences. Final research reports are submitted to MMS, and results are published in peer-reviewed journals. To meet the demands for rapid dissemination of information, research reports

are now prepared in digital format to facilitate access through the Internet. The Environmental Studies Program Information System (ESPIS), a major information management effort, houses many of these reports and can be accessed through the MMS homepage on the Internet. These products all form a part of the information base used by MMS analysts and others, to conduct environmental assessments related to the management of OCS resources.

The ESP Studies Planning Process addresses a wide variety of environmental concerns and issues. It complements and builds upon broader strategic plans that set agencywide policies and directions. The following current research themes and technology issues are discussed on subsequent pages:

- Deep-Sea Ecosystems
- Ocean Noise, Marine Mammals, and Offshore Industry Operations
- Bowhead Whale Aerial Survey Project
- Monitoring Marine Environments
- Physical Oceanography
- Social Science

In addition to these described elements, aspects of the ESP also consider topics related to invasive species, environmental issues associated with deep-sea methane hydrates, and the potential use of offshore platforms as sites for harvesting marine bioproducts. The broad spectrum of research and monitoring undertaken through the ESP contributes to the MMS mission and the long term goals, as well as the goals of DOI, by focusing on environmentally sound development of the Nation's natural resources.

## Deep-Sea Ecosystems

### Overview of Deepwater Activity

With frequent announcements by the offshore oil and gas industry of significant discoveries, MMS anticipates that oil and gas leases in both deep water and on the shelf will continue to experience activity levels at historic highs. The MMS faces new challenges due to increased emphasis on innovative technology for deepwater development, as well as the need to address engineering, safety, and environmental protection issues.

### Deep-Sea Ecosystem Studies

In the late 1970's, it was already apparent that the petroleum industry was nearing the uppermost continental slope. In the early 1980's, work was being conducted to review the available information on deep-sea communities. This was based primarily on accumulated trawl data and bottom photography collected in the 1960's and 1970's. In 1983, the MMS initiated the first deep systematic field study, *The Northern Gulf of Mexico Continental Slope Study* (NGoMCS). It was designed largely to test a depth zonation scheme suggested earlier. Consisting ultimately of stations on shallow-to-deep and E-W transects, the study concentrated on benthic (bottom) and benthopelagic (near-bottom) sampling. Included were sediment characteristics, meio-, macro-, and megafauna, contaminants, and hydrography.

In 1984, toward the end of NGoMCS field activities, chemosynthetic communities were discovered, and MMS used a manned submersible for the first direct observations. Following the

immediate implementation of protective measures, the MMS funded the first *Chemosynthetic Ecosystem Study* (CHEMO I) in 1990, a study focusing on community descriptions and experiments to address various immediate management needs. Investigators employing submersibles made the first quantitative studies of factors affecting distribution, abundance and growth, other nonchemosynthetic animals, some biogeochemical and physiological activity, and methods for detecting communities.

A followup study in 1995, *Change and Stability in Gulf of Mexico Chemosynthetic Communities* (CHEMO II), was designed to expand on CHEMO I. The MMS recognized that there were still few data on ecological interactions, temporal stability and change, and the supporting physiochemical habitat. Additionally, CHEMO II addressed the sources (e.g., deep vs. shallow, or petrogenic vs. biogenic) of any necessary dissolved gasses and the age, growth rate, turnover rates, reproduction and recruitment, and recovery rates.

In 1988, when the final NGoMCS report was received, the MMS was already aware that the classical picture of the continental slope was changing. Many newer scientific findings had been made on the slope, among the most important being the discoveries of these chemosynthetic communities, and far better information on the geological complexity and biogeochemical processes. Technological and engineering advances, the discoveries of vast gas hydrate reserves on the slope, and economic factors all fueled the rapid expansion of industry into slope waters. In 1997, an MMS-supported Workshop on Environmental Issues Surrounding Deepwater Oil and Gas Development was convened to identify data gaps and recommend new investigations.

A 1999 study, *Deepwater Program: Northern Gulf of Mexico Continental Slope Habitats and Benthic Ecology*, followed the workshop recommendations. There were similarities to the NGoMCS study, but with striking differences in approach. The Deep GoM Benthos (DGoMB) study began with a series of models and testable hypotheses. It also has a significant process-oriented component that supplements descriptive faunal data. During 2002, through a cooperative venture with Mexican marine scientists, the DGoMB program extended sampling and experiments into Mexican waters.

Other (nonfield) studies were discussed at the 1997 workshop, and two studies were initiated: (1) a review of management usage of deep-sea information; and (2) a Gulf of Mexico deepwater information resources data search and literature synthesis. In 2001, MMS received the study reports: (1) *Management Applicability of Contemporary Deep-Sea Ecology and Re-evaluation of Gulf of Mexico Studies* and (2) *Deepwater Gulf of Mexico Environmental and Socioeconomic Data Search and Synthesis*.

Also in 1999, the *Effects of Oil and Gas Exploration and Development at Selected Continental Slope Sites in the Gulf of Mexico* was initiated. This study is investigating whether any effects on benthic communities can be detected around existing deepwater oil and gas platforms.

## Ocean Noise, Marine Mammals and Offshore Industry Operations

All marine mammals in U.S. waters are protected under the MMPA of 1972. In the Act, Congress declared that marine mammals "be protected and encouraged to develop to the greatest extent feasible commensurate with sound policies of resource management, and that the primary objective of their management should be to maintain the health and stability of the marine ecosystem."

"There is general agreement in the scientific community that hearing is probably the primary sense of whales, dolphins, and other marine species, as vitally important to them as seeing is to us . . . . By some estimates, ambient noise in the world's oceans rose by as much as 10 decibels, one full order of magnitude, between 1950 and 1975 alone." (National Resources Defense Council (NRDC), March 1999).

These two statements and the 75-page NRDC report on what that may mean to the marine environment are a few of the numerous recent documents to sound the alarm on a potential environmental problem in the world's oceans. The concept that intense noise from human activities can harm hearing is certainly not new. The concept of it being an environmental rather than safety issue and that noise underwater is as much a problem as on land is more recent; only in the past five years or so has it been elevated to national attention. In 1999, MMS held a Protected Species Workshop in the Gulf of Mexico that initiated a new program to study acoustic effects on whales.

### Gulf of Mexico: The Challenge

Industry is moving into deeper waters in the Gulf of Mexico, an area that has a diverse marine mammal community of over 20 common species, including the endangered sperm whale. There is virtually no information on what levels of underwater noise originate from offshore platforms, workboats, and seismic operations in Gulf waters. From past marine mammal surveys, it is known that sperm whales are often found near 1,000-meter depths and favor the Mississippi River Delta, an area with both deepwater platforms and active seismic exploration.

***Addressing the Challenge*:** Expert opinion from the 1999 Gulf of Mexico workshop affirmed the need to address acoustic issues and recommended that the sperm whale should be the species of most concern. A pilot project through an existing Interagency Agreement with NMFS was begun in 2000 on ways to study the effects of air guns on sperm whales. An international team of experts was brought together to develop new field methods to conduct controlled exposure experiments using an industry seismic vessel. The 2000 study established a coordinated research protocol using visual observations, passive acoustics, and tagging teams. A digital tag (D-tag), developed at Woods Hole with Office of Naval Research (ONR) funding, was the key new technology. The D-tag records sperm whale movements and water depth, and receives sound levels for up to nine hours. In 2001, additional technology—a satellite tag (S-tag)—that records whale surfacing locations over several months was added, and tagging methodologies for sperm whales were tested. The pilot study efforts produced extremely interesting and unique data in the process of developing research tools and procedures. Detailed dive

profiles, recordings of previously unknown sperm whale vocalizations at depth, and the first estimates of received sound levels (at the whale) from seismic operations were obtained from D-tags. The first deployed S-tag recorded a whale remaining in the Mississippi River Delta from August to early November and then moving to Mexican waters.

In 2002, program management was switched from NMFS to Texas A&M. Notable seasonal achievements were the consecutive D-tagging of two whales one day, followed by the consecutive D-tagging of three whales on the next. Analysis of recorded data from these multiple, close proximity taggings will shed some light on group diving behavior, and communications and responses of multiple whales receiving seismic noises occurring at a similar distance from the same source. New FY 2002 efforts included controlled exposure experiments with scheduled air gun firings in the vicinity of D-tagged whales. Multiple applications of S-tags on sperm whales are providing data points on seasonal distribution and travel routes of the whales within the Gulf of Mexico.

In 2003, the field season continued with behavioral observations, DNA analysis, photo-identification, and D-tag and S-tag applications, more controlled exposure experiments, and calibration of air guns using moored and buoyed hydrophones.

**Alaska: The Challenge**

The effects of seismic exploration and other oil-industry noise and disturbance on marine mammals in arctic Alaska have been subjects of responsibility, interest and MMS-funded research for years. The MMS funded pioneer studies on the effects of underwater noise on marine mammals in the Alaska and Pacific Regions beginning in 1979.

***Addressing the Challenge*:** The MMS grants open-water seismic permits that restrict exploration when bowhead whales are nearby. Lease stipulations for Beaufort Sea leases require oil companies to limit the potential effects of noise on marine mammals. Such measures from past sales include:

- Industry Site-Specific Bowhead Whale-Monitoring Program to measure any behavioral effects on bowhead whales, and

- Conflict Avoidance Mechanisms to Protect Subsistence Whaling and Other Subsistence Activities, which requires the oil industry to consult with potentially affected communities and the Alaska Eskimo Whaling Commission (AEWC) to prevent unreasonable conflicts.

***MMS Alaska Marine Studies*:** Since 1979, the ESP has conducted numerous research efforts to identify potential impacts on marine mammals from noise caused by oil and gas activities. Prior to it becoming a global concern, the MMS was addressing this topic and gathering data. In Alaska and the Pacific, studies looked at potential impacts from vessel noise, seismic noise, and even the playbacks of predators' calls. The marine mammal species studied for potential impacts were bowhead, gray, and beluga whales, polar bears, and ringed seals. These species were selected for their endangered or threatened status as well as their importance as subsistence to the Native Alaskans.

Other key efforts by MMS include the 1991 comprehensive review and report titled *Effects of Noise on Marine Mammals*. This review included literature published up to 1990 and emphasized the effects of noise from the oil and gas industry.

In 1995, this report was released as a book, *Marine Mammals and Noise*, with a more expanded scope than that of the report. The book gave additional attention to noise sources other than the oil industry and brought review and analysis up to date through 1995.

For over 20 years, the MMS has held workshops and has funded numerous studies to address the thoughts and concerns about noise impacts to marine mammals. A key element has been time and the advancement of technology and methodologies that can measure and analyze the source of potential impacts. Information gained from these workshops and studies is being used to develop measures that can be taken to minimize or prevent impacts.

The interest and concerns about man-induced underwater noise is shared with industry as well as other agencies. The offshore oil and gas industry monitors potential site-specific noise effects to comply with the MMPA and the ESA and to obtain incidental harassment authorizations. The MMS, through interagency agreements with the U.S. Geological Survey Biological Resources Division, the Alaska Department of Fish and Game, and the Coastal Marine Institute of University Alaska, Fairbanks, participates in cost-sharing studies that address disturbance and other oil-and gas-related potential effects on polar bears, ringed seals, and other marine mammals in the Beaufort Sea Planning Area.

## Bowhead Whale Aerial Survey Project

One of the most important focuses for scientific study in the Alaskan offshore area has been the bowhead whale. Distinctive for its huge, comb-like baleen and thick blubber, the bowhead migrates annually between the Canadian Beaufort Sea and the Bering Sea. This large whale is vitally important to Native Alaskan subsistence hunters and coastal villages in Alaska that are located along the migration route. It is protected by laws of the United States and has been designated as an endangered species.

One particular study, somewhat notable because of its duration, is the Bowhead Whale Aerial Survey Project (BWASP). From 1979 to the present, MMS has monitored the migration of bowhead and beluga whales in the Beaufort Sea. Each year from late August to late October, the BWASP provides daily reports on the status of the migration to the MMS Anchorage office as well as NOAA Fisheries. This information is used to regulate seismic and drilling operations to ensure that oil industry activities do not pose serious, irreparable, or immediate harm to the bowhead whales or to other marine mammal populations.

This annual survey program has been based on a design of random field transects within established geographic blocks overlapping or near the Chukchi and Beaufort Sea lease sale areas offshore Alaska. A nonrandom selection of blocks to be surveyed is chosen, based on weather conditions and the level of offshore oil and gas industry in various areas. Daily flight patterns are based on sets of computer-generated, unique transect grids for each survey block. Surveys are flown at about 1,500 feet in a de Havilland Twin Otter Series 300 that has bubble windows for good trackline visibility. The BWASP coordinates with the AEWC to avoid disturbing their hunting activities and coordinates with other aircraft to ensure safe flying over Arctic waters.

Information about the marine mammals sighted (such as the number of animals, swim direction, calf number, sighting cue and behavior, to mention a few) is recorded along with weather and ocean conditions. This information is entered into a computer on the aircraft which is linked to the airplane's navigation equipment to include recordings of the aircraft heading, altitude, etc., at the time of whale sightings.

Key goals of this ongoing MMS program have been to: (1) define the annual fall migration of bowhead whales, significant inter-year differences, and long-term trends in the distance from shore and water depth at which whales migrate; (2) monitor temporal and spatial trends in the distribution, relative abundance, habitat, and behaviors (especially feeding) of endangered whales in arctic waters; (3) provide real-time data on the general progress of the fall migration of bowhead whales across the Alaskan Beaufort Sea; (4) provide an objective wide-area context for management interpretation of the overall fall migration of bowhead whales and site-specific study results; and (5) record and map beluga whale distribution and incidental sightings of other marine mammals.

Using its multiyear database, the BWASP has found that bowhead whales congregate farther offshore in heavy-ice years during fall migrations across the Central Alaskan Beaufort Sea. Bowheads generally occupy nearshore waters in years of light sea-ice severity, somewhat more offshore waters in moderate ice years, and are even farther offshore in heavy ice years. While factors other than sea ice may have localized effects on site-specific distributions, the distance of bowhead whales from shore across the central Alaskan Beaufort Sea is related to overall sea-ice severity. The relationship is clearer and more geographically restricted than previously noted.

The BWASP has also found that greater relative occurrences of feeding and/or milling behaviors of bowhead whales were observed in six of the 20 years near the mouth of Dease Inlet, Alaska. Similar relative occurrences of feeding and/or milling behaviors of bowheads were observed in four of those years near Cape Halkett, Alaska. There were nine years when feeding and/or milling behaviors were noted on transect but not near Dease Inlet or Cape Halkett. In five other years, neither feeding nor milling behaviors were observed anywhere in the study area.

A yearly report on each fall survey presents scientific data and includes maps depicting where the whales were present. Each report also compares that information with that of previous years. Draft reports are reviewed by other Federal, State, and Native Alaskan groups before publication. Taken together, these yearly reports provide a unique long-term record on bowhead whale migrations.

## Monitoring Marine Environments

Concerns continue to be expressed by environmental scientists and the general public regarding possible effects of OCS activities on the marine and coastal environment. Some of the issues concerning acute, short-term effects of OCS oil and natural gas activities have been addressed adequately through credible scientific studies. For example, studies have shown that discharges from exploratory drilling in the OCS environment would not result in significant long-term effects, except possibly in areas with rare, slowly recovering communities. However, one issue that has not been resolved is that of potential long-term, chronic effects from oil and natural gas development and production activities.

In the past, benthic communities have been one area of focus for monitoring the effects of OCS oil and natural gas activities. Contaminants often attach onto suspended particles, settle to the bottom, and accumulate in bottom sediments. Many benthic organisms are relatively long-lived and sedentary, making them more susceptible to effects from accumulated contaminants. However, it has been found that water column organisms, plankton and nekton, are unlikely to experience significant contaminant concentrations or exposure durations. Also, benthos can be sampled with greater statistical precision than water column organisms.

Another essential means of assessing potential impacts of direct and indirect OCS activities is monitoring information on endangered and nonendangered birds and mammals. Efforts to monitor potential contaminant loading, water and sediment quality, and bioaccumulation in important marine species will be maintained.

**Meeting the Need**

Future MMS marine environmental monitoring studies will focus on assessing the long-term and short-term environmental effects associated with OCS production activities. The ESP monitoring efforts will be part of the bureau's effort to not only establish result-oriented goals, but also to help measure the success of MMS-funded research and impact-mitigation efforts.

- Environmental monitoring studies will include interdisciplinary efforts involving biological, chemical, geological, and physical oceanographic components designed to measure any sublethal effects caused by offshore activities.
- Other future monitoring efforts include the investigation of potential OCS impacts on marine mammal, bird, and turtle populations. The ESP will continue monitoring special habitats and communities such as the Flower Garden Banks National Marine Sanctuary, rocky intertidal communities on the southern California coast, and bowhead whale migration routes in the Alaskan Beaufort Sea.
- Present and future marine environmental monitoring projects will provide information needed for evaluating exploration and development/production plans for offshore oil and natural gas resources. Information from these projects will also be used to develop and evaluate the effectiveness of lease stipulations and other environmental mitigation measures. Opportunistic monitoring of oil-spill impacts will provide information important to the development of oil-spill cleanup and contingency plans.

**Long-Term Monitoring at the East and West Flower Garden Banks**

The East and West Flower Garden Banks, located approximately 100 miles southeast of Galveston, Texas, in the Gulf of Mexico, are collectively the northern most coral reef ecosystem on the North American continental shelf. These submarine banks rise from a depth of 328 feet to a crest in about 60 feet of water. The caps of these banks are covered by an assemblage of reef-building corals and associated tropical and subtropical organisms.

Since the early 1970's, the MMS has supported and has been actively involved in a program of protective activities and study of these banks. With the East and West Banks at the top of a list of topographic features of concern in the Gulf of Mexico, this stewardship effort began with a comprehensive outline of mapping and delineating these potentially sensitive submarine banks. A series of mapping expeditions began in 1974, which developed into a synthesis of information in 1981. This included a multidisciplinary study effort spanning five years of field investigations and over a year of integration and synthesis costing approximately $6.5 million. The initial study objectives consisted of detailed mapping of the banks and photographic surveillance of the coral reef communities. This descriptive phase evolved into a comprehensive program of describing the geologic structure of the features and surrounding sediments, characterizing the physical oceanography of the banks, and identifying their biological communities and zonation. Later years focused on understanding and describing ecosystem processes at the banks, including looking at the movement of water currents and the transport of sediment at the base of the banks. A brine pool possessing a unique biological community was described seeping from the side of the East Bank.

Coral community diversity and numbers were documented in order to scrutinize any possible decline in the health of the higher diversity reef zone. Other research components examined coral bleaching, the recruitment of populations generated from settling plankton, and the effects from anthropogenic activities including long-term impacts from recreational SCUBA diving. This database has provided valuable information needed in numerous NEPA documents, including EIS's, lease stipulations, and the designation of no-activity zones. Throughout all steps of this project, MMS has coordinated closely with the numerous stakeholders at the Flower Gardens, including industry representatives, recreational fishermen and divers, other Federal agencies, academic researchers, and private entities.

With the designation of the Flower Garden Banks as a Marine Sanctuary in 1992, MMS has continued to participate in active stewardship. Since 1992, the MMS, in conjunction with NOAA's National Marine Sanctuary Division, has conducted a series of long-term monitoring studies at both the East and West Flower Garden Banks. This monitoring effort is designed to assess the health of coral reefs, evaluate changes in coral population levels, and investigate other associated characteristics. The goal is to address concerns related to the gradual and punctuated degradation of these unique offshore ecosystems.

The East and West Flower Garden Banks have been the subject of study longer than any other similar coral reef ecosystem in the world and could easily be used as a model for hemisphere-wide coral communities and global climate issues.

In addition to the ongoing monitoring program, MMS has worked closely with the NOAA Sanctuary Manager on various projects, such as facilitating seismic development agreements, developing and expanding oil-spill response plans, investigating pipeline sitings, and serving on advisory boards. During 2002, MMS, with NOAA and USGS, sponsored a high-resolution multibeam mapping project of selected areas of the northwestern Gulf of Mexico including the Flower Garden Banks. In 1994, the stewardship of MMS was recognized by the Flower Garden Banks National Marine Sanctuary program for more than twenty years of commitment to resource protection, funding of surveys, and supporting research at the Flower Garden Banks. Based on this continued record of proactive environmental concern and cooperation, MMS and NOAA will continue to maintain a long and productive relationship affecting the protection and preservation of the valuable natural resources at the Flower Garden Banks.

**Monitoring Development on the Alaska OCS**

The multiyear *Arctic Nearshore Impact Monitoring in the Development Area* (ANIMIDA) study is designed to collect baseline and monitoring information around the first proposed offshore developments in the Alaska Beaufort Sea. These developments are "Northstar," located in State waters but with approximately 20 percent of the oil reservoir on the Federal OCS, and "Liberty" located in Federal OCS waters and for which the MMS Alaska OCS Region completed the Final EIS during 2002.

The Northstar and Liberty sites are located nearshore in the central Beaufort Sea. Northstar is located west of Prudhoe Bay, and Liberty is to the east. The sites are about 34 miles apart. Northstar has been developed as an artificial island with a subsea pipeline to shore. Liberty is still under consideration for development but the design and planning phases would likely be similar to Northstar's. However, Liberty is protected from pack ice by barrier islands, while Northstar lies outside the barrier islands, in a more dynamic ice environment.

The early start of ANIMIDA relative to development for Northstar and Liberty has provided some specific advantages for achieving ANIMIDA monitoring goals. Northstar construction started during winter 1999-2000. Liberty construction, which is still under consideration, will not start before winter 2004-2005. In order to get an early baseline, ANIMIDA started in the summer of 1999 and collected background information at both Northstar and Liberty sites. Additional monitoring was done during Northstar's construction and continued during Northstar's early production. To some extent, ANIMIDA's sampling near Liberty will serve as a control for monitoring potential effects of Northstar.

The OCSLA requires MMS to monitor OCS development to identify significant changes in the quality or productivity in potentially affected marine environments. In addition to providing the necessary long-term study continuity, ANIMIDA's design maximized stakeholder participation. The MMS, along with other Federal and State agencies, the North Slope Borough, and the public, needed to consider what the impacts of oil development would be near Northstar and Liberty. The ANIMIDA study was designed to address both the initial site-specific monitoring issues identified by Federal, State, and local agencies, and additional, subsequent monitoring issues as they developed in the EIS process. The ANIMIDA project began with an 18-month first phase that outlined specific objectives focused on the physical environment. The second phase consists of overlapping, more extensive, multiyear studies with broader, multidisciplinary objectives. In addition to widely attended planning workshops, the study design was reviewed at important milestones by the local government and a Scientific Review Board. A special subcommittee of the MMS Scientific Committee, an independent nationwide group of science experts, also reviewed the study design.

The initial Phase I scientific objectives included monitoring baseline trace metal and hydrocarbon concentrations in the sediment, monitoring baseline noise levels in water, air, and ice, and developing a database. In addition to its own research, ANIMIDA supplied logistical support for a concurrent MMS/ University of Alaska cooperative research project on under-ice currents using current meter moorings in the study area.

Phase I found that sediments in the study area contained natural levels of the 16 metals studied with only minor exceptions. Although no changes through time were found in total polycyclic aromatic hydrocarbon (PAH) concentrations versus earlier MMS studies in the 1980's, there were substantial differences in the sorts of PAH's found. Results suggested an apparent decrease in petroleum-related PAH inputs and/or increase in PAH's from the burning of organic materials like peat, coal, oil, etc.

Phase II tasks include: monitoring hydrocarbons and metals in sediments and invertebrate tissues, investigating the sources, concentrations, and dispersion pathways for suspended sediments in the ANIMIDA area, examining the partitioning of potential metal and hydrocarbon contaminants between dissolved and particulate phases, investigating water turbidity and total suspended sediment loading effects on kelp productivity in the "Boulder Patch," considered an area of special biological concern by MMS since OCS exploration began in the Beaufort Sea, establishing a baseline characterization of anthropogenic contaminants in biota (fish and marine mammals) associated with the ANIMIDA study area, and monitoring subsistence whaling near Cross Island.

The ultimate goal of the MMS Alaska OCS Region is to assure effective environmental protection during OCS development and production. The ANIMIDA project, through the adoption and implementation of its "ANIMIDA Monitoring Indicator Matrix for Decision Making" provides a crucial real-time linkage between ANIMIDA scientists and the MMS Alaska office. Each activity above has identified a key monitoring result or parameter for decisionmaking which, in the event of unusual trends or change, will trigger notification of the MMS Alaska office. Thus, in the unlikely event of such changes, MMS will be able to quickly and effectively take any necessary action to assure protection of the environment near Northstar and Liberty.

**Pacific OCS Region – Rocky Intertidal Monitoring**

The Multi-Agency Rocky Intertidal Network, MARINe, is a long-term monitoring program dedicated to determining the health of the rocky intertidal ecosystem in the Southern California area. Mussels, barnacles, anemones, seastars, black abalone, surfgrass and several species of marine algae are monitored by teams of biologists across southern and central California every fall and spring. Formed in 1995 through a joint effort by MMS, Channel Islands National Park, Santa Barbara County and the University of California, MARINe now has seventeen partners from federal, state, and local agencies, universities and private institutions. Coordinated funding provides the added benefits of a diversified funding source including better coordination among field researchers, data sharing, a common database management system, and standardized field measurements. In cooperation with the Partnership for Interdisciplinary Studies of Coastal Oceans (PISCO), MARINe comprehensively monitors sites across the Pacific coastline from Alaska to mainland Mexico every four years.

Biologists from MINT (MMS Intertidal Team) monitor rocky intertidal sites along the California Pacific shoreline through an in-house study funded by the MMS ESP. The MINT team, along with University biologists funded through the ESP, monitors intertidal species at the 24 MMS-funded sites every fall and spring in San Luis Obispo, Santa Barbara, Ventura, Los Angeles and Orange Counties. The MINT team also conducts projects to support long-term monitoring efforts. The MMS biologists monitored four mussel recovery sites from 1992 to 1999 in an effort to determine recovery time for mussel beds following a major disturbance. These sites are now being monitored through MARINe in an effort to understand long term trends across sites and to understand patch dynamics.

## Physical Oceanography

Physical oceanographic research is an important part of the ESP and includes field data collection, analysis, and modeling studies. This research is important for estimating the transport and fate of any spilled oil and other OCS discharges. The general strategy is to use field observation and model results to calculate the circulation for a given area. This information is used in the OSRA model and associated NEPA documents and to support biological and ecological studies. Physical oceanographic conditions, for example, may help explain the variation in biological communities and may be useful in interpreting long-term monitoring data.

### Studies of Deepwater Processes in the Gulf of Mexico

Development of oil and gas activities in deep water (areas deeper than 1,000 feet) led to concerns about oil released by accidents near the seafloor. Releases in deep water may behave differently due to the density stratification and the extreme high pressures and low temperatures. Preliminary calculations suggest that a plume of gas and/or oil could travel beneath the surface for many kilometers and surface many hours after release. Some physical and chemical changes that occur in this deepwater environment, such as the formation of frozen gas hydrates from gas bubbles, could significantly reduce the buoyancy of the plume and keep large amounts of the oil submerged for an extended time. It was also shown that there are strong currents at water depths between 1,000 and 2,000 meters. This has significant implications for environmental impact assessment, oil-spill cleanup, contingency planning, and source tracing.

### Studies on Sea Ice and Ocean Circulation in the Alaska Region

Ice conditions are highly influential in determining the movement and final disposition of spilled oil. Under calm conditions, the primary processes affecting the oil are spreading, advection, and evaporation. Under rough-water conditions, dispersion and emulsification also become important to oil movement. Even at 0°C, evaporation occurs, with estimates of up to 30 percent evaporation in 48 hours and up to 40 percent evaporation over a 2-week period. Such weathering results in greater density of the remaining oil which, in turn, causes increased thickness of the oil by increasing its viscosity. The low temperatures in the Arctic further increase the viscosity and the oil's equilibrium film thickness. The oiled ice can be transported for a considerable distance before melting occurs and the oil is released.

Understanding under-ice currents is also necessary for estimating the potential effects on environmental resources from oil spills. A study of under-ice currents indicated that under-ice oil spills could move and pose risk to offsite and, in particular, shoreward resources. Studies are required for simulating arctic circulation, improving oil-spill trajectory modeling applied to Alaskan waters, and enhancing MMS's environmental impact evaluations.

### Santa Barbara Channel-Santa Maria Basin Circulation Study in California

For over a decade, the MMS has supported studies and modeling programs in the Santa Barbara Channel-Santa Maria Basin, California, to better understand the physical oceanographic processes needed to support management decisions, such as reviews of oil-spill response plans. The ocean circulation model

aids in the primary form of risk assessment, which is the assessment of probable paths and fates of any spilled oil, and is useful for determining the frequency and short-term variability of the major circulation processes. These varying oceanographic currents also affect variations of the biological characteristics in the area, such as the transport of nutrients, fish larvae, plankton, and other biota.

### Support for Biological and Ecological Studies

Physical oceanographic research also supports MMS biological and ecological studies. For example, physical oceanography studies help to explain the distribution and abundance of whales and dolphins along the continental slope in the northern Gulf of Mexico and assist MMS in assessing the potential effects of deepwater oil and gas exploration and production on these marine mammals. The MMS studies have documented, for example, that some marine mammals are found in conjunction with certain physical oceanographic features, and that as a feature moves and changes, so will the presence and movements of whales and dolphins.

## Social Science

The MMS's major legal mandates are NEPA and the OCSLA. An objective of both laws is to provide the information needed for balanced decisionmaking. Both direct MMS to study the human environment and both include guidance on the social and economic information needs of the bureau. These include the study of potential effects (whether direct, indirect, or cumulative) that relate to economic, social, cultural, historic, aesthetic, or health issues.

Social science in MMS is empirically driven and provides information essential to understanding the consequences of OCS-related activities on the populations, economies, and social and cultural systems in areas where the activities occur. It supports MMS's planning and management processes, and provides information for effective interaction with the public about such effects.

Social and economic effects can occur at all stages of OCS development, from lease sale planning through exploration, development and production, to decommissioning and the cessation of activities. Therefore, MMS designs studies to address the data and analytical needs arising from these specific phases in order to aid in the decisionmaking process.

The possible social and economic effects of the OCS program are among those of greatest concern to the public and to Federal, State, and local government officials. Analysis of these dimensions can provide a better understanding of how future long-term impacts will affect communities and their ways of life, and will allow for estimating the magnitude and direction of these impacts. In addition, this information allows the decisionmaker to discuss the likely impacts of development in terms familiar to the public (e.g., jobs, income, public services, subsistence resources, etc.), thereby allowing the public to examine the development in terms relevant to their own communities and lives.

Impacts from any type of industrial development can be both negative and positive. In fact, a positive impact for one community or individual may be a negative impact for another. Therefore, social scientists at MMS attempt to frame social phenomena as patterns over time in order to estimate and identify potential effects

at various scales of analysis, including the national, regional, and local levels. When possible, later studies build on the information and analysis completed by earlier ones.

Resource-use issues often arise from the conflicts between potential offshore activities and existing uses. Existing resource uses typically include commercial fisheries, subsistence activities, tourism and recreation, and military operations. Social analysis of resource-use issues helps inform management decisions by providing data for modeling efforts and by enabling the development of mitigation strategies.

Evaluation of the potential social and economic impacts of offshore energy development are very important to MMS. Researchers have confirmed that many potential social and economic effects are often the first to be recognized and the most strongly experienced. Although government, industry, and local communities perceive and respond to effects differently, it is important to understand the perspective of each.

## Marine Mineral Research Centers

In 1996, Congress authorized three marine mineral research centers to conduct applied research on marine mineral resources. Oversight of the centers, established at the Universities of Mississippi, Hawaii, and Alaska-Fairbanks, was given to MMS because of the Agency's responsibility for mineral leasing on the OCS. The Center for Marine Resources and Environmental Technology (CMRET) is run by the University of Mississippi, and the Marine Minerals Technology Center (MMTC) is at the University of Alaska-Fairbanks; the center at the University of Hawaii closed in 2000. In 2003, Congress appropriated $800,000 each for the Mississippi CMRET and Alaska MMTC. The MMS has been working with the centers to ensure that research is focused on information and technological needs of the Agency.

One of those needs concerns methane hydrates in areas of active petroleum exploration and production in the Gulf of Mexico. The CMRET is developing a permanent gas hydrate monitoring station, which it expects to place at a site with known hydrates in the Gulf of Mexico. The station will be in 4,300 feet of water. Other participants in the project include the DOE, the Naval Research Lab, and methane hydrate researchers from other universities and energy companies.

The MMTC has been developing a placer gold deposit model for an area offshore Nome, Alaska, where gold has been mined in the past. Nova Resources, a former leaseholder in this area, has allowed limited use of its extensive database of cores, samples, and assays for the model. The MMTC is also developing a remote-controlled mining machine capable of working year round on the seafloor offshore Alaska, including six months beneath the winter ice cap. The Alaska center continues working on these and other new projects to more accurately evaluate offshore gold deposits.

# Engineering Safety & Research

## Technology Assessment & Research Program

The Technology Assessment & Research (TA&R) Program is a research element encompassed by the MMS Regulatory Program. It supports research associated with operational safety and pollution prevention as well as oil-spill response and cleanup capabilities. It was established in the 1970's to ensure that industry operations on the OCS incorporated the use of the best available and safest technologies, subsequently required through the OCSLA amendments.

The TA&R Program has four primary objectives:

- **Technical Support -** Provide engineering support to MMS decisionmakers in evaluating industry operational proposals and related technical issues and ensuring that these proposals comply with applicable regulations, rules, and operational guidelines and standards.
- **Technology Assessment -** Investigate and assess industry applications of technological innovations and ensuring that governing MMS regulations, rules, and operational guidelines encompass the use of the best available and safest technologies.
- **Research Catalyst -** Promote leadership in the fields of operational safety and engineering research and oil-spill response and cleanup research activities by acting as a catalyst for industry research initiatives.
- **International Regulatory -** Provide international cooperation for research and development initiatives to enhance the safety of offshore oil and natural gas activities and the development of appropriate regulatory program elements worldwide.

The TA&R Program operates through contracts with universities, private firms, and government laboratories to assess safety-related technologies and to perform necessary applied research. Participation in jointly-funded projects with industry, other Federal and States agencies, and international regulatory organizations is the primary funding mechanism, in view of the overlap of issues and challenges, as well as a broader recognition that participation in these joint projects is the most effective and efficient means to leverage available funds.

The TA&R Program is comprised of two functional research activities: Operational Safety and Engineering Research and Oil-Spill Response Research.

## Operational Safety & Engineering Research

The MMS Operational Safety & Engineering Research Program addresses technological issues associated with the complete spectrum of operations, ranging from the drilling of exploratory wells to the removal and decommissioning of platforms and related production facilities. The expansion of operations into the deepwater areas of the Gulf of Mexico presents significant technological challenges to the oil and gas industry and to MMS. The industry is focused upon the development of new concepts, operational procedures, production facilities, and transportation facilities to meet the physical and economic challenges imposed by the operating environments associated with water depths between 3,000 and 10,000 feet. In many cases, custom designs that employ new space-age materials and unique operating characteristics are being developed and need to be independently verified by MMS to ensure operational safety and environmental protection.

Concurrently, industry continues to conduct exploratory drilling operations on shallow-water areas of the Gulf of Mexico, focused upon finding new oil and natural gas accumulations that are being identified by technologically advanced geophysical data collection and computer-assisted analyses systems. Companies continue to operate several thousand production platforms and subsea pipelines of various ages and operational efficiencies. As these platforms and pipelines continue to age, MMS is increasingly concerned with the means to ensure the integrity of these older facilities, and is sponsoring research on the means available to conduct such assessments and processes that could correct or reverse problematic aging events.

Finally, as platforms and associated production facilities reach the end of their usefulness, as is currently happening in the Gulf of Mexico and offshore southern California, decommissioning and removal are required. National and international focus on this process has identified numerous safety and long-term environmental concerns that MMS regulatory personnel must address as the operations proceed. The MMS and industry jointly formulate multiyear research projects to assess the most feasible means of both the decommissioning and the removal of facilities, including the possible impacts on the marine environment and related onshore impacts arising from regulatory decisions.

The first commercial development of oil discoveries on the Federal portions of the Beaufort Sea offshore Alaska also presents special challenges to the TA&R Program, particularly the forces associated with sea ice and potential impacts of ice forces on the production structures and pipelines necessary to produce these discoveries.

## Oil-Spill Response Research Program

The MMS Oil-Spill Response Research (OSRR) Program provides research leadership to improve the capabilities for detecting, containing, and responding to an oil spill in the marine environment. The MMS is the principal U.S. Government agency funding offshore oil-spill response research. For more than 20 years, MMS has maintained a comprehensive, long-term research program to improve oil spill response technologies. This program has expanded the existing capabilities to respond to an open ocean oil spill. The OSRR Program complies with Title VII of the Oil Pollution Act of 1990 (OPA-90) and is conducted in cooperation with the Interagency Coordinating Committee for Oil Pollution Research, as called for in the OPA-90.

The OSRR Program is one tool that MMS uses to fulfill its regulatory responsibilities mandated by OPA-90. Information derived from the OSRR Program is directly integrated into MMS's offshore operations and is used in making regulatory decisions pertaining to permit and plan approvals, safety and pollution inspections, enforcement actions, and training requirements. Funding for both the OSRR Program and the National Oil Spill Response Test Facility (Ohmsett) is appropriated from the Oil Spill Liability Trust Fund (OSLTF). The OSLTF receives funds from a $0.05 tax on each barrel of oil produced or imported into or out of the United States. As intended by OPA-90, the companies that produce and transport oil are supporting research to improve oil-spill response capabilities.

The OSRR Program operates through contracts and other agreements with universities, private industry, State governments, government laboratories, and foreign countries with the expertise to perform the necessary research. Funding is leveraged by co-sponsoring research whenever possible. The OSRR Program routinely participates in 30 concurrent research and development projects, many of which are Joint Industry Projects. The MMS cooperates in the exchange of technological information with Canada, Norway, the United Kingdom, Japan, Germany, and France through informal contacts, workshops, and technical meetings, such as the biennial International Oil Spill Conference.

The OSRR Program covers a wide spectrum of oil-spill response issues and includes laboratory, meso- and full-scale experiments, and field investigations. Its current focus is on (1) testing and evaluating the technologies required to respond to oil spills in the icy waters of the Alaskan Beaufort Sea; (2) evaluating the technologies required to respond to open-water spills from deep-water operations offshore California and in the Gulf of Mexico; (3) conducting a comprehensive assessment of the operational and environmental factors associated with the use of chemical dispersants to treat oil spills from MMS-regulated facilities and pipelines; (4) increasing the knowledge base of the physical and chemical properties of crude oil and how these properties change during a spill; (5) improving the ability to burn oil slicks on the water's surface (in-situ burning); (6) mitigation of oil spills associated with pipelines; and (7) operation of Ohmsett located in Leonardo, New Jersey.

## MMS National OCS Oil-Spill Prevention Program

The majority of activities undertaken by the MMS during the regulation and oversight of oil and gas exploration, development, and production operations in the OCS are devoted to spill prevention. The MMS review and approval authority for almost every task that takes place offshore—application of state-of-the-art system design and operations standards, and a robust life-cycle facility inspection program—has resulted in a systemic work ethic in which protection of the environment has become second nature to those working in the energy sector, from oil field roustabouts to those in corporate management.

The MMS National OCS Oil Spill Prevention Program looks beyond the practices surrounding spill prevention, focusing on equally important and complementary facets of environmental protection; namely, spill planning, preparedness, and response. Working under authority of the Oil Pollution Act of 1990, Presidential Executive Orders, and various regulations, MMS holds primary responsibility for verifying that operators of facilitiesthat handle, transport, or produce oil from facilities located not only

in the OCS but also in State waters are capable of responding to spills from their facilities, whether the spill constitutes a minor event or is categorized as their "worst-case discharge scenario."

Even before operations begin offshore, MMS verifies, through the Oil Spill Financial Responsibility Program, that an operator can pay for spill cleanup, requiring bonding of up to $150,000,000. Additionally, MMS checks that the operator has a contract with an approved Oil Spill Removal Organization (OSRO) that is capable of providing qualified personnel and sufficient equipment to respond to the firm's worst-case spill volume. Finally, MMS requires that the operator prepare and submit for approval an Oil Spill Response Plan, which describes in detail what actions of their Spill Management Team will take should an oil spill occur.

After development of their response plan, operators are required to conduct "table-top" exercises and train response team members in spill response methods, and accepted incident command systems—preparedness requirements that are tracked by MMS staff. Instrumental in validating an operator's ability to respond to an oil spill, MMS conducts unannounced oil spill drills which are designed to elicit the exact actions an operator would need to take in the event of a real spill, and drills often include participation by the State and/or Federal On-Scene Coordinators (FOSC). Using Organization Design, Operational Response, and Response Support criterion from the National Preparedness for Response Exercise Program, operators are critiqued on their performance and provided with recommendations for improvement.

Another area of spill preparedness that MMS is responsible for is that of response equipment inspection, in which engineers travel to locations throughout the Gulf of Mexico Region and along the California coast to inspect oil spill equipment owned and operated by contracted OSRO's. Through unannounced inspections, MMS verifies that equipment is located in designated locations, that it is being maintained and is in good working order, and that records of its deployment or use in training exercises have been documented. Tracking and verification of training requirements for personnel who will operate spill response equipment is also an MMS function, one that ensures that all responders display the necessary skills and possess the requisite knowledge to respond quickly and adeptly to an offshore spill.

The roles of the MMS in oil spill "response" are critical to limiting the volume of oil released to the environment due to accidents, storm events, or system failures, and are carried out in concert with the FOSC, which is the U.S. Coast Guard (USCG). Using advanced mapping and geographic information systems, MMS can identify the potential sources of spills from offshore facilities, provide immediate contact information for the responsible party and the firm's spill response Incident Commander, and determine the most effective way to stop the source of flow, not only immediately after spill occurrence but also during required system repairs as well. Staff from the MMS, including petroleum engineers, biologists, archaeologists, oceanographers, air quality specialists, computer modelers, and others, also assist the FOSC, as requested, working within the Incident Command or Unified Command System, to ensure that both short-and long-term impacts of oil spills on our fragile oceans are minimized.

## Ohmsett – The National Oil-Spill Response Test Facility

Ohmsett is an integral part of the OSRR Program. The facility directly supports MMS's goal of ensuring that the best available oil-spill detection, containment, and removal technologies are available to protect the U.S. coastal and ocean environment. Ohmsett is a large, above-ground test tank that is unique in the world in its ability to tow full-sized oil-spill containment and cleanup equipment, such as booms and skimmers, in the presence of a variety of crude oils and refined petroleum products. Even the operation of the facility has an environmental focus. The test oils collected from the tank after testing is completed are then centrifuged and filtered for reuse. When the oil can no longer be recycled for use in testing, it is removed from the facility and refined for use as heating fuel. The 2.6 million gallons of water is maintained in crystal clear condition by the filtration and chlorinating systems to enhance the underwater video of equipment being tested.

The Ohmsett tank is over two football fields long at 667 feet, is 65 feet wide, and 11 feet deep. The length of this gigantic tank can seem short as one moves down the tank towing equipment at speeds up to 6.5 knots. It's especially exciting to tow equipment in waves, up to three feet in height that can be generated by an artificial wavemaker. Ohmsett has been used to evaluate sensors that detect floating oil and measure slick thickness, to calculate optimum timing for the emptying of temporary storage devices, and to evaluate the operational efficiency of sorbent materials. Standard test protocols that incorporate American Society of Testing and Materials standards and guidelines are used at Ohmsett to evaluate oil spill containment booms and skimmers. This is critical to reproducing and directly comparing test results in a scientifically valid manner. Ohmsett represents a necessary intermediate step between small-scale "bench testing" and open-water testing of equipment in uncontrollable, highly variable, and always expensive conditions.

The Ohmsett facility was originally built and operated by the EPA from 1974 to 1987. In 1989, Ohmsett was closed, and responsibility for the facility was transferred to the U.S. Navy (USN),

since the facility is located on the Naval Weapons Station Earle Waterfront in Leonardo, New Jersey. With OPA-90, MMS has the lead responsibility for operating and maintaining Ohmsett. The MMS refurbished Ohmsett, beginning in 1990, and reopened it for testing in 1992. Much of the initial reopening expenses, as well as continued base support for the yearly operating and maintenance costs of Ohmsett, are covered by OSLTF. The OSLTF derives its funds from a tax on companies that produce or transport oil. In other words, no appropriated taxpayer dollars are used to support this unique oil-spill response technology testing, training, and research facility.

In 1998, a new testing capability was added at Ohmsett with the construction and installation of an air-injected underwater propane burner system that realistically simulates burning oil at sea. The propane burner system is used to evaluate the performance and survivability of fire-resistant booms. The information obtained from the burn tests will facilitate scientifically-based decisions on the suitability of burn equipment.

In 1999, MMS examined the feasibility of performing dispersant effectiveness testing at the facility. One difficulty of using oil-spill dispersants in the field is predicting and measuring the effectiveness of dispersants over a wide range of conditions. The MMS developed a test protocol for the use of dispersants at Ohmsett, and several test series were successfully completed.

A partnership with the National Spill Control School at Texas A&M University helps make Ohmsett a premier training site for spill response personnel. The USCG and USN both use the facility for training their emergency response personnel. Ohmsett was selected because of the unique capability to combine class-room training with deployment and operation of actual cleanup equipment in oil.

The Ohmsett facility is open to all private and public sector clients on a reimbursable basis. Major Federal testing clients include the USCG, USN, and EPA. For example, the USCG used the facility to comparatively test high-speed skimmers before making a major purchase. The diverse client base of Ohmsett varies from foreign government agencies such as the Canadian Coast Guard and Environment Canada, to major oil industry firms like ExxonMobil Corporation, to academic research institutions like the Universities of New Hampshire, Rhode Island, and Miami. Equipment manufacturers use Ohmsett to independently demonstrate the capabilities and performance of their products.

## Safety and Environmental Management Program

Most offshore oil and gas incidents that lead to injuries and pollution can be traced to human error or poorly organized operations. As the Federal agency responsible for managing the mineral resources on the OCS in an environmentally sound and safe manner, the MMS encourages OCS operators to use a companywide Safety and Environmental Management Program (SEMP) plan to organize their activities and their contractors' activities in ways that minimize risks to workers and the environment.

The SEMP is a tool for integrating and managing fundamental drilling, construction, and production activities. The activities SEMP addresses include:

- maintaining facility safety and environmental information
- assessing operating hazards
- managing changes to equipment and personnel
- developing procedures for operating equipment
- establishing safe work practices
- training workers
- assuring the quality and integrity of critical equipment
- conducting a safety and environmental review before starting new or modified equipment
- responding to emergencies
- investigating operating incidents

The SEMP was developed in response to the 1990 finding of the National Research Council's Marine Board that MMS's prescriptive approach to regulating offshore operations had forced industry into a compliance mentality. A more systematic approach to managing offshore operations was needed.

While SEMP is voluntary, all the principal offshore industry trade associations (i.e., American Petroleum Institute (API), Offshore Operators Committee, Independent Association of Drilling Contractors, Independent Petroleum Association of America, and National Ocean Industries Association) support SEMP. The best estimates indicate that approximately six out of ten OCS operators have a partially- or fully-implemented SEMP.

It is MMS policy to collaborate with OCS operators to implement SEMP on a voluntary basis. Current MMS efforts to promote OCS operator participation in SEMP include accepting company invitations to participate in self-audits, and discussing company SEMP efforts during annual performance reviews. The MMS is also represented on the API Technical Committee for RP-75, and through this committee, MMS can make recommendations for needed revisions to the SEMP guidance.

## Offshore Security Program

The MMS has a strong commitment to OCS safety and environmental protection. Protecting the OCS oil and gas infrastructure not only enhances OCS safety and environmental protection, but it is also a critical part of our national energy policy. The OCS oil and gas infrastructure provides the foundation for our national security, economic stability, and way of life.

Since September 11th, 2001, the MMS has taken a proactive approach towards homeland security. Offshore production and transportation facilities are potential terrorist targets. Given the rise in geopolitical risks, the importance of domestic production has increased in view of the potential for a disruption in oil and gas imports. The MMS has taken a leadership role to help ensure that offshore personnel, the environment, and facilities are all protected. The MMS developed guidelines to enhance existing protective measures. The *OMM Threat Advisory Guidelines for OCS Operations* form the foundation for a comprehensive MMS offshore security system that improves response during a crisis by establishing specific protective measures for each standardized threat condition level of the Homeland Security Advisory System.

The MMS also actively participates with regional coordination groups to increase vigilance, identify potential security risks, and establish procedures for communication and reporting suspicious

occurrences near offshore production and transportation facilities. The agency's expertise is used extensively to help identify vulnerabilities to OCS infrastructure, improve communication and the dissemination of information, and identify appropriate measures to enhance OCS security. For example, MMS experts worked closely with the American Petroleum Institute to develop an industrywide, *Recommended Practice 70 - Security for Offshore Oil and Natural Gas Operations.* The MMS also assisted the U.S. Coast Guard in developing draft security regulations for OCS oil and gas facilities.

**Meeting Terrorism Through Regulation**

The MMS has established and maintains a comprehensive and practical regulatory and compliance program that stresses the importance of safety on the OCS. The events of September 11th, 2001, introduced a new safety issue—terrorism. Fortunately, the MMS and offshore operators are not starting from scratch. Many of the measures and practices MMS implements to ensure environmentally sound and safe operations also work towards improving the security of offshore facilities. This is the result of a well established and accepted regulatory and compliance program. The MMS is prepared to respond to an explosion, fire, hazardous materials spill, and is able to evacuate a facility. Not only are regulations and policies in effect, but more importantly, there are frequent drills and practices for dealing with these critical safety issues.

# Abbreviations

| | |
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| AEWC | Alaska Eskimo Whaling Commission |
| ANIMIDA | Arctic Nearshore Impact Monitoring in the Development Area |
| API | American Petroleum Institute |
| APR | Annual Performance Review |
| BWASP | Bowhead Whale Aerial Survey Project |
| CC | Consistency certification |
| CD | Consistency determination |
| CE | Categorical exclusion |
| CER | Categorical Exclusion Review |
| CHEMO I | Chemosynthetic Ecosystem Study |
| CHEMO II | Change and Stability in Gulf of Mexico Chemosynthetic Communities |
| CMP | Coastal management programs |
| CMRET | Center for Marine Resources and Environmental Technology |
| CZMA | Coastal Zone Management Act |
| DGoMB | Deep GoM Benthos |
| DOC | Department of Commerce |
| DOE | Department of Energy |
| DOI | Department of the Interior |
| D-Tag | Digital tag |
| EA | Environmental Assessment |
| EFH | Essential fish habitat |
| EIA | Energy Information Administration |
| EIS | Environmental Impact Statement |
| EPA | Environmental Protection Agency |
| ESA | Endangered Species Act |
| ESP | Environmental Studies Program |
| ESPIS | Environmental Studies Program Information System |
| FMP | Fishery management plan |
| FMV | Fair Market Value |
| FOSC | Federal On-Scene Coordinator |
| FWS | Fish and Wildlife Service |
| GIS | Geographic Information System |
| G&G | Geological and geophysical |
| LSMWG | Louisiana Sand Management Working Group |
| MARINe | Multi-Agency Rocky Intertidal Network |
| MINT | MMS Intertidal Team |
| MMPA | Marine Mammal Protection Act |
| MMS | Minerals Management Service |
| MMTC | Marine Minerals Technology Center |
| MRM | Minerals Revenue Management |
| MSFCMA | Magnuson-Stevens Fishery Conservation and Management Act |
| NEPA | National Environmental Policy Act |
| NGoMCS | Northern Gulf of Mexico Continental Slope Study |
| NMFS | National Marine Fisheries Service |
| NOAA | National Oceanic and Atmospheric Administration |
| NPV | Net Present Value |
| NRDC | National Resources Defense Council |
| OCS | Outer Continental Shelf |
| OCSLA | Outer Continental Shelf Lands Act |
| OMM | Offshore Minerals Management |
| ONR | Office of Naval Research |
| OPA-90 | Oil Pollution Act of 1990 |
| OSI | Operator Safety Index |
| OSLTF | Oil Spill Liability Trust Fund |
| OSRA | Oil-spill Risk Analysis |
| OSRO | Oil-Spill Removal Organization |
| OSRR | Oil-spill Response Research |
| PAH | Polycyclic Aromatic Hydrocarbon |
| PISCO | Partnership for Interdisciplinary Studies of Coastal Oceans |
| RE | Resource Evaluation |
| RIP | Risk-based Inspection Program |
| RTR | Rigs-to-reefs |
| SAFE | Safety Award for Excellence |
| SEMP | Safety and Environmental Management Program |
| SFA | Sustainable Fisheries Act |
| S-tag | Satellite tag |
| TA&R | Technology Assessment & Research |
| USCG | U.S. Coast Guard |
| USGS | U.S. Geological Survey |
| USN | U.S. Navy |


**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 ensuing 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.

U.S. Department of the Interior
Minerals Management Service
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