Statement of
Minerals Management Service
Department of the Interior
Before the
Committee on Science and Technology
Subcommittee on Energy and Environment
U.S. House of Representatives

"A New Direction for Federal Oil Spill Research and Development"

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The Minerals Management Service (MMS) is the bureau within the Department of the Interior responsible for the management of the Nation's renewable energy, oil, natural gas, and other mineral resources on the Outer Continental Shelf (OCS) as well as the energy and mineral revenues from the OCS and from Federal onshore and American Indian lands. From the gasoline that powers our cars, the natural gas that heats our homes, and the benefits obtained through the disbursement of collected mineral revenues, the Nation and its citizens benefit from the efforts of the MMS.

The MMS has jurisdiction over approximately 1.7 billion acres of the OCS, on which there are about 8,100 active oil and gas leases. We work with other federal agencies, state and local governments, industry, and academia to achieve a common objective to maintain high standards for safety and the environment and to meet national economic, security and energy policy goals. The OCS is a significant source of oil and natural gas for the Nation's energy supply, providing about 14 percent of domestic natural gas production and 27 percent of domestic oil production.

MMS recently published the final rulemaking that provides the framework to grant leases, easements and rights of way for the orderly, safe, and environmentally responsible development of renewable energy resources on the OCS such as wind, wave, and ocean current.

The MMS has a robust regulatory system designed to prevent accidents and oil spills associated with OCS oil and gas exploration and production. However, whenever oil is being handled - whether in tankers, pipelines, or production facilities, whether onshore or offshore, and whether in the US or abroad - spills are a possibility. For that reason it is imperative that US and international agencies work together to prepare for oil spills in a comprehensive manner. This preparation includes continued improvement in response technology and procedures.

MMS is pleased to have the opportunity to present the Committee with information on the MMS Oil Spill Response Research Program and the operation of Ohmsett – The National Oil Spill Response Test Facility.

Overview

For more than 25 years, the Minerals Management Service (MMS) has maintained a comprehensive, long-term research program to improve oil spill response technologies. The major focus of the program is to improve the knowledge, technologies and methodologies used for the detection, containment and cleanup of oil spills that may occur on the OCS and disseminate findings through a variety of public forums such as workshops, conferences, peer-reviewed publications and the internet. The intent is to make this information widely available to oil spill response personnel and organizations world wide. The activities undertaken by the MMS oil spill response research (OSRR) program comply with the research and development provisions of Title VII in the Oil Pollution Act of 1990 (OPA-90).

The OSRR program provides research leadership to improve the capabilities for detecting and responding to an oil spill in the marine environment. In the past decade the OSRR program has been making progress in developing technological advances to improve the ability to clean up oil spills in Arctic environments. This includes development of systems, equipment and methodologies that can be used in extremely cold temperatures and in broken ice conditions. These advancements have allowed oil and gas exploration and development activities to move forward in Arctic offshore environments and will produce real cost savings.

The OSRR program is a cooperative effort bringing together funding and expertise from research partners in government agencies, industry, and the international community to collaborate on oil spill research and development (R&D) projects. The OSRR program operates through contracts with universities, government agencies and laboratories and private industry to assess safety-related technologies and to perform necessary applied research.

Funding for the OSRR program activities is appropriated from the Oil Spill Liability Trust Fund (OSLTF). MMS plans and implements OSRR projects that have multiple phases in a stepwise approach over several years, enabling the MMS to secure cooperative funding from private industry as well as countries that have offshore regulatory programs. The MMS OSRR program monitors and capitalizes on the efforts of other agencies and industry whenever possible through active partnering. More than 40 percent of the OSRR projects are Joint Industry Projects, where MMS partners with other stakeholders to maximize research dollars.

The MMS coordinates oil spill research closely with the National Oceanic and Atmospheric Administration (NOAA), the U.S. Coast Guard (USCG), and the Environmental Protection Agency (EPA) through participation on the National Response Team and on the Interagency Coordination Committee for Oil Pollution Research. This allows the MMS to foster collaborative research at the national and international level, optimize current and future research initiatives, minimize research duplication, and

ensure that MMS's interests are addressed. Partnering has reinforced the MMS's oil spill response research and development and encouraged oil spill technology development efforts by academia and industry. The MMS has participated in the exchange of technological information with Canada, France, Germany, Japan, Norway and the United Kingdom through cooperative research projects, workshops and technical meetings.

Information derived from the OSRR program is directly integrated into MMS's offshore operations and is used to make regulatory decisions pertaining to permitting and approving plans, safety and pollution inspections, enforcement actions, and training requirements. The MMS as well as US and foreign government agencies and organizations worldwide utilize the results from the OSRR program and Ohmsett in making planning, regulatory, and emergency response decisions. Current OSRR projects cover a wide spectrum of oil spill response issues and include laboratory, meso-scale and full-scale field experiments.

Major topic areas include:

- Remote sensing and detection of spilled oil
- Physical and chemical properties of crude oil
- Mechanical containment and recovery
- Chemical treating agents and dispersants
- In situ burning

MMS Oil Spill Response Research

Success from the MMS OSRR program comes from a step-wise research approach to solve specific research needs that includes formation of joint industry projects to expand the scope and leverage program funds. Many significant technical advances in oil spill response can be attributed to successful multi-phase research projects that involve scientists worldwide. Applied research and the development of response strategies traditionally involve a combination of laboratory small-scale tests, meso-scale tank and basin experiments, and full-scale field trials. The MMS has used this approach to develop, initiate, and conduct more than 200 successful oil spill research projects.

Once the MMS has identified a research need or data gap in spill response we initiate and conduct a scoping project to define the current state-of-the-art for this technology or methodology. The results from these scoping projects are used to develop a systematic approach required to successfully address the data need. Communicating the results from these projects to government agencies and private industry is the next step to build consensus on the future research direction. A carefully focused work plan or agenda encompassing a priority list of projects is developed. It is generally beyond the capabilities of any one organization to fund these projects in their entirety. International cooperation, including governmental and industry participants, is needed to make substantial progress in the most important research and development areas. Given the specialized nature and limited number of researchers actively working on oil spill response, it is essential to involve different centers of expertise on a global scale. The MMS has initiated many successful joint industry projects (national or international) to leverage our program funds and expand the scope of the project to develop innovative or

new technological advancements to detect, contain, and cleanup oil spills in the marine environment.

Ohmsett – The National Oil Spill Response Test Facility

The passage of the Oil Pollution Act of 1990 (OPA-90) significantly expanded MMS's role in oil spill research. Title VII of OPA-90 mandated the reactivation of Ohmsett – The National Oil Spill Response Test Facility located in Leonardo, NJ. The Interagency Coordinating Committee on Oil Pollution Research (created by OPA-90) delegated this responsibility to the MMS. Ohmsett is the only facility in the world where full-sized oil spill response equipment can be tested and training of first responders can be conducted with a variety of oils in a simulated marine environment under controlled conditions. The primary feature of Ohmsett is a large outdoor, above ground concrete test tank which measures 667 feet long (the approximate length of two football fields) by 65 feet wide, by 11 feet deep. It is filled with 2.6 million gallons of crystal clear salt water. Ohmsett is also the premier training site for spill response personnel from state and federal government agencies, private industry and foreign countries. This includes the U.S. Coast Guard Strike Team personnel. MMS now manages Ohmsett as part of its mandated requirements to ensure that the best and safest technologies are used in offshore oil and gas operations. On July 22, 2009, Ohmsett celebrated its 17th anniversary under MMS management and to date 24 countries have made use of the facility.

The facility provides an environmentally safe place to conduct objective, independent testing of oil spill response equipment as well as training responders. Many of today's commercially available oil spill cleanup products and services have been tested at Ohmsett either as off-the-shelf commercially available equipment, or as equipment or technology still under development. In North America, a large portion of existing independent performance data and information on containment booms and skimmers has been obtained through testing at Ohmsett. The MMS has expanded the capabilities of Ohmsett to test all types of oil spill response equipment and techniques. The testing capabilities of Ohmsett were recently upgraded to provide a simulated Arctic environment for cold water testing and training. This capability will allow Ohmsett to remain operational year round, offering testing, training and research. We now have the ability to test and evaluate fire resistant containment booms using an air-injected propane burner system that realistically simulates in situ burning at sea. We have added the capability to conduct effectiveness testing on a variety of chemical treating agents, dispersants, emulsion breakers, and sorbent products.

The use of chemical dispersants is another important option in oil spill response. The Ohmsett facility is a world leader in realistic dispersant effectiveness testing through the design and development of a calibrated, referenced and realistic test protocol and subsequent testing under cold and temperate conditions using fresh and weathered crude and fuel oils. The National Research Council strongly supported the use of wave tank testing in their recent review of chemical dispersants. Ohmsett is the world's largest wave-tank complex presently conducting such research, and is the logical venue for bridging the gap between laboratory and field testing.

The Ohmsett facility is developing the capability to conduct independent and objective performance testing of emerging marine renewable energy devices. The objective is to provide as realistic conditions in the model scale as possible including realistic parameters for wave heights, wave periods, and directional spreading water depth. The program includes the development of standard test protocols both nationally and internationally.

Ohmsett is an integral part of the MMS oil spill research program and is essential for fulfilling the agency's regulatory responsibilities under OPA-90. The facility directly supports MMS's mission of ensuring safe and environmentally sound oil and gas development on the OCS. Ohmsett is not only an important component of the MMS oil spill research, it is also a national asset where government agencies, private industry and academia can conduct full-scale oil spill research and development programs in a controlled environment with real oil. Ohmsett allows research, testing and evaluation of equipment, systems and methodologies, and responder training to take place in a controlled environment.

Significant Accomplishments of the MMS Oil Spill Response Research Program

Following are some examples of the significant accomplishments of the MMS OSRR Program and how these new technological advances are currently being operationally used worldwide to respond to oil spills in the marine environment.

1. Detection of Oil In, On, and Under Ice

The ability to detect reliably and map oil trapped in, under, on, or among ice is critical to mounting an effective response in Arctic waters. In the past, the only successful method for detecting the presence of oil in or under ice involved drilling holes through the ice sheet or by sending divers down under the ice to delineate the extent of a spill. This method is expensive, labor intensive, and exposes personnel to the vagaries of extreme weather.

In 1999, the MMS initiated a project to evaluate potential remote sensing techniques to detect oil trapped within and under ice. Of the many technologies recently reviewed, only ground penetrating radar (GPR) showed potential. Between 2003 and 2008 the MMS initiated four international joint industry projects to develop GPR into a functional remote monitoring sensor. Two of these projects conducted offshore Svalbard, Norway involved a permitted, intentional oil release for research purposes.

2. Oil Spill Thickness Sensor

One of the most important initial steps in response to an oil spill at sea is the assessment of the extent of the oil slick and the quantity (i.e. thickness) distribution of oil within it. A critical gap in spill response is the lack of capability to measure and map accurately the thickness of oil on water and to rapidly send this information to response personnel in the command post.

In testimony given before the Subcommittee, Mr. Doug Helton of NOAA, cited the need for remote sensing technologies during the *Cosco Busan* oil spill to detect oil effectively, determine areas of the thickest amounts of oil, and then use this information to direct skimming operations to increase the recovery of spilled oil.

In November 2005, the MMS initiated a research project that would enable the measurement of oil slick thicknesses using multispectral aerial imagery. The California Department of Fish and Game, Oil Spill Prevention and Response (DFG/OSPR) partnered with MMS on this project and provided technical expertise with the Geographic Information System component of this project. Over a three-year period (2005-2008) the aerial mapping system was developed through a systematic approach which included many overflights of the Coal Oil Point, CA natural oil seeps. In November 2007, remote aerial sensing of the *Cosco Busan* oil spill was performed using the prototype thickness sensor mounted to a small plane and flown over the spill area to test the system under actual field conditions. The sensor performed as expected and could effectively identify the extent and high density areas of the spill. Under commercial application this aerial thickness sensor could have been used to prioritize clean-up activities. The full system integration flight of the aerial thickness mapping system was successfully completed in November 2008.

On December 7, 2008, there was an oil spill from Platform A in the Santa Barbara channel due to a ruptured tank. The California Department of Fish and Game, Oil Spill Prevention and Response used the aerial thickness mapping system to acquire image data. The data was immediately processed and made available to the Unified Command center for guiding response operations. The data was used to recover successfully the spilled oil over a five day period and none of the oil hit the shoreline.

3. Mechanical Containment and Recovery in Arctic Ice Environments

More than a decade of MMS research has focused on methods to improve the effectiveness of equipment and techniques for the mechanical recovery of oil spills in ice-infested waters. This research has substantially improved mechanical recovery of oil spills in Arctic environments. In October 2004, the MMS initiated a research project with the University of California, Santa Barbara (UCSB) to study the process of oil adhesion to the surface of oil skimmers and to identify parameters to improve their efficiency. Over a three year period (2004-2007), numerous laboratory, small and large scale tank tests were conducted to improve the mechanical recovery of oil. Research results demonstrated that changing the surface pattern of the drum will improve recovery efficiency by over 200%. The results from this research project were patented by UCSB and the principal investigator (PI). The PI was awarded her doctoral degree as a result of her research. There are at least six types of grooved skimmers being commercially sold around the world that resulted from this research.

4. In Situ Burn Research

MMS was designated as the lead agency for in situ burn research (ISB) in the Oil Pollution Research and Technology Plan prepared under the authority of Title VII of the OPA-90. The use of ISB as a spill response technique is not new, having been researched

and employed in one form or another at a variety of oil spills since the 1960's. Burning as a response tool for oil spills in broken ice has been researched since the early 1980's using both tank tests and medium to large-sized experimental spills. Many scientists and responders believe this technique is among the best option for oil spill response in the Arctic, especially with a high degree of ice coverage. Between 1995 and 2003, the MMS partnered with the National Institute of Standards and Technology to conduct more than ten different ISB research projects.

To disseminate results of eight years of intensive ISB research, the MMS assembled a comprehensive compendium of scientific literature on the role of in situ burning as a response option for the control, removal and mitigation of marine oil spills. All operational aspects of burning are covered in detail. It contains more than 350 documents with over 13,000 pages and nearly one hour of video. The MMS has distributed more than 2,000 ISB-CD sets worldwide.

In situ burning is now considered a viable countermeasure for offshore oil spills. Regional Response Teams (RRT) and Area Committees are integrating the use of in situ burning into their response protocols and contingency plans. Overall the opportunity for use, growing inventory of equipment resources and the trend for Federal On Scene Coordinators (FOSC's) and RRT's to seriously consider and more readily approve its use indicate an expanded role for in situ burning in the Arctic.

5. Dispersants in Cold Water/Broken Ice Environments

The use of chemical dispersants in is another important option in oil spill response. The Ohmsett facility is rapidly becoming a world leader in realistic dispersant testing through the design and development of a calibrated, referenced and realistic test protocol and subsequent testing under cold and temperate conditions using a variety of crude and fuel oils. Ohmsett is the world's largest wave-tank complex presently conducting dispersant research and is a logical venue for bridging the gap between laboratory and field testing. The National Research Council strongly supported the use of wave tank testing in their recent review of chemical dispersants. In the past seven years there have been fourteen major dispersant research projects conducted at Ohmsett. Experiments at Ohmsett have demonstrated that dispersants are effective in near-freezing water temperatures but this is highly dependent on the properties of the crude oil. Dispersants can be effective in broken ice if there is some mixing energy present (wind, waves, movement of ice floes caused by wind, waves, and currents). Dispersants can potentially provide an invaluable third response option when strong winds and sea conditions make mechanical cleanup and in situ burn techniques unsafe and/or ineffective.

Results from dispersant testing at Ohmsett are being used by local, state and federal regional response teams and regulators to support the use of dispersants as an oil spill response tool in their jurisdictions. Results from dispersant testing in cold water/broken ice conditions at Ohmsett have been used by industry to gain regulatory approval for the use of this countermeasure for the Sakhalin Island project in Russia and for planned projects in the Canadian Beaufort Sea.

6. Chemical Herders

Spilled oil rapidly spreads on the waters' surface into very thin slicks. Chemical herders have the ability to quickly clear oil films from the waters' surface. The intention of herding is to thicken oil slicks sufficiently to allow them to be cleaned up with conventional mechanical containment systems or through the use of in situ burning or the use of dispersants.

Since 2004, the MMS and ExxonMobil have jointly funded research to evaluate using herders to extend the window of opportunity for oil spill response options in Arctic environments. Research efforts have focused on the use of herders to thicken oil slicks in broken ice to allow them to be effectively ignited and burned. Three years of laboratory, small and large scale tank tests were completed. In May 2008, two full scale burn experiments were successfully conducted during an intentional oil spill exercise offshore Svalbard, Norway. In February 2009, the MMS conducted research on the use of herders to improve the efficiency of mechanical containment and recovery systems. More than 400,000 pounds of ice was delivered to Ohmsett for these experiments. Research on the use of herders to expand the use of dispersants will be conducted at the Ohmsett facility in October 2009.

Oil Spill Response Research Outreach

The MMS collaborates with state, federal and international governmental agencies, organizations, and private industry to coordinate oil spill response research and Ohmsett testing. We also participate in international, regional and local conferences, workshops and meetings to present the results of MMS funded OSRR projects. We publish and disseminate the results of OSRR projects as widely as possible in peer reviewed scientific papers and articles, in technical journals and reports and in public information documents. The MMS sponsors and participates in Arctic related oil spill response workshops and conferences to disseminate results from the OSRR program and from Ohmsett testing, training and research activities to the public. The MMS maintains a website that contains a listing of all Arctic OSRR projects funded by the MMS as well as downloadable reports and film clips free of charge.

The Ohmsett facility also plays an important role in environmental outreach by informing the oil spill community of oil spills, environmental contamination, cleanup methods and testing. Ohmsett's recently renovated conference room enables various federal, state, academic and private organizations to conduct on-site committee meetings and conferences. Facility tours and presentations are given upon request. Regular attendance at both U.S. and international environmental conferences plays an important role in getting the information, the analysis and the results achieved from the research projects to the public.

Publication of The Ohmsett Gazette, the facility's semi-annual newsletter, keeps the oil spill community abreast of recently conducted facility activities. Ohmsett's website describes the testing that the facility conducts and gives objective results of the research conducted. Staff members also participate in environmental education projects such as

school science fairs, college work study programs, and student mentorship programs. Through this type of public interaction, Ohmsett is able to increase public awareness by educating the community of the importance of marine safety and environmental protection.

The MMS Environmental Studies Program (ESP)

In addition to the Oil Spill Response Research, MMS also conducts the Environmental Studies Program which is designed to gather scientific information needed for stewardship of coastal and marine environments as we manage the development of OCS energy and minerals. A component of this broad-based program focuses on the collection and development of scientific information needed to understand and predict the fates and effects of potential oil spills from these OCS activities.

The MMS assesses oil-spill risks associated with offshore energy activities on the OCS 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. Paths of hypothetical oil spills are based on hindcasts (history) of winds, ocean currents, and ice in arctic waters, using the best available input of environmental information.

The research to support the oil-spill risk analyses includes scientific observations of the ocean surface circulation in the Gulf of Mexico, in the Santa Barbara Channel and Santa Maria Basin offshore Southern California, and in the Beaufort and Chukchi Seas off Alaska. In addition, MMS has sponsored development of ocean surface circulation models in these areas, as well as most recently in the mid-Atlantic OCS area, to provide input for OCS lease sale environmental analyses. As the oil and gas industry moved into deepwater areas of the Gulf of Mexico, we also undertook research to characterize the deepwater current movements in the Gulf of Mexico to assist our assessment of a possible release of oil from these ocean depths. In Alaska, we have sponsored research to better describe the weathering of oil on snow and ice, and we have sponsored field studies and modeling of sea ice – ocean movement and the interaction with spilled oil. The Environmental Studies Program research management philosophy always seeks out partners, and much of the research described is linked to programs in NOAA and NASA, as well as cooperative efforts with key universities in the affected States.

The MMS is committed to the continuous improvement of OSRA estimations and environmental impact statements (EIS) analyses, and uses the results of new observation and modeling to better manage OCS oil and gas development. As offshore activity expands into deeper waters and new geographic areas, MMS oil-spill modeling will be applied to pertinent risk assessments and validated with environmental observations.

Modeling results are used by MMS staff for preparation of environmental documents in accordance with the National Environmental Policy Act; other Federal and State agencies

for review of EISs, environmental assessments, and endangered species consultations; and oil industry specialists preparing the oil spill response plans.

Conclusion

Mr. Chairman, this concludes MMS's prepared statement. Thank you for the opportunity to present an overview of the MMS's oil spill response research program and the Ohmsett facility. The program directly supports the MMS mission of ensuring safe and sound operations on the OCS and has made substantive technological advances in the ability to detect, respond and cleanup oil spills in the marine environment. MMS would be happy to respond to any questions.