U.S. HOUSE OF REPRESENTATIVES
COMMITTEE ON SCIENCE, SPACE, AND TECHNOLOGY
Subcommittee on Energy and Environment

HEARING CHARTER

Offshore Drilling Safety and Response Technologies

Wednesday, April 6, 2011
2:00 p.m. to 4:00 p.m.
2318 Rayburn House Office Building

PURPOSE

On Wednesday, April 6, 2011 at 2:00 p.m. the House Science, Space, and Technology Subcommittee on Energy and Environment will hold a hearing to examine industry and Federal efforts to identify and address safety and response technology challenges since last year's *Deepwater Horizon* oil spill, and how Federal programs in these areas can best be structured and prioritized.

WITNESSES

- **Dr. Victor Der,** Acting Assistant Secretary for Fossil Energy, Department of Energy
- **Mr. David Miller**, Director, Standards, American Petroleum Institute
- **Mr. Owen Kratz**, President and CEO, Helix Energy Solutions Group
- **Dr. Molly Macauley,** Research Director and Senior Fellow, Resources for the Future

Overview

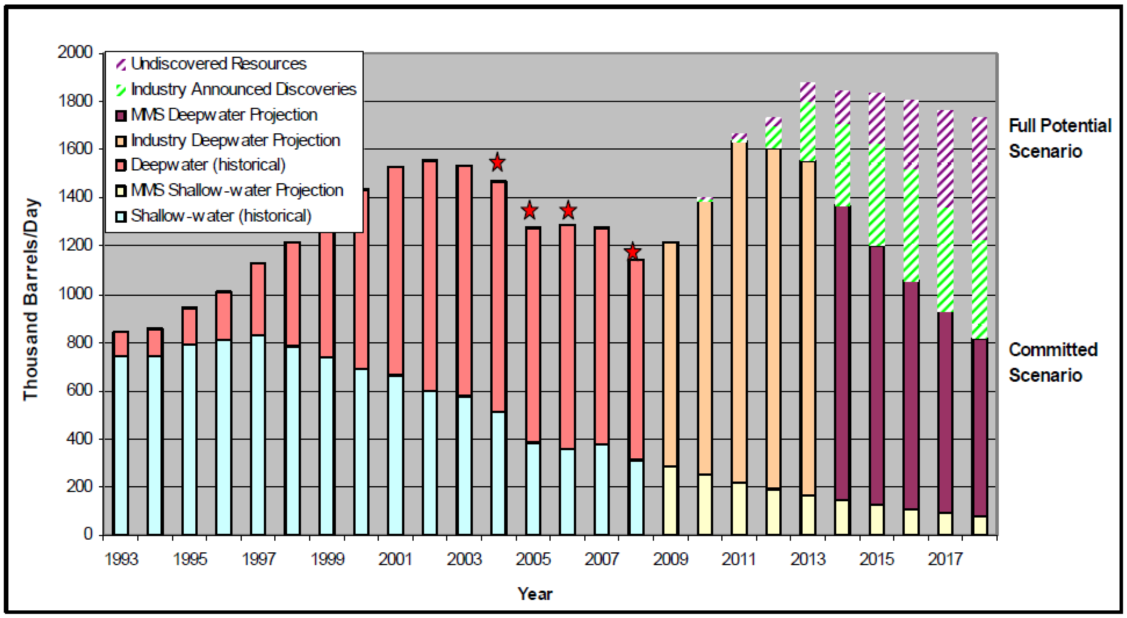
- According to DOE's Energy Information Administration (EIA), petroleum comprises 35 percent of total U.S. energy consumption, and supplies 94 percent of transportation sector needs.[1] In 2009, a little more than half of U.S. oil demand was met through imports; the rest was produced domestically at a rate of just over 5 million barrels per day. Since peaking in 1970, domestic production of oil steadily decreased for almost 40 years, until increasing 7 percent in 2009 due to a 35 percent increase in Federal waters off of the Gulf of Mexico. [2]

[1] http://www.eia.doe.gov/aer/pecss_diagram.html
[2] http://www.eia.doe.gov/kids/energy.cfm?page=oil_home#tab2

- In 2009, drilling operations in the Gulf of Mexico accounted for 1.6 million barrels per day (bpd), representing about 29 percent of total U.S. crude oil production and 11 percent of natural gas production.[3]

- Initially pursued in the early 1980s, oil and gas production from deepwater fields began to increase rapidly in the 1990s as shallow-water production declined and higher oil prices made expensive offshore projects viable (Figure 1).

Figure 1. Comparison of Shallow-water and Deepwater oil production trends in Gulf of Mexico. (Source: 2009 Department of Interior report: http://www.gomr.boemre.gov/PDFs/2009/2009-012.pdf)



★ Indicates years with known anomalous data due to hurricane affected shut-in

- According to the Department of Interior, by 2009, 80 percent of offshore oil production and 45 percent of natural gas production took place in "deepwater" (water depth of 1,000 feet or greater), and industry had drilled nearly 4,000 wells to those depths, as well as about 700 wells in "ultra-deep" water depths of 5,000 feet or greater.[4]

- Prior to the 2010 oil spill, the Federal government had foreseen most U.S. oil near-term production increases coming from deepwater fields in the Gulf. On May 27th, 2010, President Obama announced a six-month moratorium on all offshore deepwater drilling. The moratorium was lifted on October 12, 2010. As of March 30, 2011, eight permits have been issued.

[3] http://www.eia.doe.gov/special/gulf_of_mexico/index.cfm
[4] http://www.doi.gov/deepwaterhorizon/loader.cfm?csModule=security/getfile&PageID=33598

- At the time of the Deepwater Horizon accident there were 55 active rigs drilling in the Gulf of Mexico.[5] As of March 28, 2011, this figure had declined to 28 rigs. EIA is expecting production from the Federal Gulf of Mexico to fall by 240,000 barrels per day (bbl/d) in 2011 and by a further 200,000 bbl/d in 2012.[6]

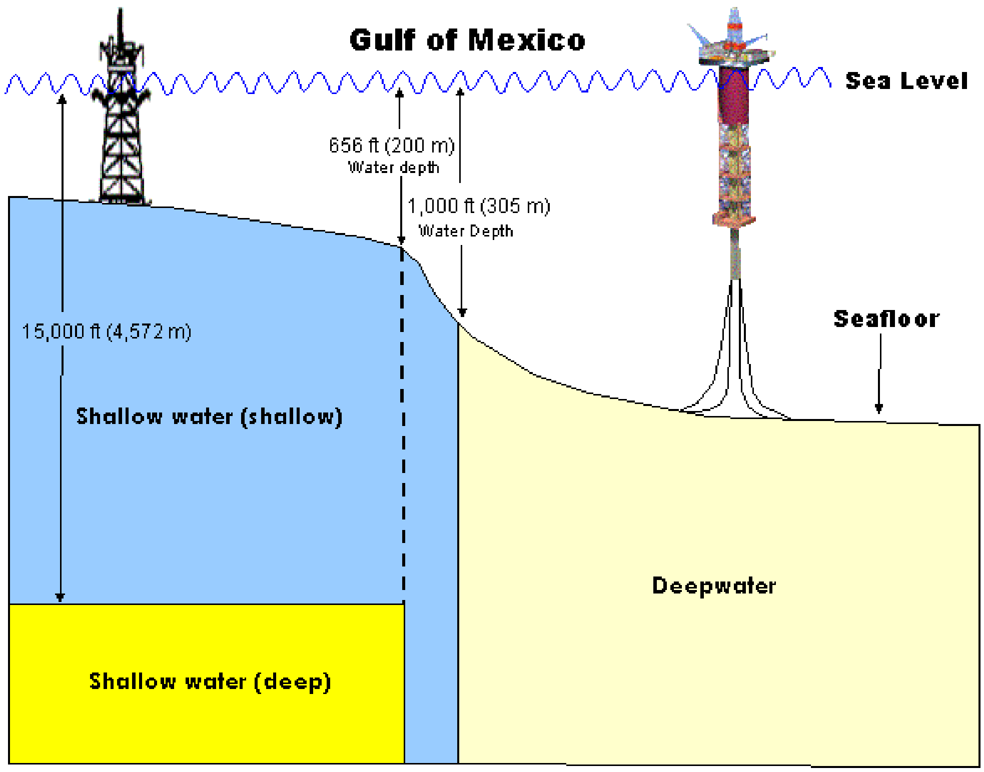
Overview of Deepwater Drilling Technology and Operations

A Congressional Research Service analysis of the Deepwater Horizon spill described deepwater drilling technology as follows (excerpt truncated)[7]:

> In comparison with near-shore oil and gas activities, deepwater and ultra-deepwater exploration and production require technologies that can withstand high pressures and low temperatures at the seafloor, and require the operator to control the process remotely from a surface vessel thousands of feet above the actual well.
>
> Drilling technologies built to withstand the harsher conditions in deep water and ultra-deep water are complicated, difficult to repair, and expensive. In addition, long lengths of pipe, or marine "riser," extending from the seafloor to the drill rig, are needed, requiring a large and complex surface platform to conduct operations through the longer pipe. One of the most common types of drilling platforms for deep water and ultra-deep water is a semisubmersible rig, which has an upper and lower hull. During the drilling operation, the lower hull is filled with water, partially submerging the rig but leaving the upper hull floating above the drill site. Transocean's *Deepwater Horizon* rig was a semisubmersible platform, kept in place above the drill site by a dynamic positioning system (i.e., not permanently anchored to the seafloor) and connected to the well by the marine riser (Figure 2).
>
> During drilling operations, the drill bit and drill pipe (or drill string) extend through the riser from the drill platform and through a subsea drilling template—essentially a large metal box embedded in the seafloor—into the marine sediments and rocks down to the hydrocarbon-bearing zone. A special fluid called drilling mud (a mixture of water, clay, barite, and other materials) is circulated down to the drill bit and back up to the drilling platform. The drilling mud, which has higher viscosity and density than water, serves several purposes: it lubricates the drill bit, helps convey rock cuttings from the drill bit back to the surface, and exerts a column of weight down the hole to control pressure against a possible blowout. A blowout can occur if the subterranean pressure encountered down the hole exceeds the pressure exerted by the weight of the drill assembly and drilling mud. The *Deepwater Horizon* rig experienced a blowout on April 20, 2010, and the role of the drilling fluid is under investigation.
>
> As a last line of defense against a blowout, a blowout preventer (BOP) is installed at the seafloor and connected to the marine riser. The BOP is essentially a system of valves designed to be closed in the event of anomalous wellbore pressure (such pressure is sometimes referred to as a "kick"). At the depth and pressures encountered by the *Deepwater Horizon* well, BOEMRE/MMS regulations require at least four such valves, or rams, which must be remote-controlled and hydraulically operated during offshore operations. During the *Deepwater Horizon* blowout, all of the rams on the BOP failed to close properly.

[5] http://investor.shareholder.com/bhi/rig_counts/rc_index.cfm
[6] http://www.eia.doe.gov/emeu/steo/pub/contents.html
[7] http://www.crs.gov/pages/Reports.aspx?PRODCODE=R41262&Source=search

Figure 2. Basic diagram illustrating differences between shallow water anchored and deepwater semi-submersible drilling rigs.
(Source: 2009 Department of Interior report: http://www.gomr.boemre.gov/PDFs/2009/2009-012.pdf)



Causes of the Deepwater Horizon Accident

Numerous investigations into the direct and indirect causes of the Deepwater Horizon accident have been undertaken and are ongoing. The Bureau of Ocean Energy Management, Regulation and Enforcement (BOEMRE)/U.S. Coast Guard (USCG) Joint Investigation Team (JIT), is conducting a comprehensive forensic examination into the causes of the spill. It is expected to release a report on the BOP within the next month, and a full investigation report in July.[8]

In January 2011, the President's *National Commission on the Deepwater Horizon Oil Spill and Offshore Drilling* released a detailed report exploring the facts and circumstances associated with the root causes of the spill. The report concluded that the disaster was caused by a confluence of factors, specifically finding that "The well blew out because a number of separate risk factors, oversights, and outright mistakes combined to overwhelm the safeguards meant to prevent just such an event from happening…[b]ut most of the mistakes and oversights at Macondo can be traced back to a single overarching failure--a failure of management."

[8] http://www.deepwaterinvestigation.com/go/site/3043/

Most recently, a report by the Norwegian firm Det Norske Veritas—commissioned by the Departments of Interior and Homeland Security—concluded that the ultimate cause of the spill was a piece of drill pipe that became trapped in the platform's blowout preventer.[9] Specifically, the report says the blind shear rams -- designed to cut through the well pipe and seal it -- failed to close completely and seal the well because of the trapped drill pipe.

Federal Activities to Advance Safe Drilling and Response Technologies

Department of Energy

For several decades, the Department of Energy's Fossil Energy Research and Development program has been tasked with supporting R&D to enable technological breakthroughs that lead to increased domestic energy production and deliver affordable, abundant energy to power the American economy. The technology areas pursued under this program include applied research and technology development to advance safe and responsible oil and gas exploration and production.

Within DOE's FER&D program, the Natural Gas Technologies Program and Petroleum and Oil Technologies Program are tasked with increasing access to domestic energy. Funding for the programs steadily declined in recent years and the Petroleum and Oil Technologies Program was zeroed out in FY 2010 (see table below).

Program	FY03	FY04	FY05	FY06	FY07	FY08	FY09	FY10	FY12 Request
Natural Gas Technologies	45.9	41.8	43.6	31.8	11.7	19.3	19.4	17.4	0
Petroleum – Oil Technologies	41	34.1	33	30.8	2.6	4.8	4.9	0	0

In addition to these discretionary programs, Section 999 of the Energy Policy Act of 2005 (EPACT) also authorized $50 million in annual mandatory spending (collected from oil and gas royalty revenues) for ultra-deepwater and unconventional natural gas R&D.

The goal of this program is to "maximize the value of natural gas and other petroleum resources of the United States by increasing resource supplies, reducing the cost and enhancing the efficiency of exploration and production, improving safety, and minimizing environmental impacts."[10]

Most of the program's funding (75%) is managed by a private consortium known as the Research Partnership to Secure Energy for America (RPSEA), is divided into three parts: ultra-deepwater architecture and technology (UDW); unconventional onshore natural gas and other resources; and technology challenges of small producers. The mission of the "ultra-deep" portion of this effort is to "identify and develop economically viable acceptable risk

[9] http://www.boemre.gov/ooc/press/2011/press0322c.htm
[10] http://www.fossil.energy.gov/programs/oilgas/ultra_and_unconventional/index.html

technologies, architectures, and methods for exploration, drilling, and production of hydrocarbons in formations under ultra-deepwater, or in the Outer Continental Shelf (OCS) in formations that are deeper than 15,000 feet."

The remaining 25 percent of program funding is managed by the National Energy Technology Laboratory (NETL), which conducts "in-house" R&D on drilling technology. For example, NETL has developed a prototype Ultradeep Drilling Simulator (UDS). The simulator permits researchers to replicate conditions found in wells with total vertical depths of 30,000 (almost three times the current depth of ultra-deepwater drilling), enabling study of how to best increase domestic energy production in an environmentally safe manner.[11]

Oil Pollution Act of 1990

Enacted in the wake of the Exxon Valdez spill, title VII of the Oil Pollution Act of 1990 authorized an interagency oil pollution program to conduct research, technology development, and demonstration for the prevention, response, and mitigation of oil pollution resulting from discharges.

The statute creates an Interagency Coordinating Committee (ICC) of 14 agencies and chaired by the Coast Guard. The ICC is tasked with developing a research and development plan to guide the program and identify gaps in current knowledge, research priorities and the resources needed to attain those priorities. The program is broken into three main research areas: innovative technology development, technology evaluation, and effects research.

The statute also authorizes demonstration projects, continues operation of the Oil and Hazardous Materials Simulated Environmental Test Tank (OHMSETT) Research Center, requires the ICC to coordinate with States and universities to develop Regional Research programs, and provides authority to coordinate and cooperate with other nations to conduct oil pollution research, development, and demonstration activities, including controlled field tests of oil discharges. Title VII had a total authorization level of $28 million. Of that amount, $6 million was for the regional research programs.

Regulatory Changes

In response to the Deepwater Horizon incident, the Department of Interior has issued numerous regulatory changes. These rules were described in recent testimony by Bureau of Ocean Energy Management and Enforcement (BOEMRE) Director Michael Bromwich as follows[12]:

> We promulgated two new rules last fall that raise standards for the oil and gas industry's operations on the OCS. One of these rules strengthens requirements for safety equipment and drilling procedures; the other improves workplace safety by addressing the performance of personnel and systems on drilling rigs and production platforms.

[11] http://www.netl.doe.gov/publications/others/accomp_rpt/accomp09.pdf

[12] http://appropriations.house.gov/_files/031711BOEMREHouseApropsTestimony.pdf

The Drilling Safety Rule, was an emergency rulemaking that put in place heightened new standards for well design, casing and cementing, pressure testing, and well control equipment, including blowout preventers. For the first time, operators are now required to obtain independent third-party inspection and certification of each stage of the proposed drilling process. In addition, an engineer must certify that blowout preventers meet new standards for testing and maintenance and are capable of severing the drill pipe under anticipated well pressures.

The second rule we implemented is the Workplace Safety Rule, operators now are required to develop a comprehensive safety and environmental management program that identifies the potential hazards and risk-reduction strategies for all phases of drilling and production activities, from well design and construction, to operation and maintenance, and finally to the decommissioning of platforms. Although many companies had developed such SEMS systems on a voluntary basis in the past, many had not.

In addition to the new rules, we have issued important guidance, in the form of Notices to Lessees (NTLs), which provides operators additional direction with respect to compliance with BOEMRE's existing regulations.

For example, NTL-06 (the Environmental NTL) requires that operators submit well-specific blowout scenarios and worst case discharge calculations – and that operators also provide the assumptions and calculations behind these scenarios. My staff and I are working closely with operators to ensure that they have the information necessary to perform their worst case discharge calculations accurately and in accordance with the guidance set forth in NTL-06.

Following the lifting of the suspension of deepwater drilling operations, we issued NTL-10, which provides operators with guidance related to regulatory compliance and subsea containment. First, each operator is directed to submit a corporate statement that it will conduct proposed drilling operations in compliance with all BOEMRE regulations, including the new Drilling Safety Rule.