Bakalov, Raya

From: Black, Steve [steve_black@ios.doi.gov]
Sent: Tuesday, July 06, 2010 7:53 PM
To: Beaudreau, Tommy; Bromwich, Michael R; Hayes, David; Kemkar, Neal; Tompkins, Hilary C; Jacobson, Rachel; Screnar, Brian
Cc: Lane, Kenneth; Strickland, Thomas
Subject: FW: API document on enhanced oil spill response capabilities

Follow Up Flag: Follow up
Flag Status: Red

Attachments: Enhanced Industry Capability for Offshore Operations draft 7-6-10 version 2.doc; JITF Document - Subsea Well Control and Oil Spill Response 7-6-10.pdf

Enhanced Industry Capability f... JITF Document - Subsea Well Co...

Relevant to our recent discussions.

-----Original Message-----
From: Erik Milito [mailto:militoe@api.org]
Sent: Tuesday, July 06, 2010 7:46 PM
To: Black, Steve
Subject: API document on enhanced oil spill response capabilities

Steve,

Please find attached our response to your request for information that describes the industry's ability to respond to another Gulf event.
Please also find a document that describes the work of the two task forces that are focusing on subsea containment and surface response/clean-up.

Please feel free to contact me with any questions.

Best regards,

Erik

Erik Milito

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Enhanced Industry Capability for Offshore Operations

The April 20, 2010 Deepwater Horizon tragedy has suggested the need for enhanced capabilities for the offshore industry to prevent, respond to, and clean-up a potential deep water well control incident, in the unlikely event another one were to occur. The offshore industry, in conjunction with the government, has effectively responded to this incident by enhancing prevention and response capabilities. An outcome of this unfortunate situation is a significant improvement in regulatory, safety and response capabilities. Enhanced capabilities now exist in the Gulf of Mexico toward both prevention of a similar incident from occurring and response in the unlikely event of a similar incident. Some of the enhanced capabilities include:

- Well design and construction:
  - Interior now requires all well casing designs and cementing procedures to be certified by a Professional Engineer, to verify the design is appropriate for the intended purpose under expected wellbore conditions.
  - Interior now requires casing hanger latching mechanisms or lock down mechanisms to be engaged at the time the casing is installed in the subsea wellhead.
  - Interior now requires verification of dual mechanical barriers in addition to cement to prevent flow in the event of a failure in the cement.
  - API issued Recommended Practice (RP) 65-2, Isolating Potential Flow Zones during Well Construction. This document helps to ensure that deep water cementing jobs include the design, placement techniques, well conditions and execution for successful cementing.
- Blowout preventers (BOPs):
  - Interior now requires a secondary control system for subsea blowout preventer (BOP) stacks with remote operated vehicle (ROV) intervention capabilities. BOP systems must have an emergency cut-off system in the event that you lose power to the BOP stack, have an unplanned disconnection of the riser from the stack, or experience another emergency situation. BOP stacks must have both a deadman and an autoshear system. The emergency shut-down system must be powered by a separate and independent, rechargeable subsea accumulator bank.
  - Interior now requires operators of floating drilling rigs (or facility) to have an independent third party conduct a detailed inspection and design review of the BOP, and must certify that the BOP will operate as originally designed and that any modifications have not compromised the design and function of the BOP.
  - Interior now requires operators to obtain third party verification that the BOP stack:
    - Is designed for the specific equipment in use on the rig and for the specific well design including certification that the shear rams are appropriate;
    - Has not been compromised or damaged from previous service;
    - Will operate in the conditions in which it will be used.
  - Interior now requires function testing of the hot stabs that will be used to interface with the ROV intervention panel.
  - Interior now requires the operator to provide information that shows the blind-shear rams installed in the BOP stack are capable of shearing the drill pipe in the wellbore under maximum anticipated pressure.
  - Interior now requires additional testing and inspection procedures.
  - All active BOPs in the Gulf have been inspected.
- Subsea intervention at the wellhead/BOP to stop and contain a blowout:

- Based upon the Deepwater Horizon incident, the industry has developed increased knowledge, resources and capabilities to respond to a deep water blowout at the wellhead. There is now a heightened level of expertise and an increased resource base for shutting down/containing a well in the subsea environment. This includes expertise/resources related to:
    - Drilling of relief wells
    - Application of production recovery devices such as top hats, cofferdams, manifolds, and umbilicals
    - Utilization of well kill techniques, including top kills, junk shots
    - Use and staging of ROVs
    - Use of vessels of opportunity to produce captured oil, and skim surface oil

- Oil spill preparedness and response
    - Based upon the Deepwater Horizon incident, the industry has developed increased knowledge, resources and capabilities to contain and recover oil, and to protect and clean-up the environment and affected resources. This includes:
        - The deployment of large quantities of boom, including mobilization of stocked boom and sorbet boom/materials from other regional locations in a short period of time
        - Mobilization of a significant number of personnel, both within the industry as well as from other industries and the public, to respond with shoreline and wildlife protection and cleanup of vital coastlines.
        - Mobilization of a significant number of vessels, including skimmers, tugs, barges, and recovery vessels to assist in containment and cleanup efforts—in addition to dozens of aircraft, remotely operated vehicles, and multiple mobile offshore drilling units.
        - Successful and significant application of dispersants both on the surface as well as in the subsea environment, which is a new technique that has been reviewed and approved by the government and has been shown to be very effective.
        - Successful and significant use of in-situ burning. Again, based upon government review and approval, we now have the capability to utilize this technique on a large-scale basis in response to a spill event.

- Safety Management Systems
    - Interior has announced that it will be completing an emergency rulemaking to adopt safety case requirements for floating operations on the OCS. The industry has recommended the integrated use of drilling contractor safety case documents and operator safety and environmental management plans as a method for enhancing safety and risk management. The International Association of Drilling Contractors already has guidelines in place for meeting the requirements of a safety case and API already has a recommended practice of safety and environmental management plans. The industry has been using these documents in their safety programs for years.

Based on the lessons learned and the capabilities developed in equipment and procedures associated with the unprecedented response to the Deepwater Horizon oil spill, we are now operating with significantly improved capabilities and are in a better position of preventing and responding to an incident. As a result, we believe the offshore industry should be permitted to resume operations without restriction.

Furthermore, the industry will continue to work to make improvements through the joint industry task forces that are presently addressing offshore equipment, offshore operating procedures, subsea well control and containment, and oil spill response and preparedness. The equipment and operating procedures task forces have provided significant input to the government and these task forces continue to work on issues related to these two areas (many of these recommendations are incorporated into the above-cited Interior requirements). In addition, please find attached a document that outlines the short-term, mid-term, and long-term work of the subsea well control and containment task force and the oil spill response and preparedness task force.

DRAFT

Joint Industry Task Force to Address Subsea Well Control and Oil Spill Response

July 6, 2010

In response to the Gulf of Mexico (GOM) incident, the oil and natural gas industry, with the assistance of the American Petroleum Institute (API), International Association of Drilling Contractors (IADC), Independent Petroleum Association of America (IPAA), National Ocean Industries Association (NOIA), and the US Oil and Gas Association (USOGA) has assembled a Joint Industry Task Force to Address Subsea Well Control and Oil Spill Response (Task Force). This Task Force has established two sub task forces to focus on critical areas of oil spill preparedness and response: the Subsea Well Control and Containment Task Force and the Oil Spill Response Task Force. Overall, the Task Force will review and evaluate current capacities; identify areas for improvement; and develop and implement a strategy to address future needs and requirements in equipment, practices or industry standards to improve oil spill preparedness and response.

Wherever possible, information developed by the Task Force will be augmented with input from the Regulatory Agencies, oil spill response and well control specialists, investigation panels, and other public sector and other non-governmental organizations. Ultimately, materials produced through this effort will be delivered to Congress, the Administration, and the National Commission on the BP Deepwater Horizon (DH) Oil Spill and Offshore Drilling (Presidential Commission). It is important to note that recommendations will be formulated based on limited information and in advance of any investigative findings in relation to the current incident in the Gulf of Mexico. The contributing joint industry task force companies and trade associations express no views regarding the cause, fault or liability of the incident or regarding any mechanisms of prevention, nor should any recommendations be interpreted as a representation of any such views. The oil and natural gas industry remains committed to working with Congress, the Administration, the Regulatory Agencies, the Presidential Commission, and interested stakeholders as we work to improve oil spill preparedness and response.

Overview

Both sub task forces groups held initial meetings on June 21, 2010, and participants are working expeditiously to develop their recommendations. While the Task Forces are not involved in the investigation of the Deepwater Horizon event, industry experts involved in this effort will review current practices and capabilities in light of the incident. Further, the Task Forces will identify best practices to ultimately enhance the efficiency and effectiveness of the industry's oil spill preparedness and response.

Estimated production from the GOM federal waters as of October 2009 represents about 30 percent of domestic oil production and about 11 percent of domestic natural gas production. Approximately 35,000 workers and 90 rigs are currently active in Gulf of Mexico federal waters, including 68 mobile offshore drilling units and 22 platform rigs. There are about 3,500 production platforms in federal waters in the GOM; 978 of those are manned.

Subsea Well Control and Containment Task Force

The Joint Industry Task Force on Subsea Well Control and Containment has been formed to review current subsea well control preparedness and response options to determine their efficacy throughout all offshore operations. The review will include equipment designs, testing protocols, R&D, regulations, and documentation to determine if any gaps exist or improvements are needed. The Task Force will identify any actions necessary to move industry standards to a higher level of performance or achieve industry best practice. The Task Force will make recommendations to close any gaps or identify improvements. Where appropriate, enhanced capabilities and other information developed from the DH incident will be considered.

This task force will review intervention and containment at the seafloor. The primary focus will be on operations that can occur after a BOP has failed and ROV shut-in attempts have failed or are not possible. Consideration will also be given to containment on subsea trees and containment of open casing or casing leaks. The review will not include Blow Out Preventers (BOPs), Emergency Disconnect Systems (EDS), Autoshear System, Deadman System, ROV / BOP interface (pumps and hot stab) all of which are covered in the existing equipment task force. The task force will focus on other well control procedures including well shut in, kill methods, as well as subsea containment and collection methods.

Schedule and Work Plans

Short-term (by Tuesday, July 6)

- Review existing efforts, identify opportunities of improvement, examine possible pre-staging equipment and research & development in the follow subcategories:
    1. Well Containment at the Seafloor
    2. Subsea Well Intervention Methods
    3. Surface and Subsea Processing, including no well containment at the seafloor
- Review industry data associated with operation and testing of subsea well control and response methods with the objective of identifying issues, areas of concern, etc. Identify potential areas needing improvement.
- Develop a strategy and action plan to complete Mid Term commitments.
- Develop subgroups to focus on specific issues.
- Communicate initial findings

Mid Term (by August 25, 2010)

- Review existing testing and inspection requirements, regulations, protocols for subsea well control and containment. Based on industry experience, incident data, overlaying current regulations and requirements, etc., make recommendations to Presidential Commission and other appropriate government entities that can improve subsea well control and response.
- Review Section II. C. (Wild-Well Intervention, Recommendations 9 & 10) of the DOI May 27 Safety Report, make recommendations regarding implementation of this section, including possible volunteers to the technical workgroup.
- Develop a strategy and action plan to complete Long Term commitments.

Long Term (by December 31, 2010)

- Review information available from recent Deepwater Horizon incident, specifically associated with subsea well control and response. (Junk Shot, LMRP Cap, Top Kill, etc.)
- Provide detailed report on progress and activities of the Task Force.
- Identify next steps/milestones to improve subsea well control and containment.

Task Force Participants

AMPOL, Anadarko, Apache, API, ATP, BP, Chevron, Cobalt International Energy, ConocoPhillips, Dorado Deep, ExxonMobil, FMC Technologies, Halliburton, Helix, Marathon, Newfield Exploration, Shell, Statoil, Wild Well Control

Subcategories - Initial Review of Current Techniques & Issues to be studied

1. Well Containment at the Seafloor

The following options will be investigated and proposals put forth should primary activation of the Subsea BOP equipment fail to secure a well that is blowing out. This discussion will be limited to the scenario that still has a Subsea BOP stack connected to the Subsea Wellhead with full pressure integrity between the wellhead and BOP stack, either in a normal vertical position or damaged position at some angle up to and including lying horizontally on the mudline. Longer term work will also look at the case where the well has lost casing containment, has broached the mudline and created a crater around the wellhead possibly introducing Subsea BOP stability issues. External support of the BOP stack will be studied in case stability is a concern.

Hard Connect
A Hard Connect to the riser or BOP system will be defined as a method of connecting to the BOP a system that provides full integrity to rated working pressure and could provide a means to shut in the well if that is deemed as appropriate. Should shutting the well in not be advised or not possible because of concerns with the pressure rating of the existing equipment, these methods could also be used in conjunction with capture methods and possibly "top kill" methods as described in the Containment section of this report. These methodologies will be for both the case where the Subsea BOP stack is vertical or nearly vertical and the case where significant angle would affect the procedures and equipment. The following are techniques and equipment needs that would be studied:

1. Use of the flange connection between the Flex Joint and the LMRP
2. Regain control of the BOP through a new pod, or ROV
3. Land and lock a diverter spool with shut off valves on the LMRP mandrel
4. Repair and rerun the LMRP
5. Replace the BOP with new undamaged BOP
6. Add a 2nd BOP on top of old lower BOP
7. Directly attach to the existing casing

Top Kill
The Task Force will take a detailed look at the Top Kill technique attempted in the Deepwater Horizon incident to see if further improvements could be made to the equipment used and the methods implemented. This would include possible modifications to the choke and kill lines for easier access in an intervention

requirement with ROV's, Subsea manifold configurations, kill pump requirements, junk shot material and techniques.

Investigate Existing Equipment Modification
Equipment requirements for all the previous discussion points in this section will be reviewed and described for both equipment that needs to be built and placed on standby, and well equipment that needs to be designed and custom built according to the exact scenario being addressed.

2. Intervention and Containment within the Subsea Well

For the purpose of this document, Subsea Well Intervention is defined as accessing the subsea well by mechanical or hydraulic means in order to perform some function within the wellbore. That function could be to circulate or bullhead a different fluid into the well, shift a device, install or remove a barrier, check for or remove a blockage, perform diagnostics (logs or surveys), or other similar activities. A variety of means to perform these activities have been created and continue to evolve as the depth, pressure and complexity of well designs continues to progress. In the case of an uncontrolled release of hydrocarbons from a subsea well, a blowout, the purpose of the intervention(s) will typically be to regain control of the well. The task group will determine if the following techniques need enhancement or if totally new techniques need to be studied and developed to deliver an optimum set of tools for the industry.

Relief Well Considerations
In their original use, Relief well's, as the name suggests, were intended to relieve pressure on a blowing formation by drilling vertical wells around the blowout and producing them at high rates. (Wright, 1999) Before about 1970 the technology did not exist to directionally drill and intersect an existing well. The wells would intersect the reservoir of interest and would be allowed to flow to "relieve" pressure or could be used to pump water and "flood" the blowing well with water. In more modern times, a relief well is a well drilled specifically with the intent of intersecting an original wellbore which has encountered a well control problem. The well is designed to provide hydraulic access to the "blow out" well such that kill weight fluids can be circulated into place to kill the well. By definition then, a relief well has to be planned specifically with detailed knowledge of the original wells design and "as built" trajectory.

Dynamic Kill
In 1978, Mobil Oil documented the technique of "Dynamic Kill" on a prolific gas blowout in the Arun field in Indonesia The technique involves circulating a light initial fluid, such as water, with sufficient friction pressure to kill the blowout (hence the name "dynamic"), followed by mud with sufficient density to hold the reservoir pressure statically (Wright, 1999). The method requires sufficient pump rates to achieve the required incremental frictional pressure and must be calculated ahead of the technique being utilized. Computer based modelling has been developed for well control incidents within the industry and has proven to be accurate for this purpose.

The technique is dependent upon several factors including having a means to circulate fluid into the well, understanding of the hydraulic circulation path dimensions within the well(s), as well as the fluid properties to allow determination of the required pump rate. The circulation path may either be by direct access to the original, blowing out well or via a relief well in hydraulic communication with the blowing out well. Successful application of this method may require a lot of available pump horsepower dependent on the specific conditions.

Direct Mechanical Intervention

Subsea Stripping & Snubbing

Snubbing is defined as forcing pipe through the blowout preventers when the workstring weight is not sufficient to overcome the net upward force created by wellbore pressures. Once a sufficient weight of tubulars has been inserted into the wellbore, the operation becomes a stripping operation which is defined as tripping pipe through the blowout preventers when the workstring weight is greater than the net upward force created from wellbore pressures (Chevron Energy Technology Company, 1994). Stripping and snubbing are techniques that are used to establish a string of pipe inside a "live" well under pressure such that fluid with sufficient density to "kill" the well (balance formation pressure with hydrostatic pressure) can be circulated into place. The ability to snub in will require that an operable blow out preventer (BOP) or snubbing BOP is in place, or can be put in place on the blowing out well. The well is not flowing uncontrollably during these operations, but rather the BOP units are used to contain the flow while snubbing or stripping operations are conducted.

Subsea snubbing has only reportedly been performed on subsea wells utilizing conventional surface equipment rigged up on a floating vessel. In the case of stripping, the subsea location of the BOP actually improves the situation; since the water column height of pipe can be run before the stripping operation begins which means there is additional pipe weight available to counteract well pressure. The snubbing technique requires a high pressure riser and connection to the subsea wellhead or BOP as well as a means to compensate for the motion of the vessel relative to the subsea well. EEX documented a subsea well snubbing job in World Oil in 1998 (MOAK). Several other cases are in the literature as far back as 1982. A potential area for future development would be the design of a fully subsea snubbing unit which could eliminate the need for a high pressure riser and a motion compensation system.

Coiled Tubing

Coiled Tubing is a spooled continuous length of pipe which can be inserted into and retrieved from the wellbore under pressure. The technology relies on the use of an injector head or device to pull the tubing off the reel and push it into the wellbore (which can be pressurized) which in conventional uses is located at the surface. In subsea well applications, coil tubing has been limited to deployment from the surface using an injector head and BOP located on the deployment vessel. Since pressure control is located on the surface, it necessitates containment of the coiled tubing within a high pressure riser or landing string. Utility of coiled tubing in open water applications or within a riser with subsea injector heads and subsea BOP's has been the subject of many studies and some development work but is not currently commercially available.

Packers/ Mechanical Barriers

Packers are mechanical devices designed to seal an annular space typically between tubing and casing or open hole in a wellbore. Others types of barriers are designed to seal the full open hole or casing inner diameter to completely seal the wellbore. The specific designs, pressure ratings, operational methods of these tools are varied but setting them typically involves running them into the well on pipe and then either manipulating the pipe (reciprocation or rotation) or using hydraulic pressure applied to the tool to set them in place and effect the seal. Wireline setting of packers is also possible utilizing electric wireline, however, this would generally not be applicable to a blowout scenario.

The challenge with mechanical barriers in a blowout scenario is with the flow rates potential to create high velocities and differential pressures across the barrier both getting it into the well and when trying to set it. An opportunity for future development would be in the area of mechanical barriers which present minimal cross sectional area to the flow stream while providing the ability to be set reliably and achieve a seal.

Reactant Pills

Reactant pills come in many different formulations and trade names but broadly are treatments to regain control of mud circulation from either lost circulation or wellbore flow of water, gas or oil. They have been successfully used to seal off the zone or pathway to underground flows and allowing the flowing zone to be killed. The term 'reactant' means that the pill's final properties will be much different after the pill is placed into the wellbore. The reaction may be initiated down hole once the pill is in place or surface activated (Chevron Petroleum Technology Company, 1996). The two technologies with the most promise for combating a well flow appear to be Barite pills and various forms of "Bentonite-Diesel Oil or "Gunk" squeezes. Barite pills involve extremely heavy, high water loss slurries and have been used successfully for years in well control, especially in the case of underground blowouts. Gunk squeezes have been used less frequently, but there is documented at least one case in which a variant of the Gunk squeeze family was used to stop an underground blowout (Flak, 1994).

In addition to the Reactant Pills, consideration may be given to investigating reactant pills derived from technology used for other operations within the oilfield or other industries. Two areas which could be explored for further with potential are polymer-based reactants and epoxy-based reactants. Polymer-based reactants have been used successfully to seal small leak paths in well heads and pack-offs. It is not known whether the technology can be up-scaled to seal a large wellbore. There are companies that are recognized providers of polymer-based sealing technology and they may have additional insight regarding the potential for achieving a technical solution with this technology. Another area for possible research is employment of a fast-acting epoxy that can be circulated in place and then rapidly hardened to form a sealing plug in the wellbore.

The above techniques as well as emerging techniques will be studied and recommendations will be made for enhancement or for R&D on completely new ideas for well intervention.

3. Subsea Collection and Surface Processing and Storage

If the blowout well cannot be mechanically shut in or killed with heavy mud via containment and intervention techniques in a timely manner, a method of capturing the oil from the blowout subsea is needed. This would take place until measures to shut in or kill the well were successful. Subsea oil capture is divided into three categories: 1) a hard seal is made with the wellbore, 2) a hard seal cannot be attained, but the flow stream is fairly concentrated, and 3) a hard seal cannot be attained and the flow stream is dispersed.

Capture system sealed to the wellbore

It is expected that this will be the most likely case. This case is discussed above. The oil flows from the well to a sealing interface connection possibly installed by an ROV, to a containment device with control valves, then to a riser, and then on to a separation and oil storage system on the surface. Interface/containment devices

would include methods to seal to the LMRP, the LMRP mandrel, the wellhead, and a casing stub.

Technology: Existing, has been done, minimal development needs but should be reviewed and optimized and new ideas considered.
Availability: Long lead items. Likely an industry owned system that is readily available for any future blowout.

Capture system without seal to wellbore or seafloor and concentrated flow
This case would include a well broaching up the outside of the casing or to another localized area. For this scenario, some type of containment dome is required to capture the oil and move it to a riser/hose for separation on surface. A significant challenge is flow assurance and in particular hydrate control. Other methods should be researched as well.

Technology: Needs development has not been done successfully.
Availability: Long lead items. If development efforts result in a usable design, recommend industry owned system to be available for any future blowout.

Capture system for dispersed flow
If a damaged rig sinks on the wellhead, or if a broach results in multiple, widely spaced flows to the seafloor, or there is a debris field, a system to collect the oil becomes difficult to design and build in advance. Some type of umbrella device needs to be considered. Also subsea lift or pumping may be needed.

Technology: considerable research and development needed - has been successful only in low rate cases

Oil Spill Preparedness and Response Task Force

The Oil Spill Preparedness and Response Task Force will review the industry's ability and capacity to respond to an oil spill of national significance. The task force is addressing both the preparedness for response and the actual response to crude oil or related oil products after they have escaped containment during Exploration & Production activities and entered into the surrounding environments (e.g. sub-sea, surface, shoreline, etc.).

Currently, there exists a robust spill response system in the United States that has been specifically designed with the capability of contracting and expanding depending upon the size and complexity of the required response. This system has been in place for approximately 20 years for use in both exercises and actual responses. After every one of these major events, a "lessons learned" session is conducted with all of the key stakeholders to identify, and where possible, implement any improvements. These "lessons learned" sessions include the responsible party, federal, state, local agencies, and others (e.g. tribal representatives) involved in the response. This Task Force will conduct a critical assessment of the entire spill response system in light of the Deepwater Horizon (DH) incident. When the official "lessons learned" session is completed by those entities involved in the DH incident response, the Task Force members will review the results and identify opportunities of improvement that are consistent throughout the industry. In those instances, the Task Force will develop recommendations, an action plan, and implementation plan to do so.

The availability, reliability and expectations of both non-mechanical techniques and mechanical recovery resources will be addressed. Additionally, improvements to current technology and the development of new technologies will be assessed. Significant emphasis will be placed in the development and contents of spill response plans. Ultimately, the entire oil spill response system will be assessed. The Task Force will identify any actions and implementations necessary to achieve high levels of performance to achieve industry best practice. The Task Force will communicate opportunities for non-industry review of the recommendations appropriately as it develops and implements its strategy and plan.

This task force will also evaluate the need for additional research and development in the response portfolio.

Schedule and Work Plans

Short-term (by Tuesday, July 6)

- Review and, where appropriate, develop work plans for the following subcategories:
    1. Oil Spill Response Planning
    2. Mechanical Containment & Recovery
    3. Non-Mechanical Oil Spill Response Techniques
    4. Technology Advancements
    5. Shoreline Protection Techniques and Capabilities
    6. Funding Opportunities
- Develop a strategy and action plan to complete Mid Term commitments.
- Develop subgroups to focus on specific issues.

Mid Term (by August 25, 2010)

- Review in detail existing oil spill response techniques, mechanisms and capabilities. Based on industry experience, incident data, overlaying current regulations and requirements, etc., provide recommendations to the Presidential Commission and other appropriate government entities that can improve the industry's ability to respond to an oil spill of national significance.
- Develop and initiate a strategy and action plan to complete Long Term commitments.

Long Term (By December 31, 2010)

- Review information available from recent Deepwater Horizon incident, specifically associated with oil spill response.
- Provide detailed report on progress and activities of the Task Force.
- Identify next steps/milestones to improve oil spill response.
- Implement a strategy and action plan to complete Long Term commitments

Task Force Participants

AMPOL, Anadarko Petroleum, API, Aramco Services Co., Baker Hughes, BP p.l.c., C&C Technologies, Chevron, ConocoPhillips, Dynamic Offshore, ExxonMobil Corporation, Hess, IPAA, LOOP LLC, Marathon Oil Company, Marine Preservation Association (MPA), NOIA, Oceaneering, Oil Spill Response Ltd, Seacor Holdings, Shell, Statoil, Tidewater, Wild Well Control

Subcategories

1. Oil Spill Response Planning

Concern has been expressed with regard to the adequacy of BP's Oil Spill Response Plan (OSRP) for the Deepwater Horizon incident as well as the adequacy of OSRPs industry-wide for dealing with worst case discharges in the Gulf of Mexico. The following general areas will be investigated and proposals put forth to address improvement areas:

Planning Process & Framework

Gulf of Mexico OSRPs are required to be submitted to and approved by the Bureau of Energy Ocean Management. This planning process is the culmination of a larger process that begins with the National Response Plan (NRP), continues down through the Area Contingency Plans (ACP), into the One Gulf Plan, and then further down to the industry (facility specific or Gulf of Mexico Regional) plans. All of the plans above the "industry plans" are developed by federal, state, local agencies and others who desire to participate. This process of the industry level plans being required to work in concert with the plan immediately above it leads to consistency and reduces redundancy in the planning process and is seen as an imperative by all response organizations. Consequently, plans developed for a general area should and will be very similar in content under the current planning process and framework.

Oil Spill Response Plan Contents

Many oil spill response plans developed for a localized area will consist of similar contents, as they are dictated by the regulations, including equipment resources listed usually through contractors or industry co-ops. The equipment requirements and required maximum response times for that equipment are required by regulatory

programs based upon the location of the asset and the volume of worst case discharge possible.

OSRPs contain information on the various critical species in the potentially affected area of the release. This information, which is captured in NOAA's Environmental Sensitivity Indices and utilized by spill planners and responders throughout the country, provides guidance on prioritization for protection of various assets that could be damaged by the release. These include various shoreline types; archaeological sites; estuaries; sensitive species; recreational areas; breeding /nesting areas for various animals; etc.

This Task Force will look at a more effective means to conduct spill response planning rather than relying solely on regulatory driven "cookie cutter" plans.

Oil Spill Response & Incident Command System (ICS)

The "incident management" system under which all oil spill responses are required to be managed is called the Incident Command System (ICS). ICS was adopted by the government and industry as the incident management system of choice. All federal agencies and industry who respond to an oil spill are supposed to fall under ICS and their assigned role. This provides a common terminology and consistent structure no matter the Responsible Party or the federal agency responding. Many years of training on this system through exercises and actual incidents have resulted in a consistent "incident management" system that is expandable and collapsible depending on the size of the incident. ICS has a proven track record with the fire services nationally as a reliable and efficient incident management system in very large incidents, but it takes training and practice at all levels of an organization to function properly.

This task force will address the role of ICS as it specifically applies to oil spills and make recommendation how it can best be utilized as the management system for all levels and type of spill response.

The Task Force will address these and other key response planning issues with respect to the current plans and identify recommendations for making improvements in the development of future plans. The creation of a response plan standard will be considered.

Additional, specific areas to be investigated are as follows:

- Role of cascading resources
- Worst Case Discharge calculations and response
- Role of Mutual Aid agreements
- Application of ICS in an incident as large as the Deepwater Horizon

2. Mechanical Containment & Recovery

Numerous questions have arisen regarding the performance of mechanical containment and recovery equipment used during the response to the Deepwater Horizon incident. An accurate understanding of current performance standards and how performance might be improved in the future is important. Mechanical equipment generally performs one of two functions: (1) containment and/or (2) recovery. The following general areas surrounding the practical constraints of mechanical containment and recovery will be investigated and proposals put forth to address potential improvements

Containment

Containment techniques are focused on the three general areas of (1) containment; (2) exclusion; and (3) deflection used in various locations and for specific reasons. The most prevalent tool used for these functions is "boom" which comes in various sizes and designs. These are all "fit for purpose" with specific intended uses. Examples of boom uses include but are not limited to:

- shoreline protection
- oil collection to work in concert with a skimmer system
- containment oil for in-situ burn
- deflection to move oil to a collection area
- deep draft boom for use in deep water with potential large wave action
- exclusion boom used for protection of sensitive areas

Recovery

Recovery tools come in a wide range of technology from simple absorbent pads to highly sophisticated equipment controlled by hydraulic systems and skimmers. In the most basic form of spill response, absorbent pads are placed on the oil then simply picked up for appropriate disposal. Conversely, mechanical recovery can be much more complicated where, for instance, skimmers work in connection with an oil spill response vessel (OSRV) and are many times matched up with "spotter" aircraft. The efficiency of a skimmer is directly proportional to its "encounter rate" or how long it can "stay in the oil". Skimmers also come in various sizes and capacities and are appropriately used based on factors such as the type of oil; depth of water; thickness of the oil layer; etc.

Additional, specific issues on Mechanical Containment and Recovery to be investigated include:

- Current understanding, limitations to mechanical recovery equipment (i.e. boom, skimmers, sorbents, etc.)
- Future improvements to mechanical recovery equipment
- The use of vessels of opportunity outfitted with recovery and storage systems
- (e.g. barges and other large offshore supply vessels)
- Current research and development underway and future needs
- Oil characteristics and spill profile and their role in determining appropriate mechanical recovery. This task force will also evaluate the need for additional research and development in the response portfolio.
- Capacity and pre-staging
- Coordination/collaboration with international efforts underway
- Aspects of surface / aerial observation command, control and communication arrangement systems to better control and direct at sea resources.
- Review of systems introduced during DH spill and identify their suitability and opportunity for improvement

3. Non-Mechanical Oil Spill Response Techniques

Non-mechanical oil spill response techniques were used extensively in response to the Deepwater Horizon incident. Various questions have been raised concerning the efficiency and benefit of these techniques. The following general areas will be investigated and proposals put forth to address improvement areas:

In Situ Burning

In Situ Burning is being used wherever possible in the Deepwater Horizon Incident response with great effectiveness. While some concerns with this response method have been raised, especially with regard to air emission issues, the net environmental benefit of this response tool has yielded overall positive results. The current benefits and limitations of in situ burning will be addressed by this Task Force as well as issues of concern for its use as a mitigation option. Identified areas for further investigation include such general areas as the approval process; current technology and availability of fire boom; operational task force issues, such as use of vessels of opportunity (VOO), and the capability to monitor the burning and its by-products.

Additional specific issues to be investigated include:

- Burning efficiency and availability
- Pre-deployment of fire boom
- Safety risks to personnel and surrounding areas in conducting burning operations
- Conditions and type of product and its ability to be burned
- Environmental concerns and effects
- Efficacy of near shore/on shore burns, e.g. marshes

Dispersant Use and Application

Dispersants are a standard response tool for surface spills. They have been used for the Deepwater Horizon response both in volume quantities and in ways (sub-sea application) that they had not previously been used. Testing conducted to date has indicated that dispersants have been an effective mechanism for mitigating the damage of the spilled oil, especially when viewing their use relative to other spill response methods through net environmental benefit analysis. Various aspects of dispersants and their use will be assessed, especially in relation to the current incident, to validate current understanding and/or identify and implement activities where understanding can be improved.

Specific issues to be addressed include:

- Dispersant application techniques with aim to use as little dispersants as necessary to disperse the oil
- Quantity and type of dispersants to be stockpiled in GOM and elsewhere
- Regulatory and legislative issues pertaining to dispersant use; address toxicity issues
- Research into the next generation of dispersants products
- Effectiveness and fate/effects of dispersant use in Deepwater Horizon Incident
- Use of dispersants to lower volatile organic compounds (VOC's) as an aid to personnel safety and to enhance and speed the effectiveness of other offshore mechanical recovery tactics.
- Environmental concerns and effects

- Developing more efficient delivery systems including subsea systems

4. Technology Advancements

Technological advancements have been a common topic of discussion during the response to the Deepwater Horizon incident. Generally, technology can be used in various disciplines related to oil spill response. For the purposes of this effort technological advancements will be addressed first in relation to the identification, development, and implementation of alternative technologies for response and then in the area of oil sensing and tracking.

Alternative Technology for Response

There has been great interest in industry's investment and attention to the development or improvement of non-conventional response technologies. Specifically, there are questions regarding the manner in which these response mechanisms identified, evaluated, and then incorporated into the oil spill response "toolbox. In this effort, the alternative technologies currently available are reviewed and potential areas of focus for future investment are identified. For those technologies that exist, their value and efficacy to the current spill response system is determined and appropriate efforts are made to incorporate them into industry use. For emerging technologies or those technologies not yet identified, a system is identified to encourage their development and advancement.

The specific issues to be addressed include:

- Role and responsibility of investment in alternative response technologies
- Extent to which alternative technologies have been used in the past, their effectiveness, and their limiting factors
- Capability to assess new technologies and fold them into a response before and during a spill
- Available capability and future possibility for:
  - Bioremediation
    - Herders -Usefulness of chemical herders in mechanical response?
  - Effectiveness and role of other technologies such as
    - Centrifugal separator
    - Solidifiers
    - Nanotechnology / Microencapsulants

Oil Sensing and Tracking Technology

Oil sensing and monitoring is a critical factor in effective oil spill management and response. The ability to accurately identify individual oiled areas and predict where slicks and/or sheens will migrate can define not only the effective management of an oil spill from an asset deployment perspective but also the management of communications and planning of future efforts. The current capabilities are addressed along side of the future possibilities and potential improvements beyond these current capabilities.

The specific issues to be addressed include:

- Current capabilities, limitations and uses of available technology including: satellite imagery, optical/infrared/radar/acoustical systems on both manned and unmanned aerial and underway vehicles
- Research and Development needs for each technology

- Legislative/regulatory impediments
- Linkage of data from remote sensing equipment and outputs from trajectory models to serve as a validation/correction mechanism for the trajectory models
- Updating and/or creating tide and current data for estuaries, bays, near-shore and off-shore environments

5. Shoreline Protection and Clean-Up

Great efforts have been made to protect the fragile shoreline ecosystems of the Gulf of Mexico from the oil released as a result of the Deepwater Horizon incident. A large effort has been mobilized to protect the shoreline (e.g. use of dredging material to create berms or barriers) recognizing that once oil has reached the beaches, marshes, etc., it is very difficult to remediate. Nonetheless, some oil has reached the shoreline. This Task Force is addressing not only the abilities and techniques to protect the shoreline, but also what is done after the oil actually impacts those ecosystems. The availability of effective equipment and trained personnel, techniques, successes and short comings with shoreline protection and cleanup are all addressed.

The specific issues to be addressed include:

- Availability of response contractors and equipment to aggressively collect stranded oil and to protect shorelines.
- Capabilities and limitations of existing shoreline cleanup equipment and techniques
- Role of various booms such as curtain boom, Tiger boom, geotextile fabrics, dams and other innovative measures
- Cost/benefit of berms and dikes as a shoreline protection strategy
- Under what circumstances clean-up activities do more harm than leaving the oil in place
- Sorbent material/boom and its efficacy

6. Funding Opportunities

Significant funding has been in place by offshore operators to maintain readiness in the event of an oil spill. Major efforts towards preventing spills have resulted in a significant reduction in the number and volume of oil spills over the last 20 years. As part of the Task Force work, we will evaluate how funding for oil spill response organizations, equipment and technology development, R&D, training, and other aspects has evolved. The funding will be reviewed from the different sources: Industry (U.S. and International), Regulatory Agencies, Equipment Manufacturers, etc.

The specific issues to be addressed include:

- Funding adequacy
- R&D prioritization
- mutual aid mechanisms
- equipment pools and cascading
- Coordination between the various organizations involved in funding.

DEPARTMENT OF THE INTERIOR

INCREASED SAFETY MEASURES FOR ENERGY DEVELOPMENT ON THE OUTER CONTINENTAL SHELF

MAY 27, 2010

INCREASED SAFETY MEASURES FOR ENERGY DEVELOPMENT ON THE OUTER CONTINENTAL SHELF

EXECUTIVE SUMMARY

Overview

On April 20, 2010, an explosion and fire erupted on an offshore drilling rig in the Gulf of Mexico called the *Deepwater Horizon*, which had just completed an exploratory well 52 miles from shore in 4,992 feet of water. Eleven members of the crew are missing and presumed dead. The remainder of the crew abandoned the rig and was rescued by a nearby supply vessel, the *Damon Bankston*. The fire destroyed the rig, which sank on April 22, 2010. The resulting oil spill has been declared "a spill of national significance" and could become one of the oil industry's gravest disasters. Crude oil continues to flow from a broken pipe on the seafloor, has spread across thousands of square miles, and is damaging local economies, sensitive coastlines and wildlife throughout the Gulf region. On April 30, 2010, the President directed the Secretary of the Interior to conduct a thorough review of this event and to report, within 30 days, on "what, if any, additional precautions and technologies should be required to improve the safety of oil and gas exploration and production operations on the outer continental shelf." This report responds to the President's directive.

Recommendations

The Secretary recommends a series of steps immediately to improve the safety of offshore oil and gas drilling operations in Federal waters and a moratorium on certain permitting and drilling activities until the safety measures can be implemented and further analyses completed.

The report recommends a number of specific measures designed to ensure sufficient redundancy in the blowout preventers (BOPs), to promote the integrity of the well and enhance well control, and to facilitate a culture of safety through operational and personnel management (see Table ES-1). Recommended actions include prescriptive near-term requirements, longer-term performance-based safety measures, and one or more Department-led working groups to evaluate longer-term safety issues. The recommendations take into account that drilling activities conducted in the deepwater environment create increased risks and challenges.

Key recommendations on BOPs and related safety equipment used on floating drilling operations include:

- *Mandatory inspection of each BOP to be used on floating drilling operations to ensure that the BOP:* meets manufacturer design specifications, taking into account any modifications that have been made; is compatible with the specific drilling equipment on the rig it is to be used on, including that the shear ram is compatible with the drill pipe to be used; has not been compromised or damaged from previous service; is designed to operate at the planned operating depth. Certification of these requirements will be made publicly available.

- *Requirement of new safety features on BOPs and related backup and safety equipment including*: a requirement that BOPs have two sets of blind shear rams spaced at least four feet apart to prevent BOP failure if a drill pipe or drill tool is across on set of rams during an emergency; requirements for emergency back-up control systems; and requirements for remote operating vehicle capabilities. *The Department will develop new surface and subsea testing requirements to verify reliability of these capabilities.*

- *Overhaul of the testing, inspection and reporting requirements for BOP and related backup and safety equipment to ensure proper functioning, including new means of improving transparency and providing public access to the results of inspections and routine reporting.*

Key recommendations on well control systems include:

- *Development of enhanced deepwater well-control procedures.*

- *Verification of a set of new safeguards that must be in place prior to displacement of kill-weight drilling fluid from the wellbore.*

- *New design, installation, testing, operations, and training requirements relating to casing, cement or other elements that comprise an exploratory well.*

- *A comprehensive study of methods for more rapid and effective response to deepwater blowouts.*

Key recommendations on a systems-based approach to safety:

- *Immediate, enhanced enforcement of current regulations through verification within 30 days of compliance with the April 30, 2010, National Safety Alert.*

- *Enhanced requirements to improve organizational and safety management for companies operating offshore drilling rigs.*

- *New rules requiring that offshore operators have in place a comprehensive, systems-based approach to safety and environmental management.*

The Secretary also recommends temporarily halting certain permitting and drilling activities. First, the Secretary recommends a six-month moratorium on permits for new wells being drilled using floating rigs. The moratorium would allow for implementation of the measures proposed in this report and for consideration of the findings from ongoing investigations, including the bipartisan National Commission on the BP Deepwater Horizon Oil Spill and Offshore Drilling.

The Secretary further recommends an immediate halt to drilling operations on the 33 permitted wells, not including the relief wells currently being drilled by BP, that are currently being drilled using floating rigs in the Gulf of Mexico. Drilling operations should cease as soon as safely

practicable for a 6-month period.

The recommendations contained in this report have been peer-reviewed by seven experts identified by the National Academy of Engineering. Those experts, who volunteered their time and expertise, are identified in Appendix 1. The Department also consulted with a wide range of experts from government, academia and industry.

Relationship to Ongoing Investigations

This 30-day review has been conducted without the benefit of the findings from the ongoing investigations into the root causes of the explosions and fire on the Deepwater Horizon and the resulting oil spill (collectively "BP Oil Spill") including if there were any violations of existing safety or construction law, gross negligence, or willful misconduct. In the coming months, those investigations will likely suggest refinements to some of this report's recommendations, as well as additional safety measures. Nevertheless, the information currently available points to a number of specific interim recommendations regarding equipment, systems, procedures, and practices needed for safe operation of offshore drilling activities.

Furthermore, because the purpose of this review is to recommend immediate measures to improve the safety of offshore drilling activities, nothing in this report should be used to influence or prejudice any ongoing investigations, or impact any current or future litigation.

Table ES-1. Recommendations for Increased Safety Measures

Recommendations	Key Components (with implementation plan)
Blowout Preventer (BOP) Equipment and Emergency Systems	■ Order re-certification of subsea BOP stacks (immediately) ■ Order BOP equipment compatibility verification (immediately) ■ Establish formal equipment certification requirements (rulemaking)
New Safety Equipment Requirements and Operating Procedures	■ Develop new BOP and remote operated vehicle (ROV) testing requirements (immediately) ■ Develop new inspection procedures and reporting requirements (immediately) ■ Develop secondary control system requirements (emergency rulemaking) ■ Establish new blind shear ram redundancy requirements (emergency rulemaking) ■ Develop new ROV operating capabilities (rulemaking)
Well-Control Guidelines and Fluid Displacement Procedures	■ Establish new fluid displacement procedures (immediately) ■ Establish new deepwater well-control procedure requirements (emergency rulemaking)
Well Design and Construction – Casing and Cementing	■ Establish new casing and cementing design requirements – two independent tested barriers (immediately) ■ Establish new casing installation procedures (immediately) ■ Develop formal personnel training requirements for casing and cementing operations (rulemaking) ■ Develop additional requirements for casing installation (rulemaking) ■ Enforce tighter primary cementing practices (rulemaking) ■ Develop additional requirements for evaluation of cement integrity (immediately) ■ Study Wild-Well intervention techniques and capabilities (immediately)
Increased Enforcement of Existing Safety Regulations and Procedures	■ Order compliance verification for existing regulations and April 30, 2010, National Safety Alert (immediately) ■ Adopt safety case requirements for floating drilling operations on the Outer Continental Shelf (emergency rulemaking) ■ Adopt final rule to require operators to adopt a robust safety and environmental management system for offshore drilling operations (rulemaking) ■ Study additional safety training and certification requirements (rulemaking)

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I. Introduction

On April 20, 2010, the crew of the Transocean drilling rig *Deepwater Horizon* was preparing to temporarily abandon BP's discovery well at the Macondo prospect 52 miles from shore in 4,992 feet of water in the Gulf of Mexico. An explosion and subsequent fire on the rig caused 11 fatalities and several injuries. The rig sank two days later, resulting in an uncontrolled release of oil that has been declared a spill of national significance. The Nation faces a potentially massive and unprecedented environmental disaster, which has already resulted in the tragic loss of life and personal injuries as well as significant harm to wildlife, coastal ecosystems, and other natural resources. The disaster is commanding the Department of the Interior's resources as we work to ensure that the spill is stopped and the well permanently plugged; that our natural resources along the Gulf Coast are protected and restored; and that we get to the bottom of what happened and hold those responsible accountable.

On April 30, 2010, the President ordered the Secretary of the Interior to evaluate what, if any, additional precautions and technologies should be required to improve the safety of oil and gas exploration and production operations on the Outer Continental Shelf (OCS). In addition to this review of the OCS regulatory structure, the President recently created the bipartisan National Commission on the BP Deepwater Horizon Oil Spill and Offshore Drilling. The President established the National Commission to examine the relevant facts and circumstances concerning the root causes of the BP Oil Spill, to develop options for guarding against, and mitigating the impact of, oil spills associated with offshore drilling, and to submit a final public report to him with its findings and options for consideration within six months of the date of the Commission's first meeting.

In addition, the Departments of the Interior and Homeland Security are undertaking a joint investigation into the causes of the BP Oil Spill, including holding public hearings, calling witnesses, and taking any other steps necessary to determine the cause of the spill. Several committees in Congress have held and will continue to hold hearings on the events associated with the BP Oil Spill. Respecting the ongoing investigations, this report does not speculate as to the possible causes of the BP Oil Spill. This report is intended to identify an initial set of safety measures that can and will be implemented as soon as practicable to improve the safety of offshore oil and gas development.

To provide context for the safety recommendations, this report presents a history of OCS production, spills, and blowouts, a review of the existing U.S. regulatory and enforcement structure, a survey of other countries' regulatory approaches, and a summary of existing Minerals Management Service (MMS)-sponsored studies on technologies that could reduce the risk of blowouts.

In compiling the recommendations presented in this report, the Department has drawn from expertise within the Federal Government, academia, professional engineers, industry, and other governments' regulatory programs. In particular, seven members of the National Academy of Engineering peer reviewed the recommendations in this report. The Department received ideas from the Department of Energy National Laboratories on ways to improve offshore safety. Appendix I lists expert consultations for this report.

This report examines all aspects of drilling operations, including equipment, procedures, personnel management, and inspections and verification in an effort to identify safety and environmental protection measures that would reduce the risk of a catastrophic event. (A brief primer on offshore drilling technology and systems is included in Appendix 2). In particular, this report examines several issues highlighted by the BP Oil Spill regarding operational and personnel safety while conducting drilling operations in deepwater environments.

While technological progress has enabled the pursuit of deeper oil and gas deposits in deeper water, the risks associated with operating in water depths in excess of 1,000 feet are significantly more complex than in shallow water. This report describes safety and environmental issues involved in offshore drilling, including the unique challenges associated with drilling operations in deepwater.

The recommendations address well-control and well abandonment operations; specific requirements for devices, such as blowout preventers (BOPs) and their testing; industry practices; worker training; inspection protocol and operator oversight; and the responsibility of the Department for safety and enforcement.

In developing the recommendations contained in this report, the Department has been guided by the principle that feasible measures that materially and undeniably reduce the risk of a loss-of-well-control event should be pursued. Therefore, some recommended measures—particularly those the Department intends to implement immediately—are necessarily prescriptive. At the same time, the Department is examining innovative ways to promote a culture of safety for offshore operations by addressing the human element of operations. The Department is committed to moving to finalize a rulemaking that would require operators to adopt a systems-based approach to safety and environmental management. This rule would require operators to incorporate global best practices regarding environmental and safety management on offshore platforms into their operating plans and procedures. In finalizing this rulemaking, the Department will analyze carefully the current circumstances in the Gulf of Mexico and lessons learned from the ongoing investigation into the causes of the BP Oil Spill.

To realize an improved margin of safety associated with the recommended equipment standards and operating procedures, the report proposes new inspection and verification measures, which the Department will implement. Several of these efforts will also allow the public to access information about the inspection and verification structures, to promote confidence that: (1) the Federal Government undertakes appropriate actions to review, audit, and confirm industry performance; and (2) industry follows the best possible practices and the new set of regulatory requirements.

A comprehensive set of reforms encompassing all aspects of oil and gas development on the OCS simply could not be fully developed in the 30-day timeframe of this report. With respect to some safety measures, the Department will undertake further study—with appropriate input from independent experts, academia, industry, and other stakeholders—to develop new regulations and other appropriate steps to promote drilling safety. These Department-led strike teams will also help to inform the work of the President's new bipartisan National Commission. Finally, this report does not address several important issues associated with the safety of offshore

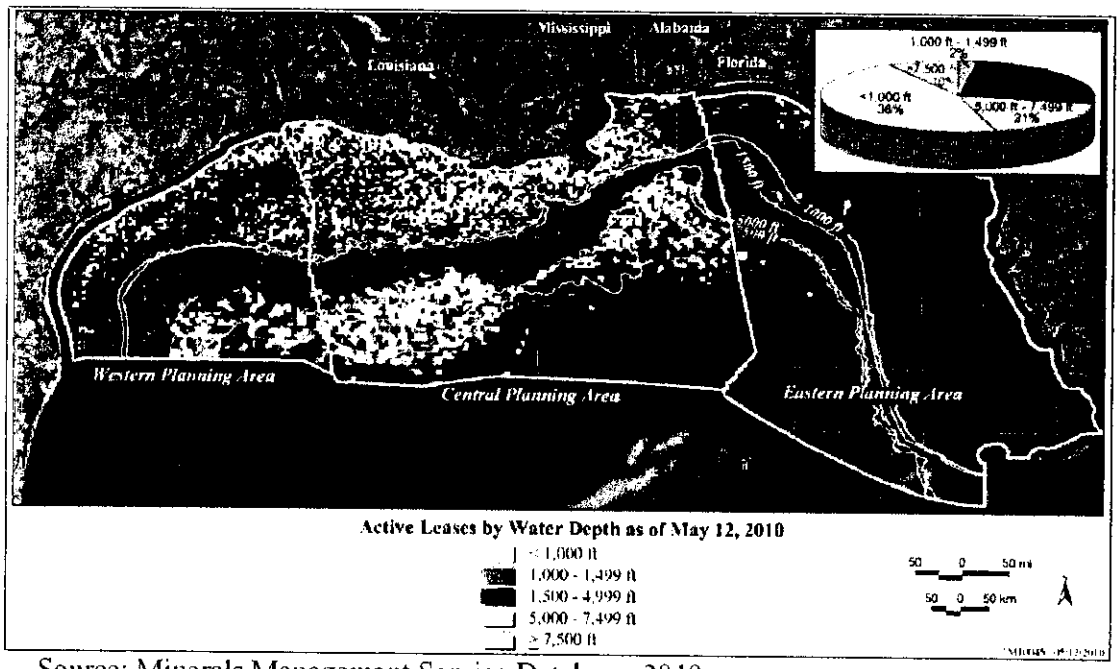
drilling that implicate shared responsibilities with other departments and agencies. For example, the Department will work in close cooperation with the Department of Homeland Security, including the United States Coast Guard, the Environmental Protection Agency, and other agencies to evaluate and improve oil spill response capabilities and industry responsibilities.

II. Offshore Oil and Gas Production

A. Federal OCS Oil and Gas Activities

The Gulf of Mexico provides 97 percent of Federal OCS production. The Gulf of Mexico has nearly 7,000 active leases (see Figure 1), 64 percent of which are in deepwater. The Pacific OCS has 49 active leases off the coast of Southern California, 43 of which are producing. There have been no Pacific OCS lease sales since 1984. Alaska has 675 active leases and production from a single joint State-Federal field. The Atlantic does not have any active leases or production.

Figure 1
Gulf of Mexico OCS Active Leases



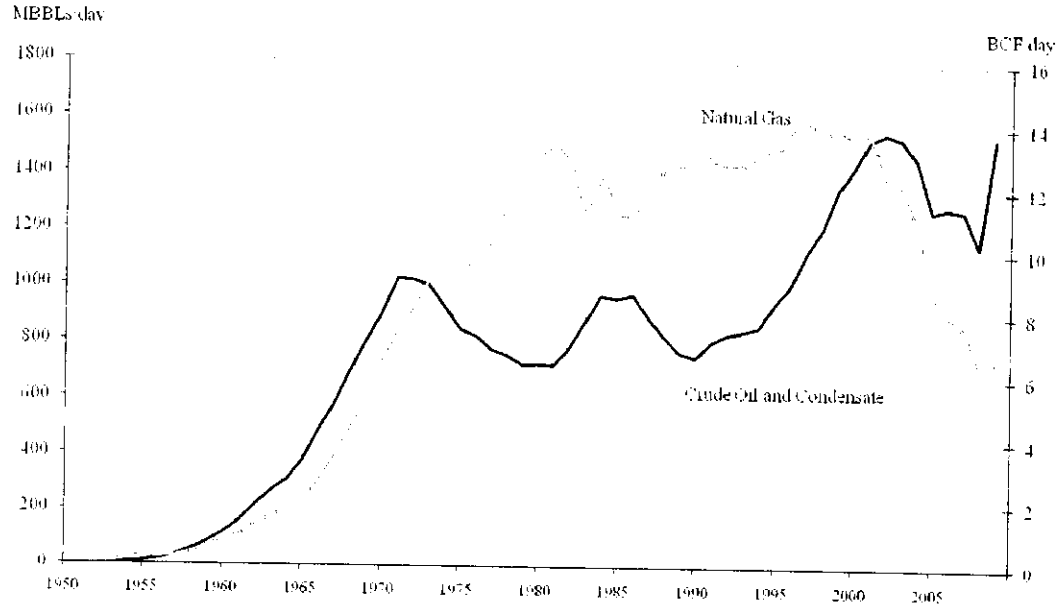
Source: Minerals Management Service Database, 2010.

Since 1947, more than 50,000 wells have been drilled in the Federal Gulf of Mexico, and there are now approximately 3,600 structures in the Gulf. In 2009, production from these structures accounted for 31 percent of total domestic oil production and 11 percent of total domestic, marketed natural gas production. Oil production in 2009 represented the second highest annual production for the Gulf of Mexico OCS (see Figure 2). Minerals Management Service Database, 2010.

Since the first major deepwater leasing boom in 1995 and 1996, a sustained and robust expansion of deepwater drilling activity has occurred, largely enabled by major advances in drilling

technology. In 2001, U.S. deepwater offshore oil production surpassed shallow water offshore oil production for the first time. By 2009, 80 percent of offshore oil production and 45 percent of natural gas production occurred in water depths in excess of 1,000 feet, and industry had drilled nearly 4,000 wells to those depths. In 2007, a record 15 rigs were drilling for oil and gas in water depths of 5,000 feet or more in the Gulf of Mexico. Operators have drilled about 700 wells in water depths of 5,000 feet or greater in the OCS. While fewer wells are drilled in the OCS today, they tend to be more sophisticated with higher per-well production levels than those in the past.

Figure 2
Gulf of Mexico OCS Oil and Gas Production



Source: Minerals Management Service Database, 2010.

Since 1953, the Federal Government has received approximately $200 billion in lease bonuses, fees, and royalty payments from OCS oil and gas operators. Last year, the Federal OCS leasing revenue was $6 billion. The OCS oil and gas industry provides relatively high-paying jobs in drilling and production activities, as well as employment in supporting industries. Offshore operations provide direct employment estimated at 150,000 jobs. Minerals Management Service Database, 2010.

B. OCS Petroleum Spills

Since the 1969 Santa Barbara, California, oil spill, there have been relatively few major oil spills from offshore oil and gas operations in the U.S. and around the world. Yet several notable blowouts have occurred, including one in June 1979, when the Ixtoc I exploratory well located about 50 miles off the Yucatan Peninsula blew out and was not brought under control until March 1980, releasing over three million barrels of oil off the coast of the Mexican state of Campeche. In 2009, the Australian Montara well in the Timor Sea blew out and was not brought under control for more than 10 weeks, releasing oil into the open ocean and forming a thin sheen covering up to 10,000 square miles. Nevertheless, the relatively infrequent occurrence of a major oil spill from an offshore drilling operation has led many to view these operations as safe.

From 1964 to 2009, operators in the Federal OCS produced about 17.5 billion barrels of oil (crude oil and condensate). Over this same time, the total estimated petroleum volume spilled from OCS activities was approximately 532,000 barrels, or 30.3 barrels spilled per million barrels produced. The spill rates from OCS platform and rig activities improved each decade from the 1960s through the 1990s, although the past decade reversed this trend (see Table 1). The oil spilled from OCS rigs and platforms over the past 30 years totaled about 27,000 barrels, illustrating how a catastrophic spill like the current BP Oil Spill can vastly exceed the impacts of typical spills on the OCS.

Table 1
Crude Oil Spills from Platform and Rigs from Federal OCS Activities, 1960-2009

Time Period	OCS Oil Production (Thousand Barrels)	Number of Spills	Barrels Spilled (Thousand Barrels)	Thousand Barrels Produced per Barrel Spilled
1960-1969	1,460,000	13	99	15
1970-1979	3,455,000	32	106	33
1980-1989	3,387,000	38	7	473
1990-1999	4,051,000	15	2	1,592
2000-2009	5,450,000	72	18	296

Note: Only covers spills of 50 barrels or more.

Source: Minerals Management Service Database, 2010.

Blowouts represent a type of loss of well control event that can result in large discharges of oil into the natural environment. Since 1970, the number of blowouts per number of wells drilled has varied significantly from year to year. From 1964 through 1970, a total of approximately 178,000 barrels of oil was spilled on the Federal OCS as a result of blowout events (see Table 2). Of this total, about 13,000 barrels resulted from blowouts related to external forces, such as hurricanes and ship collisions. An additional 30,000 barrels were released when a production fire resulted in the loss of well control of 12 wells on a production platform. The remaining

135,000 barrels that were released during blowouts occurred during drilling, well completion, or workover operations.

Table 2
Blowout Events Exceeding 1,000 Barrels on the Federal Outer Continental Shelf, 1964-2009

Year	Description of Event
1964	Two blowouts associated with a hurricane event that destroyed four platforms. Total of 10,280 barrels crude oil spilled.
1965	One blowout associated with drilling. 1,688 barrels condensate spilled.
1969	One blowout that occurred when a supply vessel collided with a drilling rig during a storm and sheared the wellhead. 2,500 barrels crude oil spilled.
1969	One blowout (Santa Barbara, California) was associated with drilling. 80,000 barrels spilled.
1970	One blowout was caused by a fire in the production area that resulted in the loss of control of 12 wells on the platform. 30,000 barrels crude oil spilled.
1970	One blowout associated with wireline work during workover operations. 53,000 barrels spilled.

Source: Minerals Management Service Database, 2010.

After these blowouts, in the period from 1971 through 2009, a total of approximately 1,800 barrels was spilled on the Federal OCS as a result of blowout events. Of that amount, 425 barrels were blowouts resulting from hurricane damage. An additional 450 barrels occurred at an oil pump during production operations. Since 1956, 15 blowouts resulted in at least one fatality; three of these events occurred after 1986.

While the rate of blowouts per well drilled has not increased, even as more activity has moved into deeper water, the experience with the BP Oil Spill illustrates the significant challenges in containing a blowout in deepwater, as compared to containing a blowout in shallower water.

III. EXISTING WELL CONTROL STUDIES

The Department has conducted research related to offshore oil and gas exploration, development, and production for two purposes: (1) to augment the overall knowledge base in the field, and (2) to identify information supporting new or modified requirements in a regulation or recommended practices. The Department maintains interagency agreements and working arrangements for research with other Federal agencies who share responsibility for regulatory oversight of OCS operations, including the Departments of Commerce, Energy, and Transportation.

Through the Technical Assessment & Research (TA&R) Program, the Department studies the operational safety, technology, and the pollution prevention and spill response capabilities

associated with offshore operations. The TA&R Program serves "to promote new technology and safety through the funding of collective research with industry, academia, and other government agencies and disseminate findings through a variety of public forums." *Minerals Management Service Engineering and Research Branch 2008-2012 Strategic Plan.* This program has funded or co-funded numerous studies investigating the use of well control techniques and equipment, including those associated with drilling fluid of a specified weight and circulation, cement with a specific bond and integrity, casing with a specific design, pressure control safety valves, and BOPs (see Table 3 for a list of well control studies funded by the Department since 1990). These studies have led to offshore drilling safety improvements around the world.

Table 3
TA&R Funded Well Control Research, 1990-2010

Study No.	Title of Study	Completion Date
8	Blowout Prevention Procedures for Deepwater Drilling	1978 to 2003
150	Floating Vessel Blowout Control	December 1991
151	Investigation of Simulated Oil Well Blowout Fires	1989 to 1993
170	Improved Means of Offshore Platform Fire Resistance	1991 and 1994
220	Study of Human Factors in Offshore Operations	1995 to 1997
253	Blowout Preventer Study	December 1996
264	Development of Improved Drill String Safety Valve Design and Specifications	1996 and 1998
319	Reliability of Subsea Blowout Preventer Systems for Deepwater Applications–Phase II	November 1999
382	Experimental Validation of Well Control Procedures in Deepwater	December 2005
383	Performance of Deepwater BOP Equipment During Well Control Events	July 2001
403	Repeatability and Effectiveness of Subsurface-Controlled Safety Valves	March 2003
408	Development of a Blowout Intervention Method and Dynamic Kill Simulated for Blowouts in Ultra-Deepwater	December 2004
431	Evaluation of Secondary Intervention Methods in Well Control	March 2003
440	Development and Assessment of Well Control Procedures for Extended Reach and Multilateral Wells	December 2004
455	Review of Shear Ram Capabilities	December 2004

463	Evaluation of Sheer Ram Capabilities	September 2004
519	Drilling and Completion Gaps for High Temperature and High Pressure In Deep Water	June 2006
540	Risk Assessment of Surface vs. Subsurface BOP's on Mobile Offshore Drilling Units	August 2006
541	Application of Dual Gradient Technology to Top Hole Drilling	November 2006
566	Using Equipment, Particularly BOP and Wellhead Components in Excess of the Rated Working Pressure	October 2006
582	A Probabilistic Approach to Risk Assessment of Managed Pressure Drilling in Offshore Drilling Applications	October 2008
631	Risk Profile of Dual Gradient Drilling	Estimated completion in September 2010
640	Risk Analysis of Using a Surface Blow Out Preventer	April 2010

Note: This report includes hyperlinks to the reports via the study numbers.

Source: Minerals Management Service Database, 2010.

These studies have examined, among other things, blind shear ram capabilities, back-up BOP systems, and drilling and cementing design and operations, which have informed the setting of Department regulations. For example, the 1999 *Reliability of Subsea BOP systems for Deepwater Applications* (study number 319) recommended modifying testing regulations to ensure that the testing of variable pipe rams appropriately account for the diameters of all the sizes of pipe in use in a given drilling project. The Department used this recommendation in revising its 2003 final drilling regulations.

The 2002 *Review of Shear Ram Capabilities* (study number 455) identified issues associated with the cutting power of shear rams, which are intended to cut through drill pipe when the well must be secured in an emergency situation. The Department adopted the report's recommendation that the BOP must be capable of shearing pipe planned for use in current drilling programs under 30 CFR 250.416(e). This regulation requires the submittal of information demonstrating that shear rams on the proposed BOP stack can cut drill pipe under maximum anticipated surface pressure.

The 2004 *Evaluation of Sheer Ram Capabilities* (study number 463) expanded on the analysis in study number 455 through an evaluation of BOP shear rams under the most demanding conditions. In this study, 214 pipe samples were tested against various ram models, and 16 (7.5 percent) were unsuccessful in shearing the pipe below a certain pressure (3,000 pounds per square inch). All 16 of these cases involved a particular combination of shear ram and pipe, which was found unsuitable for actual drilling operations. The results of this study confirmed the regulatory decision to require operators to submit documentation that shows the shear rams are capable of shearing the pipe in the hole under maximum anticipated surface pressures.

The 2003 *Evaluation of Secondary Intervention Methods in Well Control* (study number 431) reviewed the design and capabilities of various secondary BOP intervention systems used in practice. Secondary intervention represents an alternate means to operate BOP functions in the event of total loss of the primary control system or a means to assist personnel during situations involving imminent equipment failure or well-control problems. This study discusses the possible use of acoustic systems in the Gulf of Mexico. According to the report, there remain significant doubts about the ability of an acoustic control system to provide a reliable emergency back-up to the primary control system during an actual well flow event.

IV. Legal Framework, Inspections, and Enforcement

A. Statutory Authority

In 1953, the Congress passed the Outer Continental Shelf Lands Act (OCSLA) that defines the OCS as any submerged land outside state jurisdiction and established Federal jurisdiction over these waters and all resources they contain. The OCSLA also set Federal responsibilities for managing and maintaining the OCS subject to environmental constraints and safety concerns. The legislation authorized the Department to lease areas of the OCS for development and to regulate offshore operations and development. Since then, the OCSLA has been amended to address changing issues, including the 1978 requirement for the Department to develop 5-year leasing program schedules after consideration of environmental, social, and economic effects of natural gas and oil activity on OCS resources, location-specific risks, energy needs, laws, and stakeholder interests. This amendment also requires the Department to seek a balance between potential damage to the environment and coastal areas and potential energy supply. The first 5-year leasing program started in 1980 and the current 5-year plan ends in 2012.

Congress has also enacted laws to promote production in frontier areas like the Gulf of Mexico deepwater. For example, the 1995 Deepwater Royalty Relief Act encouraged oil and gas development in the Gulf of Mexico in water depths greater than 200 meters (656 feet) through royalty relief. Royalty relief incentives were also offered to encourage production from wells drilled for deep natural gas (greater than 15,000 feet or 4,572 meters total depth) on new leases located in shallow waters (less than 200 meters). The Energy Policy Act of 2005 included additional incentives for oil and gas development in offshore areas to stimulate production in deepwater and expanded the OSCLA to include the areas offshore Alaska for royalty suspension.

Oil and gas leasing and operations are subject to environmental reviews under the National Environmental Policy Act (NEPA). On May 14, 2010, Secretary of the Interior Ken Salazar and the Council on Environmental Quality Chair Nancy Sutley announced a full review of NEPA compliance for oil and gas activities on the OCS, and accordingly, NEPA will not be covered in this report.

B. Regulations

Under the OCSLA, the Secretary of the Interior, through the MMS, manages and regulates leasing, exploration, development, and production of resources on the OCS. Current regulations are a combination of prescriptive and performance-based measures.

Prescriptive regulations specify rules or courses of action that must be explicitly followed in order to comply with regulation. A prescriptive approach sets clear rules for industry to follow. Performance-based regulations, in contrast, specify objectives for industry to achieve but allow flexibility in the technology and approaches used to meet these objectives. This approach allows improved technologies and methodologies to be incorporated into industry practices without major revisions to regulations and puts the onus on industry to develop systems for continuous improvement of safety and environmental protection practices. Internationally, many countries (e.g., United Kingdom, Norway, and Australia) are moving toward more performance-based regulations. The Department also incorporates by reference recommended practices and standards from industry associations and technical standard setting groups such as the American National Standards Institute, API standards and recommended practice documents, and National Association of Corrosion Engineers documents. The Department also issues Notice to Lessees (NTLs) to clarify and provide direction on regulatory requirements.

The regulations in 30 CFR 250 govern important drilling operations on the OCS. Subpart D covers all aspects of the drilling operation including permitting, casing requirements, cementing requirements, diverter systems, BOP systems, drilling fluids requirements, equipment testing, and reporting. The minimum requirements for BOPs are stated in detail, including system components, surface and subsea BOP stacks, associated systems and equipment, choke manifolds, kelly valves, drill-string safety valves, maintenance and inspections, pressure tests and additional testing, and recordkeeping. Subpart Q covers decommissioning, which includes temporary abandonment of wells. These regulations are mainly prescriptive in nature, and convey the minimum requirements for safe operations.

While regulations governing OCS exploration, development, and production activities have been largely prescriptive, the Department has been considering more performance-based approaches. For example, the 2002 Subpart O (30 CFR 250.1500) training rule is a performance-based regulation. In addition, the Department has incorporated by reference nearly 100 consensus standards into current offshore operating regulations. In this way, the Department imposes a responsibility on operators to ensure safe operations through compliance with prescribed standards as well as compliance with performance-based, overarching measures. As such, it is the responsibility of operators to meet the requirements of 30 CFR 250.401:

> **What must I do to keep wells under control?** You must take necessary precautions to keep wells under control at all times. You must: (a) Use the best available and safest drilling technology to monitor and evaluate well conditions and to minimize the potential for the well to flow or kick and...(e) Use and maintain equipment and materials necessary to ensure the safety and protection of personnel, equipment, natural resources, and the environment.

Review of Applications for Permit to Drill (APDs)

Upon receipt of an APD, the Department reviews the approval documents for the Exploration or Development Plans for conditions that apply to the APD or the well's proposed location. The Department also assesses whether the applicant has oil spill financial responsibility coverage.

The Department conducts an engineering review of the APD, to check the proposed drilling rig's maximum operating limits for drilling depth and water depth to ensure appropriateness for the proposed well program. The review consists of, but is not limited to, the proposed procedure, well location and directional program, geological and geophysical hazards, subsurface environment for pore pressure and fracture gradient, wellbore design and schematic, design calculations for pressure containment during drilling and completion, cement volumes, and testing pressures for the well control equipment, casing and casing shoe. This review is performed for shallow and deepwater drilling operations, and a hurricane risk assessment is performed during hurricane season. The Department reviews APDs to determine how the proposed operation satisfies the regulations in meeting its objective of safely reaching a targeted depth. This review includes an assessment of:

- well casing setting depths determined by formation strength, predicted formation fluid pressure, drilling mud weight limits, any anticipated subsurface hazards;
- effectiveness of well casing strength for pressure containment at its specified depth;
- effectiveness of cementing the well casing after successfully securing and isolating the hydrocarbon zones or any encountered subsurface hazards; and
- maintaining well control by adjusting drilling mud properties and the use of well control equipment such as diverters and BOPs.

The Department reviews the operator's plans and APDs to verify the use of best available and safest technology (BAST), and inspections verify the use of approved equipment and maintenance thereof.

Upon completing the engineering review, the Department may approve the APD with conditions if warranted, return it to the operator for modifications, or deny it. If the applicant makes changes to the drilling application, the Department must grant approval before the applicant performs its work.

C. Inspections

The Department maintains a comprehensive inspection program to promote the safety of offshore oil and gas operations on the OCS. This program places inspectors offshore on drilling rigs and production platforms to enforce operator compliance with Federal safety and environmental protection requirements. When a drilling rig enters Federal waters to drill a well, Federal inspectors will meet the rig where it is moored to provide training to the rig operators about the Federal regulatory structure. At this time, inspectors will conduct a drilling inspection

of the equipment. It is Departmental policy for inspectors to inspect the rig once on location every 30 days.

For production platforms, it is practice for initial inspections to take place during the fabrication of the platform at a shipyard. Federal inspectors and engineers review the flow diagrams and charts to determine if the specific facility meets regulatory requirements. A complete production inspection of the facility occurs typically about 30 to 45 days after a production platform is installed.

After operations begin, the Department conducts additional announced and unannounced inspections. Inspectors typically give the operator a few days notice for announced inspections. Inspectors also fly to platforms or rigs unannounced, and in such cases, inspectors contact the operator as they approach the facility. These unannounced inspections foster a climate of safe operations, maintain an inspector presence, and allow regulators to focus on operators with a poor performance record. They are also conducted after a critical safety feature has previously been found defective during previous inspections or by operator reporting.

During a drilling inspection an inspector typically conducts the following:

- a general safety walk through of the facility looking for general housekeeping hazards related to slips/trips/falls/railings/open gratings;
- verification of the location of gas detectors/hydrogen sulfide detectors/mud volume detectors;
- verification that the mud trip tank is operational and properly marked (graduated), that appropriate quantities of a mud weighting material are onboard (barite), and that the drilling mud currently in use has been periodically tested and is of the proper density as indicated in the APD (viewing mud logger's report);
- verification that proper well control data relative to the well depth and type of tubulars (drill pipe, casing) in the well is clearly marked and posted on the rig floor and that there are remote BOP and Diverter control panels on the facility;
- verification that equipment is properly grounded and that drill string safety valves with proper wrenches for the diameter of drill pipe or casing currently in the well are located on the drill floor in an open position and within easy access to rig personnel;
- verification that the crown block safety device is installed and operational and that fresh air intakes are properly located on the rig;
- verification that diesel engines have required shut down devices, that breathing air is properly labeled, that engine exhaust is insulated;

- verification that crane load charts on platform rigs have been recorded, that all equipment has proper catch basins/drains/curbs/gutters/drip pans, that the facility is properly marked as to location, that the facility is properly lighted;

- if drilling is being conducted on a production facility, verification that there is an operational Emergency Shut Down device on the rig floor;

- verification of the status/switch position of the BOP pumps that the stand-by pump operates in an automatic fashion, that the accumulator bottles are in service;

- review the BOP tests records;

- checks the Subpart O well control status of contractor and lessee employees;

- checks for certain Potential Incidents of Noncompliance, which allow the inspector to check for general competency related to drilling operations; and

- inspectors may test, randomly or as a result of a safety concern, an offshore employee's competency with various safety devices.

The records check and documentation components of a drilling inspection apply to equipment, procedures, and operations that were conducted prior to the inspector boarding the facility, including but not limited to casing, cement, diverter, and BOP pressure testing results, casing setting depths, cement volumes, proper wait on cement time, formation pressure integrity tests, formation evaluation tests, required well control drills, hydrogen sulfide training certifications, and gas detector and hydrogen sulfide detector calibration records. Furthermore, the inspector confirms that proper paperwork is available in regard to any granted departures approved during the drilling of the well which were not previously approved in the APD.

During 2009, industry drilled a total of 331 wells in the Gulf of Mexico, and the MMS Gulf of Mexico Region conducted the following types and numbers of inspections:

- 561 drilling inspections;

- 3,678 production inspections;

- 268 well workover and well completion inspections;

- 6,804 meter inspections;

- 82 abandonment inspections;

- 4,837 pipelines inspections; and

- 3,342 personal safety inspections, on behalf of the U.S. Coast Guard.

E. Enforcement

The Secretary of the Interior, the Secretary of the Army, and the U.S. Coast Guard have the authority to pursue civil and criminal enforcement actions against persons who violate the OCSLA, the regulations created to implement the OCSLA, and the terms of any lease, license, or permit issued under OCSLA. The Department maintains a National Potential Incident of Noncompliance (PINC) List to help inspectors carry out enforcement actions: it contains a checklist of requirements for specific installations or procedures and prescribed enforcement actions consisting of written warnings, shut-in of a component, including wells, equipment, or pipelines, or shut-in of an entire platform if noncompliance with the National PINC is detected. If the violation does not impose an immediate danger to personnel or equipment, a warning Incident of Noncompliance (INC) is issued. An INC must be corrected within 14 days from the time specified on the INC, and the operator may not continue the activity in question until it has corrected the INC.

The OCSLA (43 U.S.C. § 1334(a)(2)) and regulations at 30 CFR 250.181-188 authorize the Secretary to cancel a lease or permit if, after opportunity and notice for a hearing, it is determined that: (1) continued activity would probably cause serious harm or damage to life, property, the environment, minerals, or national security or defense; (2) the threat of harm or damage will not disappear or decrease to an acceptable extent within a reasonable time; (3) the advantages of cancellation outweigh the advantages of continued activity; and (4) a suspension has been in effect for at least five years or the termination of suspension and lease cancellation are at the request of the lessee.

Regulations appearing in 30 CFR 250.135-136 provide for a disqualification process for operators exhibiting chronic poor compliance. This procedure allows operators to be placed on probation and requires that they submit Performance Improvement Plans. This gives the operator an opportunity to improve their performance. Should it not improve during a specified time, the operator may be disqualified from operating a given facility, including up to any and all facilities. Ultimately, an operator can go through Departmental debarment procedures that would prevent it from transacting any business with the Federal Government.

Under 43 U.S.C. § 1350(b) of the OCSLA, as amended, and regulations appearing at 30 CFR 250.200-206, civil penalties can be assessed for failure to comply with responsibilities under the law, a lease, a license, a permit, or any regulation or order issued pursuant to the Act. In addition to the enforcement actions specified above, civil penalty of up to $35,000 per violation per day may be assessed if: (1) the operator fails to correct the violation in the amount of time specified on the INC; or (2) the violation resulted in a threat of serious, irreparable, or immediate harm or damage to life, property, minerals, or the environment. On a drilling rig, for example, 160 items are checked for potential violations. If significant enough, the violation may call for the particular well component or the entire complex to be shut in. In 2009, drilling operations of 20 facilities were shut-in.

V. Regulatory Authority and Requirements in Other Nations

There have been and continue to be a number of approaches for regulating offshore drilling activity. Some countries have adopted a prescriptive approach directing offshore oil and gas activities through detailed regulations and requirements, while other regulatory bodies have adopted a performance-based approach. Some regulators have adopted a hybrid approach by being prescriptive in areas deemed critical, while also establishing broad performance parameters where they deem industry needs the latitude to meet particular objectives.

There is a major difference among offshore oil and gas regulators in the number of technical standards referenced within their regulations, and the effect of referenced standards. For example, in the United Kingdom, the standards are not compulsory, while in the United States, referenced standards have the same status as regulations. A standard is a formal document that establishes or defines a method or practice; these may also be called recommended practices. Some of the standards developing organizations, referenced in the regulations, include API, American Society of Mechanical Engineers, and American National Standards Institute. The following summarizes the regulatory structures in Norway, the United Kingdom, Australia, and Canada.

Norway

Over the past 40 years, Norway has moved from a prescriptive to a performance-based approach for regulating offshore oil and gas. Like the United States today with joint regulatory oversight of mobile drilling rigs by the Department and the U.S. Coast Guard, Norway originally regulated mobile units through its maritime authority and fixed installations by the Norwegian Petroleum Directorate (NPD).

Over time, the NPD has developed new approaches, including "compliance responsibility" that required companies to verify that their business was run acceptably and in line with the rules. The NPD eliminated the concept of inspection and replaced it with the concept of "supervision." They also replaced the term "approvals" with "consents." Supervision spans audits, verification, investigations, and most significantly, interaction with industry in the form of studies, professional seminars, and the development of regulations. These changes transformed the earlier approvals system that had the effect of the NPD being a virtual guarantor that company activities were acceptable into one centered on the concept of consent.

Since this major change in 1985, the trend has been away from prescription towards a regulatory approach based more on performance and risk management. Also, a series of reforms has resulted in regulations that are aligned with the changes in regulatory approach. Norway's regulatory requirements are general and primarily specify the conditions or functions that must be achieved to be compliant. Within this framework, companies have the freedom to choose practical solutions along with the responsibility to ensure compliance. To avoid misunderstandings about requirements for complying with the regulations, non-binding recommendations and guidelines have also been issued that reference reputable Norwegian and/or international industrial standards for structures, equipment, or procedures. These recommendations and guidelines rely primarily on Det Norske Veritas *Offshore Standards* that

provide technical requirements and acceptance criteria and *Recommended Practices* for proven technology and sound engineering practice.

This approach also means that the regulator must keep abreast of and participate in developing and revising industry standards to ensure that they remain relevant and reflect best practice. Supervision by the regulator involves checking whether the administrative management systems at the companies ensure acceptable operation. This auditing must be conducted by personnel who have special technical and management expertise and experience.

The NPD acknowledges that the requirements for successfully delivering performance-based regulations demands extensive participation from industry, employees, and the regulator in terms of expertise, management and flexibility. To achieve a safe and environmentally responsible offshore work environment, strategic, and operational plans must be drawn up, selected development measures implemented, progress monitored and corrective action taken when problems arise.

The Petroleum Safety Authority Norway (PSA) was established as an independent government regulator in 2004. It took over the safety department of the NPD and continued its role. Its authority was also extended to cover supervision of safety, emergency preparedness, and the working environment for petroleum-related plants and associated pipeline systems on land. Norway is working toward harmonizing their regulations for offshore and land-based petroleum operations under the PSA.

United Kingdom

The UK safety regulation is predominantly performance-based. Indeed, the safety case concept for offshore oil and gas operation began after the 1988 explosion and resulting fire of a North Sea oil production platform called Piper Alpha, which killed 167 men. The subsequent investigation led to the issuance of the Public Inquiry into the Piper Alpha Disaster (the Lord Cullen report) and the reorganization of the UK offshore safety laws from prescriptive to a safety case approach. UK standards describe objectives, and operators can select the methods and equipment used to achieve these objectives and meet their statutory obligations. Complementing the safety case regulations are approved codes of practice and guidance documents.

The UK regulates offshore oil and gas through the Health and Safety Executive (HSE). The core activities of HSE are safety case assessment, verification, inspection, investigation, and enforcement. The approval process for the HSE is case-specific, and each case must be accepted and approved before offshore installation operates. A government inspectorate is in place as an assurance mechanism. The HSE oversight includes over 300 installations including, production platforms, Floating Production Storage and Offloading units, and mobile offshore drilling units. Other legislation is applied offshore on an activity basis. In 1992, the Offshore Installation (Safety Case) Regulations were introduced into the UK sector. These require all fixed and mobile offshore installations operating in UK waters to have a safety case which must be reviewed and approved by the Health and Safety Executive.

Australia

The organization responsible for regulating Australia's oil and gas industry is The National Offshore Petroleum Safety Authority, an independent statutory agency designated under the Commonwealth *Offshore Petroleum and Greenhouse Gas Storage Act 2006*. This organization implements a performance-based regulatory approach. The regulator is responsible for providing assurance that the operators address risks identified by a safety case. The organization includes a joint government inspectorate, and requires third party validations for regulatory assurance. Each manned facility is inspected at least once every year. The inspections are planned and usually take several days. The subject of planned inspections includes both control and management of major equipment and occupational health and safety.

The primary features of the Australian regulatory system are:

- Duties of care: Specific categories of persons (operators, employers, etc.) who are involved in offshore petroleum activities at facilities are required to "take all reasonably practicable steps" to protect the health and safety of the facility workforce and of any other persons who may be affected.

- Consultation provisions: Mechanisms are set out that will enable effective consultation between each facility operator, relevant employers, and the workforce regarding occupational health and safety.

- Powers of inspectors: Inspectors are granted powers to enter offshore facilities or other relevant premises, conduct inspections, interview people, seize evidence and otherwise take action to ensure compliance by parties with legal obligations.

- Standards and best practices are based on a safety case approach, similar to that specified in the UK regulatory system.

Canada

The Canada-Nova Scotia Offshore Petroleum Board (C-NSOPB) and the Canada Newfoundland & Labrador Offshore Petroleum Board (C-NLOPB) are responsible for the regulation of petroleum activities in the Nova Scotia, Newfoundland, and Labrador offshore areas. Their principle responsibilities include ensuring health and safety for offshore workers, protection of the environment, conservation of offshore petroleum resources, compliance with legislative provisions regarding employment and industrial benefits, issuance of licenses for offshore exploration and development, and resource evaluation. Both boards are independent joint agencies of the Government of Canada and their respective provinces. Each work activity proposed in the offshore area related to exploration, drilling, production, conservation, processing, or transportation of petroleum requires the authorization of the responsible board. Assurance mechanisms include board inspections, audits and investigations programs, and industry self inspections. Operators are required to submit reports detailing the status of their work programs on an ongoing basis, along with other documentation to demonstrate compliance with regulatory requirements. The C-NSOPB oversees one operational natural gas project

comprised of five production platforms and one 26-inch pipeline. The C-NLOPB oversees three oil projects comprised of Floating Production Storage and Offloading units and one integrated drilling/production accommodation installation.

VI. Recommendations for Immediate Action to Improve Offshore Drilling Safety

The BP Oil Spill demonstrates the possibility of a catastrophic event (or multiple catastrophic failures) and, therefore, the need to ensure that oil and gas development on the Outer Continental Shelf can be conducted safely and that another event like the BP Oil Spill never occurs again.

This 30-day review has of necessity been conducted without the results of the ongoing investigations into the precise causes of the event. A series of other investigations will determine those causes in the coming months. Nevertheless, this report makes a set of interim recommendations based upon what is known about the equipment, systems, and practices necessary for safe operation. For example, the BP Oil Spill has underscored that as drilling activity moves increasingly into very deep water environments, it is important to reevaluate whether the best practices for safe drilling operations developed over the years need to be bolstered to account for the unique challenges of drilling in deepwater. In addition, the presumed failure of the BOP points to a need to examine standards specifically related to BOP safety.

With that context in mind, the recommendations are designed to address specific policies, practices, and procedures, which the Department has identified as important for workplace and environmental safety, even before completion of the investigation into the event. Many of the near-term recommendations are prescriptive in nature, reflecting the importance of addressing immediate needs while the Department conducts a more comprehensive examination of the entire regulatory program and determines whether additional performance-based standards are necessary.

Implementation of these recommendations is expected to improve safety of offshore drilling operations. In the coming months, these measures will be refined and supplemented based on recommendations from other reviews and investigations, including from continuing work at the Department as described below, from the Joint Investigation and from the independent bipartisan commission established by the President.

Each recommendation below is accompanied by a brief discussion of the context of the recommendations and an explanation of how it will enhance the safety of future OCS drilling activities. Each is also identified with regard to priority of expected implementation. Certain measures are intended for immediate implementation (within the next 30 days), through issuance of either a NTL, internal Departmental guidance, or in the case of a safety and environmental rule, through publication of the final rulemaking.

Other recommendations will be addressed through emergency rulemaking, where appropriate. It is the intent of the Department to issue expeditiously interim final rules to implement these recommendations. Such rules will become effective immediately upon issuance, but will also be

opened for public review and comment and may be adjusted after comments are received through the appropriate process.

Finally, several recommendations require further study and, therefore, will be addressed through notice and comment rulemaking. The Department will immediately establish strike teams within the Department to further develop these measures. These strike teams will address the highly technical and complex issues raised and will seek input as appropriate from academia, industry, and other technical experts and stakeholders. The teams will present their recommendations for additional environmental protection and safety measures within six months. Recommendations will be implemented as expeditiously as possible through formal rulemaking. The recommendations from these strike teams may also inform the efforts of the President's new bipartisan National Commission.

A primer on offshore drilling technology and systems describes many of the terms used in the below recommendations (see Appendix 2).

The specific recommendations of the Department follow:

I. Blowout Preventer Equipment and Emergency Systems

BOPs and Emergency Systems: BOPs are used to control the release of oil and gas in the event of loss of well control. Current drilling regulations impose specific requirements addressing BOP systems, including requirements for annular preventers and the primary systems that control those preventers, as well as pipe and blind-shear rams.

Although the regulations do not require specific secondary control systems (back-up systems) including subsea BOP safety systems, which are designed to shut-in the wellbore automatically during emergency events the Department only approves permits for which they are secondary control systems. These safety systems include autoshear and deadman systems. Emergency events could include the loss of communication and power between the surface and the BOP stack or an unplanned disconnect of the marine riser from the BOP stack. In addition, all Gulf of Mexico drilling rigs are currently equipped to use a remote operated vehicle (ROV) to provide secondary control of the subsea BOP stack, and most provide other tertiary control systems as well. The ROV intervention capability is limited on some subsea BOP stacks while others have the ability to control multiple functions.

A. Certification of Subsea BOP Stack

Recommendation 1 – Order Immediate Re-certification of All BOP Equipment Used in New Floating Drilling Operations

Prior to spudding any new well from a floating vessel, the operator will be required to obtain a written and signed certification from an independent third party attesting that, on or after the date of this report, a detailed physical inspection and design review of the BOP has been conducted in accordance with the Original Equipment Manufacturer specifications and that: (i) the BOP will operate as originally designed, and (ii) any modifications or upgrades to the BOP stack

conducted after delivery have not compromised the design or operation of the BOP. This certification must be submitted to the Department and made publicly available. Prior to deploying the BOP, the operator must also verify that any modifications or upgrades to the BOP are approved by the Department and that documentation showing that the BOP has been maintained and inspected according to the requirements in 30 CFR 250.446(a) and other applicable standards and is on file with the Department and available for inspection.

Recommendation 2 – Order BOP Equipment Compatibility Verification for Each Floating Vessel and for Each New Well

For each new well, the Department will require, as part of a structured risk management process, the operator to obtain an independent third party verification that:

- The BOP stack is designed for the specific drilling equipment on the rig and for the specific well design including certification that the shear ram is appropriate for the drilling project.
- The BOP stack has not been compromised or damaged from previous service.
- The BOP stack will operate in the water depth in which it will be deployed.

Recommendation 3 – Develop Formal Equipment Certification Requirements

The Department will investigate new certification requirements for BOP equipment and other components of the BOP stack such as control panels, communication pods, accumulator systems, and choke and kill lines. In addition, the Department will develop a system to make BOP certifications publicly available in order to increase transparency and accountability.

B. New Safety Equipment Requirements and Operating Procedures

Recommendation 4 – New Blind Shear Ram Redundancy Requirement

The BOPs used in all floating drilling operations will be required to have two sets of blind shear rams spaced at least four feet apart (to prevent system failure if drill pipe joint or drill tool is across one set of rams during an emergency).

Recommendation 5 –Secondary Control System Requirements and Guidelines

The Department will establish clear requirements for secondary BOP control systems on all subsea BOPs and for systems that address well-control emergencies. These requirements will include:

- ROV intervention capabilities for secondary control of all subsea BOP stacks, including the ability to close all shear and pipe rams, close the choke and kill valves and unlatch the lower marine riser package (LMRP).

- Requirements for an emergency back-up BOP control system, e.g., autoshear, deadman, emergency disconnect system, and/or an acoustic activation system that is powered by a separate and independent accumulator bank with sufficient capacity to open and close one annular-type preventer and all ram-type preventers, including the blind shear ram.

- Guidelines for arming and disarming the secondary BOP control system.

- Requirements for documentation of BOP maintenance and repair (including any modifications to the BOP stack and control systems).

Recommendation 6 –New ROV Operating Capabilities

The Department will develop requirements for ROV operating capabilities including the following:

- Standardized intervention ports for all subsea BOP stacks to ensure compatibility with any available ROV.

- Visible mechanical indicator or redundant telemetry channel for BOP rams to give positive indication of proper functioning (e.g., a position indicator).

- ROV testing requirements, including subsea function testing with external hydraulic supply.

- An ROV interface with dual valves below the lowest ram on the BOP stack to allow well-killing operations.

C. New Testing Guidelines and Inspection Procedures

Recommendation 7 – Develop New Testing Requirements

The Department will develop surface and subsea testing of ROV and BOP stack capabilities. These will include:

- Surface and subsea function and pressure testing requirements to ensure full operability of all functions (emergency disconnect of the LMRP and loss of communication with the surface control pods (e.g., electric and hydraulic power)).

- Third party verification that blind-shear rams will function and are capable of shearing the drill pipe that is in use on the rig.

- ROV performance standards, including surface and subsea function testing of ROV intervention ports and ROV pumps, to ensure that the ROV can close all shear and pipe rams, close the choke and kill valves, and unlatch the LMRP.

- Protocols for function testing autoshear, deadman, emergency disconnect systems, and acoustic activation systems.

- Mandatory inspection and testing of BOP stack if any components are used in an emergency (e.g., use of pipe or casing shear rams or circulating out a well kick). This testing must involve a full pressure test of the BOP after the situation is fully controlled, with the BOP on the wellhead.

Recommendation 8 – Develop New Inspection Procedures and Reporting Requirements

- The Department will evaluate and revise the manner in which it conducts its drilling inspections. Revised drilling inspections will include the witnessing of actual tests of BOP equipment, including the new requirements and guidance that address the surface and subsea testing of ROV and BOP stack capabilities. The Department will also develop methods to increase transparency and public availability of the results of inspections as well as routine reporting. The Department will work with Congress to obtain the necessary resources to implement these recommendations.

- Within 15 days of the date of this report, all operators of floating drilling equipment will report to the Department the following: (i) BOP and well control system configuration; (ii) BOP and well control system test results, including any anomalies in testing or operation of critical BOP components; (iii) BOP and loss of well control events; and (iv) BOP and well control system downtime for the last three years of drilling operations.

- The electronic log from the BOP control system must be transmitted online to a secure location onshore and made available for inspection by the Department.

II. Procedures to Ensure Adequate Physical Barriers and Well Control Systems are in Place to Prevent Oil and Gas from Escaping into the Environment

Minimizing Risk of Uncontrolled Flow: A well creates a conduit for subsurface formations to potentially flow uncontrolled to the surface. There are multiple methods that can be utilized to minimize the risk of the occurrence of uncontrolled flow. Those methods include the installation of rigid physical barriers such as cement plugs or mechanical plugs, well casing design and securing of the casing, and well control equipment. An appropriate well safety program must account for many factors unique to the drill location and dictates the installation of plugs and casing at strategic points to maintain well control and to enable drilling to the desired depth. Current Department regulations require that well-control equipment be in place at all times during the drilling operation to mitigate against failure of a plug or casing. Other, more specific standards may be appropriate to improve physical barriers and well-control systems. Well-control procedures must be revisited for deepwater operations because of the complexity of the equipment design in deepwater and the location of the BOP stack on the seafloor. Enhanced training for rig personnel will complement new well-control requirements.

A. Well-Control Guidelines and Fluid Displacement Procedures

Recommendation 1 – Establish Deepwater Well-Control Procedure Guidelines

As expeditiously as possible, the Department will establish new requirements for deepwater well-control procedures no later than 120 days of the date of this report.

Recommendation 2 – New Fluid Displacement Procedures

Prior to displacement of kill-weight drilling fluid from the wellbore, the operator must independently verify that:

- The BOPs are closed during displacement to underbalanced fluid columns to prevent gas entry into the riser should a seal failure occur during displacement.
- Two independent barriers, including one mechanical barrier, are in place for each flow path (i.e., casing and annulus), except that a single barrier is allowable between the top of the wellhead housing and the top of the BOP.
- If the shoe track (the cement plug and check valves that remain inside the bottom of casing after cementing) is to be used as one of these barriers, it is negatively pressure tested prior to the setting of the subsequent casing barrier. A negative pressure test must also be performed prior to setting the surface plug.
- Negative pressure tests are made to a differential pressure equal to or greater than the anticipated pressure after displacement. Each casing barrier is positively tested to a pressure that exceeds the highest estimated integrity of the casing shoes below the barrier.
- Displacement of the riser and casing to fluid columns that are underbalanced to the formation pressure in the wellbore is conducted in separate operations. In both cases, BOPs must be closed on the drill string and circulation established through the choke line to isolate the riser, which is not a rated barrier. During displacement, volumes in and out must be accurately monitored.
- Drill pipe components positioned in the shear rams during displacement must be capable of being sheared by the blind-shear rams in the BOP stack.

B. Well Design and Construction

1. Requirements for Both Casing and Cementing

Recommendation 3 – New Casing and Cement Design Requirements: Two Independent Tested Barriers

Before spudding any new floating drilling operation, all well casing and cement designs must be certified by a Professional Engineer, who verifies that there will be at least two independent

tested barriers, including one mechanical barrier, across each flow path during well completion and abandonment activities and that the casing design is appropriate for the purpose for which it is intended under reasonably expected wellbore conditions.

Recommendation 4 – Study Formal Personnel Training Requirements for Casing and Cementing Operations

The Department will immediately establish a technical workgroup to evaluate new training and certification requirements for rig personnel specifically related to casing and cementing operations.

2. Casing Requirements

Recommendation 5 – New Casing Installation Procedures

The Department will ensure the requirement of the following BAST practices:

- Casing hanger latching mechanisms or lock down mechanisms must be engaged at the time the casing is installed in the subsea wellhead.
- For the final casing string, the operator must verify the installation of dual mechanical barriers (e.g., dual floats or one float and a mechanical plug) in addition to cement, to prevent flow in the event of a failure in the cement.

Recommendation 6 – Develop Additional Requirements or Guidelines for Casing Installation

The Department will establish specific requirements for the following procedures and practices:

- Positive and negative test procedures and use of test results for evaluation of casing integrity.
- Use of float valves and other mechanical plugs in the final casing string or liner.

3. Cementing Requirements

Recommendation 7 – Enforce Tighter Primary Cementing Practices

- The Department will institute a rulemaking address previously identified gaps in primary cementing practices).
- The Department, with input from independent experts will determine specific cementing requirements.

Recommendation 8 – Develop Additional Requirements or Guidelines for Evaluation of Cement Integrity

The Department will immediately evaluate whether and under what circumstances the use of cement bond logs is feasible and practical and will increase safety.

Discussion of Recommendations 3-8

Recommendations 3-8 are intended to result in better well control. Requiring a Professional Engineer to review and certify the well design will add another level of review to the current well design requirements. The Department's review new training requirements for casing and cementing operations helps focus industry and rig personnel on the importance of proper casing and cementing operations. Additional operational requirements for casing installation and cementing operations will add new assurances that adequate barriers are in place before continuing on to new drilling activities. Incorporation of the new cementing standard will bring all of industry up to state-of-art cementing practices—this means less chance of a well blowout due to a poor cement job.

C. Wild-Well Intervention

Recommendation 9 – Increase Federal Government Wild-Well Intervention Capabilities

Blown out, or "wild" wells, involve the uncontrolled release of crude oil or natural gas from an oil well where pressure control systems have failed. The Federal Government must develop a plan to increase its capabilities for direct wild-well intervention to be better prepared for future emergencies, particularly in deepwater. Development of the plan should consider existing methods to stop a blowout and handle escaping wellbore fluids, including but not limited to coffer dams, highly-capable ROVs, portable hydraulic line hook-ups, and pressure-reading tools, as well as appropriate sources of funding for such capabilities.

Recommendation 10 – Study Innovative Wild-Well Intervention, Response Techniques, and Response Planning

The Department will investigate new methods to stop a blowout and handle escaping wellbore fluids. A technical workgroup will take a fresh look at how to deal with a deepwater blowout. In particular, the workgroup will evaluate new, faster ways of stopping blowouts in deepwater. The technical workgroup will also address operators' responsibility, on a regional or industry-wide basis, to develop and procure a response package for deepwater events, to include diagnostic and measurement equipment, pre-fabricated systems for deepwater oil capture, logistical and communications support, and plans and concepts of operations that can be deployed in the event of an unanticipated blowout, as well as assess and certify potential options (e.g., deepwater dispersant injection).

III. Organizational and Safety Management

A. Increased Enforcement of Existing Safety Regulations and Procedures

Enforcing Existing Regulations: Immediately following the BP Oil Spill, the MMS and the U.S. Coast Guard issued a joint Safety Alert to compel operators and drilling contractors to inspect their drilling equipment (both surface and subsea), review their procedures to ensure the safety of personnel and protection of the environment, and review all emergency shutdown and dynamic positioning procedures. Inspections began immediately to verify that all active deepwater drilling activities complied with these recommendations and all other regulations. Following the completion of the drilling inspections, inspections of all deepwater production facilities began immediately to ensure compliance by those facilities with the regulations. Reconfirmation of adherence to this Safety Alert and all existing regulations will heighten safety awareness.

Recommendation 1 – Compliance Verification for Existing Regulations and April 30, 2010, National Safety Alert

Within 30 days of the date of this report, the Department, in conjunction with the Department of Homeland Security, verify compliance by operators with existing regulations and National Safety Alert (issued April 30, 2010), which issued the following safety recommendations to operators and drilling contractors:

- Examine all well-control equipment (both surface and subsea) currently being used to ensure that it has been properly maintained and is capable of shutting in the well during emergency operations. Ensure that the ROV hot-stabs are function-tested and are capable of actuating the BOP.

- Review all rig drilling/casing/completion practices to ensure that well-control contingencies are not compromised at <u>any</u> point while the BOP is installed on the wellhead.

- Review all emergency shutdown and dynamic positioning procedures that interface with emergency well control operations.

- Inspect lifesaving and firefighting equipment for compliance with Federal requirements.

- Ensure that all crew members are familiar with emergency/firefighting equipment, as well as participate in an abandon ship drill. Operators are reminded that the review of emergency equipment and drills must be conducted after each crew change out.

- Exercise emergency power equipment to ensure proper operation.

- Ensure that all personnel involved in well operations are properly trained and capable of performing their tasks under both normal drilling and emergency well-control operations.

After the 30-day compliance period, the Department will provide a public report on operator verification, including any cases of non-compliance.

B. Organizational Management

Organizational Safety Case Documentation: A safety case is a comprehensive and structured set of safety documentation to ensure the safety of a specific vessel or equipment. This documentation is essentially a body of evidence that provides a basis for determining whether a system is adequately safe for a given application in a given environment. In response to the 1988 Piper Alpha disaster in the UK, the Lord Cullen investigation and report advanced the safety case concept for offshore oil and gas operations.

The use of a formal safety case for drilling operations is an important component in regulating drilling activities in many countries. The International Association of Drilling Contractors (IADC) has developed guidelines that can be applied to any drilling unit regardless of geographic location. The use of these guidelines can assist both the operator and regulatory authorities when evaluating a drilling contractor's safety management program by providing them assurance that the program encompasses a series of best industry practices designed to minimize operating risks. The Department will undertake an evaluation of requiring the application of all or part of these guidelines to OCS oil and gas operations.

Recommendation 2 – The Department Will Adopt Safety Case Requirements for Floating Drilling Operations on the OCS

The Department will assure the adoption of appropriate safety case requirements based on IADC Health, Safety and Environmental Case Guidelines for Mobile Offshore Drilling Units (2009), which will include well construction safety assessment prior to approval of APD. This safety case must establish risk assessment and mitigation processes to manage a drilling contractor's controls related to the health, safety, and environmental aspects of their operations. In addition to the safety case, a separate bridging document will be required to connect the safety case to existing well design and construction documents. Such a proposed Well Construction Interfacing Document will include all of the elements in a conventional bridging document plus alignment of the drilling contractor's management of change (MOC) and risk assessment to the lease operator's MOC and well execution risk assessments. The use of the IADC's Health, Safety, and Environmental Case Guidelines for Mobile Offshore Drilling Units will help operators and drilling contractors demonstrate their ability to operate safely and handle the risks associated with drilling on the OCS.

C. Personnel Accountability Procedures for Operational Safety (Risk, Injury, and Spill Prevention)

Recommendation 3 – Finalize a Rule that Would Require Operators to Develop a Robust Safety and Environmental Management System for Offshore Drilling Operations

Department investigation findings and reports indicate that unsafe offshore drilling operations often result from human error. The Department is proceeding with the rulemaking process to finalize a regulation to require operators on the OCS to adopt a comprehensive, systems-based approach to safety and environmental management that incorporates best practices from around the globe. The Department believes that requiring operators to implement robust and comprehensive safety and environmental management plans could reduce the risk and number of injuries and spills during OCS activities. The Department will finalize a rule that is informed by current operational conditions in the Gulf and the events and related investigation surrounding the BP Oil Spill.

Recommendation 4 – Study Additional Safety Training and Certification Requirements

The Department will immediately establish a workgroup to investigate safety training requirements for floating drilling rig personnel and possible requirements for independent or more frequent certification and testing of personnel and safety systems.

- Establish an oil production safety program or institute similar to U.S. Nuclear Regulatory Commission (NRC) reactor safety program.
- Establish a formalized analytical methodology to assess performance of safety systems in the event of multiple component failure or excursions outside normal environmental ranges.
- Strengthen technical support to the Department and other regulatory authorities, including the resources necessary to obtain independent technical review of regulations and standards.
- Charter a longer-term technical review of BOP equipment and emergency backup system reliability.
- Review and adopt as appropriate best practices from other agencies with similar responsibility for safety regulation of technically complex systems (e.g., Federal Aviation Administration, NRC, Chemical Safety Board, and National Transportation Safety Board).

VII. Conclusion

The Department developed these recommendations with input and suggestions from experts from across the field and reviewed by members of the National Academy of Engineering. The

Department has presented new requirements for well design, construction and operation and for the quality and sufficient redundancy of fail-safes, so as to promote better well control and ensure the efficacy of the BOPs. The Secretary of the Interior has directed the Department to develop measures to increase the frequency, thoroughness, and transparency of inspections, such as for testing of BOPs and associated back-up systems. The Secretary has also directed the Department to look at innovative ways of promoting a greater culture of safety through a new rule that would require all rig operators to develop enhanced operational, safety, and environmental management plans, which would include more extensive worker training to enable them to adapt and respond effectively to events when something unexpected happens on a drilling rig.

The Department's approach to implementing these recommendations will follow a continuum from near-term prescriptive regulations, which are required to increase immediately the margin of safety in offshore oil and gas development, to longer-term actions designed to facilitate an environment where the absolute highest standard of performance is demanded of industry. This approach puts the onus on industry to perform safely, with the Government focusing on aggressive verification and enforcement. The majority of the specific recommendations contained in this report fall within the category of near-term prescriptive actions necessary to increase offshore energy production safety immediately.

At the same time, the Secretary has directed a fundamental restructuring of the MMS to bring greater clarity to the roles and responsibilities of the Department while strengthening oversight of the companies that develop energy in our Nation's waters. This restructuring, the latest in a series of reforms to the MMS that the Secretary began in January 2009, will establish:

- Bureau of Ocean Energy Management: A new bureau under the supervision of the Assistant Secretary for Land and Minerals Management that will be responsible for the sustainable development of OCS conventional and renewable energy resources, including resource evaluation, planning, and other activities related to leasing.

- Bureau of Safety and Environmental Enforcement: A bureau under the supervision of the Assistant Secretary for Land and Minerals Management that will be responsible for ensuring comprehensive oversight, safety, and environmental protection in all offshore energy activities.

- Office of Natural Resources Revenue: An office under the supervision of the Assistant Secretary for Policy, Management and Budget that will be responsible for the royalty and revenue management function including the collection and distribution of revenue, auditing and compliance, and asset management.

Another critical part of the ongoing effort to reform the MMS began in September 2009 when the Secretary asked the National Marine Board, an arm of the highly respected National Academy of Sciences, to direct an independent review of MMS's inspection program for offshore facilities. That review is on-going.

The Secretary is committed to implementing the changes recommended in this report at the same time this and other reviews are ongoing and at the same time that the Department undertakes

fundamental change in its OCS oversight. The Secretary established by Secretarial Order 3298 the OCS Safety Oversight Board. The OCS Safety Oversight Board is a high-level team, led by the Assistant Secretary for Land and Minerals Management, the Assistant Secretary for Policy, Management and Budget, and the Inspector General, that reviews and oversees OCS operations to support reasoned and fact-based recommendations for potential improvements.

The success of the Department's longer-term objective of creating a more dynamic and effective regulatory environment for offshore energy production overall is very much the focus of the efforts to restructure the MMS. Specifically, the persons responsible for designing the new Bureau of Safety and Environmental Enforcement have been tasked to create a structure, operational processes, and culture that supports both the longer-term recommendations contained in this report, as well as a continuously evolving set of additional policies and practices that provide the highest assurance of safety in offshore energy operations.

As the Presidential Commission completes its review and as the Department and the U.S. Coast Guard finish the root cause investigation, the Department will know more and will respond accordingly. The measures contained in this report will increase the safety in offshore oil and gas development, but represent only the beginning of the Department's work.

Appendix 1: Expert Consultations

The Department consulted with a wide range of experts in state and Federal governments, academic institutions, and industry and advocacy organizations. In addition, draft recommendations were peer reviewed by seven experts identified by the National Academy of Engineering.

Expert Reviewers of the National Academy of Engineering

- **Bea, Robert** holds a Bachelor of Science in Civil Engineering and a Master of Science in Engineering both from the University of Florida. Dr. Bea has done post-graduate studies at Tulane University, Rice University, Texas A&M University, Bakersfield College, University of Houston, and the Technical and Scientific University of Norway. Dr. Bea received a PhD from the University of Western Australia. He is a registered Professional Civil Engineer (retired) in Louisiana, Texas, Florida, Alaska, Washington, Oregon and California. He is a registered Professional Geotechnical Engineer (retired) in California. He is a member of the American Society of Civil Engineers, the American Society of Mechanical Engineers, and the National Academy of Engineering. Dr. Bea has 55 years of experience in engineering and management of design, construction, maintenance, operation and decommissioning engineered systems, including offshore platforms, pipelines and floating facilities. Dr. Bea has worked for the U.S. Army Corp of Engineers, Shell Oil Company, the Ocean Services Division of Woodward-Clyde Consultants, PMB Engineering – Bechtel Inc., and the University of California at Berkeley where he is currently a professor. In 2009, he was honored by the Offshore Technology Hall of Fame.

- **Brett, Ford** holds a Bachelor of Science in mechanical engineering and physics from Duke University as well as a Master of Science in Engineering from Stanford University and a Masters of Business Administration from Oklahoma State University. Mr. Brett is recognized as a leader in the area of Petroleum Project Management. He has consulted more than 25 countries in the area of petroleum project and process management. Formerly, Mr. Brett worked with Amoco Production Company where he specialized in drilling projects in the Bering Sea, North Slope of Alaska, Gulf of Mexico, offshore Trinidad and Wyoming. In 1996, Mr. Brett was nominated for the National Medal of Technology, the U.S. Government's highest technology award. Mr. Brett has been granted over 25 U.S. patents.

- **Baugh, Benton** holds a Bachelor of Science in Mechanical Engineering from the University of Houston; a Master of Science in Mechanical Engineering and PhD in Mechanical Engineering from Kennedy Western University. Additionally, Dr. Baugh graduated from the Army Machinist School. Dr. Baugh has been employed by Bowen, Camco, Cameron, Vetco, Brown Oil Tools, and Baugh Consulting Engineers. Dr. Baugh is the owner and President of Radoil, Inc., which designs and manufactures oilfield and subsea products. Dr. Baugh has received over 100 U.S. patents for his tool and solution designs, consulting and management. Dr. Baugh has over 50 years of oilfield machine design, manufacturing, management, consulting, and expert witness experience.

- **Chenevert, Martin** holds a Bachelor of Science in Petroleum Engineering from Louisiana State University as well as a Master of Science in Petroleum Engineering and a Doctor of Philosophy in Petroleum Engineering, both from the University of Texas at Austin. Dr. Chenevert has over ten years of industrial experience with Exxon Production Research and Exxon USA and over 30 years of teaching experience from Oklahoma State University, the University of Houston, and the University of Texas. Dr. Chenevert has published over 120 articles on well control, wellbore stability, rock mechanics, drilling fluids, and cementing.

- **Holand, Per** graduated from Norwegian University of Science and Technology in 1982 with a Master of Science in Mechanical Engineering. He has 18 years experience from safety and reliability engineering at SINTEF, prior to joining ExproSoft on May 1, 2001. His main work focus in SINTEF and ExproSoft has been on the reliability of drilling equipment, offshore blowout experience, subsea and well reliability analyses. Dr. Holand carried out numerous subsea BOP reliability studies on behalf of clients in Norway, Brazil, the United States, and Italy. Since 1990 he has been responsible for maintaining the SINTEF Offshore Blowout Database, which serves as the key information in connection with blowout risk analyses in the North Sea area. Dr. Holand holds a PhD (1996) in safety and reliability engineering from the Norwegian University of Science and Technology in Trondheim, Norway. His PhD was later reworked and published as a book at the Gulf Publishing Company in 1997 (Title: Offshore Blowouts, Causes and Control).

- **Juvkam-Wold, Hans** holds a Bachelor of Science, Master of Science, and a Doctor of Science in Mechanical Engineering from the Massachusetts Institute of Technology. His area of expertise is buckling of tubular in horizontal drilling, well control, Arctic and offshore drilling, and dual-gradient drilling in ultra-deep water. Dr. Juvkam-Wold is a Registered Professional Engineer in Texas. Prior to his 24 years of teaching drilling experience at the University of Texas A&M, Dr. Juvkam-Wold has 20 additional years of oil industry experience: Juvkam-Wold has served as a Consultant for the National Institute of Standards & Technology; Frontier and Offshore Technology Co.; Western Irrigation Supply House; Oil & Gas Consultants Inc.; Ocean Drilling Program; Unocal E&P. He has served as the Gulf Mineral Resources Company's Representative on the industry's advisory committee on mine shaft drilling as well as manager of technical services and section supervisor of production engineering. Dr. Juvkam-Wold joined Texas A&M in 1985 with his main area of teaching and research in drilling; he is now a Professor Emeritus of Petroleum Engineering. Dr. Juvkam-Wold holds seven drill-related U.S. patents.

- **Stancell, Arnold** holds a Doctor of Science in Chemical Engineering from the Massachusetts Institute of Technology. Dr. Stancell is the retired Vice president of Mobil Oil, Exploration and Production, and Professor Emeritus, Chemical Engineering, Georgia Tech. Dr. Stancell was awarded nine U.S. patents and was inducted into the National Academy of Engineering and received the AIChE's National Award in Chemical

Engineering Practice. He is a licensed Professional Engineer in New York and Connecticut.

Other Experts Consultations

- **Arnold, Ken** holds a Bachelor of Science in Civil Engineering from Cornell University and a Master of Science in Civil Engineering from Tulane University. Mr. Arnold is currently a registered Professional Engineer in the State of Texas, is a member of the Marine Board of the National Research Council, Society of Petroleum Engineers, the Texas Society of Professional Engineers, was elected to the National Academy of Engineers in 2005 due to his work on offshore safety and is a member of the Academy of Medicine, Engineering and Science of Texas.

- **Danenberger, Elmer "Bud"** holds a Bachelor of Science degree in Petroleum and Natural Gas Engineering and a Master's degree in Environmental Pollution Control, both from Pennsylvania State University. After a 38-year career, Mr. Danenberger retired from the Department of the Interior's offshore oil and gas program in January 2010. During his career, Mr. Danenberger served as a staff engineer in the Gulf of Mexico regional office, Chief of the Technical Advisory Section at the headquarters office of the U.S. Geological Survey, District Supervisor for several MMS offices, and Chief of the Engineering and Operations Division at MMS Headquarters. For the last five years of his tenure at the Department, he served as Chief, Offshore Regulating Programs with responsibilities for safety and pollution prevention research, investigations, regulations and standards, and inspection and enforcement programs.

- **Epstein, Lois** holds a Bachelor of Science in Mechanical Engineering from Massachusetts Institute of Technology and a Master of Science in Mechanical Engineering from Stanford University. Ms. Epstein is currently a licensed engineer in Maryland. Ms. Epstein is a former Senior Engineer, Cook Inlet Keeper. Ms. Epstein is the President of LNE Engineering and Policy, which provides technical and policy consultant to non-profit organizations on oil/gas issues. Ms. Epstein was a public member of the Office of Pipeline Safety Federal Advisory Committee on Hazardous Liquid Pipelines from 1995 through 2007.

- **O'Reilly, David J.** is the retired Chairman and Chief Executive Officer of Chevron Corporation. Mr. O'Reilly is a native of Dublin, Ireland, where he earned his Bachelor's degree in Chemical Engineering from the University College, Dublin. Mr. O'Reilly started as a process engineer with Chevron Research Co in 1968 and after several decades and earning positions of increasing responsibility he was elected Senior Vice President and Chief Operating Officer of Chevron Chemical Company in 1989. Mr. O'Reilly was named Chairman and Chief Executive Office of Chevron Corporation on January 1, 2000, and he held that position until his retirement on December 31, 2009. Mr. O'Reilly is the Vice Chairman of the National Petroleum Council. He is a director of Bechtel Group, Inc., a member of The Business Council, the World Economic Forum's International Business Council, and the American Society of Corporate Executives. He also serves on the San Francisco Symphony Board of Governors.

- **Regg, Jim** holds a Bachelor of Science in Petroleum and Natural Gas Engineering from Pennsylvania State University as well as a Bachelor of Art in Math/Science from Edinboro State University. Mr. Regg worked for the Minerals Management Service Field Operations for almost 20 years where his primary focus was technology assessment. Currently Mr. Regg is a Senior Petroleum Engineer for the Alaska Oil & Gas Conservation Commission where he is responsible for managing the compliance inspection program (including investigations and enforcement); well integrity and regulation development.

- **Ward, E.G. "Skip"** holds a Bachelor of Science in Mechanical Engineering from Lamar University and a Master's and Doctorate in Mechanical Engineering from the University of Houston. Dr. Ward spent 30 years with Shell Oil Co. beginning in Shell Development's E&P Research Division in 1968 as a researcher. From 1981 to 1985, he supervised the Oceanographic Engineering section. From 1985 through 1994, he managed the Offshore Engineering Research Department. In 1994, Dr. Ward became the technology manager of Shell Offshore Inc's Deepwater Division where he was responsible for a group that designed deepwater structures and developed new structural concepts and components for deepwater production systems. Dr. Ward has been a member of the American Petroleum Institute since 1976 and received API's 30+ Years of Service Recognition Award in 2006. Dr. Ward served on the Marine Board of the National Academies for nine years. Dr. Ward is currently the Associate Director of the Texas Engineering Experiment Station's Offshore Technology Research Center.

- **West, Robin** is the current Chairman, Founder, and Chief Executive Officer of PFC Energy where he advises chief executives of leading international oil and gas companies and national oil companies on corporate strategy, portfolio management, acquisitions, divestitures, and investor relations. Before founding PFC Energy in 1984, Mr. West was the Assistant Secretary of Policy, Management and Budget at the Department of the Interior from 1981 through 1983. While there, he conceived of and implemented the Outer Continental Shelf Leasing Schedule and managed the $14 billion per year OCS budget policy. Mr. West also served as the Deputy Assistant Secretary of Defense for International Economic Affairs during the Ford Administration. Mr. West has served on several boards and commissions including a Presidential appointment to the National Advisory Committee on Oceans and Atmosphere in 1977. Mr. West is also a member of the National Petroleum Council; Director of the Magellan Petroleum Corporation; Director of Key Energy Services, Inc and Director of Cheniere Energy. He earned his Bachelor of Arts from the University of North Carolina at Chapel Hill and a Juris Doctorate from Temple University.

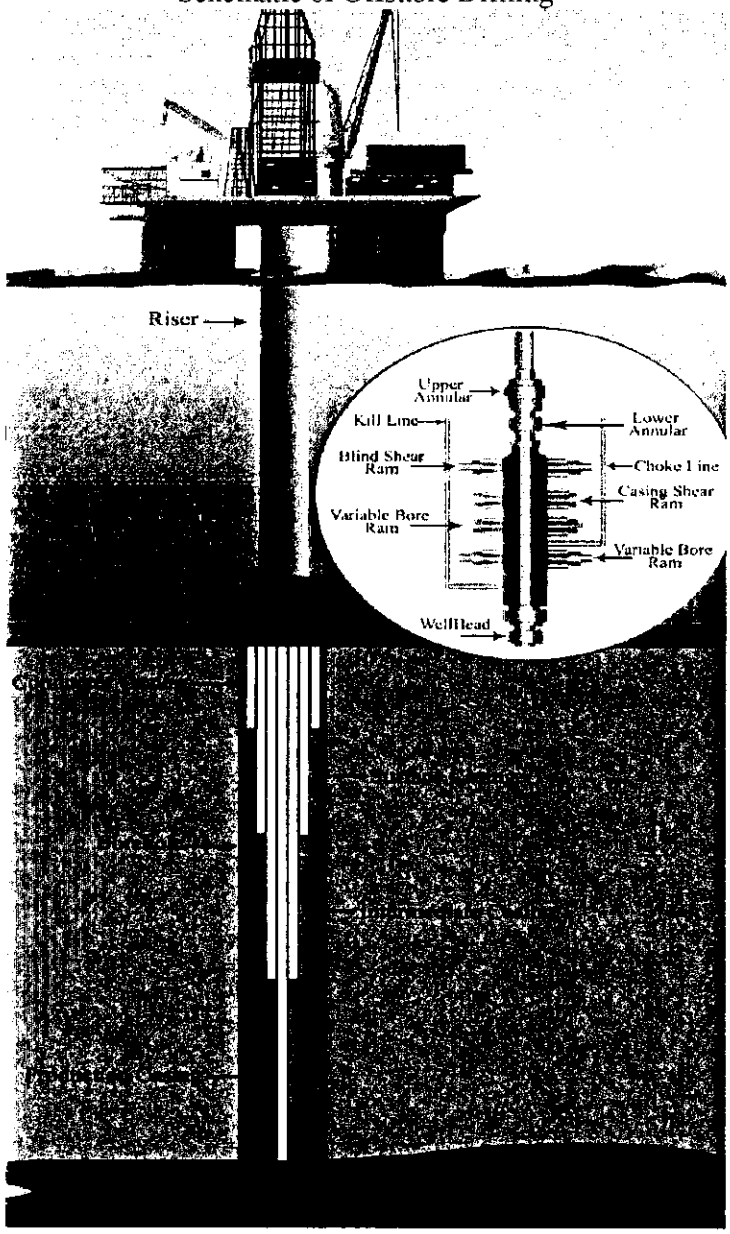
- **Williams, Tom** has been in the energy business for over 28 years. He is currently the Managing Director of Nautilus International LLC. Mr. Williams served as President of Maurer Technology Inc, a leading drilling research and development and engineering technology company. From 1993 through 2000, he was Business Director at Westport Technology Center, a leading upstream oil and gas research company. Mr. Williams held senior executive positions at the Departments of the Interior and Energy during the Bush

Administration from 1989 through 1993. He owned and operated an oil and gas exploration, production and consulting company prior to joining the Department of Energy. Mr. Williams is currently on the Board of Directors of Far East Energy Corporation, a public oil and gas company with operations in China; Board of Directors of Petris Technology, Inc. TerraPlatforms LLC; The Research Partnership to Restore Energy for America; The Contributor Committee Co-Chair of DeepStar Consortium; The Society of Petroleum Engineers; The Independent Petroleum Association of America; The International Association of Drilling Contractors; the American Association of Drilling Engineers. Mr. Williams' Environmentally Friendly Drilling Project was awarded the Environmental Stewardship Award by the Interstate Oil and Gas Compact Commission in May of 2010.

Appendix 2: Brief Primer on Offshore Drilling Technology and Systems

The process for an offshore oil and gas exploratory well begins by positioning a drill rig above the intended leasing tract for exploration (see Figure A1).

Figure A1
Schematic of Offshore Drilling



Source: Minerals Management Service Database, 2010.

The rig lowers drill pipe (also known as a drill string) with a drill bit attached to its end to the seafloor where it commences to drill. The borehole created by the drill is then set with casing. At the seafloor, conductor casing is normally set to stabilize the soft sediments at the top of the borehole to ensure that continued drilling does not precipitate a borehole collapse. Once the conductor is in place, the drill rig lowers to the seafloor a marine riser (a large pipe that surrounds the drill pipe) that connects the conductor casing to the drill rig. As drilling proceeds, a blowout preventer (BOP) is lowered to the seafloor and sits atop the wellhead.

As drilling progresses with depth, additional casings (sections of pipe) that are slightly narrower in diameter than the hole created by the drill bit are inserted into the borehole and bonded into place by "cement." This process ensures that the borehole does not collapse on itself, and it isolates the borehole from any pockets of gas or water in the strata that the borehole passes through. A series of casings of equal diameter that are connected together and run down the borehole is a "string" and a string may be hundreds to thousands of feet long with a threaded connector between each 30-foot segment of casing. Deeper into the borehole, narrower casings are inserted one into the other resulting in strings of casing that are enclosed and cemented into the previous, slightly wider-diameter string of casing. The outermost casing can be up to four feet in diameter with the innermost string of casing less than six inches in diameter in some cases. The initial and final casing diameters, the types of casing, and type of cement used are determined by the profile (depth, temperature, pressure, etc.) of the well being drilled. Once the well is in production, the hydrocarbons will come to the surface through the production casing that is run down through the middle of the narrowest casing string.

During the process of drilling, drill fluid, referred to as "mud," is pumped down the drill pipe through drill bit nozzles. The mud's primary function is maintaining "well control," but it also cools the drill bit and carries the drill cuttings away from the bottom of the borehole and returns to the surface through the space (the annulus) between the drill pipe and the walls of the casing strings. To maintain well control, the pressure created by the weight of the mud in the drill pipe and annulus must be maintained equal to or greater than the pressures encountered in the borehole. Various indicators of well pressure measures allow the mud engineer on the rig to maintain the well bore fluid pressure equal to or slightly greater than the pressures from the deepest formation. This type of pressure balance is called overbalanced.

The pockets of oil, gas, or water that are encountered in porous layers during the drilling process can suddenly push the mud through the annulus with considerable pressure—what is referred to as a "kick." When a kick occurs there are various bypass mechanisms, such as diverters and BOPs, to shunt the pressure away from the well bore (diverter) or prevent the pressure from rising to the ocean surface (BOP), thereby maintaining well control. If a kick overwhelms the control mechanisms, a blowout can occur.

A BOP consists of a series of ram and annular preventers that sits atop the wellhead and connects to one of the outermost casing strings, allowing the narrower casing strings and drill pipe to be lowered down the borehole through the center of the BOP. In the event of significant loss of well control, one or more of the preventers can be activated from the drill rig. The annular preventer is typically the first to be utilized when an influx from a formation is experienced, but is not usually used with pressures above 3,500 pounds per square inch (psi). The pipe (variable

bore) rams are utilized for pressures above 3,500 psi. A pipe ram and/or annular preventer will be closed around the drill pipe shutting off the upward movement of mud and pressure through the annulus between the drill pipe and the casing string. A blind-shear ram can be used to cut through the entire drill pipe and seal the borehole. In the event that activation from the drill rig fails, BOPs may have one or more back-up means for activating the rams. Remote operated vehicles (ROVs) can trigger closure of the rams working at the BOP. Other redundant control systems include "acoustic switch" technology which can activate the BOP with an acoustic signal from the rig through the water. Another device called a "deadman" switch automatically closes rams if the BOP loses connection electronic or hydraulic communication with the drill rig for any reason.

The BOPs are a hydraulically activated device. The hydraulics are supplied by the accumulator system located on the rig through lines that run down the riser and connect to the BOP. The BOP contains control devices called pods which are blue and yellow. The hydraulic fluid is distributed by the pod to the desired components of the BOP. The communication system to the pod may either be a pilot hydraulic system or an electro-hydraulic system. The pilot hydraulic system uses hydraulic pressure to function the pod and the electro-hydraulic system uses electrical signals to communicate with the pod. All commands for the system are sent from the control panel on the rig. The subsea BOP also contains pre-charged bottles that provide hydraulic fluid to activate the BOP's auto shear or deadman devices in the event of disconnects. The BOP is also equipped with an ROV "hot stab" panel that allows the hydraulic line(s) from the accumulator system to be isolated in order for the ROV to "stab" in a separate control line and directly pump into the BOP to function the rams via a pump mounted on the ROV. The panel for the ROV to "stab" into may be capable of activating all rams or only designated ram(s).

June 30, 2010

To: Tommy Beaudreau

From: Walter Cruickshank

Subject: Drilling Activities Rated by Relative Risk

[redacted]

(b) (5)

[redacted]

(b) (5)

[redacted]

(b) (5)

[redacted]

Other Factors

(b) (5)

[redacted]

OMB Control Number: 1010-0182
OMB Expiration Date: 12/31/2010

UNITED STATES DEPARTMENT OF THE INTERIOR
MINERALS MANAGEMENT SERVICE

NTL No. 2010-N05 Effective Date: June 8, 2010

NATIONAL NOTICE TO LESSEES AND OPERATORS OF FEDERAL OIL AND GAS LEASES, OUTER CONTINENTAL SHELF (OCS)

Increased Safety Measures for Energy Development on the OCS

Background and Purpose

This Notice to Lessees and Operators (NTL) implements certain safety measures outlined in the report entitled "Increased Safety Measures for Energy Development on the Outer Continental Shelf" (Safety Measures Report), dated May 27, 2010. The President requested that the Department of the Interior develop this report as a result of the Deepwater Horizon incident on April 20, 2010. This incident resulted in the death of 11 people, an oil spill of national significance, and the sinking of the Deepwater Horizon. Although the cause of the incident is currently under investigation, this incident highlights the importance of ensuring safe operations on the Outer Continental Shelf (OCS). The Secretary has a duty to ensure the OCS is managed in a safe manner, by considering available environmental information and implementing best available and safest technology. In furtherance of this duty, on June 2, 2010, the Secretary directed the Director, Minerals Management Service, to adopt the recommendations contained in the Safety Measures Report and to implement them as soon as possible.

This NTL addresses recommendations of the Safety Measures Report that warrant immediate implementation. The following paragraphs identify the specific recommendations from the Report and provide guidance to lessees and operators on the requirements they must meet. These recommendations apply to all activities on the OCS, including deepwater activity suspended under the Notice to Lessees to Implement the Presidential Directive to Impose a Moratorium on all New Deepwater Wells (NTL No. 2010-N04 - Moratorium NTL), and shallow water operations (under 500 feet in depth).[1]

General Certification of Compliance with Existing Regulations and National Safety Alert

Recommendation 1 of section III.A. of the Safety Measures Report directed the Department of the Interior, in conjunction with the Department of Homeland Security, to verify operator compliance with existing regulations and the joint Minerals Management Service (MMS) – United States Coast Guard (USCG) Safety Alert (SA), Deepwater Horizon Explosion and Fire

[1] The six month suspension under the Moratorium NTL was directed toward operations in water depths greater than 500 feet in the Gulf of Mexico and the Pacific Regions. The 500 feet specification was based on the fact that jack-up rigs and human diver capability does not exist beyond this depth, and therefore there are significantly greater challenges in containing a blowout in deep water. The six month suspension period coincides with the hurricane season and the timeline for the Presidential Commission to examine the root causes of the BP Oil Spill and develop options for guarding against and mitigating the impacts of oil spills. The suspension also provides the time necessary to develop regulations to address additional safety concerns described in the Safety Measures Report.

Resulting in Multiple Fatalities and Release of Oil, issued on April 30, 2010. This NTL informs lessees and operators that all operators are required to submit a general certification that they are knowledgeable of all operating regulations at 30 CFR 250 – Oil and Gas and Sulphur Operations in the OCS – and that they are conducting their operations in compliance with those regulations. Operators must review their operations to ensure that they are performed in a safe and workmanlike manner as required by §250.107(a)(1). In addition, each operator must certify that they have conducted the following specific reviews of their operations:

1. Examine all well control system equipment (both surface and subsea) currently being used to ensure that it has been properly maintained and is capable of shutting in the well during emergency operations. Ensure that Blowout Preventers (BOPs) are able to perform their designated functions. Ensure that the ROV hot-stabs are function-tested and are capable of actuating the BOP.
2. Review all rig drilling, casing, cementing, well abandonment (temporary and permanent), completion, and workover practices to ensure that well control is not compromised at any point while the BOP is installed on the wellhead.
3. Review all emergency shutdown and dynamic positioning procedures that interface with emergency well control operations.
4. Ensure that all personnel involved in well operations are properly trained and capable of performing their tasks under both normal drilling and emergency well control operations.

Operators must submit to MMS: (1) a general statement by the operator's Chief Executive Officer (authorized official) certifying the operator's compliance with all operating regulations at 30 CFR 250 and (2) a separate statement certifying compliance with each of the 4 specific items above.

You must certify each of the 4 specific items above separately, and include the following statement in your written certification: "By signing this certification, I certify in my capacity as authorized official that the statements herein are true and complete to the best of my knowledge. I understand that the submission of false statements to the United States is a criminal offense under 18 U.S.C. Section 1001."

Operators must submit these certifications by 5:00 pm EDT June 28, 2010, by mail or email to the address set forth below.

If an operator cannot certify compliance with the 30 CFR 250 regulations or any specific review items, then the operator must submit an explanation of the circumstances for failure to certify and a plan to certify, including a timetable for the certification. Failure to provide this certification will result in the issuance of an incident of non-compliance and may result in a shut-in order.

BOP Configuration and Performance Information

Recommendation 8 in section I.C. of the Safety Measures Report sets forth new reporting requirements for BOP stacks and loss of well control events. All operators that were conducting operations using a subsea BOP system or using a surface BOP stack on a floating platform on May 27, 2010, must submit BOP and well control system configuration information for the drilling rig that was being used. Operators must submit the following information by 5:00 pm EDT June 17, 2010, to the address set forth below:

1. BOP and well control system configuration. This includes the piping diagram of the stack and control system, including the BOP stations and accumulator system.
2. BOP and well control system test results, including any anomalies in testing or operation of critical BOP components. Submit test results (charts, digital pressure data, forms, etc.) and information on any initial failed test attempts and remedy to obtain a successful test.
3. BOP and loss of well control events. Document <u>any</u> loss of well control event, even if temporary, and the cause of the event. The operator does not have to include kicks that were controlled but should include the release of fluids through a diverter.
4. BOP and well control system downtime. Submit downtime related to BOP and well control system failures (failure to test properly).

Data for items 2, 3, and 4 is for the time period you have had the rig under contract, not to exceed three years.

Address for Submitting General Compliance Certification and BOP Information

Operators must submit their general compliance certification statement and BOP information to MMS by mail or email to:

Minerals Management Service
Office of Offshore Regulatory Programs
Attention: David Nedorostek
381 Elden Street, MS-4023
Herndon, VA 20170
or David.Nedorostek@mms.gov

Operators must identify the facilities they are certifying by region, company, MMS company number (5 digit), area and block, and rig name. Contact information and questions: David Nedorostek, 703-787-1029.

BOP Certification Requirements for Floating Drilling Operations

Recommendation 1 of section I.A. of the Safety Measures Report ordered immediate re-certification of all BOP equipment used in new floating drilling operations. Floating drilling operations includes drilling operations that use a subsea BOP system and drilling operations on a floating production platform that use a surface BOP system. Before beginning new floating drilling or resuming floating drilling operations that were suspended under NTL No. 2010-N04, you must have an independent third party conduct a detailed physical inspection and design review of the BOP. If you are currently conducting workover, completion, or abandonment activities you must conduct this inspection and design review before you begin work on another well. The design review must be conducted in accordance with the Original Equipment Manufacturer (OEM) specifications and § 250.446(a) and other applicable standards. The review must certify that:

(a) The BOP will operate as originally designed; and
(b) Any modifications or upgrades to the BOP stack conducted after delivery have not compromised the design or operation of the BOP.

You must submit a written and signed certification from the independent third party attesting to the information required above to the appropriate District Manager (Regional Supervisor for Field Operations in the Alaska OCS Region), and you must make this certification publicly available. A description of the qualifications of the independent third party should be attached to the certification. This certification is required one time only, on or after the effective date of this

NTL. for all BOP equipment used in floating drilling operations. Additional safety measures for BOP equipment set forth in the Safety Measures Report will be addressed in future rulemakings.

BOP Inspection, Maintenance, and Repair for All Wells
Recommendation 1 of section I.A. of the Safety Measures Report states that the operator must have documentation showing that the BOP has been maintained according to the regulations. You must maintain and inspect your surface and subsea BOP system according to the requirements in § 250.446(a). You must maintain records of your maintenance and inspections of your BOP systems according to the requirements of § 250.450 and make them available to MMS upon request. You must maintain records of any repairs made to your BOP system for the duration of the well work and make them available to MMS upon request.

BOP Compatibility Verification for All Wells
Recommendation 2 of section I.A. of the Safety Measures Report ordered operators to obtain independent third party verification that the BOP stack is designed for the specific equipment on the rig. Your BOP stack must be compatible with the specific well location, well design, and well execution plan. In the event of loss of well control, the BOP stack must provide a seal and contain wellbore pressure under all conditions expected in the wellbore. Before you begin drilling **any** new well or resume drilling **any** well you suspended drilling under NTL No. 2010-N04, you must obtain independent third party verification that shows the following:

(a) The BOP stack is designed for the specific equipment on the rig and for the specific well design (well location and well execution plan) including certification that the shear rams are appropriate for the project.
(b) The BOP stack has not been compromised or damaged from previous service.
(c) The BOP stack will operate in the conditions in which it will be used.

A description of the qualifications of the independent third party should be attached to the certification.

Secondary Control System Requirements and Guidelines for Subsea BOP Stacks
Recommendation 5 of section I.B. of the Safety Measures Report states that the Department will establish clear requirements for secondary BOP control systems. For all subsea BOP stacks, you must have a secondary control system with remote operated vehicle (ROV) intervention capabilities, including the ability to close one set of blind-shear rams and one set of pipe rams.

Your subsea BOP system must have an emergency shut-in system in the event that you lose power to the BOP stack, have an unplanned disconnection of the riser from the BOP stack, or experience another emergency situation. You must have both a deadman system and an autoshear system. In addition to these requirements, you may use an acoustic system to activate your BOP stack in case of an emergency. Your emergency shut down system must be powered by a separate and independent rechargeable subsea accumulator bank with sufficient capacity to close as a minimum one set of blind shear rams.

For purposes of this NTL, the definitions of "deadman system" and "autoshear system" are defined by American Petroleum Institute Spec 16D – Specification for Control Systems for Drilling Well Control Equipment and Control Systems for Diverter Equipment.

Deadman system means a safety system that is designed to automatically close the wellbore in the event of a simultaneous absence of hydraulic supply and signal transmission capacity in both subsea control pods. This is considered a rapid discharge system.

Autoshear system means a safety system that is designed to automatically shut in the wellbore in the event of a disconnect of the lower marine riser package (LMRP). When the autoshear is armed, a disconnect of the LMRP closes the shear rams. This is considered a rapid discharge system.

Dynamically positioned rigs must comply with these secondary control system requirements immediately. New secondary control system requirements for moored rigs will be established by rulemaking.

ROV Hot Stab Function Testing of the ROV Intervention Panel
Recommendation 6 of section I.B. of the Safety Measures Report states that the Department will develop requirements for ROV operating capabilities. You must function test the hot stabs that would be used to interface with the ROV intervention panel during the stump test. You must test the hot stabs at the same rate (gallons per minute) and pressure of the ROV pump with the ROV intervention panel during your stump test for subsea BOP stacks. At a minimum, these hot stabs must be capable of closing one set of blind-shear rams and one set of pipe rams, and unlatch from the LMRP. You must inform the appropriate District Manager (Regional Supervisor for Field Operations in Alaska OCS Region) at least 48 hours before you begin testing the BOP system so that MMS may observe or participate in the test. You must record and submit the results of the performance and function tests to the appropriate District Manager (Regional Supervisor for Field Operations in the Alaska OCS Region) within 14 days following completion of the tests.

Verification that Blind-shear Rams will Shear Pipe in the Hole
Recommendation 7 of section I.C. of the Safety Measures Report states that the Department will develop testing requirements for surface and subsea BOP stacks. The regulations at § 250.416(e) require the operator to provide information that shows the blind-shears rams installed in the BOP stack are capable of shearing the drill pipe in the hole under maximum anticipated surface pressure. You must obtain an independent third-party verification that provides sufficient information showing that the blind-shear rams installed in the BOP stack are capable of shearing the drill pipe in the hole under maximum anticipated surface pressures. A description of the qualifications of the independent third party should be attached to the certification.

BOP Inspection and Testing after Well Control Event for All Wells
Recommendation 7 of section I.C. of the Safety Measures Report states that the Department will develop testing requirements for surface and subsea BOP stacks. If you activate your blind-shear rams or casing shear rams in a well control situation in which pipe or casing was sheared, you must inspect and test the BOP stack and its components after the situation is fully controlled. You must physically inspect the BOP stack (retrieve a subsea BOP stack) to ensure that the stack and affected components will operate properly. You must conduct a full pressure test of the BOP stack before resuming operations. This inspection and testing must be documented as to the date, time, and description of the situation and the results of the inspection and testing.

Well Design and Construction for All Wells

Recommendation 3 of section II.B. of the Safety Measures Report establishes new casing and cementing design requirements and Recommendation 5 of section II.B. of the Safety Measures Report establishes new casing installation procedures. Thus, before you begin any new drilling operations using either a surface or subsea BOP stack or resume drilling operations that were suspended under NTL No. 2010 N04, you must have all well casing designs and cementing program/procedures certified by a Professional Engineer, verifying the casing design is appropriate for the purpose for which it is intended under expected wellbore conditions. Also, while installing casing you must:

(a) Ensure casing hanger latching mechanisms or lock down mechanisms are engaged at the time the casing is installed in the subsea wellhead; and

(b) Verify the installation of dual mechanical barriers (*e.g.*, dual floats or one float and a mechanical plug) in addition to cement to prevent flow in the event of a failure in the cement. This must be done for the final casing string. You must submit this verification to the appropriate District Manager (Regional Supervisor for Field Operations in Alaska OCS Region) no later than 30 days after installation of the dual mechanical barriers.

Submittal of Revised Application for Permit to Drill (APD)s or Application for Permit to Modify (APM)s

If you have an APD or APM that was previously approved but drilling has not commenced as of May 27, 2010, and you intend to conduct those operations, you must submit the relevant information discussed in this NTL prior to commencing those operations, and you may not commence drilling without MMS approval. The MMS will notify you within 10 days of receiving that information whether you must submit a revised APD or APM for approval before you may conduct those operations.

Authority

This NTL provides guidance and notifies lessees and operators that they must meet the specified requirements. The authority for these actions are found in the OCSLA, 43 U.S.C. 1331 et seq., and 30 CFR 250, specifically §§ 250.106(b) and (c), 250.107(d), 250.132(b)(3), 250.186(a), 250.401, 250.418(h), 250.421, 250.446(a), 250.447 (b), 250.469(d), 250.516(h) and (j), and 250.616(h). Specifically:

In § 250.106(b) and (c), the Director will regulate operations to prevent injury or loss of life and damage to or waste of any natural resource, property, or the environment.

In § 250.107(d), the Director may require additional measures to ensure the use of best available and safety technology (BAST): (1) To avoid the failure of equipment that would have a significant effect on safety, health, or the environment; (2) If it is economically feasible; and (3) If the benefits outweigh the costs.

In § 250.132(b)(3), you must make available to MMS to inspect all records of design, construction, operations, maintenance, repairs, or investigations on or related to the area.

In § 250.186(a), you must submit information and reports as MMS requires.

In § 250.401, you must take necessary precautions to keep wells under control at all times and you must use and maintain equipment and materials necessary to ensure the safety and protection of personnel, equipment, natural resources, and the environment.

In § 250.418(h), you must include with the APD such other information as the District Manager may require.

In § 250.421, the District Manager may approve or prescribe other casing and cementing requirements where appropriate.

In §§ 250.446(a), 250.516(h), and 250.616 you must maintain your BOP system to ensure that the equipment functions properly.

In §§ 250.447(b) and 250.516(j), the District Manager may require more frequent testing, as well as different test pressures and inspection methods, or other practices for BOP systems.

In § 250.469(d), you must submit other reports and records of operations.

Guidance Document Statement

The MMS issues NTLs as guidance documents in accordance with § 250.103 to clarify, supplement, or provide more detail about certain MMS requirements and to outline the information you must provide in your various submittals.

Paperwork Reduction Act of 1995 Statement

The Paperwork Reduction Act of 1995 (PRA) (44 U.S.C. 3501 et seq.) requires us to inform you that the MMS collects this information to carry out its responsibilities under the OCS Lands Act, as amended. The MMS will use the information to ensure safety and environmental protection on the OCS. No proprietary data are collected. This NTL references requirements already approved for 30 CFR part 250 under the following OMB control numbers: Subpart A – 1010-0114; Subpart D – 1010-0141; Subpart E – 1010-0067; and Subpart F – 1010-0043. This NTL requires new hour burdens; therefore, we have submitted to the Office of Management Budget (OMB) an emergency information collection for approval of these new burden hours. Once OMB has approved this collection of information, we will reissue this NTL with the OMB control number and expiration date. We estimate the public reporting burden specifically pertaining to the new requirements in this NTL to average 1.5 burden hours and $1,800 non-hour cost burdens (rounded) per response. An agency may not conduct or sponsor, and a person is not required to respond to, a collection of information unless it displays a currently valid OMB control number. The OMB has approved the collection of information and assigned OMB Control Number 1010-0182. Direct any comments regarding the burden estimate or any other aspect of this collection of information to the Information Collection Clearance Officer, Mail Stop 5438, Minerals Management Service, Department of the Interior, 1849 C Street, NW, Washington, DC 20240.

Contact

If you have any questions regarding this NTL, please contact the Gulf of Mexico Region by e-mail at MMS.FO.NTL@mms.gov or the Pacific Region's Rishi Tyagi by email at Rishi.Tyagi@mms.gov.

[ORIGINAL SIGNED BY]

Dated

James Kendall, Acting Associate Director
Offshore Energy and Minerals Management
Minerals Management Service

[redacted]

INTERAGENCY MEMORANDUM

TO: Mike Bromwich, Director, BOEM

FROM: Dr. Marcia McNutt, Director, USGS

DATE : June 28, 2010

SUBJECT: USGS Support for Macondo Well Control and Containment: Observations Regarding Technical Problems with Deepwater Efforts

I. BACKGROUND

(b) (5)

[redacted]

[redacted]

(b) (5)

[redacted]

[redacted]

(b) (5)

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(b) (5)

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(b) (5)

[redacted]

[redacted]

INFORMATION MEMORANDUM FOR THE SECRETARY

FROM: Solicitor

SUBJECT: Inspection History of Deepwater Horizon

DATE: May 15, 2010

Background

(b) (5)

[redacted]

[redacted]

(b) (5)

[redacted]

UNITED STATES DEPARTMENT OF THE INTERIOR
MINERALS MANAGEMENT SERVICE

NTL No. 2010-N06

Effective Date: June 18, 2010
Expiration Date: June 1, 2015

NATIONAL NOTICE TO LESSEES AND OPERATORS OF FEDERAL OIL AND GAS LEASES, OUTER CONTINENTAL SHELF (OCS)

Information Requirements for Exploration Plans, Development and Production Plans, and Development Operations Coordination Documents on the OCS

Purpose

Pursuant to 30 CFR 250.213(g) an Exploration Plan (EP) must be accompanied by a blowout scenario description. 30 CFR 250.243(h) imposes the same requirement for a Development and Production Plan (DPP) and a Development and Coordination Document (DOCD).[1] Pursuant to 30 CFR 250.219 and 250.250, all plans must also be accompanied by information regarding oil spills, including calculations of your worst case discharge scenario.

In April 2008, the Gulf of Mexico Region issued NTL No. 2008-G04 (Information Requirements for Exploration Plans and Development Operations Coordination Documents in the Gulf of Mexico),[2] and pursuant to 30 CFR 250.201(c), limited the information required to accompany plans you submit to the Minerals Management Service (MMS) with regard to a blowout scenario and worst case discharge scenario. The purpose of this Notice to Lessees and Operators (this NTL) is to rescind the limitations set forth in NTL No. 2008-G04 regarding a blowout scenario and worst case discharge scenario, and to provide national guidance to Lessees and Operators regarding the content of the information MMS requires in your blowout scenario and worst case discharge scenario descriptions. MMS will use this information, as well as other information and analyses, to comprehensively assess what changes may be needed to MMS program-wide requirements and to inform its review of future activities under EPs, DPPs and DOCDs.

This NTL does not apply to your plan if the only activity you wish to conduct under your plan is under an Application for Permit to Drill (APD) that was approved by MMS prior the date hereof, except that deepwater activities under an approved APD that are subject to the suspensions ordered to implement the drilling moratorium imposed by the Secretary on May 29, 2010 (NTL No. 2010-N04) are also subject to the information requirements of this NTL 2010-06.

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[1] EPs, DPPs and DOCDs are sometimes referred to in this NTL as "plans."
[2] NTL 2008-G04 continues information limitations from NTL 2003-G17, issued in 2003.

Background

Due to the explosion and sinking of the Deepwater Horizon, the resulting deaths of 11 people, and changing conditions caused by the blowout of the BP Macondo prospect well that was being drilled by the Deepwater Horizon, the MMS requires additional information concerning your planned activities.

Pursuant to the regulations at 30 CFR 250.284 and 250.201(b), the MMS may require you to submit additional information necessary to evaluate your proposed or existing plan or document. In accordance with the regulations, the MMS may also require you to provide information to demonstrate that you have planned and are prepared to conduct your proposed activities in a manner that conforms with all applicable federal laws and regulations, is safe, conforms to sound conservation practices and does not cause undue or serious harm or damage to the human, marine or coastal environment pursuant to 30 CFR 250.202. This NTL describes the information you must submit to MMS.

The Secretary's Safety Measures Report, dated May 27, 2010, contains recommendations for immediate and long-term requirements to improve the safety of oil and gas operations in shallow and deep waters. In light of the Safety Measures Report, the MMS issued NTL No. 2010-N05, Increased Safety Measures for Energy Development on the OCS (Safety NTL). The Safety NTL requires you to submit additional safety information to MMS.

Information Requirements

Pursuant to this NTL, you must submit the following information with your new EP, (30 CFR 250.213 and 250.219), DPP, or DOCD (30 CFR 250.243 and 250.250), or as a supplement to your previously-submitted plan:

- A blowout scenario as required by 30 CFR 250.213(g) and 250.243(h). Provide a scenario for the potential blowout of the proposed well in your plan or document that you expect will have the highest volume of liquid hydrocarbons. Include the estimated flow rate, total volume, and maximum duration of the potential blowout. Discuss the potential for the well to bridge over, the likelihood for surface intervention to stop the blowout, the availability of a rig to drill a relief well, and rig package constraints. Specify as accurately as possible the time it would take to contract for a rig, move it onsite, and drill a relief well, including the possibility of drilling a relief well from a neighboring platform or an onshore location.

- Describe the assumptions and calculations that you used to determine the volume (daily discharge rate) of your worst case discharge scenario required by 30 CFR 250.219(a)(2)(iv) (for EPs) or 30 CFR 250.250(a)(2)(iv) (for DPPs and DOCDs). Provide all assumptions you made concerning the well design, reservoir characteristics, fluid characteristics, and pressure volume temperature (PVT) characteristics; any analog reservoirs you considered in making those

assumptions; an explanation of your reasons for using those analog reservoirs; and the supporting calculations and models you used to determine the daily discharge rate possible from the uncontrolled blowout portion of your worst case discharge scenario for both your proposed or approved EP, DPP or DOCD worst-case discharge scenario and your proposed or approved regional (Oil Spill Response Plan (OSRP) worst-case discharge scenario used in your comparison.

- Describe the measures you propose that would enhance your ability to prevent a blowout, to reduce the likelihood of a blowout, and conduct effective and early intervention in the event of a blowout, including your arrangements for drilling relief wells, and any other measures you propose.

Submittal of Additional Information

For the Gulf of Mexico OCS Region, submit the additional information described in this NTL by mailing it to: Regional Supervisor, Field Operations Plans Section (MS 5231) Minerals Management Service Gulf of Mexico OCS Region 1201 Elmwood Park Boulevard New Orleans, Louisiana 70123-2394. For the Alaska and Pacific OCS Regions, submit the additional information described in this NTL to the address and contact for the respective OCS Region that is used to submit EPs, DPPs, and DOCDs. For additional information submitted for approved plans or documents, provide the Plan Control Number of the referenced plan or document and include the Well Name for which you provided blowout and worst-case discharge scenario information.

Authority

Pursuant to 30 CFR 250.103, this NTL requires you to submit information and provides guidance on compliance with the regulations cited below:

- 30 CFR 250.106(c), concerning measures the MMS will require to prevent damage to or waste of any natural resource, property, or the environment.
- 30 CFR 250.107, which requires you to protect health, safety, property, and the environment by performing all operations in a safe and workmanlike manner and maintaining all equipment and work areas in a safe condition.
- 30 CFR 250.186(a), which provides that you must submit information and reports as MMS requires.
- 30 CFR 250.201, which provides that MMS may require you to submit additional information to assist MMS in evaluating proposed plan or document.
- 30 CFR 250.202, which requires you to demonstrate that you have planned, and are prepared to conduct, your proposed activities in a manner that conforms with applicable laws and regulations, is safe, conforms with conservation practices, and does not cause undue or serious harm to the environment.
- 30 CFR 250.213(g) and 250.243(h), which describe the blowout scenario information that must accompany an EP, DPP, or DOCD.
- 30 CFR 250.219(a)(2)(iv) and 250.250(a)(2)(iv), which describe calculated worst-case discharge spill volume information that must accompany an EP, DPP, or DOCD.

- 30 CFR 250.243, which describes the general information that must accompany a DPP or DOCD.
- 30 CFR 250.250, which describes the oil and hazardous substances spills information that must accompany your DPP or DOCD.
- 30 CFR 250.284, which provides that MMS may require you to submit additional information and to revise your EP, DPP, or DOCD.

Paperwork Reduction Act of 1995 Statement

The Paperwork Reduction Act of 1995 (PRA) (44 U.S.C. 3501 et seq.) requires us to inform you that the MMS collects this information to carry out its responsibilities under the OCS Lands Act, as amended. The MMS will use the information to ensure safety and environmental protection on the OCS. No proprietary data are collected. This NTL references requirements already approved for 30 CFR 250 under Subpart A – 1010-0114 and Subpart B – 1010-0151. This NTL requires new hour burdens; therefore, we have submitted to the Office of Management Budget (OMB) an emergency information collection for approval of these new burden hours. Once OMB has approved this collection of information, we will reissue this NTL with the OMB control number and expiration date. We estimate the public reporting burden specifically pertaining to the new requirements in this NTL to average 15 burden hours per respondent. An agency may not conduct or sponsor, and a person is not required to respond to, a collection of information unless it displays a currently valid OMB control number. Direct any comments regarding the burden estimate or any other aspect of this collection of information to the Information Collection Clearance Officer, Mail Stop 5438, Minerals Management Service, Department of the Interior, 1849 C Street, NW, Washington, DC 20240.

Contact

If you have any questions regarding this NTL, please contact the Gulf of Mexico OCS Region by email at nick.wetzel@mms.gov; the Pacific OCS Region at rishi.tyagi@mms.gov; or the OCS Alaska Region at jeffery.walker@mms.gov

Dated
June 18, 2010

Associate Director
Minerals Management Service

U.S. Department of Homeland Security

United States Coast Guard

Federal On-Scene Coordinator
Unified Area Command

Unified Area Command
Shell Oil Training Center
23260 Shell Lane
Robert, LA 70455

16480
16 Jun 10

MEMORANDUM

From: J. A. Watson, RADM
FOSC BP DEEPWATER HORIZON OIL SPILL

To: NIC

Subj: FOSC DETERMINATION UNDER 46 U.S.C. § 55113 CONCERNING OIL SPILL RESPONSE VESSELS CAPABLE OF SKIMMING OIL

1. Pursuant to my authority contained in 46 U.S.C. § 55113, I have determined that an adequate number of oil spill response vessels (OSRVs), as defined by 46 U.S.C. § 2101(20a), documented under the laws of the United States and capable of skimming oil cannot be employed in a timely manner to recover the oil released from the BP Deepwater Horizon spill.

2. Oil currently discharges into the Gulf of Mexico at unprecedented levels. There are simply not enough U.S. OSRVs capable of skimming oil available to keep up with the pace at which oil flows from the well. Until the flow is stopped, therefore, it is my opinion that domestic **and** foreign OSRVs capable of skimming oil are needed to provide adequate and timely protection to the Gulf Coast.

3. This determination applies only to OSRVs capable of skimming. No foreign OSRV may avail itself of any privileges conveyed by this determination unless its country has accorded to vessels of the U.S. the same privileges.

4. Respectfully request that U.S. Customs and Border Protection be notified of this determination.

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National Oceanic and Atmospheric Administration
U.S. Department of Commerce

NOAA's Oil Spill Response

Hurricanes and the Oil Spill

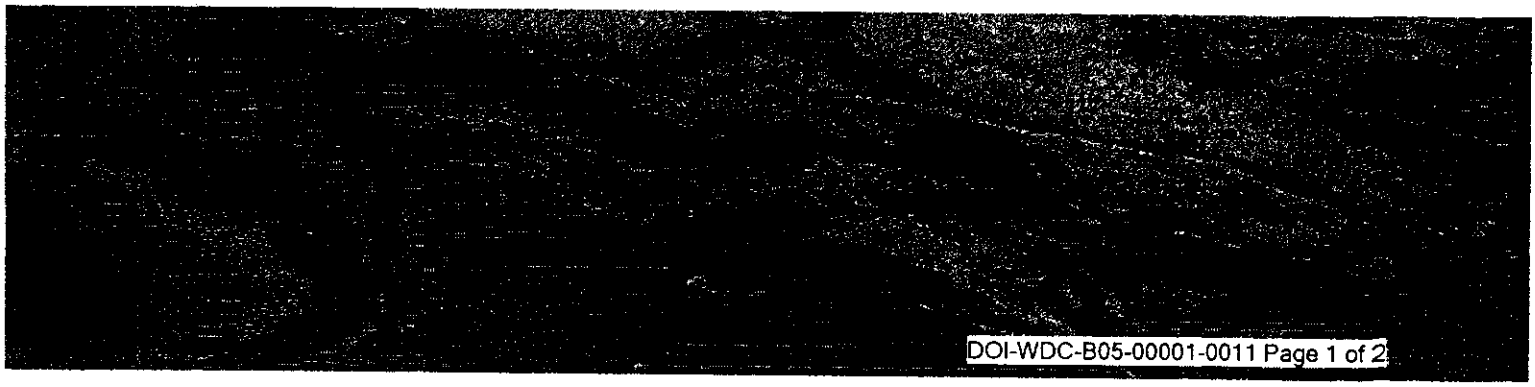
What will happen to a hurricane that runs through this oil slick?

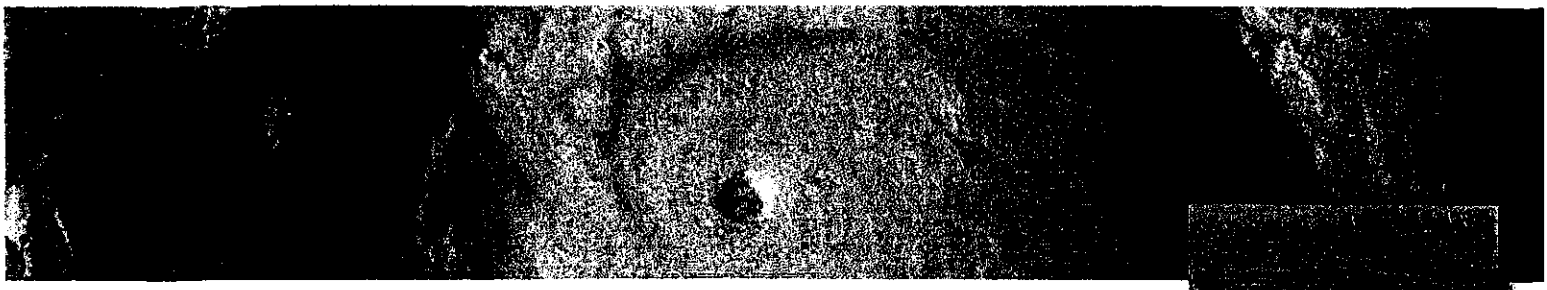
- Most hurricanes span an enormous area of the ocean (200-300 miles) — far wider than the current size of the spill.
- If the slick remains small in comparison to a typical hurricane's general environment and size, the anticipated impact on the hurricane would be minimal.
- The oil is not expected to appreciably affect either the intensity or the track of a fully developed tropical storm or hurricane.
- The oil slick would have little effect on the storm surge or near-shore wave heights.

What will the hurricane do to the oil slick in the Gulf?

- The high winds and seas will mix and "weather" the oil which can help accelerate the biodegradation process.
- The high winds may distribute oil over a wider area, but it is difficult to model exactly where the oil may be transported.
- Movement of oil would depend greatly on the track of the hurricane.
- Storms' surges may carry oil into the coastline and inland as far as the surge reaches. Debris resulting from the hurricane may be contaminated by oil from the Deepwater Horizon incident, but also from other oil releases that may occur during the storm.
- A hurricane's winds rotate counter-clockwise. Thus, in VERY GENERAL TERMS:
  - A hurricane passing to the west of the oil slick could drive oil to the coast.
  - A hurricane passing to the east of the slick could drive the oil away from the coast.
  - However, the details of the evolution of the storm, the track, the wind speed, the size, the forward motion and the intensity are all unknowns at this point and may alter this general statement.

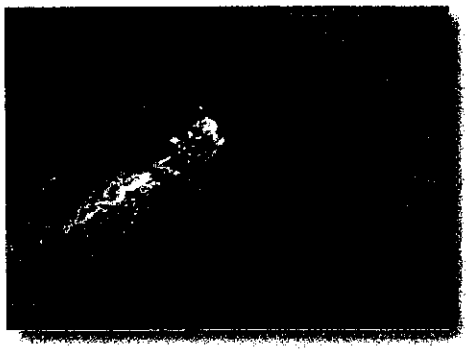
(continued on back)





Will the oil slick help or hurt a storm from developing in the Gulf?

- Evaporation from the sea surface fuels tropical storms and hurricanes. Over relatively calm water (such as for a developing tropical depression or disturbance), in theory, an oil slick could suppress evaporation if the layer is thick enough, by not allowing contact of the water to the air.
- With less evaporation one might assume there would be less moisture available to fuel the hurricane and thus reduce its strength.
- However, except for immediately near the source, the slick is very patchy. At moderate wind speeds, such as those found in approaching tropical storms and hurricanes, a thin layer of oil such as is the case with the current slick (except in very limited areas near the well) would likely break into pools on the surface or mix as drops in the upper layers of the ocean. (The heaviest surface slicks, however, could re-coalesce at the surface after the storm passes.)
- This would allow much of the water to remain in touch with the overlying air and greatly reduce any effect the oil may have on evaporation.
- **Therefore, the oil slick is not likely to have a significant impact on the hurricane.**



Will the hurricane pull up the oil that is below the surface of the Gulf?

- All of the sampling to date shows that except near the leaking well, the subsurface dispersed oil is in parts per million levels or less. The hurricane will mix the waters of the Gulf and disperse the oil even further.

Have we had experience in the past with hurricanes and oil spills?

- Yes, but our experience has been primarily with oil spills that occurred because of the storm, not from an existing oil slick and an ongoing release of oil from the seafloor.
- The experience from hurricanes Katrina and Rita (2005) was that oil released during the storms became very widely dispersed.
- Dozens of significant spills and hundreds of smaller spills occurred from offshore facilities, shoreside facilities, vessel sinkings, etc.

Will there be oil in the rain related to a hurricane?

- No. Hurricanes draw water vapor from a large area, much larger than the area covered by oil, and rain is produced in clouds circulating the hurricane.

Learn more about NOAA's response to the BP oil spill at http://response.restoration.noaa.gov/deepwaterhorizon.

To learn more about NOAA, visit http://www.noaa.gov.

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Summary of BP Deepwater Horizon Interim Incident Investigation (May 24, 2010) Washington Briefing
(Source: Powerpoint Presentation by BP on Deepwater Horizon Interim Incident Investigation (May 24, 2010)

BP's investigation team has 70 personnel and is reviewing reports, engineering drawings, real-time data transmitted from the rig, witness accounts (personnel both on rig and others involved in operations and planning of Macondo well), modeling & analysis, and aims to test equipment (cement sample, float collar, BOP). At the time of the briefing, certain key third party interviews and data (notably, Transocean) were not available. *(Slide 3)*

In several instances, ongoing BP investigative work on currently understood critical factors, incident timeline development and further lines of immediate inquiry into could inform future DOI safety decisions on the outer continental shelf.

A. Critical factors identified:

1) Loss of well integrity of the 9 7/8" and 7" casing created a path for hydrocarbon influx *(Slide 4)*
   - Ongoing BP investigative work that could inform future DOI safety decisions: review of design and execution of cement job; review of design and installation of casing shoe track and seal assembly; lab testing of float collar; well modeling to assess likely influx point *(Slide 5)*
2) Unrecognized well conditions (an unrecognized influx, unrecognized operational errors leading to that influx, and response failed to control well) *(Slide 6)*
   - Ongoing BP investigative work that could inform future DOI safety decisions: reconstructing timeline from available data and interviews to estimate when influx occurred & when it should have been recognized; looking at why well flow conditions were not detected earlier, what the crew response was to those conditions; reviewing the integrity testing procedure; and interviews with Transocean. *(Slide 6)*
3) BOP and emergency systems failed to isolate the hydrocarbon source
   - Ongoing BP investigative work that could inform future DOI safety decisions: understanding BOP testing history and performance of BOP emergency systems; understanding of BOP modifications and possible effect on functionality; asses indentified leaks; evaluate BOP maintenance history, OEM parts and 3rd party services; and an inspection and test of the BOP once retrieved from the sea floor *(Slide 7)*
4) Gas plume ignited (ignition of released hydrocarbons)
   - Ongoing BP investigative work that could inform future DOI safety decisions: results of fluid dynamic modeling of probable release scenarios, including access to pit rooms, mud pumps, access to derrick via degasser, or access to engine room; and a review of the electrical area classification, fire and as design and ventilation system design. *(Slide 8)*

Extra doc pe

BP reviewers are just beginning to put together, in incredible details, the critical timeline—in essence the story of what happened and when it happened. Better understanding and development of this timeline, particularly the final 18 minutes, is critical.

[redacted]

B. Critical timeline identified:

- 4/9/10 to 4/15/10 - Drilling completed and logging completed *(Slide 10)*
- 4/16/10 (14:00) to 4/17/10 (12:00) Wiper Trip *(Slide 11)*
- 4/17/10 (12:00) to 4/18/10 (00:30) Retrieve Wear Sleeve *(Slide 12)*
- 4/18/10 (00:30) to 4/19/10 (17:30) Run Casing and Convert Float Equipment *(Slide 13)*
- 4/19/10 (17:30) to 4/20/10 (00:30) Cement Job *(Slide 14)*
- 4/20/10 (00:30) to 4/20/10 (07:00) Set Seal Assembly – Lay Down Landing String *(Slide 15)*
- 4/20/10 (07:00) to 4/20/10 (12:00)Trip in and Casing Test *(Slide 16)*
- 4/20/10 (12:00) to 4/20/10 (15:00) Finish Trip in Hole *(Slide 17)*
- 4/20/10 (15:00) to 4/20/10 (15:54) Displace Boost, Choke and Kill Lines *(Slide 18)*
- 4/20/10 (15:56) to 4/20/10 (16:28) Pump Spacer *(Slide 19)*
- 4/20/10 (16:28) to 4/20/10 (16:52) Pump Seawater *(Slide 20)*
- 4/20/10 (16:53) to 4/20/10 (16:55) Shut Annular *(Slide 21)*
- 4/20/10 (16:55) to 4/20/10 (16:57) Bleed to 120 psi *(Slide 22)*
- 4/20/10 (16:57) to 4/20/10 (17:05) Bleed to 273 psi *(Slide 23)*
- 4/20/10 (17:05) to 4/20/10 (17:25) Drillpipe Pressure Builds/ Fill Riser *(Slide 24)*
- 4/20/10 (17:27) to 4/20/10 (17:52) Bleed from 1202 to 0 psi *(Slide 25)*
- 4/20/10 (17:52) to 4/20/10 (18:40) Bleed Kill Line/ Pressure Builds Gradually *(Slide 26)*
- 4/20/10 (18:40) to 4/20/10 (19:55) – Pressure Holds; Negative Test *(Slide 27)*
- 4/20/10 (19:55) to 4/20/10 (21:14) – Displace to Seawater *(Slide 28)*
- **4/20/10 (20:58) During displacement, pumps slowed following abnormal results; first indication of flow approx 51 minutes before explosion** *(Slide 30)*
- **4/20/10 (21:08) pump shutdown as spacer is observed at surface** *(Slide 31)*
- **4/20/10 (21:14) to 4/20/10 21:49 – Displacement is Resumed** *(Slide 33)*
- **4/20/10 (21:31) pump stops, a problem with the well is suspected (mud returns, abnormal pressures) and 4 calls are made from rig floor – chief mate discusses well with toolpusher on rig floor** *(Slide 33)*
- **<u>Final 18 minutes – data still under development</u>** *(Slide 34)*
- **4/20/10 (21:49) Explosion (data lost)** *(Slide 34)*
- **4/20/10 (21:56) Emergency Disconnect function activated by captain from bridge after explosion (no evidence that it properly activated)** *(Slide 35)*

C. BP Immediate Lines of Further Inquiry *(Slide 38)*

- BOP & control system maintenance
- BOP & primary emergency system testing
- BOP modifications
- BOP hydraulic leaks