

# Committee on Natural Resources

Rob Bishop, Chairman  
Hearing Memo

April 17, 2015

**To:** Natural Resource Committee Members

**From:** Majority Committee Staff  
Subcommittee on Energy and Mineral Resources

**Hearing:** *“Innovations in Safety Since the 2010 Macondo Incident.”*

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The Natural Resources hearing will take place on **Wednesday, April 22, 2015 at 9:30 a.m. in room 1324 Longworth House Office Building**. This hearing will focus on the many regulatory and industry driven changes that have been instituted in the five years following the tragic events surrounding the Macondo incident as well as the innovations in safety technology since that time.

## **Policy Overview**

- The Deepwater Horizon oil spill and subsequent explosion was a tragedy that resulted in the death of 11 individuals and resulted in the flow of 3.19 million barrels of hydrocarbons into the Gulf of Mexico – the largest oil spill ever in U.S. waters.
- American offshore energy production is vital to jobs, our economy and our national security, and it is important for these operations to be conducted with the utmost safety precautions to ensure nothing like this spill ever happens again.
- Industry has moved to enact significant reforms in the wake of this tragedy and the Bureau of Safety and Environmental Enforcement (BSEE) has followed by promulgating rulemakings that have followed industry standards; as a result, offshore drilling has been occurring safely in the Gulf since Macondo.
- All reforms and safety measures must find the delicate balance that demonstrates concrete results, while also encouraging the same innovative thinking that led to the new technologies used today to keep our offshore operations safe.
- As federal agencies move to keep pace with ever-evolving industry innovations in safety, it is important that layers of federal rulemakings and notices are not duplicative – and do not degrade the symbiotic goal of safe operations and increased exploration and production.

## **Witnesses Invited**

### **Panel I**

*Vice Admiral Brian Salerno (USCG, Ret.)*, Director  
Bureau of Safety and Environmental Enforcement  
U.S. Department of the Interior

### **Panel II**

*Ms. Holly Hopkins*  
Senior Policy Advisor, Upstream  
American Petroleum Institute  
Washington, DC

*Mr. Charlie Williams*  
Executive Director  
Center for Offshore Safety  
Houston, Texas

*Mr. David Coatney*  
Managing Director  
HWCG, LLC  
Houston, Texas

*Dr. Steven Murawski*  
Professor and Peter Betzer Endowed Chair of Biological Oceanography  
University of South Florida  
Tampa, Florida

### **Hearing Focus**

This hearing will focus on how the impacts of the April 20, 2010 Macondo oil spill have completely changed the playing field for offshore energy development in the United States. Many recommendations issued from various sources in the wake of the disaster have been met, such as the reorganization of the former Minerals Management Service (MMS) into three distinct agencies (Bureau of Ocean Energy Management, Bureau of Safety and Environmental Enforcement, and Office of Natural Resources Revenue), the establishment of offshore inspection fees on industry to recover the cost of inspections, the issuance of the Safety and Environmental Management Systems (SEMS) rule, passage of the RESTORE act which dedicated 80% of the Clean Water Act penalties related to the

Deepwater Horizon spill into a trust fund to be split among the five Gulf Coast states (Florida, Alabama, Mississippi, Louisiana and Texas) as well as a variety of other environmental restoration projects, and most recently the publication of the Well-Control (blowout preventer) rule – to name a few.

This disaster on one well in the Gulf had far-reaching regulatory impacts and no company with operations related to offshore energy production is exempt. Recovery in the Gulf is key – yet the purpose of this hearing is to focus on the safety reforms that have been put into place, both by industry and by BSEE, and to examine the impacts these reforms are having in ensuring that safe exploration and production can and will continue. While the intention of these many regulatory actions is to make offshore operations safer, in some cases the costs of different provisions in the regulation are severely underestimated, technical justification is lacking, and there is little measurable benefit to the overall end goal: safe operations. For instance, in the case of the Arctic Rule recently issued by BSEE, the agency estimated that the rule would cost \$1.2 billion over ten years. A separate cost benefit analysis commissioned by Shell<sup>1</sup> estimated that the standby relief rig mandate would cost \$3.2 billion, limited seasonal drilling schedule would cost \$6.8 billion, and other requirements in the rule would cost \$119 million – significantly higher than the government's estimate.

On April 13, 2015, BSEE issued the Well Control Rule (formerly called the Blowout Preventer Rule), which updates existing regulations already on the books - including the Drilling Safety Rule that was finalized in August 2012<sup>2</sup>, in order to enforce new standards for blowout preventers that are used for offshore facilities. This is one of the most technical rules released in recent years and was renamed the Well Control Rule as the scope of the rule extends beyond just blowout preventer regulations. Many in industry have yet to submit official comments as they are still combing through the details and determining how different provisions of the rule will impact existing operations in the Gulf and beyond. Industry representatives has indicated to Committee staff that several provisions of this rule lack technical justification and if enacted today, would prevent several major projects, which are currently being developed safely, from moving forward in the Gulf of Mexico. BSEE estimates the cost of this rule at \$883 million over ten years<sup>3</sup>.

Finally, the hearing will examine new technologies in offshore safety and how BSEE is working with industry to promote, not hinder, safety innovation in a highly regulated environment. Witnesses will speak to the ways that industry is constantly assessing their

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<sup>1</sup><http://www.reginfo.gov/public/do/eoDownloadDocument?pubId=&eodoc=true&documentID=770>; p.27.

<sup>2</sup> <http://www.bsee.gov/BSEE-Newsroom/Press-Releases/2012/BSEE-Releases-Offshore-Drilling-Safety-Rule/>

<sup>3</sup>[http://www.bsee.gov/uploadedFiles/BSEE/Regulations\\_and\\_Guidance/Recently\\_Finalized\\_Rules/Well\\_Control\\_Rule/2015-08587.pdf](http://www.bsee.gov/uploadedFiles/BSEE/Regulations_and_Guidance/Recently_Finalized_Rules/Well_Control_Rule/2015-08587.pdf); p. 21540.

own safety practices, finding areas that need improvement, and adapting those practices to make them better. We anticipate witness testimony to address:

- Industry standards, such as the Safety and Environmental Management Systems (SEMS) guidelines, and how industry-developed standards such as SEMS became the foundation upon which BSEE built their mandatory SEMS rule;
- How industry-driven safety standards are implemented across all offshore operations – and how industry collectively learns from third party auditing capabilities; and
- Innovations in safety technologies, and how those technologies are built with funding from private industry and tested alongside BSEE in order to be certified for offshore use in order to prevent future catastrophes.

## **Background**

The Macondo well was located in the Mississippi Canyon Block 252, which was leased to BP in June 2008. Permit work for this well was covered by the New Orleans District of the MMS Gulf of Mexico region. The well was located approximately 48 miles from the nearest shoreline, 114 miles from the shipping supply point of Port Fourchon, LA, and 154 miles from the Houma, Louisiana helicopter base. Well drilling began on October 7, 2009, using the *Marianas* rig (Transocean), but due to damage from Hurricane Ida in November 2009, the *Marianas* rig was replaced with the *Deepwater Horizon* rig in February 2010.

On April 20, 2010, the Macondo incident took the lives of eleven men, caused the explosion, destruction and sinking of the Mobile Offshore Drilling Unit (MODU) *Deepwater Horizon*, and led to the release of approximately 3.19 million barrels of oil in the Gulf of Mexico (4 million total discharged and 3.19 after factoring in oil collected).<sup>4</sup> The spill was the worst in the history of the United States and lasted approximately 87 days until the well was finally controlled on July 15, 2010. As the primary party responsible for the tragic incident, BP is responsible for the restoration efforts and making payments to those impacted by the 2010 spill. As of March 31, 2015, BP has paid over \$14 billion to individuals, businesses, government entities, and made other payments to restore local industries.<sup>5</sup>

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<sup>4</sup> <http://www.laed.uscourts.gov/OilSpill/Orders/1152015FindingsPhaseTwo.pdf>

<sup>5</sup> [http://www.bp.com/content/dam/bp/pdf/gulf-of-mexico/Public\\_Report\\_March\\_2015.pdf](http://www.bp.com/content/dam/bp/pdf/gulf-of-mexico/Public_Report_March_2015.pdf)

<b>Gulf of Mexico Oil Spill Claims and Other Payments Public Report - March 31, 2015</b>	
<b>Total Payment Overview</b>	<b>ITD</b>
<b>Individual &amp; Business</b>	
Claims Paid by BP Prior to August 23, 2010	\$395,619,857
Gulf Coast Claims Facility, the Transition Program, and Other Settlements	\$6,669,887,965
Court Supervised Settlement Program	
Economic & Property Damage	\$5,040,271,876
Medical <sup>1</sup>	\$80,340,073
BP Claims Program	\$13,973,364
Other Payments	\$62,200,000
<b>Total Paid - Individual &amp; Business</b>	<b>\$12,262,293,136</b>
<b>Government Entities and Other Payments</b>	
Government - Advances, Claims & Settlements	\$769,319,938
USCG/Federal Payments <sup>2</sup>	\$704,683,315
<b>Total Paid - Government</b>	<b>\$1,474,003,253</b>
<b>Total Paid - Other <sup>3</sup></b>	<b>\$332,040,398</b>
<b>Total Payments</b>	<b>\$14,068,336,787</b>

<sup>1</sup> Includes the Gulf Region Health Outreach Program, Specified Physical Conditions and Medical Consultations.

<sup>2</sup> US Coast Guard state reimbursements for response and removal costs included in state claim amounts

<sup>3</sup> Includes payments for Tourism, Seafood Marketing and Testing, Behavioral Health and 2010 Contributions

## Reports

In response to the Macondo incident, commissions were established to further investigate the events that transpired. Two reports are often referenced when discussing the Macondo Incident: the Joint Investigation Team Report (JIT) Report and the oil spill report from the President's National Commission on the BP Deepwater Horizon Oil Spill and Offshore Drilling<sup>6</sup>.

### Joint Investigation Team Report

On April 27, 2010, seven days following the incident, U.S. Coast Guard Commandant Adm. Thad W. Allen, Minerals Management Service Director S. Elizabeth Birnbaum, Department of Homeland Security Secretary Janet Napolitano and Department of the Interior Secretary Ken Salazar signed a jointly-issued Convening Order creating a Joint Investigation Team to "help both agencies [US Coast Guard (USCG) and the Minerals Management Service (MMS)] identify the casual factors that led to the blowout at the Macondo well and the explosion and fire on the *Deepwater Horizon* and make recommendations to prevent similar incidents in the future."<sup>7</sup>

Mr. David Dykes, MMS, and Captain Hung Nguyen, USCG, were named the co-chairs of the JIT. The USCG and MMS shared jurisdiction for the investigation of casualties occurring on the Outer Continental Shelf. The convening order signed by the Coast Guard

<sup>6</sup> <http://www.gpo.gov/fdsys/pkg/GPO-OILCOMMISSION/content-detail.html>

<sup>7</sup> <http://www.bsee.gov/uploadedFiles/JointMemo092011.pdf>

and MMS originally set a nine-month deadline for completion of the report – however the deadline was extended on several occasions due to the progress of the investigation and released in its completed form on September 14, 2011. The report was issued in two volumes given the differing jurisdictions between the Coast Guard and the Bureau of Offshore Energy Management, Regulation, and Enforcement (BOEMRE; which eventually was split into BOEM and BSEE).

The JIT was extremely thorough in their analysis of the events that led to the Macondo incident. “Together, the JIT held seven public hearings and took the testimony of more than 80 witnesses; conducted multiple interviews with more than 25 individuals; received, processed, and analyzed hundreds of thousands of pages of documents; and maintained custody of hundreds of pieces of physical evidence, ranging from small rock samples to the blowout preventer that had been in place at the Macondo wellhead.”<sup>8</sup>

This report came to the conclusion that that a series of poor choices and missed signals by the rig crew, paired with a failure in the Blowout Preventer stack - which prevented the blind shear ram from fully closing and sealing, escalated the temporary abandonment operations of April 20<sup>th</sup> into a months-long disaster in the Gulf.

The report specifically concluded that though greater regulations may have reduced the likelihood of the blowout itself, other factors were at play in the ignition and eventual explosion on the rig.<sup>9</sup> Failure by the crew to detect the blowout in a timely manner, the decision to direct the blowout to the mud-gas separator that could not handle that level of flow, and then the resulting flow of hydrocarbons onto the deck of the rig (instead of overboard) resulted in the ignition of the hydrocarbons led to the explosion, fatalities and subsequent sinking of the rig. In short, human error, lack of training, and deviations from existing safety protocol added to the causes and result of the incident.

In response to the findings, the JIT made recommendations to safely improve offshore operations in the following areas: well design (particularly for high flow potential wells), well integrity testing, kick detection and response, rig configuration, blowout preventers, and remotely- operated vehicles.<sup>10</sup>

### *The National Commission on the BP Deepwater Horizon Oil Spill and Offshore Drilling*

On May 22, 2010, President Obama announced Executive Order 13543 establishing the National Commission on the BP Deepwater Horizon Oil Spill and Offshore Drilling (the Commission). The Commission was created to examine the causes of the *Deepwater*

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<sup>8</sup> Ibid.

<sup>9</sup> JIT Report, Volume II; p. 7.

<sup>10</sup> Ibid; p. 201.

*Horizon* disaster and develop options to safeguard against future oil spill-related incidents. The Commission was instructed to submit a final report to the President with its findings and did so approximately seven and a half months later on January 11, 2011<sup>11</sup>.

Former Florida Governor and Senator Bob Graham and former Administrator of the Environmental Protection Agency William K. Reilly were named as commission co-chairs. Other commission members included the president of the NRDC, a professor of Marine Science and Vice Chancellor for Environmental Sustainability from the University of Maryland, an Executive Vice President from the National Geographic Society, a Dean from the Harvard School of Engineering and Applied Sciences, and the Chancellor from the University of Alaska Anchorage. At the time, the establishment of the Commission was highly criticized as a political maneuver – most notably in the Wall Street Journal opinion piece entitled: “The Anti-Drilling Commission.”<sup>12</sup>

While JIT Report was more technical in its evaluation and focused its investigation and findings on the actual cause of the Macondo spill, the Commission was much broader in its assessment despite the limited timeframe in which it prepared the report, as it was released just months after the disaster. The Commission concurred that a number of causes led to the Macondo incident, issuing a number of areas for improvement in the areas of safety and environmental protection, agency reorganization, further integration of agencies like NOAA, NMFS, EPA, and U.S. Fish and Wildlife Service, legislative suggestions to authorize new fees and increase liability caps under the Oil Pollution Act, strengthening National Environmental Policy Act (NEPA) provisions, U.S. Coast Guard forms to response and containment, compensation and restoration, as well as how to properly plan for prospective development of oil and gas in the Arctic.<sup>13</sup>

After the report was finalized and issued, members of the commission spun off to form: “Oil Spill Commission Action” (OSCA), a non-governmental organization which issues annual report cards on implementation of the BP Commission report recommendations. . Nearly all of the annual statements issued by this organization often deride Congress, while applauding industry and agency actions. In their 2014 statement, they noted that while they were disappointed with Congress, “...we are generally pleased with the way industry and the executive branch have moved ahead on the Commission’s recommendations to improve the safety of offshore drilling and the capacity to respond to spills.”<sup>14</sup> While this organization decries Congress’ “inaction,” the House Natural Resources Committee alone has conducted over 16 hearings on the subject of the Macondo incident. Congress has

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<sup>11</sup> <http://www.gpo.gov/fdsys/pkg/GPO-OILCOMMISSION/pdf/GPO-OILCOMMISSION.pdf>

<sup>12</sup> <http://on.wsj.com/1OPL4gf>

<sup>13</sup> <http://www.gpo.gov/fdsys/pkg/GPO-OILCOMMISSION/content-detail.html>

<sup>14</sup> <http://oscaction.org/2014-statement-by-the-co-chairs/>

appropriated increased funding to the agencies charged with governing offshore oversight (BOEM and BSEE) each year, has passed legislation that authorized inspection fees for ten years and codified the reorganization of the offshore agencies (H.R. 2231, 113<sup>th</sup> Congress), and has also provided BSEE with the authority through the annual appropriations process to charge inspection fees in order to offset increased offshore inspections.

### **Agency Reorganization**

The *Deepwater Horizon* explosion and subsequent oil spill in the Gulf of Mexico brought discussion of MMS reorganization to the forefront. One of the BP Commission's recommendations was to reorganize the agency into distinctly different agencies with separate missions. The reorganization was administered by a Secretarial Order issued by then-Interior Department Secretary Salazar on May 19, 2010. MMS was then renamed the Bureau of Ocean Energy Management, Regulation and Enforcement (BOEMRE). The revenue collection arm of MMS was withdrawn and became what it is known today, the Office of Natural Resources Revenue (ONRR) on October 1, 2010.

On January 19, 2011, the Secretary announced that BOEMRE was to be divided into two agencies, each with a very detailed and specific mission. On October 1, 2011, the Bureau of Ocean Energy Management (BOEM) and the Bureau of Safety and Environmental Enforcement (BSEE) were established. BOEM was essentially made the leasing arm – responsible for leasing activities, review and approval of exploration and development plans, seismic permitting, environmental studies including NEPA analysis on the 5-year plan, and resource evaluation. BSEE was established to enforce safety and environmental regulations which govern production of resources from the OCS, including permitting review and approvals, research, inspections, and oil spill response. While this division was a recommendation of the BP Commission, it remains to be seen as to whether or not splitting up the leasing and plan approval mission from the permit approval and safety enforcement mission has had measurable benefits in achieving more safe operations offshore. This split has most assuredly complicated the approval process considerably and will be examined further by the Committee.

### **Impacts of Regulatory Changes**

Acknowledging that the failure of the blowout preventer was just one of the contributing causes to the April 20<sup>th</sup> disaster, both industry and BSEE have developed a number of changes to the federal regulatory framework. Industry has also responded with standards that are accredited by the American National Standards Institute (ANSI). Most of these changes addressed the recommendations of the JIT and BP Commission reports. Many of these changes, including the complete reorganization of the MMS, have already



been put into place by regulatory action. Since the incident, the Department and its appropriate agencies have made substantial changes to policies affecting offshore activities including the new requirements to policies for Safety and Environmental Management Systems (SEMS)<sup>15</sup>; and the recently proposed Blowout Preventer Rule.

The Workplace Safety Rule also referred to as SEMS I was published on October 15, 2010. This rule, established under BOEMRE, was largely modeled on voluntary safety standards developed by the American Petroleum Institute (API), and required that all offshore facilities under BOEMRE jurisdiction adhere to them. The rule governs drilling, production, construction, well workover, well completion, well servicing, and DOI pipeline activities. It was agency's intention to reduce the risks of spills, accidents and injuries through the implementation of SEMS I.

The Workplace Safety Rule was later updated in April of 2013 with the publishing of Safety and Environmental Management Systems II (SEMS II). SEMS II revised and added additional levels of workplace safety for personnel. The new requirements included<sup>16</sup>:

- Development and implementation of a stop work authority that creates procedures and authorizes any and all offshore industry personnel who witness an imminent risk or dangerous activity to stop work.
- Development and implementation of an ultimate work authority that requires offshore industry operators to clearly define who has the ultimate work authority on a facility for operational safety and decision making at any given time.
- A required employee participation plan that promotes participation by offshore industry employees as well as their management to eliminate or mitigate safety hazards.
- Guidelines for reporting unsafe working conditions that enable offshore industry personnel to report possible violations of safety, environmental regulations requirements, and threats of danger directly to BSEE.
- Additional requirements for conducting a job safety analysis.
- Requiring the team lead for an audit be independent and represent an accredited audit service provider.

These new safety requirements continue what was established in the original Workplace Safety Rule, which was designed to prevent against accidents, injuries, and spills during the operation of oil and gas activities in the Outer Continental Shelf.

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<sup>15</sup> <http://www.crs.gov/pdfloader/R42942>; p.11.

<sup>16</sup> <http://www.bsee.gov/bsee-newsroom/bsee-fact-sheet/sems-ii-fact-sheet/>

On April 13, 2015, the Department of the Interior announced a new proposed offshore regulation to improve equipment and well control designs. The proposed rule seeks to update existing regulations currently in place related to the design, manufacture, and repair of blowout preventers (BOPs). Additionally, the rule requires yearly outside review of all maintenance related records to ensure that manufacturers' standards were kept as intended.<sup>17</sup> Finally, the rule addresses safety concerns well beyond simply addressing the blowout preventer by also requiring:

- Real-time monitoring capability between offshore operations and onshore technical experts<sup>18</sup>;
- Disclosure of drilling margins and adherence to new "safe margins" when filing the Application for Permit to Drill (APD);
- Performance objectives for the use of remotely operated vehicles (ROVs) to assist in closing the BOP stack; and
- Use of centralizers in cementing operations.

Given the technical complexity of this rule, many in industry are still reviewing the broad scope of the provisions and intend to be filing comments in the coming months.

### **Industry Response**

Following the Macondo incident, the oil and gas industry responded by joining together to launch a widespread review of the industry's offshore safety requirements. On top of adhering to federal regulations, companies also utilize voluntary, industry-driven standards and best practices to ensure a baseline of safe operations. Since 2010, API has published over 100 new and revised standards to address well design, operator/contractor interaction, and blowout prevention equipment – among many other safety initiatives.<sup>19</sup>

The Center for Offshore Safety was also established in Houston, Texas with a mission of promoting the highest level of safety for offshore drilling. The Center for Offshore Safety was built on the premise of collaboration with industry leaders, stakeholders, and the federal government to create the safest environment possible. Specifically, the center works with members to provide independent, third party auditing of the implementation of API standard (Recommended Practice 75) upon which the SEMS rule (issued by the federal government) was based. The Center works with companies to independently audit their use of safe operating procedures, safe work practices, extensive training, emergency response and control, among other important safety principles.

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<sup>17</sup> [http://www.nytimes.com/2015/04/14/us/new-regulation-aims-to-prevent-explosions-at-offshore-rigs.html?\\_r=0](http://www.nytimes.com/2015/04/14/us/new-regulation-aims-to-prevent-explosions-at-offshore-rigs.html?_r=0)

<sup>18</sup> Ibid.

<sup>19</sup> [http://www.api.org/~media/files/ehs/clean\\_water/oil\\_spill\\_prevention/after-macondo-report-april-2015.pdf](http://www.api.org/~media/files/ehs/clean_water/oil_spill_prevention/after-macondo-report-april-2015.pdf)

Additionally, the Macondo oil spill highlighted the importance of technological innovation in the field of well containment. While many different attempts were made at stopping the flow of hydrocarbons into the Gulf of Mexico, ultimately the idea of a “capping stack” was developed as possible solution. In July, a capping stack designed for the Macondo wellhead was moved into place by ROVs and placed on top of the failed blowout preventer riser - this stopped the flow from the well.

Given the success of this technology designed to stop the Macondo blowout, two independent companies were formed in 2010 - the Marine Well Containment Company (MWCC) and the Helix Well Containment Company (HWGC, LLC). Each are a consortium of offshore operators who saw the need to invest in this new technology as a way to add an additional layer of safety to future offshore drilling operations. Unlike the blowout preventer, the capping stack does not sit on the seabed – instead it is a post-blowout solution that can be quickly deployed to a well site and attached to a well head to stop the flow of hydrocarbons. The stack generally includes a valve that can then allow the flow of hydrocarbons and safely manage high pressures in the well. Both companies worked alongside BSEE and conducted successful well containment exercises with their respective capping stacks to show the capability of this new technology in a marine environment.<sup>20</sup>

### **Summary of Companies involved in Operations at Macondo Well**

**BP** – One of the two primary companies involved in drilling (aside from Transocean); Majority owner of the well and designated operator of the lease.

**Transocean** – Drilling contractor hired by BP on the Macondo well and owner of *Deepwater Horizon*, the Mobile Offshore Drilling Unit (MODU) or rig. Transocean is the world’s largest offshore drilling contractor, based out of Switzerland.

**Halliburton** – Provided cement planning, products and services at Macondo for well operations.

**Sperry Drilling (Sperry-Sun)** – Subsidiary of **Halliburton**; equipped *Deepwater Horizon* with Sperry data sensors and Sperry mudloggers to monitor and evaluate well condition data.

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<sup>20</sup> <http://www.bsee.gov/BSEE-Newsroom/Press-Releases/2012/BSEE-Announces-Successful-Completion-of-Deepwater-Well-Containment-Exercise-in-the-Gulf/>; <http://www.bsee.gov/BSEE-Newsroom/Press-Releases/2013/BSEE,-Noble-Energy-and-Helix-Well-Containment-Group-Successfully-Complete-Deepwater-Well-Containment-Exercise/>

**Anadarko E&P Company LP/Anadarko Petroleum Corporation** – American company and BP's partner in Macondo well; Anadarko E&P owned 22.5% of Macondo well – Anadarko Petroleum owned 2.5%.

**MOEX** – Japanese oil exploration company and partner of BP in Macondo well; owned 10% share of the well.

**Cameron** – Texas-based manufacturer; manufactured *Deepwater Horizon's* Blowout Preventer (BOP) stack.

**MI-SWACO** – Provided drilling mud and personnel to operate *Deepwater Horizon* mud system.

**Schlumberger** – Provided well logging services for Macondo well.

**Weatherford** – Provided the casing, casing centralizers, and float conversation equipment on *Deepwater Horizon*.