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Consequences of Macondo: A Summary of Recently Proposed and Enacted Changes to U.S. Offshore Drilling Safety and Environmental Regulation

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Abstract

Changes to U.S. offshore drilling safety and environmental regulations have been enacted post-Macondo and further changes are possible. New prescriptive rules for deepwater drilling will have a significant impact on drilling engineering, operations, and costs. Performance-based regulations that require all operators in the Outer Continental Shelf to implement a Safety and Environmental Management System have become law. This paper summarizes the BP Macondo blowout, including the response of government agencies and BP. Changes to U.S. Government regulations are then summarized, including a discussion of prescriptive versus performance-based regulation. It is concluded that the enacted and proposed changes to offshore drilling safety and environmental regulations should deliver the desired benefit of reducing the likelihood of future deepwater blowouts.

Introduction

The reaction of the U.S. government to the BP Deepwater Horizon blow-out accident and spill was to not only put a six-month moratorium on deepwater and arctic drilling, but to take a step back to review current offshore drilling safety and environmental regulation. The government established the bipartisan National Commission on the BP Deepwater Horizon Oil Spill and Offshore Drilling. After completing its investigation, the Commission will provide recommendations by January 2011 on how the government can prevent and mitigate the impact of future offshore spills. Additionally, in October 2010, the Department of the Interior enacted new offshore drilling regulation including the Drilling Safety Rule and the Workplace Safety Rule. These rules are a combination of both prescriptive and, for the first time in U.S offshore drilling safety and environmental regulation history, performance-based regulation.

Prior to the publication of the new regulation, several entities put forward recommendations for changes to current regulation, including the Department of the Interior, Det Norske Veritas, and the Energy Policy Research Foundation, Inc. Industry seemed nervous about the regulatory changes because of the impact they could have on the ease and cost of operations in the Gulf of Mexico (GoM) for all operators, especially the smaller, independent ones. The question posed is whether new regulation should be more prescriptive than current regulation or whether regulators should take a more flexible approach like outcome-based regulation. This paper compares the proposed regulatory changes, as well as the changes already enacted, in terms of their effectiveness and cost.

The paper summarizes BP's Deepwater Horizon accident and spill, including the response of government agencies and BP. BP's accident investigation report is partially summarized and the report's recommendations are highlighted. BP's recommendations reflect a need for both prescriptive and flexible changes to operations in deepwater, including changes to BOP design and improved safety management. The details of the recently enacted Drilling Safety Rule and Workplace Safety Rule are described. Next, the opinion of industry, including risk management and oil and gas industries, are reviewed to show that both recommend performance-based regulation as a more effective and lower cost way to improve safety in the GoM. Finally, it is concluded that recent changes to offshore drilling safety and environmental regulations include both the recommended performance-based and required prescriptive changes should deliver the desired benefit of reducing the likelihood of future deepwater blowouts. The Commission will present its findings in January and may propose further regulatory changes.

Event Summary

The Deepwater Horizon semisubmersible rig, owned by Transocean, was contracted by BP Exploration and Production Inc. (BP) to drill the Macondo exploration well. The well is located in the Gulf of Mexico (GoM), 52 miles offshore in 4,992 feet of water in Mississippi Canyon Block 252. On April 20, 2010, a blowout occurred and led to an explosion and fire on the rig. Eleven people were killed and the rig sank. The riser was still attached to the BOP and was bent over when the rig sank. The blowout preventer (BOP) was not effective, and oil, gas, and water were released from the well (BOEMRE, 2010a).

BP immediately began its attempts to contain the leaks and shut-in the well. By July 15, a cap was in place and fluids ceased to flow into the GoM. On August 4, tests showed that the well had reached a static condition. A cement plug was installed in the casing and after a successful pressure test, BP was able to declare that the well had been shut-in. A separate relief well was completed on September 17, 2010 to provide a permanent seal (BP Timeline, 2010).

The quantity of oil released into the GoM has been difficult to estimate, but it is undeniable that the blowout has caused significant losses on the regional tourism and fishing industries and damaged wildlife and the environment. The U.S. government named BP as the responsible party and they have been held accountable for the damages (EPRINC, 2010c).

U.S. Government Response. The Obama administration created the new Bureau of Ocean Energy Management, Regulation and Enforcement (BOEMRE) to replace the Minerals Management Service (MMS) within the Department of Interior (DOI). A six-month moratorium on deepwater and offshore arctic drilling operations was imposed. A bipartisan National Commission on the BP Deepwater Horizon Oil Spill and Offshore Drilling was established and tasked to provide recommendations on how the government can prevent similar incidents in the future (EPRINC, 2010c). A number of federal agencies have been involved in the response to the blowout.

- The Department of Homeland Security (DHS) deployed the U.S. Coast Guard to search for and rescue the crew of the Deepwater Horizon, as well as to lead efforts in the spill cleanup and establish a command center. The secretary of the DHS, Secretary Napolitano, led the National Response Team which is an organization of 16 federal departments and agencies responsible for coordinating emergency preparedness and response to oil and hazardous substance pollution events.
- Secretary Salazar of the DOI developed and recommended additional safety measures for offshore operations.
- The Environmental Protection Agency (EPA) monitored and responded to potential public health and environmental concerns related to the spill.
- The National Oceanic and Atmospheric Administration (NOAA) provided and coordinated weather and biological response services to the federal, state, and local organizations involved in the spill cleanup.
- The Department of the Defense (DOD) lent its Naval and Air Force bases to provide staging areas for boom deployments and other activities, as well as provided aircraft to deploy chemical dispersants.
- The Occupational Safety and Health Administration (OSHA) evaluated the safety at worksites around the GoM related to the cleanup.
- The Employment and Training Administration (ETA) helped by facilitating retraining and reemployment assistance to help workers who have been displaced by the spill to find new work opportunities.
- The DOI's Fish and Wildlife Service supported the joint agency response to the spill with personnel and equipment, such as booms. They initiated Natural Resource Damage Assessment and Restoration activities to assess and address the long-term damage to impacted resources.
- The National Park Service focused on human safety and resource protection in eight national parks in the GoM area. The National Institute for Occupational Safety and Health (NIOSH) identified, assessed and monitored the different chemical, physical, biological, and psychological hazards for the response workers (White House, 2010).

President Obama also directed the DOI to develop the Safety Measures Report to identify measures necessary to improve the safety of oil and gas exploration and development on the Outer Continental Shelf (OCS). The recommendations made in the report include a number of specific measures designed to ensure sufficient redundancy in the BOPs, to promote the integrity of the well and enhance well control, and to facilitate a culture of safety through operational and personnel management. 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 (DOI, 2010a). BP Accident

Investigation Report Summary

A ten-year lease covering the Macondo prospect was granted by the MMS on June 1, 2008 to BP with 65% ownership, Anadarko Petroleum with 25% ownership, and MOEX Offshore with 10% ownership. BP was the lease operator. The Deepwater Horizon rig was owned and operated by Transocean and had been under contract to BP for about nine years. During those nine years, about 30 wells had been drilled by the rig, two-thirds of which were exploration wells (BP Investigation, 2010).

The Macondo exploration well reached a total depth of 18,360 feet on April 9, 2010. After a five-day formation evaluation program, a cleanout trip was conducted to condition the wellbore and verify that the open hole section was in good

condition to run casing. The operational details of the casing and cementing of the well are available in BP's internal investigation report (BP report) and are not reproduced here (BP Investigation, 2010). The crew was in the final stages of the temporary abandonment process when the blowout occurred.

The BP report concluded that a series of mechanical failures, human judgments, engineering design, operational implementation and team interactions converged to initiate the blowout. The BP report made eight key findings:

1. The annulus cement barrier did not isolate the hydrocarbons.
2. The shoe track barriers did not isolate the hydrocarbons.
3. The negative-pressure test was accepted although well integrity had not been established.
4. Influx was not recognized until hydrocarbons were in the riser.
5. Well control response actions failed to regain control of the well.
6. Diversion to the mud gas separator resulted in gas venting onto the rig.
7. The fire and gas system did not prevent hydrocarbon ignition.
8. The BOP did not seal the well.

Several of the key findings are illustrated in Figure 1.

Figure 1. Macondo wellbore schematic (BP Investigation, 2010)

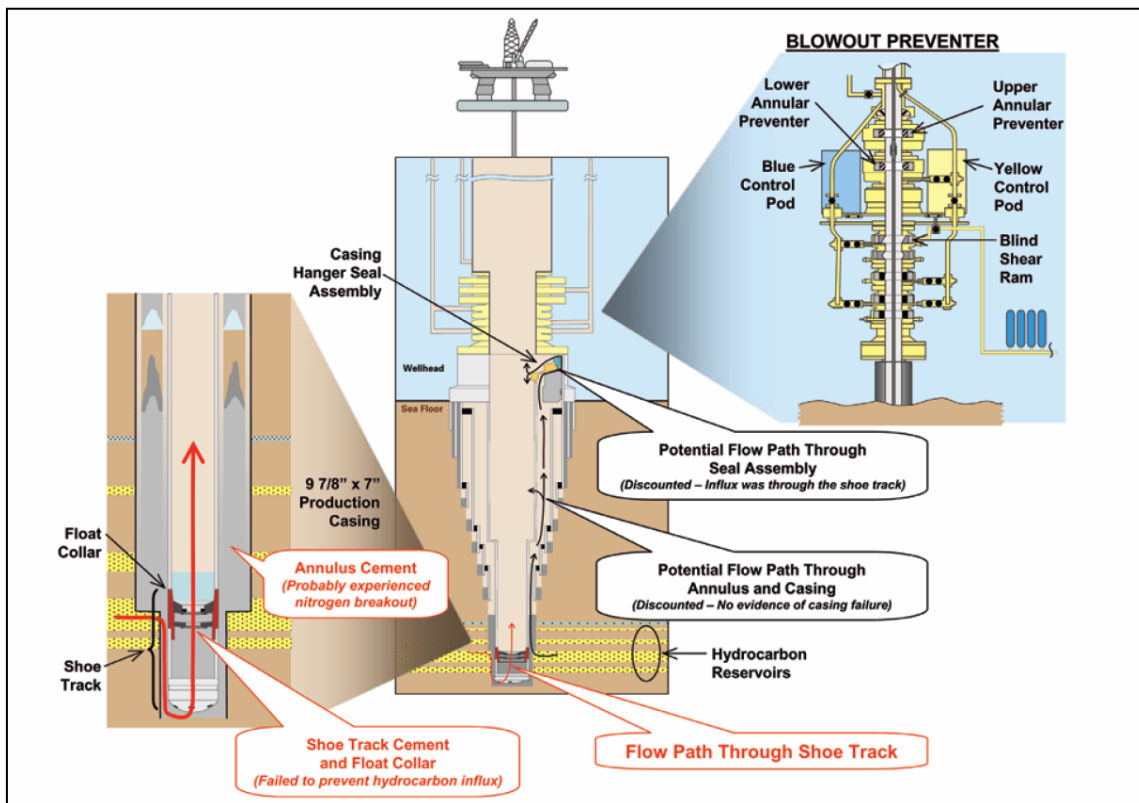
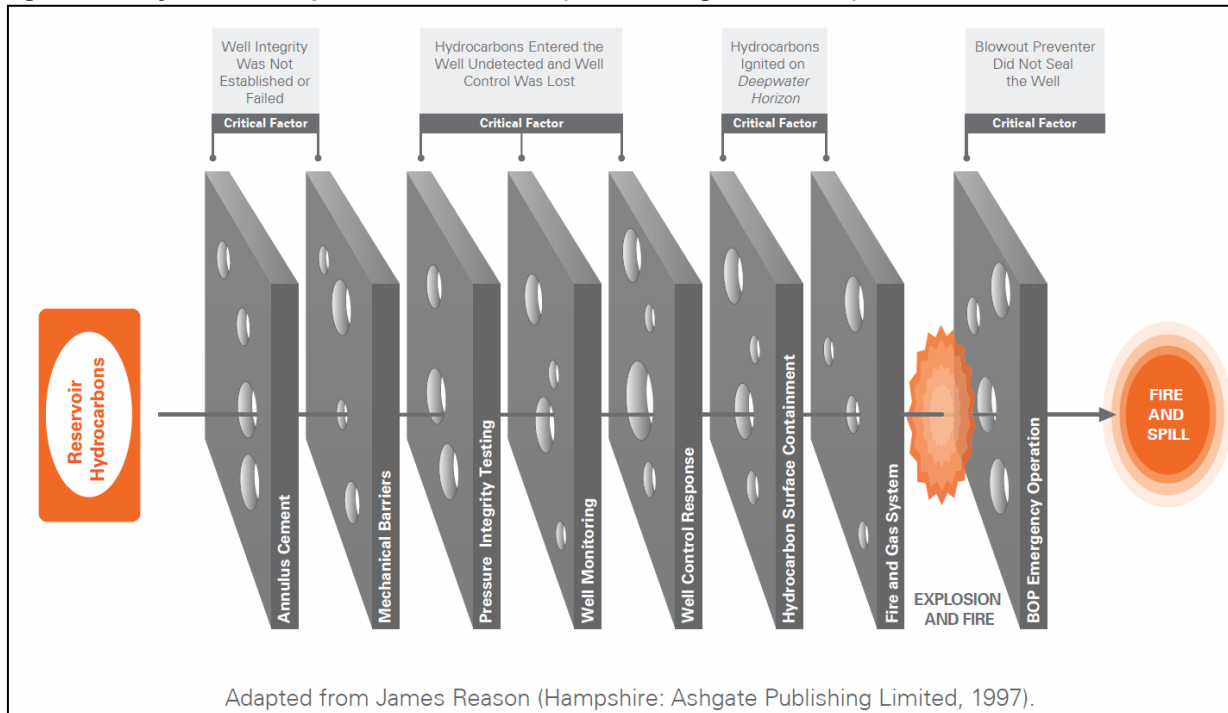


Figure 2, from the BP report, depicts eight blocks which represent the physical or operational barriers that were in place to prevent a blowout. The holes in the blocks represent failures in the barriers. The holes also represent the eight key findings listed above. Had one of these 'holes' not existed, then the blowout would have been prevented or reduced in severity.

Figure 2. Physical and operational barriers (BP Investigation, 2010)

The recommendations from the internal investigation are recommendations for BP, its contractors and its service providers. The recommendations cover two areas: (1) Drilling and Well Operations Practice (DWOP) and Operating Management System (OMS) implementation and (2) Contractor and service provider assurance. Under the first area, recommendations are generated for the following issues:

- Procedures and Engineering Technical Practices
- Capability and Competency
- Audits and Verification
- Process Safety Performance Management

Under the second area, recommendations address the following issues:

- Cementing Services Assurance
- Well Control Practices
- Rig Process Safety
- BOP Design and Assurance

It is plausible that the deficiencies identified by BP are not unique to BP, or to the Macondo well, and there may be some systemic issues that need to be addressed collectively by industry and the U.S. government. After these issues have been identified and solutions are proposed, an important question is to determine the best mode for implementation of the solutions. This is especially true in the case of new regulation, where the government must assess the costs and benefits of prescriptive and performance-based approaches.

Proposed and Enacted Safety and Environmental Regulation Changes

The Secretary of Interior manages and regulates leasing, exploration, development, and production of mineral resources on the OCS in the GoM. All oil and gas operations are subject to oversight by a number of Federal laws, BOEMRE regulations, and coordination mandates (BOEMRE, 2010b).

The BOEMRE inspection program in the GoM is directed by the Regional Office in New Orleans and five district offices that provide day-to-day review and inspection of oil and gas operations. There are 55 inspectors that go offshore daily. In 2009, these inspectors conducted 614 drilling inspections and 3,862 production inspections. There are also unannounced drills to test spill response preparedness of operators in the GoM. Noncompliance with requirements on the inspection checklists results in prescribed enforcement actions including written warnings or shut-ins of platforms, zones,

equipment, or pipelines. A Suspension of Operations (SOO) is a possible penalty for a violation when the suspension of an operation or activity is in the national interest (BOEMRE, 2010c).

There is a wide variety of opinions on how offshore drilling safety and environmental regulation should be changed, or not changed. A survey conducted by the Deloitte consulting firm of oil and gas professionals in early November of 2010 revealed that two-thirds of the respondents felt that post-Macondo regulations would harm oil and gas companies across the board, with independent E&P companies being the most vulnerable. The oil and gas professionals were asked whether new regulations will make the oil and gas industry more safe and 40% answered ‘yes’, while 40% answered ‘no’. The majority believe that any improvements in drilling safety will come from the industry itself, rather than from external regulations, discoveries or requirements (PennEnergy, 2010). These findings reveal a divided industry regarding the U.S. government’s capability to devise new rules to effectively improve offshore safety.

The following sections summarize recent U.S. government regulatory changes to offshore drilling in the OCS, including estimated costs of these changes. Recommendations made by Det Norske Veritas, a highly regarded oil and gas industry risk management firm are also reviewed. Finally, the views of the Energy Policy Research Foundation, Inc., a non-profit energy economics organization funded by oil and gas companies, are reviewed.

U.S. Government Regulation. The Piper Alpha platform explosion and fire killed 167 people in the North Sea on July 6, 1988. The subsequent investigation revealed deficient hazard analysis, poor plant design, and insufficient staff training. The oil industry transformed its safety and environmental practices because of this incident (PE, 2008). One of the biggest changes made to safety regulation in the UK was the formation of the Safety Case Regulations, which requires each North Sea installation to submit a safety case to the Health and Safety Executive demonstrating that the operator has: a safety management system in place that is adequate to ensure compliance with the law; identifies all hazards with the potential to cause a major accident; evaluates the major accident risks; and has put in place measures to control these risks and ensure compliance with the relevant statutory provisions. Each safety case costs on average £1 million (PE, 2008).

The Macondo blowout has had, and will continue to have, a profound impact on safety and environmental regulation in the GoM. Time will tell if the new and proposed regulations will yield a step change in offshore safety and environmental performance, but what is known is that the recently enacted changes will result in additional cost to operators.

The Drilling Safety Rule. The Drilling Safety Rule is an interim final rule, published in the Federal Registrar that became effective on October 14, 2010. The rule changes represent the implementation of the recommendations made in the May 27, 2010 DOI report entitled “Increased Safety Measures for Energy Development on the Outer Continental Shelf.” To implement the practices recommended in the Report, the BOEMRE amended drilling regulations related to well control, including: subsea and surface blowout preventers, well casing and cementing, secondary intervention, unplanned disconnects, recordkeeping, well completion, and well plugging. The primary purpose of the rule is to clarify and incorporate safeguards that will decrease the likelihood of a blowout during drilling operations on the OCS (30 CFR Part 250, 2010a).

The Drilling Safety Rule addresses both well bore integrity and well control equipment. Provisions in the rule that address well bore integrity are the following:

- Making mandatory the currently voluntary practices recommended in the American Petroleum Institute’s (API) standard, RP 65 – Part 2, Isolating Potential Flow Zones During Well Construction;
- Submission of certification by a Registered Professional Engineer that the casing and cementing program is appropriate for the purposes for which it is intended under expected wellbore conditions;
- Requirements for two independent barriers across each flow path during well completion activities (also Certified by a Registered Engineer);
- Ensuring proper installation of the casing or liner in the subsea wellhead or liner hanger;
- Approval from the District Manager before displacing kill-weight drilling fluid;
- Deepwater well control training for rig personnel.

Provisions that address well control equipment include:

- Submission of documentation and schematics for all control systems;
- Requirement for independent third party verification that the blind-shear rams are capable of cutting any drill pipe in the hole under maximum anticipated surface pressure (MASP);
- Requirement for a subsea BOP stack equipped with ROV intervention capability. At a minimum, the ROV must be capable of closing one set of pipe rams, closing one set of blind-shear rams, and unlatching the Lower Marine Riser Package (LMRP);
- Requirement for maintaining an ROV and having a trained ROV crew on each floating drilling rig on a continuous basis;
- Requirement for autoshear and deadman systems for dynamically positioned rigs;
- Establishment of minimum requirements for personnel authorized to operate critical BOP equipment;
- Requirement for documentation of subsea BOP inspections and maintenance according to API RP 53;
- Required testing of all ROV intervention functions on the subsea BOP stack during the stump test and testing at least

one set of rams during the initial test on the seafloor;

- Required function testing of autoshear and deadman systems on the subsea BOP stack during the stump test and testing the deadman system during the initial test on the seafloor;
- Required pressure testing if any shear rams are used in an emergency.

The Drilling Safety Rule estimates that the new regulation will result in a yearly increase in cost for each operator in the OCS equal to \$183.4 million (30 CFR Part 250, 2010a). The rule that contributes the most to the cost is the testing of ROV functions on the BOP, including the testing of one set of rams.

The Workplace Safety Rule. The BOEMRE published the Workplace Safety Rule in the Federal Register on October 15, 2010. The MMS previously had proposed a Safety and Environmental Management System (SEMS) rule in 2009. The BOEMRE continued this initiative by incorporating lessons learned from the Macondo well. Under the new rule, the following thirteen elements of the API's Recommended Practice 75 are now mandatory (30 CFR Part 250, 2010b):

- General provisions: for implementation, planning and management review and approval of the SEMS program;
- Safety and environmental information: safety and environmental information needed for any facility, e.g. design data; facility process such as flow diagrams; mechanical components such as piping and instrument diagrams; etc.;
- Hazards analysis: a facility-level risk assessment;
- Management of change: program for addressing any facility or operational changes including management changes, shift changes, contractor changes, etc.;
- Operating procedures: evaluation of operations and written procedures;
- Safe work practices: manuals, standards, rules of conduct, etc.;
- Training: safe work practices, technical training – includes contractors;
- Mechanical integrity: preventive maintenance programs, quality control;
- Pre-startup review: review of all systems;
- Emergency response and control: emergency evacuation plans, oil spill contingency plans, etc.; in place and validated by drills;
- Investigation of Incidents: procedures for investigating incidents, corrective action and follow-up;
- Audits: audits every 4 years, to an initial 2–year reevaluation; and then subsequent 3-year audit intervals;
- Records and documentation: documentation required that describes all elements of SEMS program.

There are four important areas that the Workplace Safety Rule covers that previous regulation did not: Hazard Analysis, Management of Change, Operating Procedures, and Mechanical Integrity. Most of the large operators in the OCS currently have a version of a SEMS program covering these main areas, but these voluntary programs are now mandatory for all operators. BOEMRE expects that the requirement for a SEMS will address the human factors that are difficult to regulate with prescriptive regulations, like the changes described in the Drilling Safety Rule. The Workplace Safety Rule represents a more flexible regulatory approach that can keep up with rapidly evolving technologies (BOEMRE, 2010d). The SEMS program is similar to the UK's safety case system that resulted from the Piper Alpha accident.

The Workplace Safety Rule estimates the cost to implement a SEMS program at \$2 million annually for each operator, plus \$655,000 as a one-time implementation cost. Operators that already have a SEMS in place should not incur any additional costs because of this new regulation (30 CFR Part 250, 2010b).

In summary, the U.S. government has opted for a combination of additional prescriptive regulation with the enactment of the Drilling Safety Rule, as well as a performance-based requirement with the Workplace Safety Rule. All operators are now required to identify and document potential risks, increasing the accountability for risk assessment and mitigation.

Det Norske Veritas Proposed Regulation Changes. Det Norske Veritas (DNV) is an international company that provides risk management and related services. DNV is headquartered in Norway, but has worked internationally since 1867 and currently works in 100 countries. The main focus industries of DNV are maritime, oil and gas, food and beverage, and health care. The company's statement of purpose is "to safeguard life, property, and the environment" (DNV, 2010a). DNV is widely viewed as an authority on safety.

In response to the Macondo blowout, DNV published a position paper to highlight what it believes are the key aspects of an effective U.S. offshore safety regime. This safety regime must balance the inherent risks with the benefits for society and must possess the following characteristics (DNV, 2010b):

- Performance-based regulation supplemented with prescriptive regulation;
- Consideration of technology, organization and people;
- Clear roles and responsibilities;
- Enforced identification, reduction and control of risks;
- Shared performance monitoring;
- Practical and economic feasibility;
- Balance between risk, control and condition.

More specifically, the goal of an offshore energy exploration and production safety regime must ensure that:

- Life, environment and property are protected in an effective, consistent, transparent and predictable way; both for those directly affected and involved in offshore operations, but also for those otherwise affected by an accident, such as fisheries, recreation and the whole ecosystem;
- Risks are properly evaluated and all prevention and mitigation measures are identified;
- Control measures are implemented and maintained by all parties in accordance with mandatory risk assessments as well as what is prescribed by regulation;
- Conditions of safeguards, facilities, procedures, personnel and organizations are continuously monitored throughout the lifetime for proper functioning and compliance with all regulatory requirements and to assure that risks do not increase;
- Technical innovation and efficiency improvements can be implemented safely and responsibly.

Unfortunately, safety and environmental regulation is typically only revised after an accident has occurred. This was the case after accidents such as Exxon Valdez, Piper Alpha, Bhopal, and Texas City. DNV believes that the problem with reactionary regulation changes is that the changes can be constrained by too much focus on the cause of the accident itself, rather than focusing on possible future hazards unrelated to the past accident.

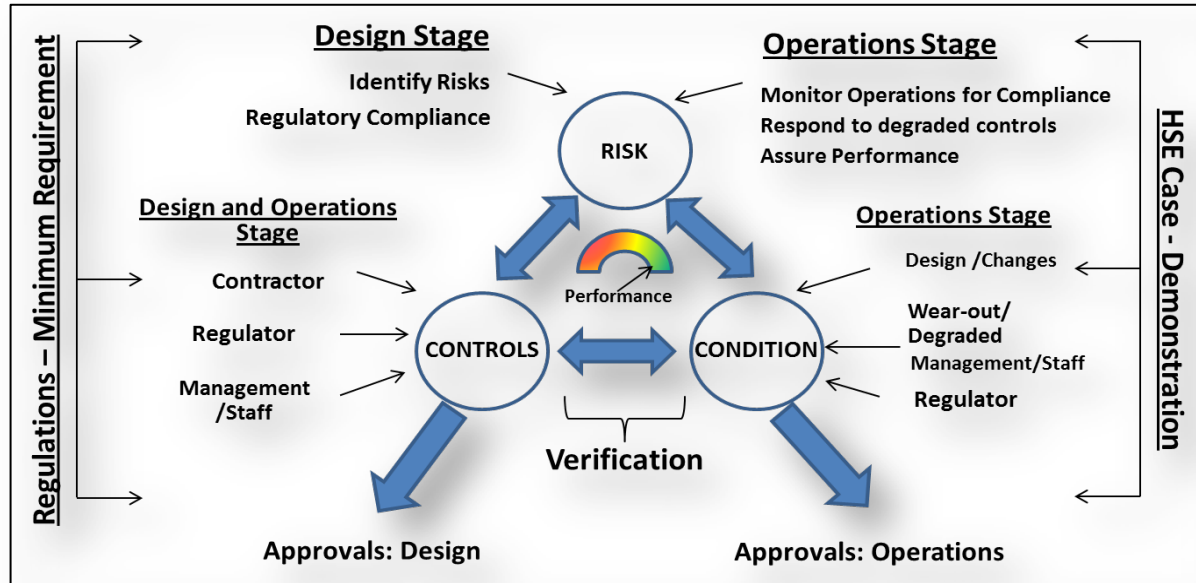
Prescriptive regulation is easier to implement and monitor, but it might not prevent new types of accidents related to new challenges or new technology related to developments in deepwater drilling. Prescriptive regulation can also cause operators to feel the need to only comply with regulation, rather than take more proactive action when it comes to offshore safety. More flexible performance-based regulation can be more effective in operational areas where new technical challenges and rapid changes in technology are anticipated.

U.S. offshore safety and environmental regulations have been mainly prescriptive, that is until the October 15th publication of the Workplace Safety Rule requiring all offshore operators to implement a SEMS. The UK and Norway have safety regimes that are performance-based. Safety cases are required in the UK as result of Piper Alpha accident as described above, and detailed risk-assessments are required in Norway. Authorities review and accept these reports prior to project execution. If an operator does not conform to its own risk assessment or safety case, then it is considered an offense and a penalty is given. DNV believes that “an offshore safety regime based on a performance-based regulation requiring safety cases including risk assessments supplemented by required or recommended specific prescriptive regulation for selected is the most effective regime model” (DNV, 2010b).

Another benefit of performance-based regulation is that it helps to define clear roles and responsibilities, in which authorities define the performance goals while the operator is responsible to ensure that these goals are met. Operators do not rely on the authorities to ensure safety. Forcing operators to perform a risk assessment ultimately leads to the control and reduction of risk.

DNV describes an ideal safety regime for offshore operations in its position paper. The risk management approach is characterized by three main elements: Risk, Control, and Condition. Figure 3 depicts this risk management approach. The operator identifies all of the risks. Effective mechanisms for controlling these risks must be implemented by ensuring that regulatory requirements and safety case commitments are achieved in practice. Verification by an independent and competent third-party is a key mechanism during design and operations. The condition of all elements must be continuously monitored to avoid degradation over time.

Figure 3. DNV illustration of the elements Risk, Control and Condition in a risk-informed offshore safety regime (DNV, 2010b)



The cost of DNV’s proposed regulation changes was not documented in its position paper. However, it is reasonable to assume that the cost would be of the same order of magnitude as the implementation of the Workplace Safety Rule. In a performance-based safety regime, operators would conduct risk assessments and/or safety cases which would result in recommendations to implement many or all of the new prescriptive rules on some wells, but perhaps not all wells.

EPRINC Proposed Safety Regulation Changes. The Energy Policy Research Foundation, Inc. (EPRINC) is a not-for-profit organization that studies energy economics with special emphasis on the petroleum industry. EPRINC is funded by a cross section of petroleum and energy companies (EPRINC, 2010a). In response to the Macondo blowout, EPRINC published a document entitled “A Proposed Agenda for the Presidential Commission” in June 2010. The paper describes the cost of the deepwater and arctic drilling moratorium, and states that the costs of the moratorium are high and that it does not deliver substantial benefits in lowering the risk of further spills (EPRINC, 2010b).

Like the DNV position paper, EPRINC recommends that the Commission consider a performance-based safety regime because it will reward strong safety cultures and will likely yield better long-term results as technological advances are made. EPRINC states that “given the catastrophic consequences of whatever errors BP made in drilling the Macondo well, these mistakes are not likely to be repeated in the future by offshore operators worldwide” (EPRINC, 2010b). EPRINC trusts that the potential liability and costs associated with major spills are enough incentive for operators to make sure they do not repeat the mistakes made by BP on the Macondo well. Currently, a \$75 million liability cap exists unless the company that caused the spill is found to be grossly negligent or in violation of federal regulations. If found negligent or in violation, then the company is liable for all damages. If the company goes bankrupt, then the Oil Spill Liability Trust Fund is used to compensate spill victims. The Liability Trust Fund is currently worth \$1.5 billion. In reality, BP has spent much more than the liability cap and the current value of the Liability Trust Fund combined on the Macondo spill response.

EPRINC’s position is that most actions taken by the U.S. government after the Macondo blowout have or will result in lost revenue for the U.S. government, offshore operators, and the American public. Not only would creating more prescriptive regulations increase costs for operators, but the U.S. government would lose revenue from royalties and taxes. Thus, a performance-based safety regulation regime which results in the lowest cost to operators is EPRINC’s favored outcome. EPRINC believes operators will be incentivized to prevent future accidents and spills because of the enormous cost associated with them. However, EPRINC does not attempt to explain why these incentives failed to prevent the Macondo blowout.

Conclusion

The Macondo accident and spill brought to light safety deficiencies of oil and gas deepwater operations in the U.S., including the federal government’s lack of oversight in offshore safety. BP’s investigation of the accident highlighted the main areas where its safety program and operations management failed and recommended areas in need of improvement. The recently enacted U.S. government’s Drilling Safety Rule provides stricter, prescriptive deepwater drilling regulations like improving BOP performance, as well as requiring the verification of designs by a Professional Engineer. This new rule increases the

cost of operating in the OCS for each operator by an estimated \$184.3 million. The main cost is the testing of the BOP once it is installed on the seafloor. The Workplace Safety Rule is a type of performance-based regulation that complements the new prescriptive regulation by requiring all companies operating in deepwater to implement a safety and environmental management system with a form recommended by API.

DNV and EPRINC both took the position that performance-based regulation is the most effective form of offshore safety and environmental regulation because of the nature of the continuous changes in technology and drilling environment. However, DNV recommended a combination of prescriptive and performance-based regulation, while EPRINC felt that the cost of a major accident or spill would be incentive enough for operators to improve their own safety performance. The recent changes to regulation adhere to both BP and DNV recommendations, while the increased cost for the drilling of each new deepwater well does not follow EPRINC's recommendations which maintain that additional costs will reduce the number of operators in the OCS and result in lost revenue for the U.S. government.

The National Commission will present its findings in January 2011. The Commission may recommend additional changes to federal laws, regulations, and industry practices based on its investigation. The regulatory changes recently enacted by BOEMRE, including the Drilling Safety Rule and the Workplace Safety Rule, seem to have satisfied the government's concerns about deepwater drilling safety and environmental performance because the six-month moratorium was lifted a few weeks earlier than the original six-month length. Unfortunately, the death of eleven men and the release of millions of barrels of crude oil were required to make the industry and government aware of the potential safety and environmental impact of deepwater drilling. It remains to be seen whether the event will result in a step change in safety performance in the oil and gas industry in the U.S. as Piper Alpha did twenty years ago.

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