

Macondo: the disaster that changed the rules

On 20 April 2010, while completing work on an exploratory well in the Macondo Prospect, approximately 50 miles off the coast of Louisiana, the semi-submersible oil rig Deepwater Horizon experienced a catastrophic blowout, leading to several crippling explosions and an uncontrollable fire that resulted in the deaths of 11 rig workers. Two days later, the rig sank in approximately 5,000 feet of water. The accident severed the rig's connection to the seafloor, while the blowout preventer experienced a complete failure, allowing oil from the reservoir to plume into the Gulf of Mexico. The federal government estimates that the Deepwater Horizon incident released 4.9 million barrels of crude oil into the Gulf of Mexico before the damaged well was stabilized on 15 July, making it the single worst offshore incident in US history.

In the three years following the oil spill, the government and the oil and gas industry (the Industry) have worked hard to create and implement new rules governing offshore drilling.

The Deepwater Horizon accident has led to a re-evaluation of deepwater drilling procedures. New regulations have been implemented with a view to preventing future oil spill incidents and improving the health and safety of both the environment and offshore workers.

This seems particularly relevant in a technological environment where an increasing number of oil and gas projects involving ultra-deep drilling are being presented by various players.

Most people in the oil production business believe that the era of easy oil discovery is over, and many of today's oil and gas reservoirs are indeed to be found in increasingly difficult locations with complex geologies. These locations include large, ultra-deep oil and gas reservoirs.

The (re)insurance sector still views these projects as extremely risky. SCOR's objective is to incorporate these new prospects into our existing portfolios as carefully as possible.

SCOR Global P&C's Business Solutions division currently deals with a large number of ultra-deep drilling projects. It is important for the underwriters, lawyers, regulators, financiers and engineers involved to understand the risk exposure linked to these projects and to verify that the insureds are closely following the new post-Macondo regulations.

► US government focus – four areas

Only three years have passed since the disaster in the Gulf, but it is already clear that the incident has led to some significant changes in terms of the regulation of offshore oil and gas production in the United States.

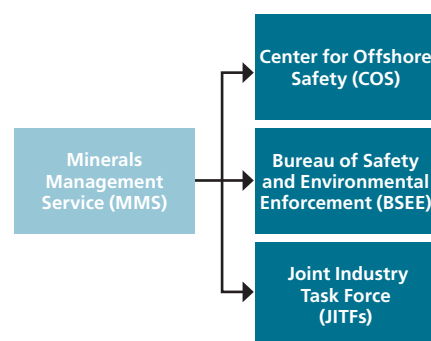
Changes in the regulation of offshore oil and gas production

The first notable change was to the identity and makeup of the regulator itself. On 9 May 2010, the Secretary of the Interior issued Secretarial Order No. 3299, eliminating the Minerals Management Service (MMS) and replacing it with three new bodies: the Center for Offshore Safety (COS), the Joint Industry

Task Forces (JITFs) and the Bureau of Safety and Environmental Enforcement (BSEE).

The order specified that:

- The Center for Offshore Safety (COS) would be created by the Industry to serve as the focal point for operators to work together on the enhancement of offshore operations.
- The Bureau of Safety and Environmental Enforcement (BSEE) would have the authority to inspect and investigate Outer Continental Shelf (OCS) activities, including calling witnesses, levying penalties, and cancelling or suspending activities.
- The Joint Industry Task Forces (JITFs) would be assembled by the Industry in order to focus on critical areas of the Gulf of Mexico's offshore activity.





The changes reflect the Department's response to criticism of its functioning in the past. MMS was supposed to be responsible for guaranteeing safe and secure operations on the Outer Continental Shelf. In theory, this meant that MMS would carefully evaluate the environmental and socioeconomic impact of lease sales and other OCS activities, balancing the costs and benefits of further development. However, there was a perception among many critics that the revenue management functions of MMS gave it a direct incentive to increase and expedite OCS development, thereby hampering its regulatory neutrality.

Changes in the safety & environmental management system

A lot of good work has gone into remaking the old MMS. The Bureau of Safety and Environmental Enforcement (BSEE), now includes an Investigations and Review Unit, the mission of which is "to promptly and credibly respond to allegations or evidence of misconduct and unethical behaviour by Bureau employees; pursue allegations of misconduct by oil and gas companies involved in offshore energy projects; and assure the Bureau's ability to respond swiftly to emerging issues and crises, including significant incidents such as spills and accidents". BSEE must be adequately staffed, clear about its mission and able to keep up with the constant innovations of private industry - a challenging task given the need to compete for talent with the Industry and with other entities.

A transparent way must be found for the Industry to be involved in exposing the new investigators and regulators to emerging technologies and techniques.

BSEE and the Industry must develop a collaborative approach to training these new investigators.

Joint Industry Task Forces (JITFs): four areas

Amid the initial uncertainty regarding the causes of the blowout, the difficulty of a major reorganization, and heavy public criticism, the oil & gas industry assembled four JITFs to focus on critical areas of Gulf of Mexico (GOM) offshore activity: the Joint Industry Offshore Operating

Procedures Task Force (Procedures JITF), the Joint Industry Offshore Equipment Task Force (Equipment JITF), the Joint Industry Subsea Well Control and Containment Task Force (Subsea JITF), and the Joint Industry Oil Spill Preparedness and Response Task Force (OSPR JITF).

Sessions began in early spring of 2010 to provide recommendations to the US Department of the Interior in the areas of oil spill prevention, intervention and response, with the definitive aim of

enhancing safety and environmental protection.

The ultimate goal for these JITFs is to improve Industry drilling standards in order to form comprehensive and safe drilling operations, well containment and intervention capability, and oil spill response capability, not just through the evaluation and revision of Industry guidelines and procedures, but also through active engagement with regulatory processes.

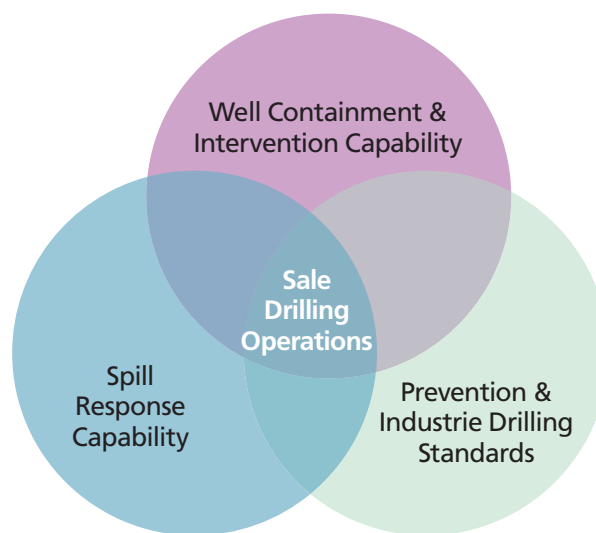


Figure 1: Restoring confidence in deepwater drilling operations through comprehensive improvements to well containment and intervention capability, spill response capability and drilling standards.

Drilling safety rules: Joint Industry Offshore Operating Procedures Task Force

Permit applications must now meet new standards for well design, casing and cementing, and be independently certified by a professional engineer. Plans must include a compliance statement and a review of subsea blowout containment resources for deepwater drilling.

Well integrity

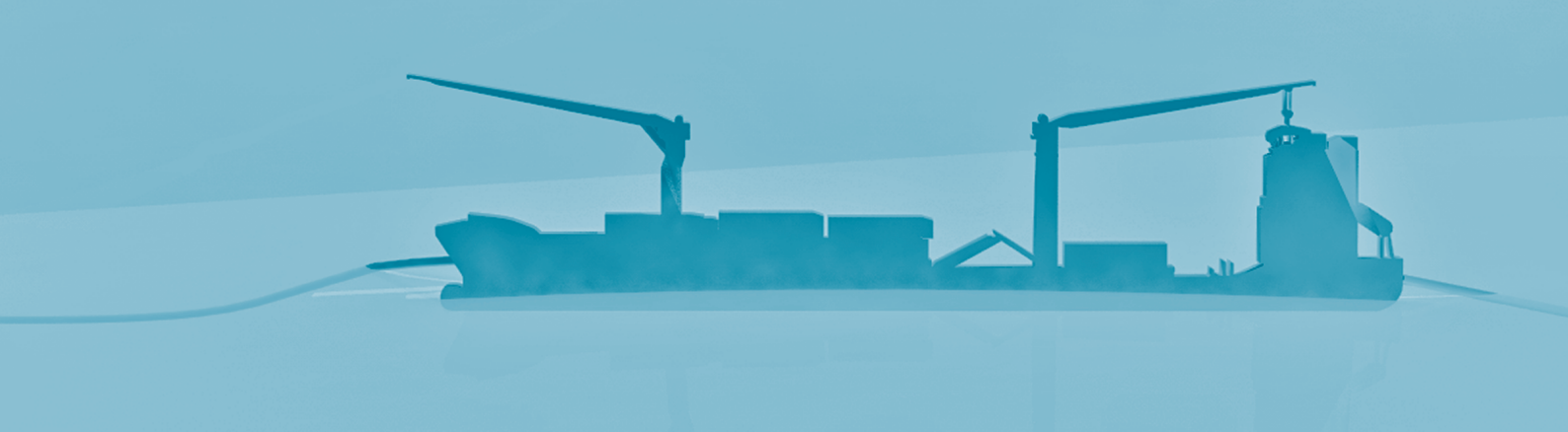
The Procedures JITF reviewed critical processes associated with the drilling and completion of deepwater wells, in order to identify gaps between existing practices and regulations and Industry best practices. Their recommendations were intended to move Industry standards to a higher level of safety

and operational performance.

These recommendations resulted in the revision of the American Petroleum Institute (API) guidelines, which are considered Industry best practices for US oil and gas operations.

The API guidelines provide well design and operational considerations for the safe design and construction of deepwater wells, with maximum reliability:

- the casing and cement programme must now be certified by a Professional Engineer;
- two independent barriers must be set up during completion (certified by a professional engineer);
- any change-out of lighter fluids must be approved (negative test procedures);
- installation, sealing, and locking of casing hangers is a new requirement.



➔ **BOP (blowout preventer) & control system: Joint Industry Offshore Equipment Taskforce**

The Equipment JITF reviewed current BOP equipment designs, testing protocols and documentation. Their recommendations, as listed below, were designed to close any gaps and to create improvements in these areas:

- blind-shear ram function-testing & 3rd Party verification;
- requirement & function testing for auto shear;
- minimum requirements for ROV intervention plus testing;
- BOP inspection & maintenance to API RP 53;
- minimum requirements for personnel operating BOP equipment.

Based on the Equipment task force's recommendations, an API work team began development on the fourth edition of *API RP 53 Recommended Practices for Blowout Prevention Equipment Systems for Drilling Wells*. This edition was updated and published in early 2012.

Worst case blowout discharge & blowout response: joint Industry oil spill

Following the Macondo accident, stronger offshore drilling regulations were implemented. For instance, operators must now demonstrate that they are prepared to deal with the potential for a blowout.

The Joint Industry Oil Spill Preparedness and Response Task Force (OSPR JITF) spent several months developing and prioritizing project plans to address each preliminary recommendation, and subsequently received approval and Industry funding commitment for a multi-year work programme.

The OSPRS divided the recommendations into seven categories, or work streams, as outlined in the original report, specifically:

- Planning
- Dispersants
- Shoreline Protection and Cleanup
- Oil sensing and Tracking
- In-Situ Burning
- Mechanical Recovery
- Alternative Technologies

Adequate spill responses & well containment resources

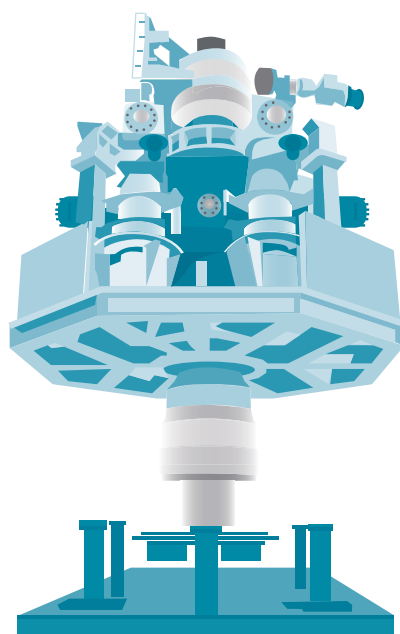
➔ **Joint Industry Subsea Well Control and Containment Task Force**

The Subsea JITF reviewed technologies and practices for controlling the release of oil from the source of a subsea well where there has been a loss of control. These include equipment design, protocol testing, research and development (R&D), regulations and documentation to determine if enhancements are needed.

The JITF identified five key areas of focus for GOM deepwater operations:

- Well containment on the seafloor;
- Intervention and containment within the subsea well;
- Subsea collection and surface processing and storage;
- Continuing R&D;
- Relief wells.

The Subsea JITF focused primarily on potential operational scenarios after a well blowout has occurred. It also considered the containment of hydrocarbons that may leak from subsea production system equipment (e.g. subsea production wells) and casing stubs on the seafloor.



Well containment system

➔ **Marine Well Containment Company**

In the days immediately following the incident, it became clear that neither the companies involved nor the Industry as a whole had realistic plans in place for containing a disaster of the scale presented by the Macondo blowout.

Though the operators were ultimately able to cap the wellhead and then seal the well itself, the initial series of trial-and-error attempts at stopping the initial leak damaged both the environment and the public's confidence in the Industry. Early shortfalls in necessary oil cleanup equipment led critics to accuse the Industry's response process of having evolved very little since the Exxon Valdez disaster decades earlier.

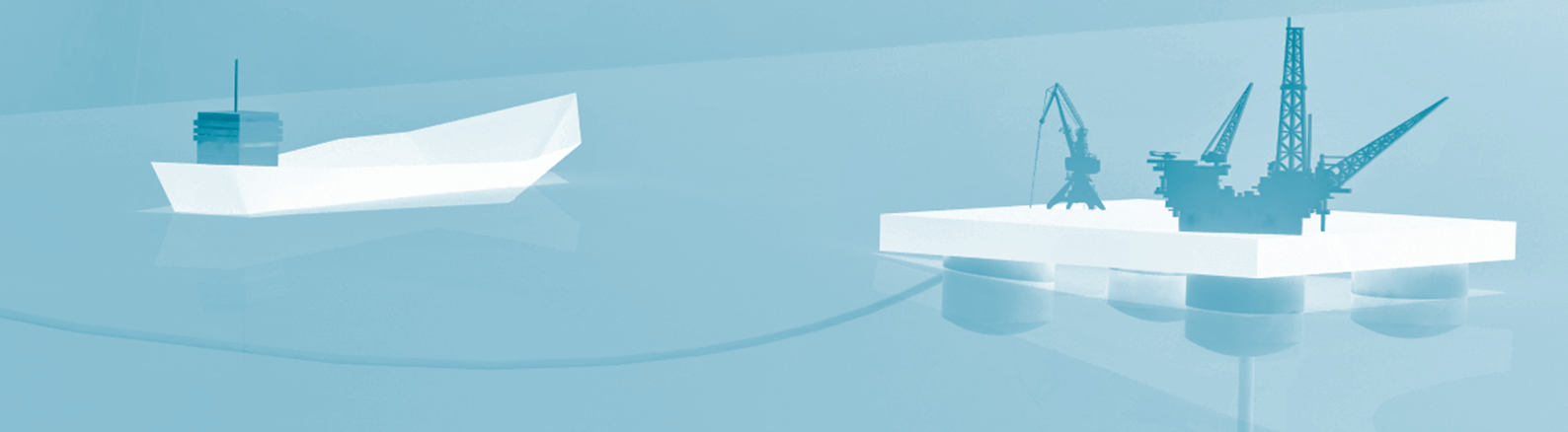
Anticipating that the Industry would now have to demonstrate enhanced capabilities, several large integrated companies formed the Marine Well Containment Company (MWCC) in July 2010.

Shell, ExxonMobil, ConocoPhillips and Chevron announced that the consortium would be funded by \$1 billion in member contributions. The purpose of MWCC was to design and make available a technology system that would be "flexible, adaptable.... able to begin mobilization within 24 hours and that can be used on a wide range of well designs and equipment, oil and natural gas flow rates and weather conditions."

The pre-engineered system was designed to be able to contain a blowout in 10,000 feet of water at a peak discharge rate of 100,000 b/d. Since its introduction, six new companies have joined MWCC (BP, Apache Corp, Statoil ASA, BHP Billiton, Anadarko Petroleum, and Hess Oil). Member companies claim to represent 70 percent of the deepwater wells drilled in the Gulf. Non-members can lease the MWCC system for a fee.

➔ **Helix Well Containment Group**

At the same time, a larger group of more than 15 independent oil and gas companies active in deepwater exploration and production formed the Helix Well Containment Group (HWCG). The group works in partnership with Helix Energy Solutions Group (HESG), a field services company active in the Gulf of Mexico.



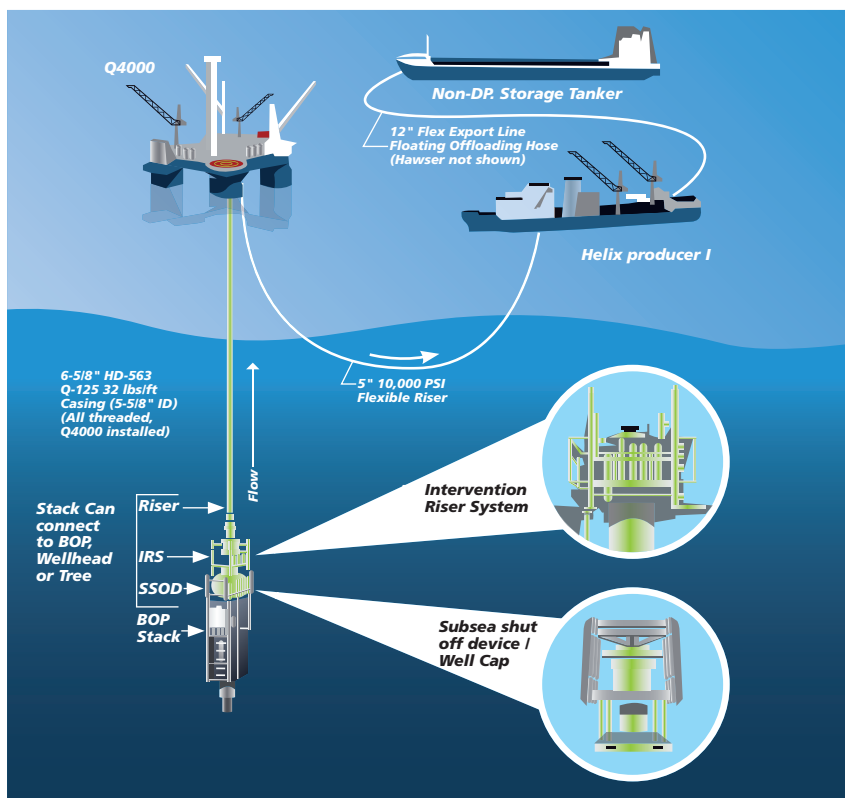
Members

ATP Oil & Gas Corporation
 Cobalt International Energy, LP
 Deep Gulf Energy, LP
 ENI U.S. Operating Company
 Energy Resource Technology GOM Inc.
 Freeport-McMoRan Oil & Gas
 LLOG Exploration Company, LLC
 Marathon Oil Company
 Marubeni Oil & Gas (USA), Inc
 Murphy Oil Corporation
 Noble Energy, Inc.
 Repsol E&P USA Inc.
 Stone Energy Corporation
 Walter Oil & Gas Corporation
 W & T Offshore Inc.

In fact, HESG was hired as part of the effort to stem the flow of oil from the ruptured Macondo well, and at one point was successfully collecting up to three quarters of the oil flowing from the well before it was capped.

There is considerable debate over whether the existence of two separate Industry-sponsored containment entities, HWCG and MWCC, is either useful or necessary. HWCG, populated by smaller, independent companies, is positioned to respond to a blowout at a mid-sized well. MWCC, as a partnership between much larger, integrated international oil companies, is clearly designed for a much larger incident. This dichotomy would seem to imply that the two systems are equally important. Indeed, there has been some discussion of the groups working together in the future.

It is important to note that both HWCG and MWCC are generally geared towards responding to incidents in the US Gulf of Mexico. An early criticism of this approach was that the Industry was ill-prepared for subsea blowouts in other areas of the OCS, or indeed globally. To respond to this issue, nine of the world's largest oil companies announced the formation of the Subsea Well Response Project (SWRP) in May of 2011. SWRP members include BG Group, BP, Chevron, ConocoPhillips, ExxonMobil, Petrobras, Shell, Statoil and Total.



Helix containment system

Center for Offshore Safety (COS) governance

The Center's primary objective is the improvement of the Industry's safety and environmental performance. It will provide a platform for Industry collaboration with third party stakeholders, including Federal agencies.

The Center is located in Houston and has a governing board representing a diverse cross-section of the Industry.

Member Companies

- Anadarko Petroleum Corporation
- Apache
- Baker Hughes Inc.
- BHP Billiton Petroleum
- BP Exploration and Production Inc.
- Cameron International Corp.
- Center of Offshore Safety
- Chevron Energy Technology Company
- Cobalt International Energy
- ConocoPhillips
- Diamond Offshore Drilling, Inc.
- EnSCO Offshore International
- Exxon Mobil Corporation
- Halliburton
- HES
- IADC
- Marathon Oil
- Marine Spill Response Corporation
- Murphy Oil
- Noble Corporation
- NOIA
- Oceaneering International, Inc
- Pacific Drilling
- Schlumberger
- Seadrill Americas
- Shell International E&P Inc.
- Statoil North America Inc.
- Stone Energy
- Tidewater Inc.
- TOTAL E&P USA INC.
- Transocean

► What about the other countries?

The human tragedies, together with the environmental, social and economic costs of Macondo, inevitably led the US to conduct an extensive review of its regulatory regime. The UK and the European commission followed suit.

UK offshore regulatory regime

In considering the consequences of the Macondo accident for the UK regulatory regime, it is important to consider the significant differences between the United Kingdom Continental Shelf (UKCS) and the Gulf of Mexico – in terms of both the physical environment concerning weather, climate and normal sea state, and the nature of the regulatory regime, where a goal-setting approach plays a major role in the UK compared to a largely prescriptive US approach.

In December 2012, the UK government published its final report on the adequacy of the present regulatory regime for offshore oil and gas operations on the UK Continental Shelf (“UKCS”) in the post-Macondo era. Responsibility for offshore oil and gas regulation in the UK is split between three authorities: (1) the Health & Safety Executive (“HSE”), which is responsible for the safety integrity of E&P operations; (2) the Department of Energy and Climate Change (“DECC”), which is responsible for licensing and drilling consents as well as environmental protection and response; and (3) the Maritime and Coastguard Agency (“MCA”), which is responsible for responding to oil spills.

In 1988, the UK suffered its own “Macondo” when the Occidental-operated Piper Alpha production platform exploded, resulting in 167 deaths.

The subsequent regulatory review led to a raft of safety legislation, with the effect that the UK’s offshore regulatory regime is now regarded as one of the most robust in the world and acknowledged as a “gold standard”. Nevertheless, Macondo provided a poignant reminder of the importance of maintaining and developing a regulatory regime of the highest standard, capable of managing incidents in increasingly complex and remote drilling scenarios.

In 2011, DECC has been reviewing the systems and processes in place with the aim of improving and strengthening procedures, including those demonstrating financial responsibility, with regard to exploration and production activity.

One of the areas scrutinised was the financial capabilities of licensees following a blowout from drilling operations on the UKCS.

In respect to drilling activity, OPEPs (Oil Pollution Emergency Plans) contain worst case scenario information and details are provided of the incident response actions to be implemented should such a scenario occur, including loss of well containment/well blow out. These actions can include deployment of a capping/containment device or the drilling of a relief well with the related logistical and time frame factors. All the response mechanisms to be used by the operators during any such incidents will be expensive (first party costs), as may the compensation costs for pollution damage (third party costs).

For an OPEP to be credible and for DECC to have sufficient assurance that the OPEP will be implemented when required, DECC requires operators to provide sufficient evidence that the risks of the operation have been appropriately estimated and that the financial mechanisms are in place to meet those risks.

The level of financial responsibility that companies need to demonstrate for any particular well should be calculated by establishing the combined:

- cost of well control
- cost of financial remediation and compensation from pollution

And this should accompany the relevant OPEP at the time it is submitted to DECC for approval, unless otherwise agreed with DECC.

Financial responsibility can be verified by means of:

- reliance on credit/financial strength rating of the operator or co-venturer
- insurance
- parent company guarantee/affiliate undertaking;
- any combination of the above.

DECC is aware through the auspices of Oil&Gas UK (OGUK), an Indemnities and Insurance Review Group was established under a forum to provide assistance to a review of what and how to demonstrate financial responsibility with regard to both first and third party costs, including the OPOL limit.

The outcome of this working group was the production of OGUK Guidelines.

These guidelines contain five appendices setting out certificates that, depending on particular circumstances, OGUK recommend should be submitted to DECC.

This guidance has effect on and from 1 January 2013.

Norwegian regulation

Following the Macondo incident in April 2010, the Norwegian Ministry of Petroleum and Energy announced that the incident could result in changes to laws and regulations concerning activities on the Norwegian Continental Shelf.

The Petroleum Safety Authority, PSA Norway, has the regulatory responsibility for safety, emergency preparedness and the working environment for all offshore and onshore petroleum-related activities in Norway.

According to PSA Norway, the Macondo accident has demonstrated the need to assess a number of measures that can improve the management of major accident risk, with an eye to more robust solutions than those generally employed today. Permission from the PSA to start drilling a new well will now depend on the applicant’s ability to handle a potential blowout.

The PSA report of assessments and recommendations after the Macondo incident was finally issued on 16 June 2011. Part one of the report focuses on lessons for safety and emergency preparedness in connection with drilling and well operations on the Norwegian Continental Shelf, and part two contains guidance on the prevention of major accidents in general for the whole Norwegian petroleum industry.

Brazilian regulation

Looking to the oil and gas landscape beyond the Gulf of Mexico, the Macondo oil spill and environmental clean-up response has been studied by another oil producing country in the Americas - Brazil. The largest country in South America is already a major player in the oil industry and its production is about to increase exponentially. State-owned energy superpower Petroleo Brasileiro S.A. (Petrobras) has projected that the current

production level of 2.5 million barrels per day could actually double by 2020, when taking into account the "pre-salt" project off the coast of São Paulo.

The offshore discoveries have resulted in new shipbuilding, ship owning, shipyards, crewing and overall maritime sector opportunities. This boom brings to mind the Spiderman comics statement: "With great power there must also come great responsibility". Said responsibility will

necessarily translate into strengthening Brazilian legislation in an effort to lessen the damage caused by an oil spill.

The Brazilian authorities discussed these issues at a meeting held in Rio de Janeiro, which concentrates 80% of the country's oil exploration. Five workgroups were created to gather information on accident prevention and strategies designed to contain and minimize the impacts of possible leaks.

► Post-Macondo projects: preparing for the underwriting challenges

Companies have no doubt learned a lot from the Macondo oil spill, but mistakes can of course still happen. Operators have learnt how to respond to these in a faster, more efficient way.

The lessons of Macondo are all about engineering, permits, plans, communication and sociology. The idea is that anyone, employee or contractor, can order work to be suspended if he or she feels that anything unsafe is going on. However, many operators have been finding that complying

with new guidance post-Macondo has been challenging due to the frequent amendments to current requirements, the differences between countries and the lack of communication between the various safety centres and organizations.

From an insurance point of view, the purpose of this document has been to give an overview of the new regulations post-Macondo and to set out the challenges encountered by insurers/reinsurers when

dealing with "deep offshore drilling" projects. In all honesty, however, it is still difficult to know if there have been effective advances in offshore safety since the Macondo accident of April 2010.

Nevertheless, the incident has not discouraged global deepwater exploration. In the near future, there will be even more deepwater drilling rigs and deepwater projects in existence than before the spill.


Caroline Haquet

Underwriter Offshore & Shipbuilding
SCOR Global P&C
chaquet@scor.com

SCOR Global P&C

5, avenue Kléber - 75795 Paris Cedex 16 - France
Editor: **Dominique Dionnet**
Tel.: +33 (0)1 58 44 72 62 - Fax: +33 (0)1 58 44 85 22 - ddionnet@scor.com

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