

**FOLLOWING THROUGH: How Industry is Continually Improving the Safety of
Offshore Development Post-Horizon**

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Abstract

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The oil and natural gas industry has worked collaboratively in many areas to make great strides to improve the safety of offshore drilling and producing operations since the Horizon incident in the U.S. Gulf of Mexico. The paper will discuss these activities. Immediately following the incident, the U.S. oil and natural gas industry launched a comprehensive review of offshore safety and operations to identify potential improvements in spill prevention, intervention, and response capabilities. Four joint industry task forces were assembled to focus on the critical areas of equipment, operating procedures, subsea well control and oil spill response. In addition to their own work, the task forces fully considered the recommendations of the Presidential Oil Spill Commission in forming their recommendations to improve offshore safety and response in the respective four areas. One of the major recommendations and actions directly linked to the Presidential Commission recommendations was the formation of an industry organization fully focused on Safety and Environmental Management Systems (SEMS) and managing risk. The industry organization formed is the Center for Offshore Safety (COS). The COS is fully focused on SEMS and its continual improvement through SEMS Auditing, safety data collection and analysis, good practice development, and sharing industry information. Additionally, there has been a continuing special focus on new and enhanced Industry standards. The task force on

equipment and other post-Horizon reports contained strong recommendations on the need to develop new and revised standards to enhance safety in the offshore. This work was done through the standards development process and organizations including collaboration with national and international Standards Development Organizations, the offshore oil and gas community, and the Federal government. The presentation will give an overview of the new and revised standards work to date including API Standard 53 Blowout Prevention Equipment Systems for Drilling Operations; API Standard 65-2 Isolating Potential Flow Zones During Well Construction; and API RP 96 Deepwater Well Design and Construction.

INTRODUCTION

The oil and natural gas industry has taken great strides in oil spill prevention and enhancing the safety of offshore operations since the 2010 Horizon incident in the Gulf of Mexico. Industry has focused on increasing its ability to: prevent spills from occurring; intervene to halt any spill that does occur; and respond to spills with the most effective mitigation measures possible.

In response to the Gulf of Mexico (GOM) incident, the U.S. oil and natural gas industry launched a comprehensive review of offshore safety. Four Joint Industry Task Forces (JITFs) were assembled to focus on critical areas of GOM offshore activity: the Joint Industry Offshore Operating Procedures Task Force, the Joint Industry Offshore Equipment Task Force, the Joint Industry Subsea Well Control and Containment Task Force, and the Joint Industry Oil Spill Preparedness and Response Task Force.

DISCUSSION

The ultimate goal for these JITFs was to identify best practices in offshore drilling operations and oil spill response with the definitive aim of enhancing safety and environmental

protection to improve well containment and intervention capability, spill response capability, and industry drilling standards to form comprehensively safe drilling operations, not only through evaluation and revision of industry guidelines and procedures, but also active engagement with regulatory processes. The industry improvements include:

PREVENTION AND SAFETY THROUGH STANDARDS

Based on the work and recommendations of the industry JITF's and the API's accredited standards development process, the oil and natural gas industry has published over 250 new and revised exploration and production standards in the 10 years after Horizon.

These industry standards provide a foundation for safe and environmentally responsible operations. For drilling and production, a key to the overall system of safety is the barrier philosophy, where multiple layers of protection are put into place to effectively ensure that oil and natural gas are contained. This philosophy is reflected in both the standards developed by the industry and in the regulations promulgated by the government.

As a result of the industry experts work in API, new and revised standards were developed for:

- Well design, cementing and operator/ contractor interaction.
- Blowout prevention equipment design, operation, repair and maintenance, and associated control systems.
- Subsea equipment interfaces with remotely operated vehicles and well capping equipment.
- Protective equipment for oil spill response workers.
- Integrity Management and Safety and Environmental Management Systems.

In December 2010, consistent with recommendations made by industry task forces and the work of the industry committee, API released Standard 65-2, Isolating Potential Flow Zones During Well Construction (2nd Edition). This document contains best practices for zone isolation in wells to prevent annular pressure or flow past containment barriers that are installed and verified during well construction. This document has been incorporated by reference into BSEE's regulations for offshore operations.

In November 2012, API released Standard 53, Blowout Prevention Equipment Systems for Drilling Wells (4th Edition), which provides the requirements on the installation, maintenance, testing and inspection of blowout prevention equipment. As stated in the introduction of this document, the "objective of this standard and the recommendations within is to assist the oil and natural gas industry in promoting personnel safety, public safety, integrity of the drilling equipment and preservation of the environment for land and marine drilling operations." BSEE incorporated this document by reference into its regulations in April 2016 (the "Well Control Rule"). API has since published the 5th Edition of Standard 53, Well Control Equipment Systems for Drilling Wells, in December 2018.

In March 2013, API published Recommended Practice 96, Deepwater Well Design and Construction (1st Edition), which provides the operational considerations to safely design and construct deep water wells with maximum reliability and includes a barrier philosophy to ensure that redundancies are in place to effectively prevent an incident. Additionally, it is a document that enhances the planning and working relationship between drilling contractors and operators.

PREVENTION THROUGH SUBSEA CONTAINMENT AND INTERVENTION

As a result of the work and recommendations of the industry JITF's, the Marine Well Containment Company (MWCC) and the HWCG, LLC were founded in 2010 to provide containment technology and response capabilities for the unique challenges of capping a well that is releasing oil thousands of feet below the water's surface.

These companies employ a mix of experienced engineers and crisis response specialists well-versed in the technical world of offshore operations and incident response, maintain quickly deployable systems that are designed to stem any uncontrolled flow of hydrocarbons from a subsea well and facilitate training of their member companies on the installation and operation of these systems.

These systems also provide the potential to capture flow from a subsea well incident via subsea equipment, risers and containment vessels that can safely capture, store and offload the oil.

The Containment Companies also facilitate the training of their member companies on the installation and operation of these systems. BSEE requires companies to demonstrate access to equipment and staff resources to deploy such systems to cap a well or capture uncontrolled hydrocarbons and the deployment and testing of the capping stacks. Operating companies are able to demonstrate compliance with this requirement through participation in MWCC or HWCG.

SAFETY AND MITIGATION OF ENVIRONMENTAL DAMAGE BY SPILL RESPONSE

As a result of the work and recommendations of the industry JITF's, the industry has built on its already strong base to establish one of the world's most sophisticated and well-coordinated spill response networks, administered by the National Contingency Plan (NCP).

By bringing together the resources and expertise of private industry, public agencies and academia, the industry ensures that it learns everything we can from past incidents. Since Horizon, oil spill response organizations have increased their capabilities by increasing training and by updating their suites of response equipment that enable them to respond to a spill with all the latest and effective tools available to them.

Assessments conducted immediately after the Horizon incident also led to the creation of new guidance documents and reports, including:

- Guidance on the creation of offshore oil spill response plans (API Recommended Practice 1145 – Preparation of Response Plans for Oil Spills from Offshore Facilities).
- An evaluation of the mechanical recovery systems used at sea during the Horizon incident.
- A report and field guide for spills on sand beaches and shoreline sediments, including protection techniques and detection and response capabilities.
- An evaluation of the process by which alternative technologies are reviewed for use during an oil spill.

In addition, the oil and natural gas industry through API has established a robust program of oil spill response research and development, with a focus on: planning; mechanical recovery; dispersants; in-situ burning; remote sensing; shoreline protection; alternative technologies; and

inland spill response. Industry through API shares reports from across the industry on these projects and this research related to oil spill response at <http://www.oilspillprevention.org>. Industry continues to invest in oil spill research through API and other research initiatives, with a commitment to transparently sharing new discoveries and lessons across the spill response community through a website, academic peer-reviewed journals, and through presenting at worldwide conferences.

The industry has also invested in two international oil spill preparedness and response programs focused on improving industry operational capabilities in all parts of the world including the Arctic. These two programs are coordinated with industry's API activities, and together, they represent a comprehensive, global approach to continued advancements in oil spill preparedness and response.

In addition to new technology and capabilities in the industry, the Regulator has instituted new requirements for determining the worst-case discharge and the associated demonstration of capability to effectively respond to such a discharge. To operate, operators must demonstrate that they have the capability to respond to the worst-case discharge associated with their operations. This demonstration has become part of industry's existing planning and preparation through conducting drills and exercises, inviting regulators and government to actively participate as they would in a real event. These drills allow all participants to learn to respond most effectively, combining skillsets across disciplines and feeding back into their respective organizations. To be prepared, all responding organizations need to understand their role within the response structure, and industry encourages participation from regulators and other response stakeholders in these drills.

SEMS AND API RP 75

Prior to the Horizon Incident, many operators in the U.S. offshore had been using a management system to manage the safety of their operations. Following the Horizon incident, the Regulator made it mandatory for the offshore operators to follow a robust systems-based approach to safety by implementing Safety and Environmental Management Systems, or “SEMS”. API Recommended Practice 75, *Recommended Practice for Development of a Safety and Environmental Management Program for Offshore Operations and Facilities* (API RP 75) was incorporated into federal regulations by the Bureau of Ocean Energy Management, Regulation and Enforcement (BOEMRE), a former agency within the U.S. Department of the Interior (now BSEE). SEMS is a performance-focused tool for integrating and managing safety and risk in offshore operations.

The purpose of SEMS is to enhance the safety of operations by reducing the frequency and severity of accidents. SEMS is a proactive, risk-based performance approach that outlines the various key elements for inclusion in an effective SEMS program, such as the completion of a thorough hazards analysis and the implementation of effective management of change procedures. Updated in December 2019 to the 4th Edition, the new edition of API RP 75 *Safety and Environmental Management System for Offshore Operations and Assets* makes several changes that expand the safety and environmental management system by:

- Extending the standard for use globally, beyond its previous focus on domestic operations in the U.S. Outer Continental Shelf;
- Providing guidance on how companies should interface with each other to ensure operational risks are managed, and safety and environmental protection are maintained;

- Expanding the types of operations that fall under SEMS risk management expectations, providing greater consideration of human performance;
- Structuring the standard to encourage utilization by contractors and sub-contractors; and,
- Including advancements in technology, operations, and overall knowledge.

CENTER FOR OFFSHORE SAFETY

The Center for Offshore Safety (COS) was formed in 2011 based on recommendations from the Presidential Commission and industry study teams to drive continuous improvement in the implementation and effectiveness of SEMS throughout the U.S. offshore oil and natural gas industry. The COS is playing a central role in both advancing a culture of safety in offshore operations and providing an important interface with government regulators.

The COS is an industry-led group with the mission of promoting continuous safety improvement for offshore drilling, completions and operations through effective leadership, communication, teamwork, disciplined management systems, and independent third-party auditing and certification. The COS draws on expertise and input from both the U.S. oil and natural gas offshore industry and the regulatory community.

Through the COS, industry members are committed to improving safety performance by subscribing to the following principles:

- Industry leaders commit to sharing industry data to demonstrate a visible commitment to safety.
- Operators, contractors, and suppliers work together to create a culture of safety.
- Decision making at all levels promotes the highest levels of safety.
- Safety processes, equipment, training, and technology will undergo continuous examination and improvement.

- Members share lessons, apply industry standards and good practices, and promote continual improvement.

Safety and Environmental Management Systems in the U.S. offshore industry and the work of COS is based on and defined by API RP 75. Safety and environmental management systems are the key foundational element of the industry-led COS which is committed to the effective implementation and continual improvement of SEMS. COS is focused on delivering SEMS tools, best practices, and implementation techniques based on API RP 75, as well as identified needs from annually collected safety data. The work continues as part of COS's commitment to learn and continuously improve SEMS, safety, and safety culture via SEMS. Furthermore, COS's work is prioritized into the following areas:

1. Safety and SEMS Data Collection, Analysis and Reporting
2. Good Practice Development
3. Sharing Industry Knowledge
4. Audit Service Provider (ASP) Accreditation

COS is governed by a diverse industry board representing the breadth of the industry. The board includes operators, drilling contractors, and service and supply companies.

COS full-time staff work with numerous industry committees, subcommittees and work groups organized by COS to address specific SEMS concerns and opportunities.

COS SEMS Data Collection, Analysis, and Reporting

Safety and Environmental Management Systems Audits, Learning from Incidents (LFI), and Safety Performance Indicators (SPI) are the key data collected for analyses to determine what good practice development and sharing that continually improve SEMS effectiveness. COS collects SPI and LFI data annually from members, which covers both process safety and

personnel safety. The data is analyzed and used to generate an annual report that is publicly available and supplied to regulators. The LFI data is also used to generate Safety Shares to communicate directly with offshore workers. These one-page incident reports review the details of incidents and near-misses, as well as the lessons learned from them, to prompt discussions amongst offshore workers for how a similar incident might be prevented. The COS Annual Performance Report reflects the Center for Offshore Safety's commitment to open communication and transparency of safety information, and to building collaboration and sharing safety and SEMS learnings in the industry.

Good Practice Development

The COS uses safety and SEMS data collected and SEMS audit results to drive the development of good practice documents, SEMS implementation techniques, and all the work of COS. This includes resources related to leadership engagement, SEMS maturity self-assessment, and safety culture. As an example, the "Leadership Site Engagement" good practice provides real, practical ways for leaders to engage the offshore workforce to embrace SEMS and also to evaluate SEMS effectiveness at the site. The COS documents are developed in a transparent process that applies the best program elements from successful safety and SEMS programs as well as the learnings developed by the workgroups to address the unique challenges of offshore oil and natural gas operations.

The good practices, enhancements to SEMS implementation and auditing, and other tools from COS also contribute to reducing the likelihood of major incidents through the continual improvement in risk management which results in the identification and correction of weaknesses in the barriers that prevent their occurrence.

Other examples of COS robust guidelines and good practices for promoting safety in offshore operations include:

- COS-3-01 Guidelines for Leadership Site Engagement
- COS-1-05 Skills and Knowledge Management System Guideline
- COS-3-03 Guidelines for SEMS Maturity Self-Assessment
- COS-3-04 Guidelines for a Robust Safety Culture
- COS-2-01 SEMS Auditor Qualification and Competence Requirements
- COS-2-02 Training Program Requirements for SEMS Auditors
- COS-2-03 SEMS Auditing Requirements
- COS-2-04 Accreditation of SEMS Audit Service Providers

Sharing Industry Knowledge

The COS works closely with members and other trade associations to share knowledge with and facilitate collaboration between all stakeholders. In addition to coordinating multiple member work groups, COS organizes and participates in various industry workshops webinars, and conferences to promote best practices in offshore SEMS performance. The COS also collects, analyzes, and shares safety performance data so that the industry can continuously improve operations by sharing data and learning from incidents. Improved performance – and more specifically improved performance in safety – occurs effectively through a process of learning, collaborating, and taking action through good practices. The COS operates as a “center of excellence” for making that happen.

Accreditation

The COS also works with the regulatory agency, BSEE, which requires SEMS implementation by operators as part of the SEMS Regulation. The regulation wholly references

API RP 75 as well as numerous COS Guidance documents. As part of compliance with the BSEE regulations, operators are required to conduct third-party audits of their SEMS every three years by accredited Audit Service Providers (ASP's).

COS is the accreditation body for these ASP's and therefore focuses on enhancing SEMS auditing to support an independent third-party auditing process. The development of uniform COS audit tools, processes, and audit documents assists in implementing SEMS and creating uniformity that enhances sharing and learning from audit results.

COS Driving Operational Excellence

From the beginning, COS has provided a place for the industry to come together, share lessons learned, collaborate, and continually improve SEMS performance. COS enables industry to continually improve safety and environmental performance through auditing of safety and environmental management systems, developing good practice, and capturing and sharing industry learnings.

The COS helps to convene subject matter experts from multiple stakeholder organizations to develop these practices and stimulate cooperation among all stakeholders to share and learn from the best of each other.

SUMMARY

The work and recommendations of the collaborative joint industry task forces following the Horizon incident resulted in the identification and development of improvements in offshore equipment, operations, well design, well control equipment targeted at prevention and containment, new procedures, tools for responding to oil spills, and an industry organization totally focused on safety and risk management. Safety is a core value for the oil and natural gas industry, embedded in every process and decision for operations. The drive for continual

improvement and the power of collaboration is shown through these improvements based on the learnings from the tragic Horizon incident. The work has led to continued advancements in technology, new and improved industry standards and enhanced best practices, advances in risk management, smarter regulations, and innovative approaches to addressing offshore safety. Continuous improvements occur through learning, collaborating, and innovating, the offshore oil and natural gas industry remains committed to following through on its responsibility to operate in a safe and environmentally sound manner. Together with changes being made by federal regulators, the collective action has served to improve and will continually improve the safety of offshore energy development with particular focus on increasing the ability to 1) prevent spills from occurring, 2) intervene to halt any spill that does occur, 3) respond to spills with the most effective mitigation measures possible, and 4) continually learn and enhance safety and risk management.