KEY IMPROVEMENTS TO OFFSHORE SAFETY

Revised 2020

Powered by the American Petroleum Institute www.api.org

Key Improvements to Offshore Safety

Center for Offshore Safety 1–3

Safety and Environmental Management Systems 4–6

New and Revised Industry Equipment and Safety Standards 7–8

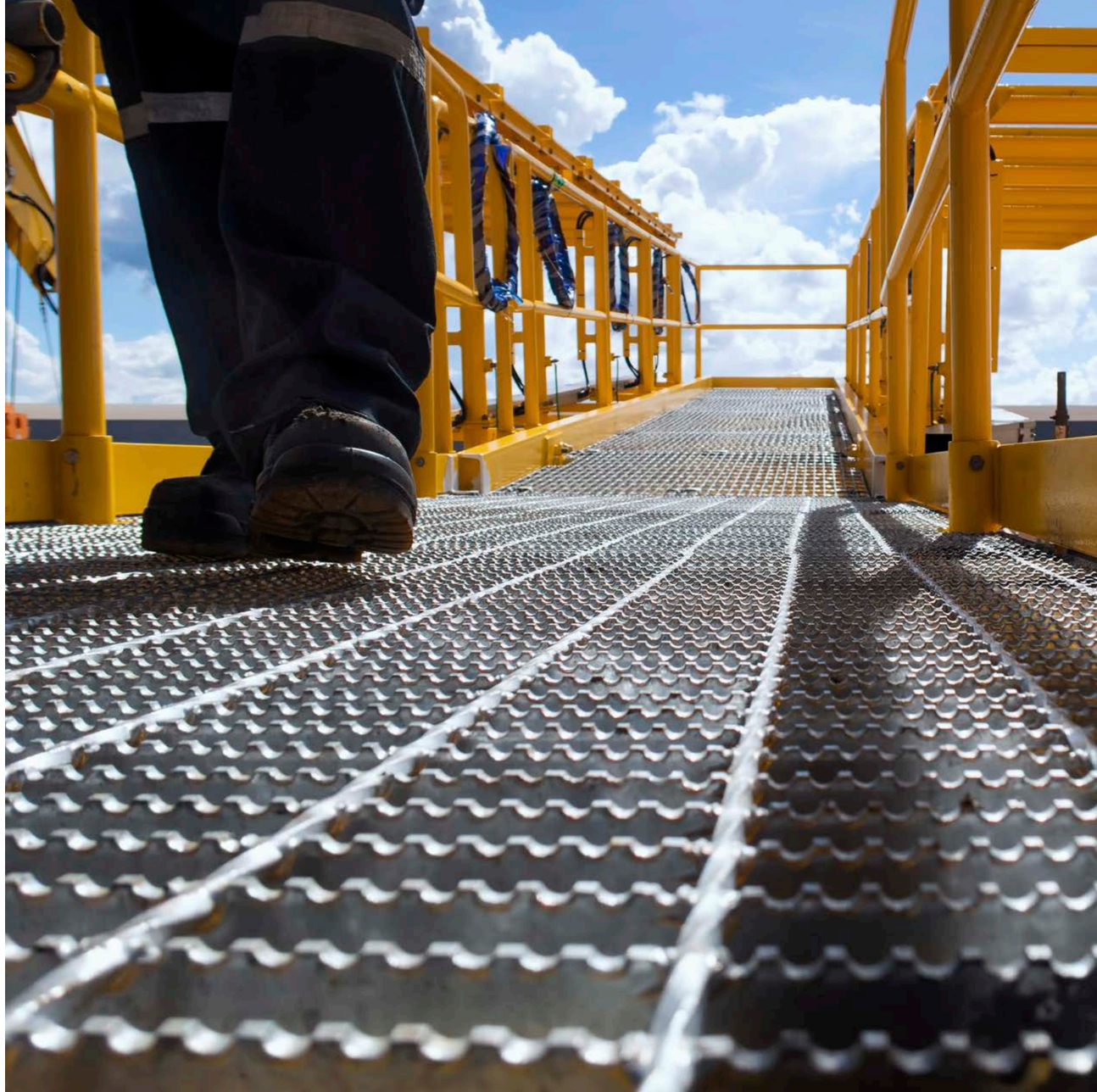
API's Q2 Certification for Service Supply Contractors 9–10

Establishment of Capping and Containment Companies and Standby Equipment 11

U.S. Department of the Interior Worst-Case Discharge and Response Policies Combined with Heightened Industry Response Capacity 12–14

Continuous Innovation and Advancement in Technology 15–16

Enhanced U.S. Government Safety Rules 17–20



1 Center for Offshore Safety

The creation of the Center for Offshore Safety (COS) in 2011 was a groundbreaking achievement for the industry and has played 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 initiative 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; and

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

A key focus of the COS is the implementation of Safety and Environmental Management Systems by the offshore industry, which is discussed in the next section.

Among other advancements, the COS has developed the following robust guidelines for promoting safety in offshore operations:

- **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

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 and advanced technologies. The COS is now firmly established as a “center of excellence” for making that happen.

2 Safety and Environmental Management Systems

Today, operators in the U.S. offshore oil and natural gas industry follow a robust systems-based approach to safety by implementing Safety and Environmental Management Systems, or "SEMS". One of the foundational elements of the industry-led Center for Offshore Safety is API Recommended Practice 75, Safety and Environmental Management System for Offshore Operations and Assets. API RP 75 was incorporated into federal regulations by the Bureau of Safety and Environmental Enforcement (BSEE), an agency within the U.S. Department of the Interior. According to BSEE, "SEMS" is a nontraditional, performance-focused tool for integrating and managing offshore operations.

The purpose of SEMS is to enhance the safety of operations by reducing the frequency and severity of accidents. API RP 75 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 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.

COS works with the offshore industry on the implementation of both API RP 75 and BSEE SEMS requirements – which are mandatory, along with third-party audits every three years, for all operators in the U.S. Outer Continental Shelf. The COS has also created a process for accrediting independent third parties to provide audits of individual company SEMS. According to BSEE's SEMS regulation, all offshore operators must undergo SEMS audits by accredited, independent third parties, also known as audit service providers. Additionally, BSEE has incorporated into its SEMS regulations various guidance documents that have been published by the COS. This ensures the qualifications and competencies of audit teams that review the SEMS programs of offshore operators by building in a further layer of quality assurance.

3 New and Revised Industry Equipment and Safety Standards

Overall, through API's accredited standards development process, the oil and natural gas industry has published over 250 new and revised exploration and production standards over the course of the past 10 years.

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. In December 2010, consistent with recommendations made by industry task forces, 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.

4

API Spec Q2 Certification for Service Supply Contractors

The performance of contractors in the oil and natural gas exploration sector is vital to safe and responsible offshore operations. Oil and gas contractors, also known as service supply organizations, are now implementing Specification Q2, Quality Management System Requirements for Service Supply Organizations for the Petroleum and Natural Gas Industries (1st Edition), to help ensure a high level of performance in all operations, particularly in the offshore. API's Spec Q2 is the first ever quality management system (QMS) certification for service supply organizations in the oil and natural gas industry. Its approach to industry improvement is similar to API's Spec Q1, which certifies oil and natural gas equipment manufacturers for the safety, consistency and interchangeability of their products.

Development of Spec Q2 began in early 2010 to reduce risk and improve service quality by identifying and standardizing the expectations for execution of upstream services like well construction, intervention, production and abandonment. The standard was officially unveiled in December 2011 and is recognized around the world as a key tool for advancing contractor performance.

5

Establishment of Capping and Containment Companies and Standby Equipment

A significant achievement of the offshore oil and natural gas industry is the creation of well intervention and containment consortiums that 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, the Marine Well Containment Company (MWCC) and the HWCG, LLC, maintain quickly deployable systems that are designed to stem any uncontrolled flow of hydrocarbons from a subsea well and 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.

6 U.S. Department of the Interior Worst-Case Discharge Response Policies Combined with Heightened Industry Preparedness and Response Capacity

Industry is committed to preventing incidents. However, sometimes events do occur, and we are prepared to respond. BSEE 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.

In addition to demonstrating their capabilities to respond to a worst-case discharge, the industry has invested heavily in improving many other types of technologies that can and should be used to respond to oil spills. These include in-situ burning, surface dispersant application, subsea dispersant injection (SSDI), novel shoreline and booming techniques, as well as many novel remote sensing methods.

The industry has also conducted extensive academic research into these spill response tools, verifying their effectiveness and how best to deploy each tool, given the nature of the specific event. Specifically, subsea dispersant injection was a novel technique used in the Macondo response, and since the technology has been proven, industry has developed worldwide capability to deploy the technology should a particular spill warrant its use.

API shares reports from across the industry on projects and 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 this website, academic peer-reviewed journals and through presenting at worldwide conferences.

In addition to research and the validation of technology, industry also prepares to respond by 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.

7 Continuous Innovation and Advancement in Technology

Innovation and advancement of technology underpin all aspects of the oil and natural gas industry, and continued improvements have enabled safer operations as well as the economic unlocking of resources.

Continual improvement is enabled through application of new technologies, both equipment and methods, across the full life cycle of offshore oil and natural gas projects. The life cycle of a well starts during the pre-planning stage, goes through pre-drill programming, drilling, completion and production, and ends when a well is plugged and abandoned with long-term integrity.

Innovation and advancements in technologies simultaneously increase safety and environmental soundness throughout the offshore well process with commensurate benefits in efficiency and project economics. Innovation cascades across the offshore industry and is evident in advancements in everything from information management systems and large data analytics to well planning and design, manufacture of heavy iron drilling rigs and tubulars, complex downhole completion equipment and tools, and new methods and techniques. As a result of the constant advancement of technologies across all project components, U.S. ingenuity and engineering prowess has elevated safety and systems integrity to the highest levels in offshore oil and natural gas operations and across the broad spectrum of industrial engineering applications.

8

Enhanced U.S. Government Safety Rules

The U.S. government, through BSEE and its predecessor agencies, has made significant changes to the regulatory requirements applicable to offshore oil and natural gas operations. In addition to the requirements for SEMS as discussed above, BSEE published several additional rules including a final drilling safety rule on August 22, 2012 (this rule had been previously issued as an interim rule on October 15, 2010 by the predecessor agency, the Bureau of Ocean Energy Management, Regulation and Enforcement); a Blowout Preventer Systems and Well Control Rule on April 29, 2016 and updated on May 15, 2019; and a Production Safety Systems Rule on September 2, 2016 and updated on September 28. 2018. The BSEE regulations now have extensive requirements for well design and integrity, blowout preventer and control systems, and production safety systems. Under these safety provisions, BSEE requires, among other things:

1. Identification of the mechanical barriers and cementing practices that will be used;

2. Independent third-party verification that the blowout prevention equipment is designed for the specific equipment on the rig and for the specific well design;

3. Independent third-party verification that the blowout prevention equipment will operate in the conditions in which it will be used;

4. A certification signed by a registered professional engineer that the casing and cementing design is appropriate for the purpose for which it is intended under the expected conditions;

5. For wells that use subsea blowout prevention equipment, the inclusion of two independent barriers, including one mechanical barrier, for each annular flow path. There are also extensive requirements for the maintenance, testing and inspection of blowout prevention equipment;

6. Real-time monitoring capability for deepwater and high-temperature/high-pressure drilling activities;

7. Requirements for the testing and inspection of subsea well containment equipment in the regulations;

8. Set criteria for what constitutes a safe drilling margin and allows for alternative safe drilling margins when justified;

9. Requirements for using remotely operated vehicles (ROV) to function certain components on the Blowout Preventors (BOPs) stack;

10. Failure reporting for both blowout prevention systems and production safety systems;

11. Improved safety and pollution prevention equipment (SPPE) design, maintenance and repair requirements;

12. Differentiating the requirements for operating dry tree and subsea tree production systems on the OCS; and

13. New requirements for firefighting systems, shutdown valves and systems, valve closure and leakage, and high pressure/high temperature (HPHT) well equipment.

The U.S. Coast Guard also plays a role in overseeing offshore oil and natural gas operations, and its responsibilities extend to safety of life, property, and navigation and protection of the environment on OCS units and vessels engaged in OCS activities. This includes units and vessels such as mobile offshore drilling units that are used in oil and natural gas exploration and production operations. The Coast Guard has revised some of regulatory policies, guidance, inspections and training over the past several years including, among others:

- Regulations for third-party testing and certification of electrical equipment in hazardous locations on newly constructing Mobile Offshore Drilling Unit (MODUs), floating offshore facilities and vessels other than offshore supply vessels that engage in offshore activities
- Guidelines for fire and explosion analyses
- Guidelines for lifesaving and firefighting equipment, training and drills onboard manned offshore facilities
- Updated inspection protocols for vessels in offshore operations
- Improved collaboration with the Bureau of Safety and Environmental Enforcement on regulatory oversight, inspection and oversight, and spill response

It is clear that worker safety and safety management is never complete. It is a journey of continual improvement. Industry collaboration and collaboration through associations has been an enabler and key foundation of this journey, bringing people, programs and data together to identify concerns and opportunities to achieve a safe place to work.

energy API