Beyond Compliance: Strengthening the Safety Culture of the Offshore Oil and Gas Industry

DETAILS

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Committee on Offshore Oil and Gas Safety Culture; Policy Studies; Transportation Research Board; National Academies of Sciences, Engineering, and Medicine

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of the Offshore Oil and Gas Industry

Committee on Offshore Oil and Gas Industry Safety Culture

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Beyond Compliance

Strengthening the Safety Culture of the Offshore Oil and Gas Industry

The offshore oil and gas industry in the Gulf of Mexico is among the most developed in the world. It provides thousands of jobs in the Gulf Coast region and supplies a sizable portion of the U.S. energy requirement. Oil production in the Gulf of Mexico is expected to account for 18 percent and 21 percent of total forecast U.S. crude oil production in 2016 and 2017, respectively, even as oil prices remain low.

Drilling offshore for oil and gas can, however, be a dangerous business. Logistical, oceanographic, operational, and economic challenges complicate deepwater exploration and development. The number and variety of contractors operating on a single facility can increase the challenges associated with sustaining a common safety culture, managing personnel effectively, and carrying out the responsibility for maintaining safe working conditions.

Incidents with extensive repercussions, such as the Macondo well blowout of 2010, are unlikely. Yet when they do occur, they can have severe consequences for offshore workers, people in the communities that support the oil and gas industry, those whose livelihoods are affected, the assets of the operator and its contractors, the environment, and the industry as a whole. The Macondo well blowout led to an explosion and fire on the *Deepwater Horizon* drilling rig that resulted in the deaths of 11 crew members, injuries to others, and the spilling of an estimated 3.19 million barrels of crude oil into the Gulf of Mexico. In the end, the incident will cost BP more than $30 billion in fines, penalties, operational response, and liabilities.[1] The magnitude of the disaster and its substantial economic impacts on the Gulf Coast region as a result of lost revenue, profits, and wages have led to intense public scrutiny of the safety of offshore drilling and production.

Prior to the Macondo event, many in the industry found it difficult to imagine an accident in the United States that would result in a major oil spill, loss of lives, injuries, and the sinking of the rig. This point is illustrated by the aftermath of the 2009 blowout and fire on the Montara wellhead platform and subsequent oil spill in the Timor Sea (northwest of the Western Australia coast). Following this incident, many of the public

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[1] According to the *Wall Street Journal* (April 26, 2016), BP's total bill is more than $56 billion to date and continues to increase.

statements from the U.S. oil and gas industry focused on explaining why a Montara-like blowout could not happen in the United States, rather than expressing the industry's intent to learn more about the Montara incident and its causes and share that knowledge industry-wide. As it happened, the root causes of the Macondo and Montara blowouts were similar: both involved failures of management systems and processes. Had industry made a greater effort to understand the causes of the Montara event, the suspension of the Macondo well might have been managed better, with less damage.

Multiple investigations of the Macondo well blowout, rig explosion, and oil spill attributed the cause of the blowout to a series of mistakes made by the operating company, the drilling contractor, and the contractor for the cementing job. Ultimately, those mistakes are indicative of systematic failures in risk management, and call into question the safety culture of the offshore oil and gas industry. Indeed, the various investigations led to a common conclusion: that a lack of process safety and deficient safety culture were primary causes of the accident. This consensus conclusion signaled a significant change in how the causes of such catastrophic accidents are understood.

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DREAMPICTURES/GETTY

Government, industry organizations, and individual companies have taken many actions to improve safety over the past several years. Nonetheless, more work remains to be done to effect safety improvements throughout the U.S. offshore oil and gas industry. To help respond to that need, the National Academies of Sciences, Engineering, and Medicine convened an expert committee to identify ways in which the offshore oil and gas industry, government, and other stakeholders can strengthen the industry's safety culture.[2]

The committee's full report,[3] issued in 2016, outlines what government, industry, and other organizations can do to strengthen safety culture. This companion publication summarizes those portions of the full report that are directly relevant to offshore industry leaders, the offshore workforce, and salient professional organizations. After briefly reviewing actions taken by companies, industry associations, and regulators that serve as the foundations for future safety efforts, the report argues for the need for a new approach based on building a strong safety culture, whose essential characteristics are then defined. Next is a discussion of recommended actions for improving safety culture, including developing a vision for appropriate regulatory oversight and a strategic plan for achieving safety and environmental objectives, and creating an independent industry safety organization. The report then describes the challenges entailed in implementing change in offshore safety culture, along with strategies for overcoming those challenges. The final section addresses assessment of progress in safety culture to facilitate improvement. The discussion herein is based on the main findings, conclusions, and recommendations of the National Academies committee. Readers interested in additional information on these topics should refer to the full report.

NICOLAS RUSSELL/GETTY

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[2] The committee's work was supported with funds designated for the National Academy of Sciences as a community service payment arising out of a plea agreement entered into between the United States Attorney's Office for the Eastern District of Louisiana and Helmerich & Payne International Drilling Company.

[3] *Strengthening the Safety Culture of the Offshore Oil and Gas Industry*, available at http://www.nap.edu/catalog/23524/strengthening-the-safety-culture-of-the-offshore-oil-and-gas-industry.

Foundations for Future Safety Efforts

In the many decades since the oil and gas industry began working along the coastline and, ultimately, moved offshore to explore for and produce oil and gas, occupational safety appears to have improved through the efforts
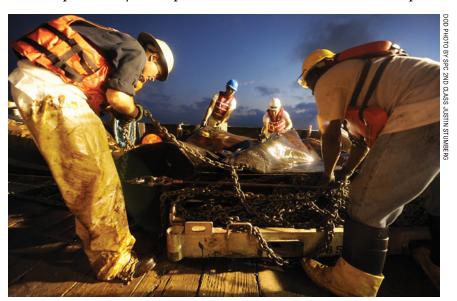

DOD PHOTO BY SPC 2ND CLASS JONATHEN E. DAVIS

of companies, industry associations, and regulators. The offshore environment did not start out as a safe one in which to work. Initial ad hoc and experimental designs for drilling from vessels and platforms in shallow water resulted in overturned vessels, fires, explosions, blowouts, and extensive loss of life in the 1950s and 1960s. Inconsistencies in reporting and reporting requirements make it impossible to assess accident rates during the early years as companies moved farther offshore, but a series of disasters during this period illustrated the risks and motivated action by industry and government.

From the mid-1960s through the 1990s, the industry began to work collectively to solve design and equipment problems. Industry associations such as the American Petroleum Institute (API) and the Offshore Operators Committee (OOC) advised the federal government on changes that would improve safety, developed and issued a series of recommended prac-

DOD PHOTO BY SPC 2ND CLASS JUSTIN STUMBERG

tices and standards, and instituted changes in required training programs for offshore personnel. The U.S. Coast Guard (USCG) and U.S. Geological Survey (USGS) (which served as a safety regulator during this period) also began enforcing new occupational safety and other regulations to enhance safety, which expanded over time.

Government regulators and industry officials did not always agree on how to address safety concerns. During the 1990s, API developed a recommended practice for safe operations (API Recommended Practice [RP] 75), which began as a voluntary standard. As the number of companies following RP 75 subsequently declined, industry resisted the efforts of federal regulators to require all companies to comply with it.

The three government departments currently responsible for regulating the offshore industry—the U.S. Department of the Interior (DOI), USCG, and the U.S. Department of Transportation (DOT)—implement safety and environmental regulations according to their capabilities and expertise. USCG regulates nearly all maritime activities, and DOT's Pipeline and Hazardous Materials Safety Administration (PHMSA) regulates all pipelines onshore and some offshore. The capabilities and expertise for permitting and inspecting oil and gas wells and production (including producer pipelines) on the U.S. Outer Continental Shelf reside in DOI's Bureau of Safety and Environmental Enforcement (BSEE). In October 2010, 3 months after flow from the Macondo well was stopped, DOI (through a predecessor bureau to BSEE) published a final Safety

and Environmental Management Systems (SEMS) rule in an effort to improve offshore operations. The rule required operators to implement a SEMS program addressing all elements of API's RP 75. BSEE subsequently revised the SEMS rule, and a new rule, called SEMS II, became effective in June 2013. SEMS II promotes employee participation and the empowerment of field-level personnel.

The Need for a New Approach: Building a Strong Safety Culture

Prior to 2010, the U.S. offshore industry had not experienced a catastrophic accident in many years. That trend ended in 2010. The *Deepwater Horizon*–Macondo blowout, explosion, and spill illustrated that the focus of industry and government regulators on improving equipment, design, and occupational safety and attributing accidents to human error was insufficient to prevent such incidents. Several reports[4] on safety in the offshore oil and gas industry issued in the aftermath of this disaster emphasized that compliance with government regulations alone is inadequate to create and maintain a safe working environment offshore. Rather, a fundamental transformation of the offshore oil and gas industry's safety culture is needed to reduce the risk of accidents offshore.

Characteristics of a Strong Safety Culture

The term *safety culture* was coined by the International Nuclear Safety Advisory Group during its

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[4] Reports issued by the National Commission on the BP *Deepwater Horizon* Oil Spill and Offshore Drilling; the National Academy of Engineering and the National Research Council; the U.S. Coast Guard; and the Bureau of Ocean Energy Management, Regulation, and Enforcement Joint Investigation Team.

investigation of the Chernobyl power plant accident in 1986. Since then, the definition of safety culture and the identification of the factors that strengthen such a culture have evolved. At its core, however, safety culture remains an aspect of the larger organizational culture, encompassing the organization's values, beliefs, attitudes, norms, practices, competencies, and behaviors regarding safety. Safety management systems such as SEMS are necessary, but not sufficient, to foster a robust safety culture. In many respects, SEMS provides a framework, or set of processes, for moving beyond compliance with specific safety regulations. A strong safety culture embodies the commitment of the organization and of each individual employee to working in a manner that truly enhances safety—a need heightened by the technical challenges posed by the offshore environment, which are exacerbated as activities move into harsher conditions, such as those associated with deeper water.

In May 2013, BSEE issued a policy statement defining safety culture as "the core values and behaviors of all members of an organization that reflect a commitment to conduct business in a manner that protects people and the environment." In issuing this policy statement, BSEE noted its commitment to a regulatory approach that would lead the offshore oil and gas industry beyond checklist inspections toward a systematic, comprehensive safety regime. The statement identifies nine characteristics of a robust safety culture (described on page 11):

JOEL SARTORE/NATIONAL GEOGRAPHIC

- Leadership commitment to safety values and actions,
- A respectful work environment,
- An environment for raising concerns,
- Effective safety and environmental communication,
- Personal accountability,
- An inquiring attitude,
- Hazard identification and risk management,
- Work processes, and
- Continuous improvement.

In developing its list of characteristics, BSEE relied heavily on the safety culture attributes defined by the nuclear power industry. BSEE's list mirrors leading scholarly reviews of safety culture research and frameworks in other industries, and is grounded in empirical research.

RECOMMENDATION: The offshore industry and government regulators should adopt the BSEE definition of safety culture and its essential elements as a guide for assessment and practice.

Although the offshore industry would benefit from adopting BSEE's nine characteristics of an effective safety culture, the list is not well known in the industry. Nor does BSEE have the means to move the entire offshore industry closer to these desired characteristics.

RECOMMENDATION: The Secretary of the Interior, in cooperation with the Commandant of USCG, should seek prominent leaders in the offshore industry to champion the nine characteristics of an effective safety culture identified by BSEE, develop guidance for safety culture assessment and improvement, and facilitate information exchange and sharing of experiences in promoting safety culture.

RECOMMENDATION: The industry as a whole should create additional guidance for establishing safety culture expectations and responsibilities among operators, contractors, and subcontractors.

Once the industry has agreed upon steps to take to achieve safety and environmental objectives, each organization involved in the offshore oil

Nine Characteristics of a Strong Safety Culture

Leadership commitment to safety values and actions—Leaders demonstrate a commitment to safety and environmental stewardship in their decisions and behaviors. Leaders visibly demonstrate this commitment through how they allocate resources within the organization and prioritize safety relative to production.

Respectful work environment—Trust and respect permeate the organization, with a focus on teamwork and collaboration.

Environment for raising concerns—A work environment is maintained in which personnel feel free to raise safety and environmental concerns without fear of retaliation, intimidation, harassment, or discrimination.

Effective safety and environmental communication—Communications maintain a focus on safety and environmental stewardship. Knowledge and experience are shared throughout the organization.

Personal accountability—All individuals take personal responsibility for process and personal safety, as well as environmental stewardship.

Inquiring attitude—Individuals avoid complacency and continuously consider and review existing conditions and activities in order to identify discrepancies that might result in error or inappropriate action. Workers are expected to question work practices as part of everyday conversations without hesitation.

Hazard identification and risk management—Issues potentially impacting safety and environmental stewardship are promptly identified, fully evaluated, and promptly addressed or corrected commensurate with their significance.

Work processes—The process of planning and controlling work activities is implemented in a manner that maintains safety and environmental stewardship while ensuring use of the correct equipment, used in the correct way, for the correct work.

Continuous improvement—Opportunities to learn about ways to ensure safety and environmental stewardship are sought out and implemented.

Source: BSEE, 2013.

ANTARTIS/DREAMSTIME

HELIX ENERGY SOLUTIONS GROUP

and gas industry—operators, contractors, and subcontractors—will be responsible for developing its own strategies for executing this overall plan. Although the regulators set the minimum requirements for operating offshore, the industry needs to go further to decide which safety guidelines should be made mandatory for participants in offshore oil and gas exploration and production.

Recommended Actions to Improve Safety Culture

A Vision for Appropriate Regulatory Oversight and a Strategic Plan

The offshore industry as a whole needs to develop a vision for appropriate regulatory oversight that delineates the respective roles of operators and regulators, as well as a strategic plan for achieving its safety and environmental objectives. The vision should include a description of the regulatory system that can best enable the accomplishment of these objectives, encourage continuous improvement, and enhance safety culture. Historically, the industry has opposed many regulatory initiatives designed to enhance safety but has not offered a vision for the type of regulatory system it would support. The regulators also have been inconsistent and unclear regarding their regulatory philosophy and strategy, sometimes issuing highly prescriptive requirements and sometimes supporting a more performance-based approach.
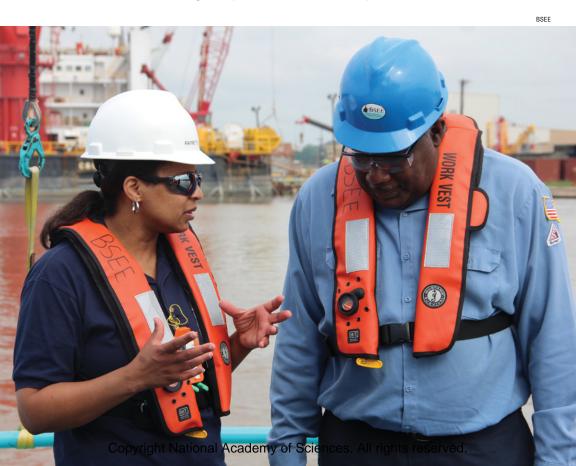
The offshore industry needs to demonstrate that it can address fundamental and long-standing concerns related to managing safety offshore.

For example, a technologically advanced industry might be expected to have sophisticated incident data collection and analysis capabilities, which still is not the case in the offshore industry. Other concerns, such as the consistency and rigor of industry standards for safe operating practices, also need to be addressed. The industry needs to develop a strategy for safety leadership. While each company is responsible for its own safety performance, the industry as a whole needs to be committed collectively to a culture that provides the best opportunity for a safe working environment.

RECOMMENDATION: Industry leaders should encourage collective and collaborative actions to effect change in an industry as fragmented as the offshore oil and gas industry.

Although a fundamental responsibility of the regulators is to implement laws, influencing safety culture in positive ways will require them to

BSEE

undertake new and different initiatives. Goals for offshore safety culture shared between the industry and regulators would help define new safety culture activities, such as coaching, sharing of lessons learned, and independent safety culture assessment. Currently, a considerable imbalance favors traditional compliance activities by regulators over activities intended to help strengthen safety culture, and the existing offshore compliance culture reflects this imbalance. If the offshore oil and gas industry is to go beyond compliance, changes in the regulators' policies will be necessary. The industry sees its regulators collectively as "the government," but when introducing safety culture initiatives, regulators will need also to assume the role of participants in the effort to establish and maintain a strong safety culture across the industry. Ideally, the overall role of the regulators is to ensure that the operating companies have systems in place to optimize safety performance.

RECOMMENDATION: The offshore oil and gas industry, in concert with federal regulators, should take steps to define the optimal mix of regulations and voluntary activities needed to foster a strong safety culture throughout the industry.

The offshore industry should collaborate on a design for a safety system for all levels of all organizations in the industry and adopt an evi-

NOAA (3)

dence-based decision-making process that involves reporting of accurate and complete data, analysis of causes and trends, and sharing of the data across the industry and with the regulators. More important, the industry and the regulators should go beyond ideas and possibilities and develop concrete plans for execution.

An Independent Industry Safety Organization

In 2011, in the aftermath of the Macondo incident, the offshore industry established the Center for Offshore Safety (COS), an industry-sponsored organization affiliated with API and created to focus exclusively on safety on the U.S. Outer Continental Shelf. The mission of COS is to promote the highest level of safety for offshore drilling, completions, and operations through leadership and effective management systems addressing communication, teamwork, and independent third-party auditing and certification.

Initially, COS membership was limited to deepwater operators, with contractors and other service providers (such as consultants and engineering firms) as associate members. In early 2015, COS opened its membership to all companies operating on the U.S. Outer Continental Shelf. As of May 2016, COS members included 14 operators, 6 drilling contractors, and 10 service or equipment providers.

RICK LOOMIS/GETTY

COS could be even more effective in encouraging safety management practices across the industry if its members and associate members represented a larger cross-section of the industry. Barriers preventing other companies from joining COS may include the annual cost of membership or the requirement to undergo regular safety management system audits and make the resulting data available.

Moreover, while COS is making important contributions to offshore safety, its affiliation with API, which is known for its public advocacy on behalf of the industry, raises questions about COS's objectivity. API has safety goals in its charter and has developed many standards used in offshore drilling around the world; yet the public perceives its primary mission as supporting and promoting its members' interests, not identifying weakness and concerns related to safety. As a result, conflicts can be perceived when advocacy and safety issues diverge. In addition, the public does not always trust the sincerity of such industry associations when they state that safety is their first priority in assessing the performance of their members. If COS were independent of API, it would more likely be recognized as a safety leader more broadly.

In 2011, the National Commission on the BP *Deepwater Horizon* Oil Spill and Offshore Drilling commented that to be credible, an oil and

gas industry institute would need to be entirely free from other interests and agendas and separate from API. The institute would also need to secure an industry-wide commitment to rigorous auditing and continuous improvement. In effect, all companies operating on the Outer Continental Shelf would participate in the safety institute.

RECOMMENDATION: The U.S. offshore industry should implement the National Commission's recommendation for an independent organization whose sole focus would be safety and protection against pollution, with no advocacy role. COS, although a strong, positive step in this direction, is nonetheless organized within API and therefore not independent of that organization's industry-advocacy role. Moreover, the current cost of membership in COS limits participation. Membership in a single independent safety organization should be a key element of the fitness-to-operate criteria for all organizations, including operators, contractors, and subcontractors, working in the offshore industry.

In addition, the regulatory agencies should support the requirement for participation in the single industry-wide safety organization. This would be one way for this independent organization to expand its financial base and engage the entire offshore industry. The details of who would make membership in the single safety organization mandatory and how that might be accomplished would need to be worked out. For example, would a regulator establish this requirement, or would industry be accountable for making membership a condition for participating in offshore work? Would an operator make membership a requirement for its contractors?

Overcoming the Challenges to Change

An organization's primary goals (e.g., production, profit) may compete with or be perceived as competing with safety. Production is seen as an acute problem

NICOLAS RUSSELL/GETTY

that needs to be addressed immediately. On the other hand, safety is seen as a chronic concern, and it is easy for complacency to set in and resources to be diverted to more pressing matters. Moreover, safety is often encouraged by "outsiders" (e.g., regulators, citizens' groups, news media) or safety specialists who may be seen as interfering with (and not understanding) the legitimate service and production work of the organization. In practical terms, organizations often wrestle with the inevitable (at least in the short term) tension between safety and production goals. A strong safety culture, of necessity, accentuates technological and economic feasibility while promoting continuous improvement.

The culture change process is more like a journey than a project: even highly successful and respected organizations can behave in ways that bring the strength of their safety culture into question. In a fragmented, competitive, heterogeneous, and ever-changing offshore oil and gas industry, supported by multiple regulators and industry associations, this journey will not be short or straightforward, but rather full of challenging twists and turns. Any change has intended and unintended consequences

and reverberations, some of which reinforce the desired change, but some of which interfere with the change or raise new challenges. Thus the change process is iterative, uneven, and not fully predict-able. The primary challenges to implementing change in the offshore industry's safety

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culture are discussed below, along with approaches for overcoming them.

Each Company Needs to Determine How to Strengthen Its Safety Culture

Each industry segment and each company needs to consider what safety culture means; what behaviors are critical for it to sustain such a culture;

and how it should implement an effective assessment system, which takes more thought and resources than simply adopting standard tools (see the discussion of assessment in the final section of this report). Change tactics need to be appropriate to the context. The same change plan may work in one setting (e.g., a large integrated operator) and not another (e.g., a small indepen-dent operator).

Overcoming the Challenge

It is evident that many companies in the offshore industry are well under way on their safety culture journey and can serve as instruc-tive examples to others. The nuclear power and airline industries also provide helpful role models and have exhibited a notable willingness to share information within their own industry as well as with others. In the offshore industry, each company need not in-vent its own safety culture policies, practices, and assessment tools, but each will have to decide how to apply the knowledge and tools derived from the experiences of other companies in addressing its own specific needs and goals. The offshore industry can continue to develop resources and guidance by sharing information through

BSEE

existing collective institutions, such as trade associations, working groups, the Society of Petroleum Engineers, and COS.

Leadership Commitment to Building and Sustaining Safety Culture Varies Among Organizations

Senior leaders and owners of companies in the offshore industry vary in their understanding of, commitment to, and engagement with developing and sustaining a strong safety culture. Although pockets of excellence exist, there remain the leadership challenges of setting strategy, deploying initiatives, and meeting business goals while modeling safety as a value. Leaders create an environment in which safety culture (and safety) erodes when they reward productivity but do not consistently recognize safety performance, or send intentional or unintentional messages that safety is less important than productivity, too expensive, or something pursued merely to comply with regulations. Leadership transitions can derail an organization's safety culture if new leaders are not prepared to take full ownership of the culture, even when a good system is in place.

Overcoming the Challenge

As discussed earlier, successful transition to an effective safety culture requires a compelling vision and a practical plan for moving forward that will motivate stakeholders. Leaders can create and communicate a vision that describes safety as a fundamental value of the organization, not just a transient priority. Priorities change, but values endure and become embedded in the culture. If leaders are to be committed to maintaining an effective safety culture, they must first believe that the tangible and intangible benefits of doing so far outweigh the costs, as illustrated by the case examples of the U.S. Navy's SUBSAFE program and an international oil and gas company discussed at the end of this section. Then, they must convince others to commit to and provide support for their efforts as well. People need to envision a compelling future state of safe operations and understand how their own behavior relates to achieving that vision if they are to have a clear sense of where they are going and why. People throughout the organization need to enact safety processes and practices, exhibiting behaviors that often go beyond written requirements. A clear and engaging picture of leadership's commitment to sustaining a strong safety

CAROLYN COLE/GETTY

culture will invite people to action. They will see a future desirable enough to change the present to achieve it.

Leaders who successfully implement an effective safety culture are highly visible role models who live safety as a value, consistently demonstrate the importance of safety-related behaviors, and instill the courage to change in others. They focus not only on getting results but also on getting results in the right way and behaving in accordance with the value of a strong safety culture. Workers, supervisors, and managers will not speak up about safety issues or be willing to stop work unless they believe their leadership will support them. Senior leaders may believe they are willing to support such actions, but if there is no precedent (or, worse, a history of negative reactions) and employees are afraid to even try, there is no opportunity to reinforce safe behaviors. Leaders need to be proactive with their messages and actions and ensure that no learning opportunity goes to waste.

The Industry Is Fragmented and Diverse

Drilling and production take place under many different organizational arrangements, from huge deepwater rigs with a large on-board staff (e.g., well over 100, including a diverse set of contractors and subcontractors) to small platforms that are unmanned or have just one or two crewmembers. Persuading each entity in such a fragmented industry to embrace safety culture is challenging. Both the heterogeneity of organizations and people and competition make it difficult to set uniform rules that apply to all settings, reach industry-level agreements, or even share information. Efforts are under way through COS and BSEE to address this challenge by developing toolkits and guidance documents, but these efforts have not yet engaged the entire offshore industry.

The economic costs and benefits and the cultural values around safety vary across the

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range of offshore operations, such as seismic, drilling, production, construction, and logistics (air and marine). Moreover, most larger operators and contractors recognize the benefit of investing in safety in light of the long-term risks to their operations and their corporate reputation of failing to do so. Smaller operators and smaller contractors, on the other hand, are more varied in their approach to safety. Some have excellent internal communication and a focused and innovative approach with respect to safety, while others may maintain a mind-set and practices aligned with a minimum level of safety (e.g., less safety training, selection of contractors based on low cost without consideration for their safety records). Those who believe they cannot afford the near-term costs of investments in safety may withhold information about unsafe practices and accidents to minimize further costs (in terms of dollars and reputation). Even the most conscientious organizations can be subject to greater pressure to deemphasize safety when projects run late and financial incentives are in jeopardy.

Cultural issues also come into play. Many parts of the industry have a dispersed and multicultural workforce, which creates challenges either within a workplace, among contractors, or between contractors and their customers. Some cultural issues have ethnic or national origins. Some skilled craft workers in the Gulf of Mexico, for example, come from vari-

ous national cultures whose languages are not English and whose safety attitudes and practices may differ both from each other and from U.S. approaches. Some foreign-flag drilling rigs move around the world with long-term, non-American crews. These crews may have consistent expertise and a coherent rig culture (which may be very safe), but this culture may vary from that of the operator. Even within a single national culture, such as that of the United States, cultural and status differences exist among professional groups (e.g., engineers versus operators versus managers), hierarchical levels, generations of workers, and local sites.

Overcoming the Challenge

Senior leaders in each company involved in offshore operations and leaders of industry associations need to demonstrate consistently their commitment to safety, aligning their actions with their words. The industry as a whole, led by the more progressive operators, contractors, and industry associations, needs to be thoughtful about extending safety culture to the heterogeneous organizations and workers in the offshore industry.

Given the many groups that are stakeholders in the offshore industry, a coalition of informed, interested, and respected parties will be needed to influence others to participate. Culture cannot easily be imposed by one organization on another, whether it be large operators telling contractors or regulators telling operators how to think and act. A better strategy is collaborative engagement in which organizations with strong safety cultures persuade others to work together to improve safety culture industry-wide.

The Industry's Safety Culture Is Still Developing

The heritage of the offshore oil and gas industry reflects the early risk-taking traditions of the onshore oil and gas companies, as well as the traditions of the mining industry, which celebrated individual heroics rather than teamwork, discipline, rules, and protection of people and the environment. Like many other industries, the offshore industry has changed significantly since its earlier years. There are signs that the number of incidents is decreasing, and evidence indicates continual improvements in the industry's safety efforts. It is more common today, for example, for anyone to report safety concerns or to stop a job. Variation in this regard

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persists, however, as a result of both the industry's heritage and the rapid growth in new operators and contractors.

In this industry, moreover, as in many others, there is an existing culture of individual blame for noncompliance with rules. Unfortunately, a blaming culture often works against a reporting culture. Thus workers are reluctant to report near misses or small accidents, which can be precursors of larger problems. In addition, problems may be hidden to avoid paperwork; please the boss; receive bonuses; or avoid management attention, peer annoyance, and regulatory enforcement. Even when reported, the incidents that garner attention are often those involving minor personal injuries, transportation incidents, and spills (because they occur most frequently) rather than gaps in process safety that could be precursors of major accidents.

Like most industries, the oil and gas industry as a whole does not consistently engage in systems thinking in which the interrelationships among events and practices are considered. Problems may be seen as one-off and each installation as unique. An operator may share lessons learned internally but be less inclined to share them with another operator. The tendency is to focus on immediate, proximal causes (such as human error) rather than systemic causes, including culture. Historically, fixes have been devised with little understanding of how they will be implemented and validated or what unintended consequences they might have.

Overcoming the Challenge

Many in the industry recognize the importance of engaging in systems thinking and deliberately managing the development of effective safety processes organization-wide. Even before the advent of SEMS, most in the industry had adopted a management system process that promotes

goal setting and drives progress toward operations free of incident (including personal and process safety accidents, near misses, and nonconformances). Plans are developed to close identified gaps, actions are taken, and results are reviewed for validation and learning purposes. Developing and sustaining a strong safety culture requires that all members of the workforce be competent relative to their assignments and accountable for established safety processes.

Although senior leadership support is essential, positive safety changes also require the involvement of field supervisors and workers who are dedicated to safety improvement and equipped to achieve it with both authority and resources. The very concept of safety culture implies commitment and participation throughout the organization.

Given the demonstrable progress being made toward strengthening safety culture in many parts of the industry, it is desirable to leverage individual successes to help accelerate progress industry-wide. Industry groups and regulators can help disseminate success stories and lessons learned. Operators can encourage and advise their contractors, contractors can encourage and advise their subcontractors, and vice versa. This industry
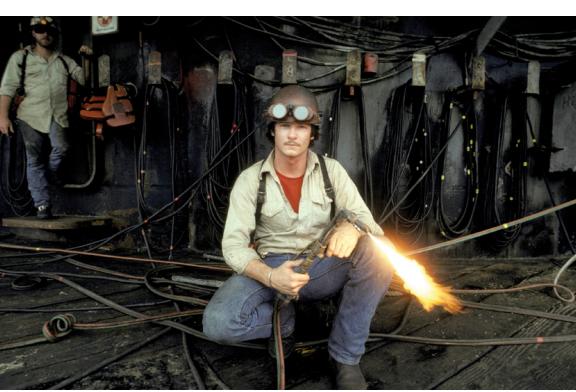

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can look to the success of the nuclear power industry in creating a strong industry-led organization (the Institute of Nuclear Power Operations) to set standards and facilitate knowledge sharing.

Case Examples of Safety Culture Change

Although there is no single recipe for developing and sustaining a strong safety culture, examples can be found in organizations that have been successful in a number of industries. The full report describes two examples of safety culture change—one from the U.S. Navy and one from a large offshore operator—both of which demonstrate dramatic improvements in safety that have been sustained over time. These examples highlight effective principles and processes rather than specific actions to be copied directly. The lessons illustrated by these examples include the following:

⁎ The structure of a safety program in terms of requirements and roles and responsibilities needs to be aligned with the balance of powers

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among managers responsible for various programs and fairness among stakeholders, with engaged leadership, and with shared cultural experiences and assumptions.

✦ Engagement of stakeholders is facilitated by clear leadership, a sense of urgency, measurable success that people care about, recognition of when performance is falling short, and programs being embedded in management structures and cultural practices.

✦ The goal is to keep the organization moving forward on the safety culture journey rather than to be satisfied with reaching an acceptable level of safety.

RECOMMENDATION: Company senior leadership needs to commit to and be personally engaged in a long and uncertain safety culture journey. Senior leaders should ensure that their organizations take advantage of resources available from other companies, industry groups, and regulators in strengthening their own safety cultures.

Assessment of Progress to Facilitate Improvement

Safety in the offshore industry is a strategic issue that needs to be managed along with operations, costs, human resources, and innovation. Safety

management requires assessment of safety outcomes and processes that enable safety, including the attitudes, beliefs, and behaviors of everyone in the organization. Safety culture is not a perfect concept, but its assessment directs attention to how people think, feel, and act, from top leadership to front-line workers. Whether the assessment process actually focuses on culture or on such factors as communication, management, leadership, work design, respect, and teamwork probably is not as important as the fact that the people involved are working on these interrelated factors. Many organizations, however—especially smaller ones—will find it challenging to build the capabilities needed to assess safety culture and use the results to draw actionable conclusions consistent with the organization's overall strategy. Given the complexity of the oil and gas industry, the safety culture concept extends to both companies of various sizes (including business units, divisions, and departments that act like organized entities) and settings or workplaces that demand interdependent activities from individuals working for owners, operators, or service providers.

As discussed earlier, although safety culture is routinely considered to be a shared property of a company or workplace, all organizations are

characterized by some degree of cultural variability. The culture of exploration and the culture of production may have different approaches to risk, even within the same company. An engineering group, for example, may share more cultural elements with other engineering professionals in their country than with operators, managers, and others in their own company. The culture on a rig or platform may have more to do with the workers and the contractors who own the rig than with the multinational oil company that commissioned the drilling.

Across hierarchical levels, moreover, senior executives, middle managers, supervisors, and workers may have very distinct cultures, including their views on safety. As one moves higher up the organizational hierarchy, views on the existing safety culture become more positively biased, because bad news does not readily travel upward.

Although some companies have already begun the safety culture journey and have the resources to invest in assessment, it will be challenging for many organizations (especially smaller ones) to build the capabilities needed to assess safety culture and derive actionable implications consistent with their overall strategy.

Why Is It Important to Measure Safety Culture?

It is important for organizations to conduct periodic assessments of their safety culture for the following reasons:

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* *Moves conversation from the vague to the specific—* An assessment moves conversation from vague, general perceptions, or a sense of how the organization is doing with respect to safety, toward a more focused exploration of what lies behind specific and quantifiable metrics, such as accident rates and injuries.
* *Allows for the tracking of progress—*Regular assessments allow management (and others) to detect and reinforce slow changes in an organization's culture that may be beneficial to safety, and to identify and address slow changes that may produce a drift into failure.
* *Provides motivation and feedback—*Ongoing assessment allows individuals throughout the organization to receive feedback, set goals, and seek to improve the organization's safety management. If its results are sufficiently communicated, moreover, it can help close the communication loop when front-line employees have raised safety concerns (or concerns about work and managerial practices that are not specified as "safety").
* *Identifies strengths, weak spots, gaps, and potential improvements—*An assessment spanning different subgroups, functions, and operational areas of the organization can provide an opportunity to examine the consistency of the culture and tailor improvement efforts to specific concerns.
* *Can produce leading indicators—*Results of assessments of safety culture hold promise as leading indicators of safety issues that can trigger proactive interventions and serve as complements to lagging indicators such as incident rates.

> **RECOMMENDATION:** Operators and contractors should assess their safety cultures regularly as part of a safety management system.

What Approaches to Safety Culture Assessment Can Be Taken?

A safety culture assessment starts with a clear concept and then builds a set of assessment procedures that are suited to that concept. Given their wide range of sizes, resources, and work activities involved with safety culture, organizations can be expected to use a great variety of assessment approaches.

Unfortunately, moreover, there is no one agreed-upon best approach for assessing organizational or safety culture. None of the established methods for assessing culture, including safety culture (see pages 34–35), is perfect; each has strengths and weaknesses. Use of multiple methods helps build on the strengths and compensate for the weaknesses of individual approaches.

RECOMMENDATION: Companies should use multiple assessment methods, including, in particular, both leading and lagging indicators and both quantitative and qualitative indicators of safety culture. Companies should also apply a mix of indicators, including some that are more standard across the industry to facilitate ease of use and comparison across organizations and some that are tailored to the specific needs and concerns of their organization.

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Safety Culture Assessment Methods

Ethnography

The emphasis of this method is typically on understanding a novel culture, particularly with respect to deriving meanings, as insiders understand them. Ethnographers observe organizations, often for an extended period, and ask questions of key individuals who are willing to share insights and mentor the researcher. In the hands of a skilled ethnographer, levels of accuracy and insight (even wisdom) are high, but reliance on a highly skilled outsider to conduct the ethnography can require considerable time and resources and yield uncertain benefits, which can be frustrating and even prohibitive for managers and regulators.

Episodic Fieldwork

Less intensive than ethnography is a set of field-based methods, referred to as episodic fieldwork, that includes combinations of direct observation of work practices by individuals or teams of visitors, interviews of individuals or groups, and analysis of documentation. Episodic fieldwork takes less time than the work of an ethnographer who enters a completely strange new culture, and the involvement of a team provides diverse viewpoints and enables testing of assumptions, observations, and conclusions. At the same time, however, an ethnographer who resides in a culture for many months may have a greater opportunity to observe the underlying culture, especially those aspects that are taken for granted and invisible to episodic visitors.

Document Review

Inquiries or governmental investigations into an accident can serve as a source of vicarious learning for other organizations throughout the industry. However, waiting for an accident to occur misses the opportunity to find weaknesses in organizational defenses. Leading indicators of accidents (i.e., near misses) can provide a more comprehensive picture and facilitate learning from a wider range of events. Document reviews can also include incident reports and investigations, maintenance backlogs, corrective action program activities, training processes, human resources and employee health records, notes from management walkarounds, and any other information that would provide insight into the functioning of the organization.

Culture and Climate Surveys

The term "safety climate" denotes shared perceptions of safety-relevant policies, procedures, and practices regarding what the organization rewards, supports, and expects. Culture and climate surveys are relatively quick and inexpensive (especially if an off-the-shelf survey is chosen, or modified in minor ways to make it more specific to the organizational context and needs), can be kept anonymous to encourage candor (although not everyone trusts "anonymous" surveys), provide quantitative scores, and can readily be compared across multiple dimensions—time, organizations, departments, locations, or hierarchical levels. Such surveys also can raise awareness and create opportunities for productive conversations about safety.

However, standard questions may be interpreted in different ways by different respondents, who may or may not be able (or willing) to report on "deeper" levels of culture. In smaller organizations, where anonymity is difficult to maintain, or in those with very low levels of trust, it may be difficult to obtain candid replies or a good response rate. Culture and climate surveys also can sometimes be treated as the endpoint of the assessment ("our scores are good enough") as opposed to a mechanism for guiding a substantive conversation about safety.

Guided Self-Analysis

Guided self-analysis is not as time- and labor-intensive as ethnography or as broad-brush or "distant" as surveys. This method relies primarily on cultural insiders to analyze their own culture through one or more workshops or meetings (hence, self-analysis), but it recognizes the need for skilled facilitation by either an internal specialist or external consultant (hence, guided). This process engages a cross section of participants who are knowledge-able about the culture but also have the curiosity and critical thinking skills to step outside their own culture. Having a diverse group for these discussions is desirable, but if the existing culture is low on trust (low psychological safety; high conflict), it may be necessary to have more homogeneous groups within a single hierarchical level and even a single department so as to encourage candid conversation.
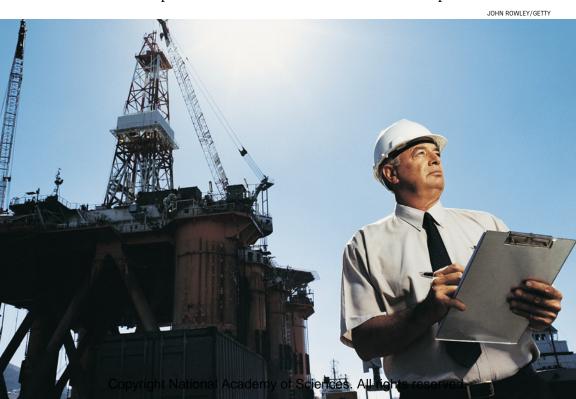
Multiple Methods

The use of multiple methods combines the strengths and mitigates the weaknesses of individual methods to achieve a practical mix of benefits without crippling costs. For example, a safety climate survey could be used to provide broad background information and raise questions about dimensions, departments, or hierarchical levels with higher or lower scores. Typically, attention focuses on the lower scores as areas for improvement, but it may be useful to think about the organization's strengths and attempt to learn from its successes. The organization then could follow up with other methods to gain a deeper understanding of the problems and opportunities. Interpretation of the meaning of the scores needs to go beyond numerical averages or the intuitions of a few people preparing the report. Many organizations use focus group interviews following a survey to discuss the results and to obtain specific examples and details as to what the responses mean to workers, supervisors, and managers. Some organizations include work observations (as in episodic fieldwork) conducted around the time of the climate survey to add further richness to the data. Then, diverse teams can begin to assemble ideas about how to intervene and how to evaluate whether progress is being made. This process helps elevate concerns so they receive the attention and resources needed to address them and ensure that steps are taken to gather further information and engage broad participation in sense-making and change initiatives.

ERIC HINSON/DREAMSTIME

Who Should Assess Safety Culture?

As with any aspect of safety, assessment of safety culture requires objectivity, expertise, and sensitivity to context. Some organizations already have the right capabilities and motivation to conduct a safety culture assessment, but many others need assistance from outside auditors, corporate experts, consultants, peer organizations, or industry groups. In some circumstances, external organizations may be more trusted by respondents and therefore elicit more candid responses, and they also may have better access to benchmarking data. The long-term goal should be to bring the self-assessment and self-reflection capabilities as close to the work as possible, involving everyone in the safety culture assessment process. Tailoring safety culture assessment to each organization is especially important in the offshore industry because of the great variation, discussed earlier, in the size, resources, risks, and sophistication of offshore organizations.

As discussed above, given that surveys provide only a partial view of the safety culture of an organization, a more comprehensive assessment often engages a team of specialists who use a combination of tools, such as interviews, document reviews, observations, and focus groups. The size and makeup of assessment teams need to flow from the scope and

purpose of the undertaking and the complexity of the methods used. Consistent with the awareness that multiple cultures exist within organizations, a broad, comprehensive understanding of an organization's safety culture (or cultures) will require a range of assessment tools and a diverse assessment team. In a larger organization, this means gathering data from multiple levels (executives, managers, front-line employees) and across functional areas (e.g., drilling, engineering). A more focused investigation of one particular aspect of safety culture (e.g., issues with lock-out, tag-out procedures) likely will require a much smaller team (or even an individual) using a more focused set of tools.

TED HOROWITZ/ALAMY

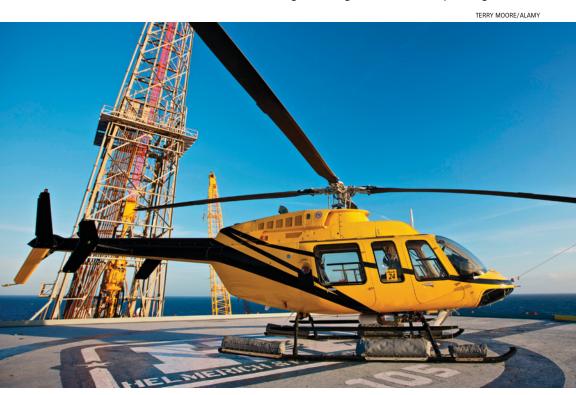Regardless of the final composition of the assessment team, it is important for the host organization to retain ownership of both the process and follow-up actions on the recommendations resulting from the assessment. This is useful for several reasons. First, if employees perceive that management has outsourced the safety culture assessment (and perhaps the broader problem) to an outside agency or contractor, they may conclude that the organization is not really serious about the issue. Second, the safety culture assessment ultimately will lead to awareness of the need for some actions and changes within the organization. One of the key factors predicting the success of change initiatives is management commitment. Staying involved and retaining ownership of the assessment process will increase management's engagement in and commitment to the process and any resulting recommended changes. Third, assessments that are conducted and evaluated closer to work processes typically result in more timely and appropriate responses and learning.

How Can Employees Be Encouraged to Participate in the Assessment Process?

Effective employee participation is a key element of the safety culture assessment process and successful follow-up actions. Yet despite this critical role, workers may be hesitant to participate because their opinion has not

always been valued. In addition, workers may fear that reporting safety issues or making negative comments could jeopardize their job, create conflict in the workplace, increase workload for themselves or their coworkers, and fail to result in improvements. Front-line employees need a feeling of "psychological safety" to be willing to disclose difficult conditions or events without fear of being embarrassed by their peers or punished by their managers. This feeling is the foundation of a reporting culture and the starting point for improvement. Psychological safety can be enhanced by messages from legitimate leaders, as well as by an open, fair, and participative process. Companies need to build trust in management and provide positive incentives to encourage reporting and participation in the learning process.

Front-line employees and all key stakeholders also need to stay involved, or at least be informed on an ongoing basis, after the safety culture assessment has been completed. Many organizations fail to communicate the results of the assessment back to employees, who are likely to conclude that the assessment was a ceremonial exercise carried out to comply with external demands and that no meaningful changes will result. Psychologi-

TERRY MOORE/ALAMY

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cal safety is important not just for front-line employees but for all participants, including senior management. Companies are understandably cautious about producing reports that expose them to regulatory sanctions or to legal actions asserting negligence. Making safety a priority entails executives showing leadership by supporting the flow of information necessary for organizational learning, because the cost of hiding problems is likely to be higher in the long run than the cost of facing them as early on as possible.

Monitoring of safety culture requires more than an assessment every 2 years through a survey. Periodic surveys and audits are most helpful when paired with other, more regular (monthly or quarterly) assessments. Larger organizations often have a "dashboard" of indicators that are used for various management concerns, including productivity, cost, environment, human relations, and safety. Increasingly, safety culture is a part of such a dashboard, with multiple indicators being examined regularly. These indicators may include codes for safety outcomes, near misses, problem reports, incident investigation results, employee concerns and suggestions, management walkarounds, observations of prejob briefings and after-action reviews, and union concerns.

The safety culture assessment process also serves as an opportunity to engage the organization in a set of conversations and change activities that could have a major beneficial impact on the culture itself. An effective

UNLISTED IMAGES/ALAMY

assessment process engages a wide range of people in talking about their concerns and opportunities for improvement, and thereby begins to break down the vertical silos and horizontal barriers in large organizations.

The Safety Culture Journey

Assessment of company and industry culture is part of a process of learning and continuously improving. The safety culture journey can be long, complex, and uncertain, but can also avert catastrophe and reduce injuries and loss of life among those working offshore while also protecting the environment. Companies and employees working offshore, and the associations that represent them, can begin this journey by building on the successes of offshore companies that are farther along the path and by learning from the experiences of other industries. This is an opportunity not to be squandered, but to be seized by the offshore industry.

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