



safety

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at sea

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NFPA and the offshore oil industry are helping to resolve dueling federal fire safety standards.

■ HALLIE EPHRON TOUGER

In 1961, when the first subsea oil was drilled, offshore activities were confined to shallow water where help was available during emergencies. As a result, the U.S. Coast Guard's equipment regulations required only basic lifesaving appliances and hand-held portable fire extinguishers. However, the offshore oil industry has grown dramatically since then. The industry was booming in the late 1970s and early 1980s, but was in a downturn by the mid-1980s. It's been on the upswing in recent years, with a current record high of 42 deepwater rigs

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operating in the Gulf of Mexico alone and the number of deepwater platforms growing internationally.

Today, an array of drilling and production facilities characterizes the industry. These facilities range from small, unmanned operations in shallow water, to large complexes more than 100 miles (161 kilometers) offshore, floating in water as deep as 7,000 feet (2,133 meters), with hundreds of workers in residence. Platforms in warm waters, such as the Gulf of Mexico, are open, while those in turbulent, frigid waters, such as those of the North Sea, are enclosed to provide protection from the weather.

roded within a month that it wouldn't work."

The primary industry standard for fire safety in this changing industry is the American Petroleum Institute's (API) *Recommended Practice 14G (API RP 14G), Fire Prevention and Control on Open Type Offshore Production Platforms*. API, the national and international trade association that represents the petrochemical industry, uses the accredited committee method to create ANSI standards and has a policy of reviewing standards every five years to revalidate, revise, or remove them. A committee can extend that review process to seven years.

Recently, API invited NFPA to assist in an

who has worked in Texaco's offshore division for 30 years.

"The operation hasn't changed much in the last 20 years; it's simple gravity separation and gas diffusion," he says. "We separate oil from gas and water from oil, and discharge treated water. Oil and gas are continuously fed into a pipeline. There are no complex processes. Facilities, by and large, have been engineered to the point that most of the folks on-site are there to monitor processes."

On oil drilling and production platforms, fire protection is based on rapid detection, aggressive suppression, and reliable shutdown of fuel feed to any fire. Platforms are



"You're fairly isolated," says Randall Eberly of the U.S. Coast Guard. "You might be near other rigs or within 20 miles (32 kilometers) of shore, but you can't call the fire department and have them arrive in 10 minutes. Self-sufficiency is a must, which isn't an easy feat. There are fire protection equipment challenges.

"Depending on the rig's design, the platform is anywhere from 50 to 300 feet (15 to 91 meters) above water, so assistance vessels need sufficient water pressure," says Eberly. "If there's a leak or equipment malfunction, you have significant ignition sources. If you took typical firefighting equipment and placed it on an offshore oil rig, it would become so cor-

update of API RP 14G, along with industry representatives and the federal agencies that share jurisdiction for regulating the U.S. offshore industry: the Coast Guard and the Minerals Management Service (MMS).

Automated fire safety

"If you visited one of these offshore rigs, you'd be taken by the serenity," says Alan Verret, executive director of the non-profit Offshore Operators Committee. "There's no hustle and bustle. There are birds landing on the handrails. These aren't miniature refineries—they're simple complexes."

Regardless of a rig's size or location, the same basic operations take place, says Verret,

equipped with alarm and automatic detection systems, backed up by fire watches for hot work.

"A common cause of fires is welding or cutting, but with hot work, a fire watch is required to stand by with a detector for gas and appropriate extinguishers," says Joe Levine, chief, Operations Analysis Branch of MMS.

In case of a fire or leak, platforms have several redundant emergency-shutdown devices. These valves "shut in" the flow of oil and gas to the platform. This ensures that fires aren't fed from the well, resulting in a blowout.

Coast Guard regulations require facilities to have full water deluge systems, in addition

to portable chemical extinguishers, to protect personnel and to give them sufficient evacuation time.

Potential for disaster

On an offshore complex, there's always the risk of major fire. Though the incidence of disasters is low, the stakes are high, and the industry takes the threat seriously.

This potential for disaster was graphically demonstrated in July 1988, when Occidental Petroleum's Piper Alpha oil platform, standing 100 feet (30 meters) above some of the fiercest waters in the North Sea, was destroyed by fire, which killed 167. The immediate cause

uncontrolled flow of gas from a pipeline.

In March 2001, the world was reminded again of the potential for human tragedy and financial loss when three explosions ripped through a 40-story production platform owned by Brazil's state-owned oil giant, Petrobras. Eleven of the 175 employees on board died. The platform, worth \$480 million, sank five days later despite salvage efforts. Months after the accident, the investigation into the cause hadn't been completed.

Industry safety record

Experts say safety in the petroleum industry is improving. An MMS bulletin, *OCS Safety*

time injuries, explosion injuries and burns remain the largest cause of fatalities.

"Oil companies spend way more money preventing fires than they spend putting them out," says Verret of the Offshore Operators Committee. "It pays more dividends to stop them before they start or to minimize their impact."

API standards guide the industry in the design and maintenance of fire-safe facilities.

"The industry has achieved such a record by meeting some of the world's most rigorous and comprehensive safety standards, which, by virtue of their effectiveness, have also become de facto standards for offshore oil and gas operations around the world," says Peter Velez, chairman of the API Executive Committee on Drilling and Production Platforms. He's referring, in particular, to API RP 14G.

Shared agency responsibility

Since 1953, the Coast Guard and MMS have shared responsibility for activities on the U.S. Outer Continental Shelf with a series of memoranda and agreements defining the agencies' roles. Historically, MMS has been responsible for drilling and production activities and the Coast Guard for vessel and marine activities. As a result, MMS has had lead responsibility for fixed production platforms, while the Coast Guard has had lead responsibility for Mobile Offshore Drilling Units (MODUs).

Advances into deep water and new types of floating facilities made a memorandum of understanding (MOU) signed in 1990 obsolete, according to Peter Hill, P.E., of Risk Reliability Safety Engineering and a consultant to the API. New types of floating facilities with drilling capability only for the initial phase of development had no clear regulatory path, and the Coast Guard wasn't involved in regulating moveable platform drilling rigs, modular units that could be moved among fixed platforms.

The MOU was updated in 1998 establishing a single lead agency, and the ultimate authority for each shared system. Authority was divided to reflect each agency's expertise, with the Coast Guard's jurisdiction resting on its familiarity with the marine environment, and MMS's jurisdiction based on its expertise in managing mineral resources. MMS became responsible for portions of the system support-

Far left: Petrobras Platform 36 as it was delivered to its new drilling site in the Campos Basin, 100 miles off the coast of Rio de Janeiro in November 1999. Moving the largest oil drilling platform in the world was the largest dry-tow operation in the oil rig industry. Left and below: Platform 36 as it sank after two explosions in March 2001. At least 11 people were killed and several were injured.



of the blast was a gas explosion, that occurred when a pump was turned on while being repaired. An accident investigation report found, "The safety policy and procedures were in place: the practice was deficient."

Oil producers and regulatory agencies responded by adding standard procedures to prevent similar catastrophes.

"It was a watershed event in terms of creating new safety regimens, especially for offshore operations in the North Sea," says Larry Meriage, vice president of Communications and Public Affairs at Occidental Petroleum. In the wake of the disaster, MMS implemented new requirements, such as automatic valve shutdown to prevent the

Facts, March 2001 states, "Despite the rise in the number of incidents reported to the MMS through 1997, the overall record for the past 33 years indicates that Outer Continental Shelf (OCS) operations are generally safer."

The International Association of Oil and Gas Producers (OGP), the worldwide association of oil and gas companies involved in exploration and production, has reported encouraging data during the last five years, showing that the lost-time injury rate for the industry is at a record low. Illness and injury rates for workers in the petroleum industry have run about a third lower than for the private sector overall. Although the industry can take credit for the trend of decreasing lost-

ing drilling and production, and the Coast Guard's other portions included those related to workplace safety and health. Dual review remains in only a few areas, such as electrical classification.

Under the terms of the new MOU, all fire-fighting jurisdiction went to the Coast Guard. Because of manpower shortages, however, the Coast Guard has proposed changes to allow MMS to perform inspections on its behalf on fixed production facilities.

With so much overlapping and shared responsibility, it would seem essential that both regulatory agencies work by the same rules. Although Coast Guard regulations, such as *33 CFR Subchapter N, Outer Continental Shelf Activities*, and *46 CFR Subchapter I-A, Regulations for Mobile Offshore Drilling Units*, Parts 107-109, and MMS regulations, such as *30 CFR Part 250, Oil and Gas and Sulphur Operations in the Outer Continental Shelf*, refer extensively to NFPA standards and API recommended practices, MMS regulations make no reference to NFPA standards, and the MMS and Coast Guard regulations conflict in key areas.

From the owner or operator's view, fire safety is a single system, so having agencies with different sets of rules is a problem.

"It's confusing even to us in the industry," says Mark Written, a senior advisor with Chevron.

Dueling regulations

One difference between the MMS and Coast Guard regulations is whether some facilities can forego a water deluge system.

Offshore oil industry experts argue that installing and maintaining deluge systems on unmanned platforms is cost-prohibitive and unnecessary. In case of a fire, they say, redundant systems are in place to "shut in" the well so the fire can burn itself out. Furthermore, there wouldn't be anyone on board to activate the water main they say. The occasional maintenance crew can protect itself with portable firefighting systems brought aboard, then evacuate quickly.

Historically, the Coast Guard has been adamant that water deluge systems are essential on all facilities, while under certain circumstances, MMS allows chemical systems instead.

"We want to see water available on all oil drilling rigs that have steel structures and are burning hydrocarbons," says Eberly. The intrinsic disadvantage of chemical systems is limited capacity, whereas the quantity of water in the ocean is unlimited. He adds that water can cool hot metal surfaces to prevent reflash.

However, MMS rules allow for chemical alternatives in lieu of water "if the district supervisor determines that the use of a chemical system provides equivalent fire protection control." When companies have petitioned the MMS in the past to allow for this alternative, especially on unmanned platforms, the MMS has granted approvals.

With firefighting responsibility shifting to the Coast Guard, the issue came to a head. Faced with new requests for exceptions for unmanned platforms, the Coast Guard and MMS looked for consistent criteria to apply in determining how to rule in each case. After examining API standards, NFPA standards, and Coast Guard and MMS regulations, they quickly discovered there were no criteria for determining when chemical fire protection was acceptable in place of water and when it wasn't.

The agencies turned to API for help. Tim Sampson, API coordinator for Drilling and Production Operations, recalls receiving a letter from the MMS "asking us to take a look at API RP 14G, specifically at the section on the use of fire extinguishers and chemical systems, and to put some criteria there that they could use to determine when chemical would be an acceptable alternative to a water system."

Moving slowly towards consensus

In December 2000, API updated API RP 14G and invited representatives of NFPA, MMS, the Coast Guard, and the offshore oil industry to participate in the review.

API focused on revising a single area of the standard, deferring a much-needed overhaul.

"We realized a lot of things were out of date, but we shelved a larger to-do list in order to focus on the issue of chemical in lieu of fire-water in unmanned facilities," says Hill.

The first review meeting was held in April 2001. With its record of consensus-based code- and standard-setting and technical expertise in fire safety, NFPA found itself welcome at the table.

"Our goal in being invited to participate in other standard developers' revision process is to assist with the technical subject matter in general and help update and add references to our own codes and standards," says Guy Colonna, NFPA's assistant vice president of Hazardous Chemicals and Materials, who is participating in the API standard update.

Once API RP 14G is updated to satisfy the Coast Guard and MMS, the agencies can eliminate their dueling standards.

"We're hoping to take all fire protection requirements out of 46 CFR 108 and refer to this recommended practice by API. Then all fire protection standards would be there, instead of split between API and CFR," says Eberly.

For MMS, working with NFPA to revise API RP 14G was the first of what both organizations hope will be many opportunities to work together.

"Since December, our relationship with NFPA has blossomed, and we're hoping that on our next fire investigation, an inspector from the NFPA will assist us," says investigator Levine.

Federal agencies, such as the Coast Guard and MMS, are striving to change their longstanding practices of defining their own rules and regulations as they adapt to the requirements of the *National Technology Transfer and Advancement Act of 1995*. That law encourages federal agencies to adopt industry standards rather than create their own wherever possible. NFPA standards are increasingly being referenced by federal and state law, and NFPA expertise in fire protection and standards development is being increasingly sought.

"The MMS, like a lot of other government agencies, is in the process of trying to augment regulations with industry guidance," says Fred Gray of MMS. "We're trying to get away from driving the train and telling people to do A, B, and C. We want standards-developing organizations to keep developing standards, and we'll take them and put them into regulations.

"We're reaching out to NFPA to use their codes and standards, as well as its expertise. They've got a long history of doing this well." ♦