How Safety Has Evolved in the Oil and Gas Industry

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Perpetual Progress

Safety is now front and center in the oil and gas industry. Thanks to a strong industrial culture of workplace safety and more advanced technologies to monitor and prevent injuries and accidents, the rate of injury was down to 1.8 per 100 workers in 2012, according to the American Petroleum Institute. And offshore, that rate dipped to 0.7 per 100 workers.

Yet there's still progress to be made. Small oversights can quickly spiral out of control and spark major—sometimes fatal—accidents. The Piper Alpha disaster that took 167 lives in 1988 was traced to inadequate maintenance and risk assessment, according to NASA's Safety Center. And an accident's impact can ripple beyond on-site workers, harming emergency crews and jeopardizing companies' reputations and financial health.

Here, a look at the progress the industry has made and the challenges it faces to move safely forward.

1800s: Accidents Abound

Worker injuries and fatalities weren't tracked in the United States before the 1880s, which speaks to the overall cultural indifference to industrial safety.

Unfortunately, the oil and gas industry was no different. Digging oil wells often happened by hand or by chiseling a hole with cable tools, according to the American Oil and Gas Historical Society.

Oil was typically stored in steel or wood tanks, which were inadequate to contain vapors as the oil evaporated. Improper storage was a major risk on two fronts: The air pollution caused by the vapors could have contributed to workers' lung problems and even cancer, according to global health group Hesperian. And the flammable fumes easily triggered fires and explosions, leading to numerous injuries. In 1890, for instance, lit lamps ignited fumes from an oil tank at a refinery in Chicago, killing 20 dockworkers, according to parliamentary papers from 1894.

Early 1900s: A Burgeoning Sense of Safety

The turn of the century saw a huge leap forward in early industry technologies. Rotary rigs began to replace simple axes and shovels, exponentially speeding the pace of oil exploration. The oil boom led refinery chemists to experiment with new equipment and processes to discover more efficient refining methods and easier ways to make oil into gasoline.

While there was an emerging understanding of the importance of industrial safety, most early measures were designed to protect property—not people, according to historians at Eastern Illinois University. Refineries, for instance, were built with steel plates to prevent leaks and asbestos roofing to withstand direct heat. Products such as Brown Barrels set themselves apart by marketing their "durability, service and safety" as major selling points, according to a 1922 edition of the National Petroleum News.

These shifts point to a nascent sense of safety importance. But worker safety remained an afterthought. New experimental processes for refining oil, for example, could be deadly for workers.

Safety Spotlight:
Moore Refining Co.

One advanced technology that emerged during this period was thermocracking, in which pressurized stills and high temperatures converted gas oil into lucrative gasoline. The new process required tanks, stills, furnaces, piping and valves that could all handle this stress.

If the equipment failed, the results could be fatal, according to the Kansas Department of Health and Environment. When the Dubbs cracking units at the Moore Refining Co. in Arkansas City, Kansas exploded, they sparked a fire that destroyed the entire refinery.

Safety Spotlight:
Thunder Bay

One month after the Outer Continental Shelf Lands Act was signed, "Thunder Bay" hit movie theaters. This 1953 Jimmy Stewart film brought offshore drilling—and its safety needs—to the popular forefront. Set in 1946, the movie follows ex-Navy engineer Steve Martin's efforts to build a safe platform for offshore oil drilling off the coast of Louisiana.

1940s and 1950s: Technology Surges Offshore

The early days of offshore drilling can be traced back to 1896, when the Summerland oilfields constructed a 300-foot pier into the Pacific and mounted a standard cable-tool rig on it. That rig's success was so notable that over the next five years, 14 more piers and 400 more wells were constructed.

By the 1940s technology was taking wells far into the Gulf of Mexico. Yet though 50 years of offshore drilling had passed, the industry had yet to build safety equipment or protocols specifically geared to this unique environment, according to the American Oil and Gas Historical Society. Offshore exploration remained an incredibly risky endeavor, with companies risking their investments and workers risking their lives.

Yet the risky environment didn't slow demand in offshore operations. In 1953, President Eisenhower signed the Outer Continental Shelf Lands Act, which placed all offshore lands beyond the three-mile limit under federal jurisdiction. It also authorized the Department of the Interior to issue leases to oil companies, driving the surging demand even further.

1960s and 1970s: Speed at the Sake of Safety

The desire to get offshore oilrigs up and running as quickly as possible sometimes put safety on the back burner, according to the bipartisan National Commission on the BP Deepwater Horizon Oil Spill and Offshore Drilling.

Drilling vessels were contracted on day rates, which increased financial pressure to work quickly. And production processes were highly interdependent, so a delay in one section could cause delays elsewhere. Aside from time-cost pressures, rig design didn't always properly account for worker safety. Platforms were often built with equipment squeezed together in an unsafe manner, such as when crew quarters were built dangerously close to compressor buildings.

Safety requirements signed by the U.S. Geological Survey Conservation Division in 1958 and 1960 mandated that oil companies install subsurface safety devices. But the orders didn't include testing requirements and didn't specify design criteria or technical standards. Accident rates for mobile drilling vessels remained high, and diving accidents and routine platform injuries were common.

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1988: Piper Alpha

Piper Alpha is considered one of the worst offshore oil disasters in history. The oil platform accounted for roughly 10 percent of the North Sea's oil and gas production. On July 6, 1988, an explosion and subsequent fires killed 167 workers, according to NASA's Safety Center. https://youtu.be/R6X4PjobTT0

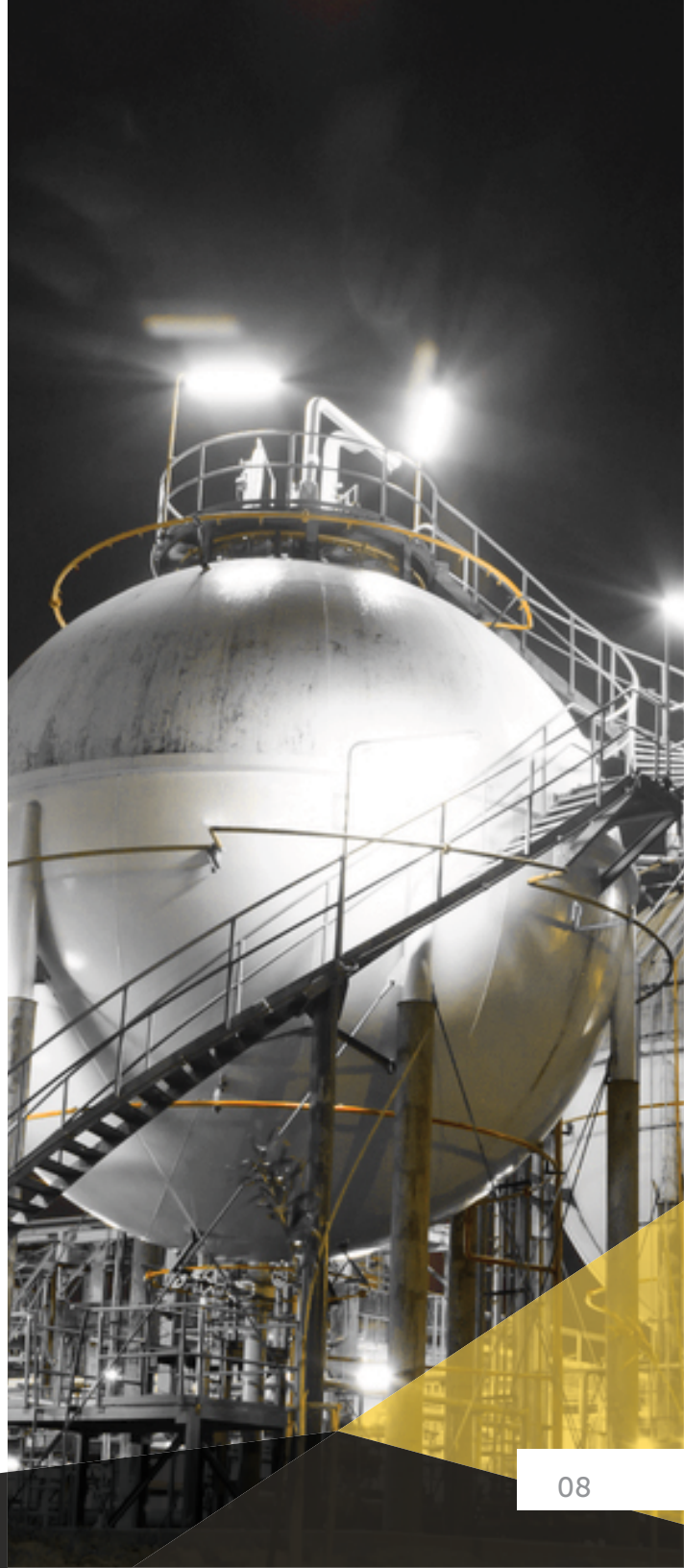
A Timeline of Safety Slips

- Routine maintenance to a pressure safety valve was left unfinished, and Pump A's status was not communicated.
- A blockage in Pump B caused the crew to restart Pump A, unaware of its condition. Without a working safety valve, the pump leaked gas, causing an explosion.
- The control room was destroyed, and there were no safety protocols in place to address this. Communication broke down, as the crew awaited evacuation orders or further instructions.
- Wind, fire and smoke prevented a helicopter evacuation. Subsequent fires spread across the platform, and the death toll surged.

2000s: Bigger, Bolder Designs

Oil and gas companies are pushing the limits of design in order to maximize production. That means deeper wells, taller offshore rigs. Scaling existing types of structures doesn't just mean scaling technologies—it often requires the creation and deployment of new technologies. That requires sharp, meticulous attention to industrial safety.

In the Gulf of Mexico, the Petronius platform, operated by Chevron Corp. and Marathon Oil, stands 2,000 feet above the ocean floor. Petronius is the largest free-standing structure in the world, according to industry firm Offshore Technology. And it's a great example of how scaling to new heights required a fundamental rethink of standard design. Unlike conventional platforms that are designed to resist winds and waves, Petronius is designed to flex with these natural forces.



Safety, at Your Service

Total Safety is the unmatched global leader in providing integrated compliance solutions to ensure the safety of workers. In fact, it is our mission to ensure the safe Wellbeing of Workers Worldwide. Last year, its team of experts completed more than 200 turnarounds and provided daily safety support to people on more than 290 onshore and offshore rigs.

…to Ensure the Safe Wellbeing of Workers Worldwide (W^3)℠

Today: Pushing New Boundaries—Safely

Conventional exploration alone is unlikely to satisfy predicted worldwide demand. Roughly 64 million barrels per day of new oil capacity would have to come on stream between 2007 and 2030 to meet anticipated demand, according to the International Energy Agency.

That means even as organizations are maximizing conventional methods, the industry is rapidly investing in new technologies, such as hydraulic fracturing. These emerging technologies will require comprehensive analysis with proven safety leaders to ensure rigorous risk management and safety protocols are in place.

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