

# What caused the explosion on the Deepwater Horizon?

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As more details emerge about the explosion and sinking of the Deepwater Horizon, which killed 11 workers and spilled millions of gallons of oil into the Gulf of Mexico, it has become clear that the single-minded drive for profit and a total lack of regulation created the disaster.

In the immediate aftermath of the explosion, oil giant BP, rig operator Transocean and the Obama administration all took the position that the disaster was an unforeseeable event. Interviews with workers, information gathered by researchers and testimony given to Congressional and Coast Guard hearings prove, however, that there was in fact ample warning that a disaster was possible, even likely. But BP and its partners, Transocean and Halliburton, disregarded these warnings.

They could do so with impunity. There exists no regulatory body in the oil industry to defend the safety interests of workers and the environment, the Mineral Management Service (MMS) of the Department of the Interior having long ago ceded all meaningful regulatory control to the industry itself.

## Buildup to disaster

Evidence revealed in Congressional testimony, press accounts and gathered by University of California professor Robert Bea has provided a detailed picture of the weeks and hours leading up to the explosion.

Deepwater Horizon was not an extractive oil rig, but an exploratory rig. When it exploded on April 20 it was in the process of completing its exploration by capping the well it had bored some three miles below the ocean floor, before moving on to another exploration site. This required the rig to plug the oil well and separate its riser piping from the wellhead to the rig. A separate rig would later have come to access the sealed wellhead.

Deepwater Horizon's exploratory drilling had been troubled by unusually frequent and forceful contact with explosive natural gas deposits, known in the industry as "kicks," workers say. Only weeks before the fatal explosion, so much gas forced its way up the well bore and onto the rig platform that an emergency freeze was placed on many activities aboard the rig in order to avoid triggering an explosion.

According to one worker's account, submitted to Bea, "at one point during the previous several weeks, so much [gas] came belching up to the surface that a loudspeaker announcement called for a halt to all 'hot work,' meaning any smoking, welding, cooking or any other use of fire. Smaller belches, or 'kicks,' had stalled work as the job was winding down."

"As the job unfolded ... the workers did have intermittent trouble with pockets of natural gas," another rig employee reported to Bea. "Highly

flammable, the gas was forcing its way up the drill pipes. This was something BP had not foreseen as a serious problem, declaring a year earlier that gas was likely to pose only a 'negligible' risk. The government warned the company that gas buildup was a real concern and that BP should 'exercise caution.'"

The day of the explosion, engineers reportedly argued over whether or not to remove dense drilling mud from the well bore, replacing it with much lighter sea water. Normally this step is taken only after a second cement plug is hardened in the piping, a process that takes several hours. Until this plug is fully installed, heavy mud is the first line of defense against kicks and "blowouts," when oil and natural gas surge up the bore to the rig platform.

The decision was taken to replace the mud before plugging the well, even though this would increase the chances of an explosion—and even though the operation failed a critical pressure test the same day, BP and Transocean executives admitted to the House Energy Committee. This clearly reckless decision to press forward was very likely done to protect BP's profit interests, both because it paid rig owner Transocean an estimated \$500,000 per day for use of Deepwater Horizon and its crew, and because it was anxious to bring the new well into active production.

A worker told the *Wall Street Journal* that the crew was in fact preparing to drop the cement plug down the riser—standard procedure—when the order came to instead pump out the mud. "Usually we set the cement plug at that point and let it set for six hours, then displace the well," he said. The worker told the *Journal* that this dangerous step was first cleared with the MMS. The MMS refused comment.

It is likely that this decision combined with the failure of two other lines of defense: cement outside the well bore's piping under the ocean floor, which is designed to prevent natural gas from moving up the bore and the riser to the rig; and the blowout preventer, a massive piece of equipment that sits on the ocean floor and is equipped with powerful hydraulic shears whose task is to sever piping in the event of a blowout.

Halliburton, which contracted for the cement and mudding work on the rig, had deployed a new chemical cement that it said would be resistant to structural damage caused by methane hydrates, which were present in the undersea rock in high quantities. But Bea, an expert with decades of experience in oil extraction engineering, said that when he saw the formula for Halliburton's cement, he said "Uh oh."

Bea told the *Times-Picayune* that Halliburton had produced "many excellent papers" that claim "because of the chemicals they've added, they think the cement can cure rapidly." But Bea explained that the same chemicals they added likely gave off too much heat, thus thawing gases lodged in the rocks from their methane hydrate form and sending them up the bore and riser.

When the cement failed, gas began to force its way up the riser. At this point, concrete well plugs in the pipe should have blocked the gas. But contrary to normal practice, the final plug had not been installed, and the

salt water was not heavy enough to stop the high pressure gas from rising.

On the evening of April 20, a geyser of seawater erupted onto the rig, shooting 240 feet into the air. This was soon followed by the eruption of a slushy combination of mud, gas and water. At this point workers knew they were in danger because the mud could only have come from 10,000 feet down, Bea said. On the rig, the gas component of the slushy material quickly transitioned into a fully gaseous state and then ignited into a series of explosions and then a firestorm. Workers immediately attempted to activate the blowout preventer, but it too failed.

Ironically, at the moment of the explosion a number of BP officials, recently helicoptered to the rig, had gathered for a celebration with rig staff marking seven years of a “spotless” safety record. Those at the party were thrown violently to the floor by the force of the explosion.

Bea, who headed up an independent team of scientists that investigated failure of levees during Hurricane Katrina, compared the two events. “BP fell into the same damn trap, and they were not engineering; they were ‘imagineering,’” he told the *Times-Picayune*. “Risk analysis continues to mislead us because we’re only looking at part of the risk. The same trail of tears led to Katrina, to the Massey Big Branch (coal) mine disaster, and it’s showing up here again.”

“For me, the tragedy of Katrina was floating bodies and the homes and businesses that were destroyed,” Bea said. “This time, it’s different. Certainly the people on the rig were killed and the pieces of equipment were destroyed, but like Katrina, there’s another non-voting population getting hurt this time and it is those marine animals that are our equivalents.”

## A collapse in regulation

The series of mechanical failures and human errors that conspired to produce the disaster aboard the Deepwater Horizon were not random accidents, as the Obama administration and much of the media seek to portray them. They arose from the deregulation of the oil industry that has advanced for decades under both Republican and Democratic administrations. These conditions made a major spill inevitable— if not on the Deepwater Horizon, then on some other rig. Indeed, thousands of oil rigs operating under precisely the same regulatory environment that produced the Deepwater Horizon disaster continue to extract oil even today.

The Deepwater Horizon, it has become clear, was operated in the total absence of real government regulation. This is most evident in relationship to the rig’s blowout preventer, its final line of defense.

At hearings in Louisiana held by the MMS and the US Coast Guard, the head of MMS’s Louisiana engineering operations, Frank Patton, who had given BP authorization to begin drilling at the Deepwater Horizon site, admitted that he had performed no inquiry and had been given no assurance that the rig’s blowout preventer would function in the event of a spill. He also admitted that he had certified “hundreds” of oil rigs without verifying the efficacy of their blowout preventers. These rigs presumably continue to operate in Gulf waters—a handful in deeper water than the Deepwater Horizon.

At House Energy Committee hearings held Wednesday, the head of Transocean, Steven Newman, confirmed that one of the Deepwater Horizon’s shear rams, devices used in blowout preventers to sever pipes, was altered in 2005 at the request of BP and with the approval of the MMS. It was modified for testing, but in the process was likely rendered useless for a real emergency.

The MMS was also aware years ago that shear rams are likely to fail in emergencies, even when functional. A 2002 study by Per Holand, a

Norwegian engineer, found that shear rams are not powerful enough to cut through joints in piping, which account for about 10 percent of total surface area in a blowout preventer’s piping. None of Holand’s resulting proposals were acted upon.

Another 2002 study conducted by the MMS revealed that in laboratory testing of one manufacturer’s shear rams half failed. Seven other makers refused to have their shear rams tested.

Yet another report commissioned by the MMS in 2004 questioned whether shear rams could even function under immense oceanic pressures such as those experienced by the Deepwater Horizon. The devices were literally untested in deep sea conditions. The study authors called this a “grim snapshot of the lack of preparedness in the industry to shear and seal a well with the last line of defense against a blowout” in deep water. In spite of the study, no standards were put in place.

In a 2000 safety alert the MMS “urged” deep sea oil rigs to include a backup device used to activate blowout preventers in the event of an explosion. The device, known as a “deadman,” was included on the Deepwater Horizon. But, according to testimony given to the House Energy Committee, the device’s battery was likely dead. The MMS, it has been revealed, does not inspect—let alone enforce—the use of blowout preventers. Other oil producing nations, including Norway, Canada and Brazil, require a second backup device that can be activated by sound. It is not required on US rigs.

It has also been revealed that the number of drill site inspections carried out by the MMS dropped by over 40 percent between 2005 and 2009, even as the number of drill rigs operating in US waters rapidly increased. Penalties issued by MMS for regulatory violations fell from 66 in 2000 to 20 last year. By all accounts, regulation depends almost entirely on industry “self-enforcement.”

The gutting of regulation continued into the Obama administration. Under Obama, the MMS intervened in a court case last summer to allow BP to proceed with exploration and extraction at its Deepwater Horizon site without submitting a legally required environmental impact study. Obama promoted a vast expansion of offshore and deep sea drilling, declaring the industry to be safe, without having addressed any of the outstanding safety issues.

Yet, like the more immediate causes of the explosion and sinking on the Deepwater Horizon, none of these regulatory decisions were mere “mistakes.” Regulation in the oil industry—as in every other US industry, including the financial system—has been reduced to its present state by a series of conscious political decisions enacted at every level of government by both Republicans and Democrats.

This political shift, in turn, has arisen from the demands of the US corporate and financial elite, who have sought to dismantle every obstacle to their personal enrichment—regardless the costs for their workers and the health of the planet.



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