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# A Case Study in Engineering Ethics: The Deepwater Horizon Disaster

by

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## **On This Tragic Day**

April 20, 2010 is another day that will live in infamy. On this night in the deep waters of the Gulf of Mexico, officials and workers aboard the Deepwater Horizon oil rig argued for hours about how to proceed with abandoning their well. The Macondo well site, as it was named, is 48 miles off the coast of Louisiana, and was being prepped for completion following the discovery of oil. The clock was ticking. Officials with Transocean, Inc. (“Transocean”) were concerned with the procedures being used to temporarily leave the well. They owned the oil rig. Finally, an official with BP Exploration and Production, Inc. (“BP”), who rented the rig to perform drilling operations, made a firm decision to save time and money by skipping protocols and substituting materials used to cap the well. The oil rig’s chief mechanic testified that a senior Transocean manager by the name of Jimmy Harrell, walked away from the argument grumbling “Well, I guess that’s what we have those pinchers for.” *Pinchers* was in reference to the device used as a final resort to stopping an explosion.

The official global distress signal was reported to have occurred at 9:53 p. m. On that night, the Macondo well suffered a catastrophic blowout. One crewman from a nearby merchant vessel described the geyser that preceded the explosion as more like seawater that billowed out just to the side of the derrick before igniting in a flash over the liquid. What followed was the explosion that sent the entire rig into flames and sank it two days later. Of the 126 workers aboard the rig, 11 men died as a direct result of the explosion.

For the next eighty-seven days, BP engineers and others tried feverishly to stop the oil gushing out of the well. At least five attempts were made to close off the well before a new cap assembly was installed that stopped the flow of oil on July 15<sup>th</sup>.

The resulting oil spill is the nation’s largest accidental, anthropogenic release of oil into marine waters. The 1989 Exxon Valdez disaster was the previous benchmark for American oil spills. The Valdez held the notorious record at 0.3 million barrels of oil (12.6 million gallons) spilled into the state of Alaska’s once pristine Prince William Sound. The Deepwater Horizon spill eclipsed this record, and came close to the estimated 3.3 million barrels spilled into the Bay of Campeche by the Mexican oil rig, Ixtoc I in 1979. This release still holds the record for the largest accidental man-made release of oil into ocean waters. Though oil releases of this magnitude are difficult to estimate, the ultimate ruling was a staggering 3.19 million barrels of oil (nearly 134 million gallons) released from the Macondo well site. Only 800,000 barrels were able to be collected from the well head through a coordinated effort between BP and government responders.



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## **Environmental Damages and the Effects on Public Welfare**

The blowout produced a slick of oil covering 43,000 square miles of surface waters – an area approximately equal to the size of Virginia. It covered at least 1,300 miles of shoreline, affecting wildlife, habitats, water quality, and sea life, which ultimately affected the commercial fishing and shrimping industries.

Approximately two-thirds of this country's oysters come from the Gulf Coast, the source of about 40 percent of America's seafood catch.

Figures from the Louisiana Department of Wildlife and

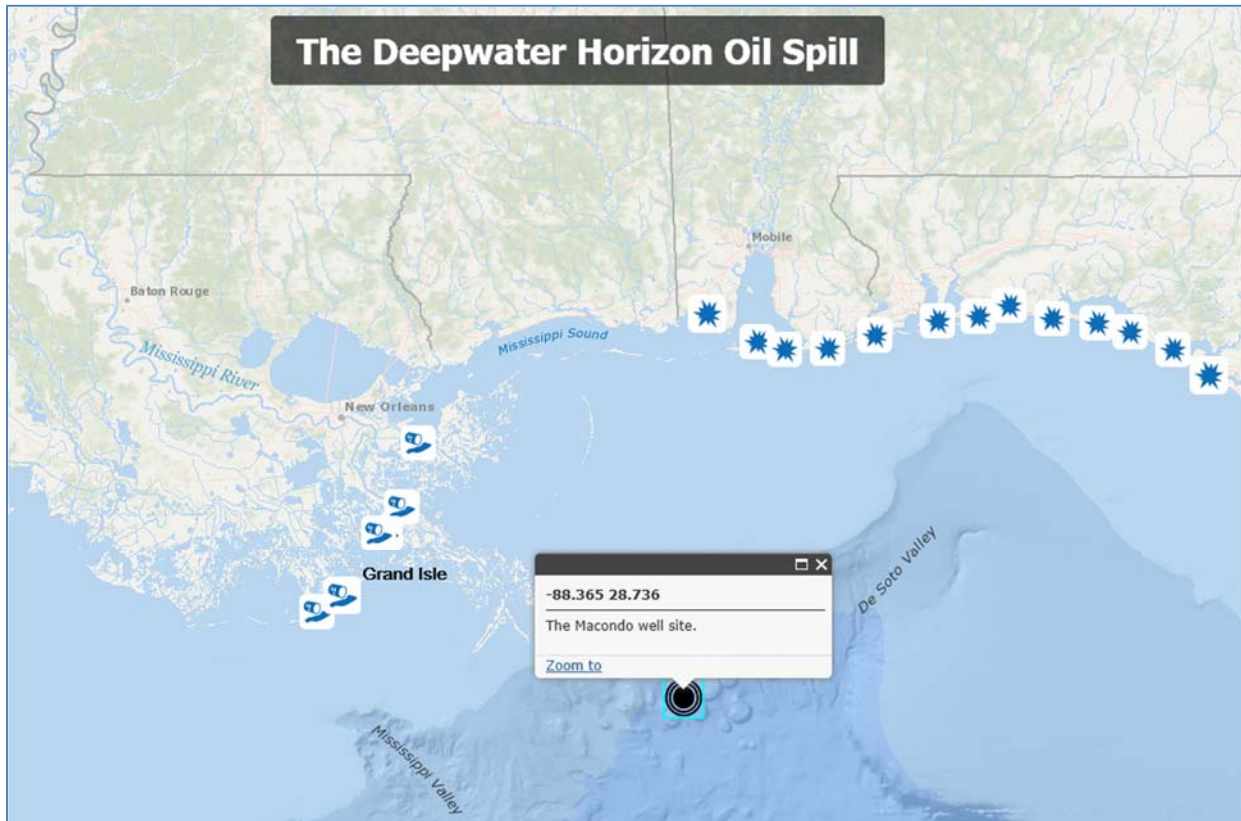
Fisheries showed the statewide oyster catch down 27 percent in 2010 from the average haul between 2002 and 2009. The hardest hit areas of Louisiana, like the Barataria Bay inlets and the communities of Yscloskey and Pointe a la Hache, where state-managed oyster grounds are fished, saw their catch decrease the most. Shrimp and blue crab landings saw percentage declines in the teens in comparison to at least the previous seven years of catch. Three tropical storms and one hurricane within the closest years after the blowout caused re-stirs of the oil to wash ashore and into marsh grasses, proliferating the problem. A fishing ban was imposed during the spill, but by 2011, seafood landings appeared to have largely returned to normal.



**Explosion of the *Deepwater Horizon* mobile drilling rig.**



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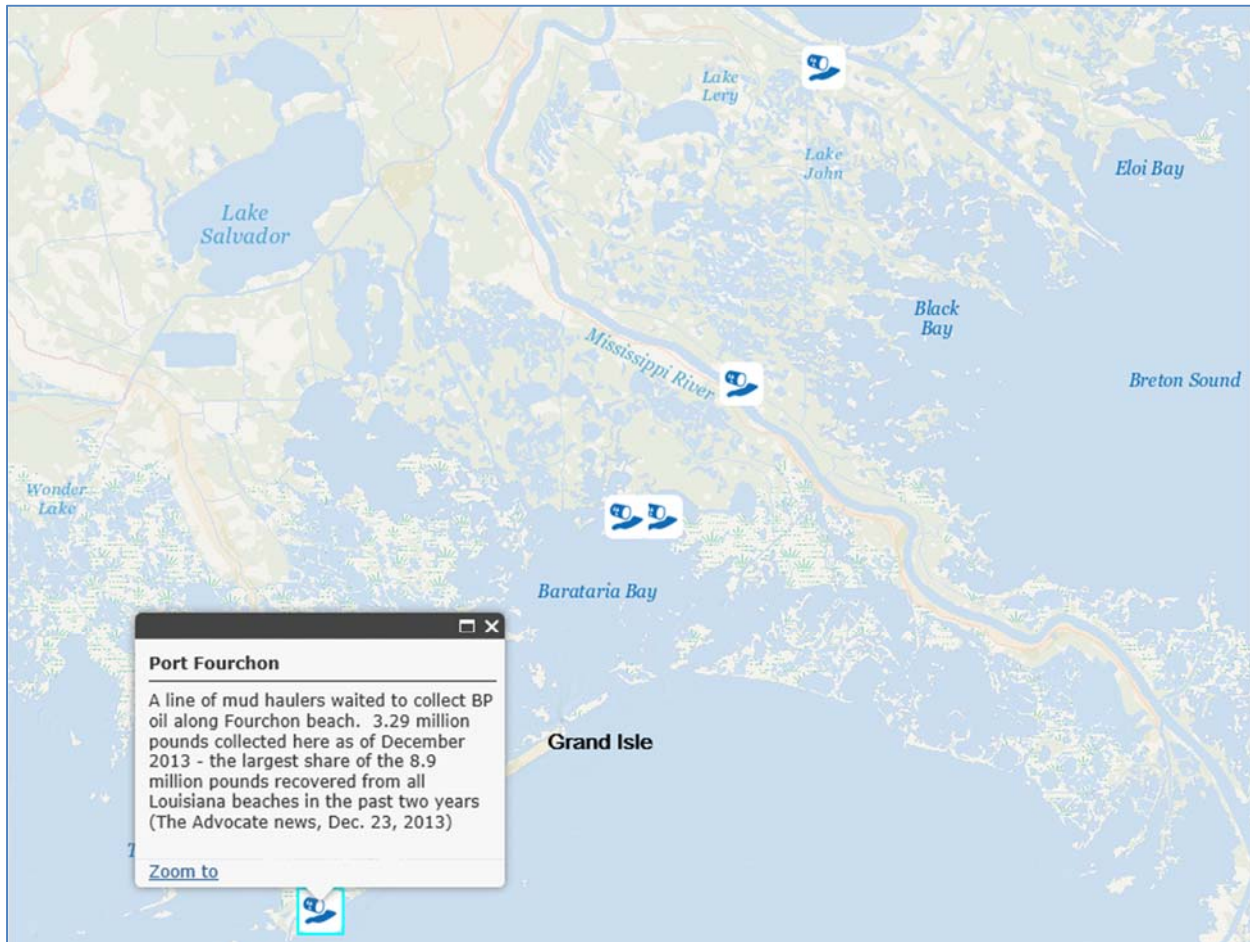
*This map shows areas along the Gulf coast, as mentioned above, that were affected by the oil slick.*

*Oil in the form of tar balls  spread from Bayou La Batre, AL as far as Panama City, FL.*

A research team led by Louisiana State University associate professors studied the effects of the spill on fish living in Louisiana marshes. Their results, published in the *National Academy of Sciences Journal*, concluded that although the fish may be safe to consume, the toxic oil affected the gill tissue and genes of fish during the time of exposure, and that these detrimental effects persisted long after the visible oil disappeared from the marsh surface. These results implied long-term ecological consequences that may ultimately affect the public's welfare in regards to commercial fishing operations.



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*This map shows areas along the Louisiana coast, as mentioned above, that were affected by the oil slick. Some of the worst hit areas were around Port Fourchon. Oil collected from recovery efforts was measured in thousands to millions of pounds, as the oily material typically consisted of 85%-90% sand, silt, shells & water, with 10%-15% as heavily weathered residual oil.*

A survey of twenty-six marine scientists by the Associated Press five years after the oil spill revealed their perceptions that the majority of impacts were to crustaceans, marine mammals, marshes, wetlands, and to the ocean bottom. Much of the oil is believed to have existed on the ocean bottom. Ironically, the Brown Pelican (the state bird of Louisiana) had recently been removed from the endangered species list. Over 2,300 of these birds were found dead.



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## **The Final Hours**

What happened in those final hours before the explosion? According to the charge published by the United States Department of Justice (DOJ), BP Well Site Leaders failed to phone engineers onshore once they received indications that the well was not secure, and again after test results continued to show abnormally high pressures on a “kill line”. This line is a high-pressure pipeline that uses fluids to control pressures from the well. As the first red light indicators presented themselves, a lack of communication between BP (rig operator), Transocean Holdings, LLC (rig owner), and subcontractors working and living on the oil rig led to a series of disastrous mistakes. Gas sensors go off, but no one activates emergency systems that may have prevented the oil and gas from igniting. Some are unaware that a mixture of oil and gas is seeping from the well and cascading onto the drilling floor. Others are aware of gas on the rig, but do not activate an emergency shutdown or order an evacuation. Then minutes after the explosion, a subsea engineer went to activate the “kill switch” only to learn that it was not working. It was time to abandon the rig.

## **Well Designs and the Pressure Build-Up Onshore**

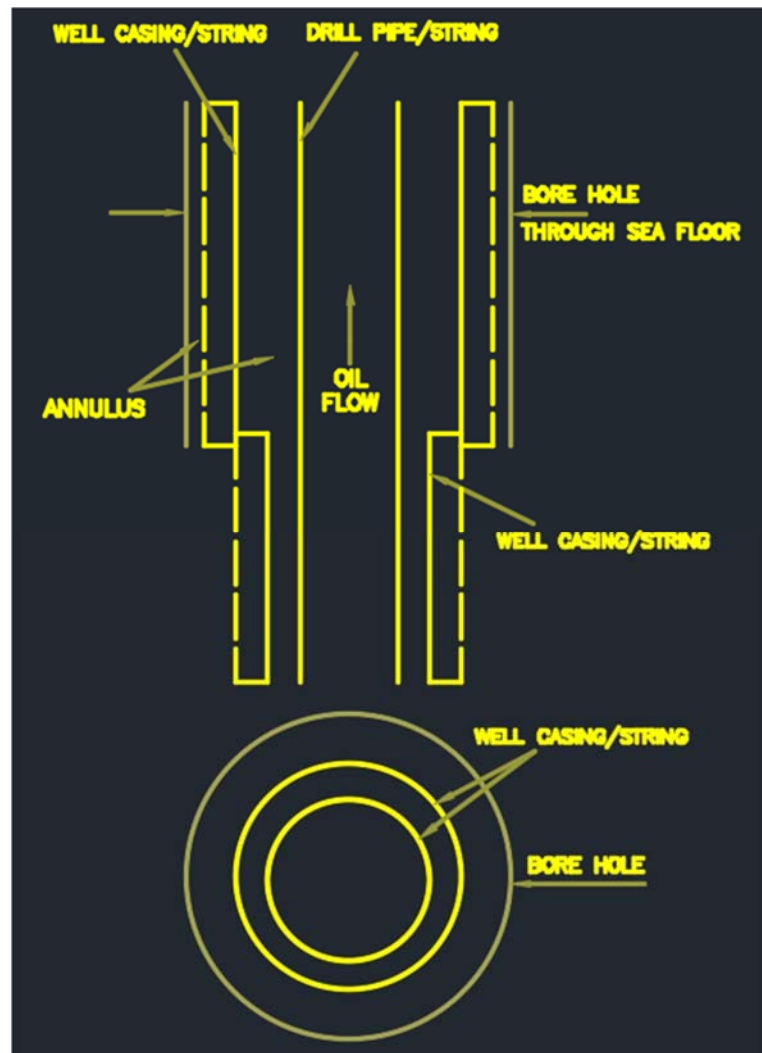
The Macondo well had its share of problems. The well site was one of the largest finds in the Gulf of Mexico. Oil companies have explored the deeper parts of the Gulf of Mexico since around 2001, and are beginning to overcome technological challenges that have only recently made deep water drilling a feasible alternative to over-drilled and depleted reserves in the shallower waters. The Macondo well was over 5,000 feet below the ocean surface. Underneath this was a series of pressurized oil and gas reservoirs located another 13,360 feet below the sea bed. BP began their work on the well in 2009. While drilling, they frequently contended with stuck drilling pipes, and what field crews called “kicks” from the well. These kicks, not uncommon in the drilling industry, are caused by low pressures inside the well from, among other things, too light weight of a drilling fluid or “mud”, as it is called. The weight of the mud, along with the strength of the riser used, act as the main pressure controls for the well. A riser is the pipe connecting the drilling rig platform on the surface of the water to the well head on the sea bottom. The mud is also used to lubricate drill bits and remove cuttings.



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BP completed drilling operations in 2010, and was preparing for temporary abandonment of the well. When drilling the well, a series of metal pipes, called *drill strings*, are attached to the drill bit. The string is designed, in part, using the principles of fluid mechanics aimed at maximizing volumetric flow rates of the drilling mud while decreasing fluid friction at the pipe and/or borehole wall. Metal pipes called

*casings* or a *casing string*, is lowered into the hole once drilling reaches a certain depth. This is to ensure wall stability. Once production is complete and the drill pipe is pulled, the well must be plugged by pouring typically, a cement slurry into the remaining annular spaces in order to stabilize it. Negative pressure testing of the wellbore is a critical part of abandonment procedures. It assesses whether the cement pumped to the bottom of the well has hardened and formed an effective barrier between the well and the oil and/or gas reservoir. If the pressure exerted from inside the well is higher than outside it, a high wellbore condition exists, and formation fracturing outside the well could occur. Conversely, if the pressure exerted from inside the well is lower than outside it, a low wellbore condition exists, and can be caused by natural gas being



*Wellbore Schematic*

released upon penetrating a reserve. An abrupt upwelling of gas is felt as a “kick”. Well Site Leaders on the drilling rig are responsible for maintaining well control at all times, and most “kicks” can be controlled by bleeding off pressure through a valve connected to the drill pipe when drilling, and/or substituting a heavier weight mud. A proper cement mix design should provide for a balanced condition in the well. The top of the well at the sea bed floor must also be capped and sealed as part of abandonment.



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Multiple news sources reported that BP was under pressure to complete the project and abandon the well. Drilling operations are very expensive. It was reported that BP was paying a fee of \$500,000 per day just to rent the oil rig. News sources asserted that the company was behind schedule, and took shortcuts such as skipping a test of the cement mix, and failing to plug the final cap at the top of the well that would prevent gas from lifting the seal located on the deck floor above it. The felony charge released against BP by the federal government cited negligence on behalf of the Well Site Leaders in their duty to secure the well, despite negative pressure tests providing abnormally high pressures on the drill pipe. Instead, the rig crews were ordered to remove thousands of cubic feet of heavy drilling mud from the riser pipe and to replace it with (lighter weight) seawater. This invited natural gas and oil to seep up through the riser and onto the rig deck.

### **Drilling Deeper into the Problem**

The administrative decisions made by BP leading up to that fateful day were not the only factors contributing to the disaster. There were technical problems, too. The structure connected to the kill line sits on top of the well head at the bottom of the sea. This structure, called the *blowout preventer*, or BOP, is connected to the oil platform by the riser pipe. The oil that is pumped from the well rises up through this pipe to the drilling rig for collection. Should the oil platform drift away from the well head, or in the event of an emergency, this structure can separate the two, allowing the riser to be pulled away from the blowout preventer. The blowout preventer, as its name implies, is a safety device used to stop surges of gas and oil from the well in the event of a loss of control.

It functions primarily by sealing annular spaces around the drill pipe to protect against these surges from the well head. A kick can cause a blowout that would spew “black rain” up through the rig’s derrick and back down onto the deck with the potential for igniting.



*Derrick*





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A blowout preventer stack can be pre-configured for the job, but generally consists of multiple hydraulic rams used to seal off annular spaces, accumulators and electrical components to control the hydraulics. It also has a critical component called the *blind shear ram*, which as a last resort, actually shears off the drilling pipe at the top of the well in order to stop what would otherwise be an uncontrolled surge of gas and/or oil from the pressurized reserves underneath it.

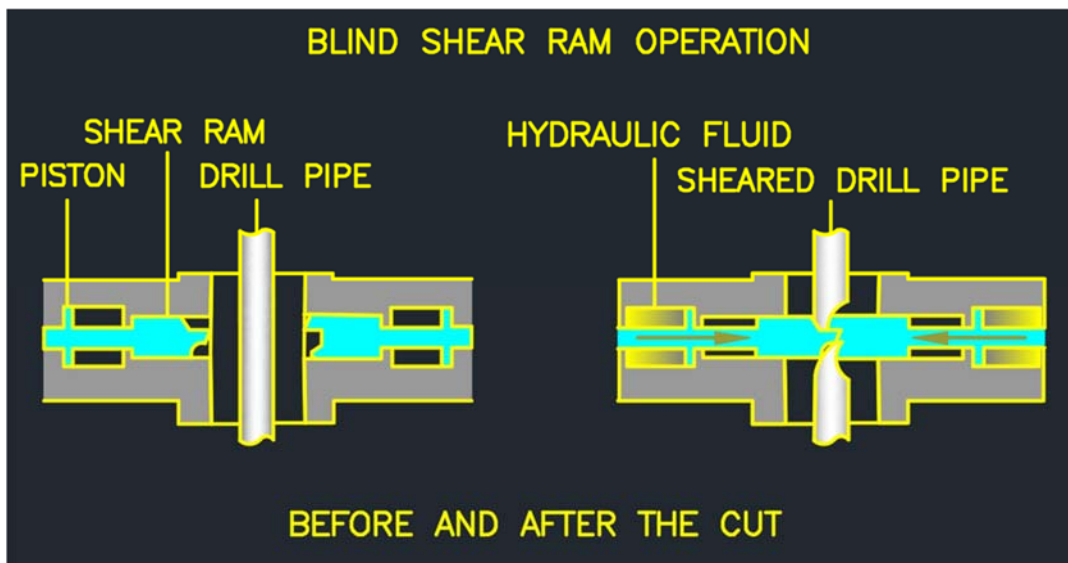


*Blowout preventer stack*



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To break it down, the blind shear ram is made up of two pistons connected to rams with offset steel blades used to cut heavy drilling pipe. Two lines deliver hydraulic fluid to either piston through a single shuttle valve (not shown). When the kill switch is activated, the pressure of the fluid pushes the rams to shear the drilling pipe and permanently terminate its flow.



Unlike many other parts of the blowout preventer, the blind shear ram has no backup function. It is the last line of defense. Speculation existed as to why the BOP failed, and there were many hypotheses. Some news sources indicated that the shuttle valve was the weakest component of the blind shear ram, and may have jammed. Others point to the possibility of the steel blades landing on a joint connecting two drill pipes. The joints are much stronger than the pipe itself, and are virtually impossible to cut. (Pipe joints make up almost 10 percent of the length of a drill pipe.) Still other sources suspect a hydraulic leak in one of the lines. The subsea engineer who activated the kill switch, later testified that he had no readings from the meter used to measure fluid pressure at the BOP. We will soon learn that there is more to this story.

### An Engineer is Indicted

In the early days after the explosions, BP engineers back onshore were focused on stopping the leak and sealing off the well. In order to do this, they had to have an idea of the rate of flow gushing from the broken riser pipe, still attached to the well head.



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These estimations would later be the subject of great scrutiny by federal prosecutors, and are what led to the indictment of a BP Vice-President.

A BP Drilling and Completions Project Engineer, as part of a team of engineers, provided some of the early oil flow rate numbers in late April 2010. In an affidavit sworn by an FBI agent on April 23, 2012, Kurt Mix had been served with a Legal Hold Notice on or about April 22, 2010 alerting him to his obligation to retain all records relevant to the Macondo well incident. These records included text messages. Over the following months of May and June 2010, the agent asserts that Mr. Mix was served with five additional Legal Hold Notices that included emphasis on instant messages and text messages that needed to be preserved. During this time period, Mix began working on the “Top Kill” method for closing off the well. This method involves pumping heavy drilling mud from ships at the surface down to the wellbore via a kill line connected to the blowout preventer. Oil flow rates reported at this time were wide-ranging and from different sources. His team estimates were between 1,000 - 146,000 barrels of oil per day, or BOPD. However, company representatives never publically refuted the Vice-President’s publically announced estimate of 5,000 BOPD. When the Top Kill method failed, the engineer purportedly announced in a May 26th email to his supervisor that the flow rate was too high for this method to succeed and thus, concluded that the rate had to be over 15,000 BOPD. The Top Kill effort was abandoned on May 29th. The FBI agent stated that on or about September 22, 2010, Mix was notified that “all active electronic data” was about to be collected. Furthermore, the affidavit proclaims that on two separate occasions, the engineer subsequently deleted strings of text which included over 300 messages between his supervisor and himself, and between a BP contractor and himself prior to turning over his cellular phone to a third-party document collection vendor. The FBI agent swore of her familiarity of the circumstances surrounding the offenses through, in part, materials obtained during the investigation. This affidavit led to the arrest of the BP engineer in his Texas home on April 24, 2012. Kurt Mix was charged with two felony counts of obstruction of justice for deleting text messages from his cellular phone without permission from the company.

The BP engineer and his attorney have always admitted to inadvertently deleting some of the text messages. Mr. Mix also insisted that he initially offered his corporate phone to be confiscated, even though it was not chosen to be collected by the vendor at a meeting held shortly after the spill was contained on July 10, 2010. When the cellular phone was obtained almost one year later, most of the removed messages were able to be retrieved with forensic tools. (Mr. Mix reports that he hired a computer expert on August 25, 2011 to recover the deleted text messages that he then turned over to the U. S. Department of Justice (DOJ). The affidavit makes no such mention of this, although the timelines for text removals and phone collection are consistent



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between sources.) So why did the engineer delete messages from his phone after having been served with hold notices, and knowing that an investigation was launched? After all, it was on or about June 1, 2010 when the U. S. Attorney General publically announced that the DOJ had launched a criminal investigation into the oil spill. Mr. Mix asserts that the majority of the messages retrieved were largely personal in nature, and that the few conversations held with his supervisor and a BP contractor regarding the incident revealed his due diligence in helping to shut off flow from the damaged well, possibly affecting the judge's decision to allow a plea agreement.

The BP engineer was acquitted of the second count of obstruction of justice in his December 2013 trial. A Louisiana jury found him guilty of the first count, but it was dismissed due to one juror's unconstitutional misconduct. A new trial was ordered. In the days leading up to the new trial, the DOJ revised its charge of the first count to allow for a misdemeanor plea. Mr. Mix accepted the guilty plea on November 6, 2015 in exchange for no further charges being brought against him regarding this case.

### **More BP Employees Indicted**

The BP Vice-President of Exploration for the Gulf of Mexico at the time was charged with one count of Obstruction of Congress, and one count of making false statements to FBI and EPA agents about oil flow rates. He was eventually acquitted in 2015. Two BP Well Site Leaders were formally indicted on manslaughter charges, only to be dismissed five years after the explosions. Instead, only one Well Site Leader, Donald Vidrine was charged with intentionally misinterpreting the results of a negative pressure test on the well. He pleaded guilty to a misdemeanor charge for violation of the Clean Water Act, and was sentenced to ten months of probation in 2016.

### **BP Corporate Ethics Questioned**

The corporation itself, was not so lucky. By January 29, 2013, BP Exploration and Production, Inc. pleaded guilty to illegal conduct leading to and after the disaster. In the plea agreement *United States v. BP Exploration and Production, Inc.*, the company was sentenced to pay \$4 billion in criminal fines and penalties.



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In 2014, BP's history of environmental compliance as a federal government contractor was brought into question. A recent trend of violations of the Clean Water Act prior and subsequent to the Deepwater Horizon incident led to grounds for disbarment. Recognizing this, the federal government made the decision to impose a five-year injunction on the company. The guilty criminal plea that BP entered into imposed a comprehensive set of measures to improve the company's drilling procedures, safety practices, and corporate ethics. For example, affiliates of the parent company, BP p.l.c, were required to create a position for an "Ethics Monitor" whose task is to review systemic issues of current corporate codes of conduct and compliance within the group of companies, and to report the findings to company representatives and the EPA. The purpose for this position is to prevent future ethical and criminal violations when dealing with regulatory authorities. All BP affiliates were also required to maintain a communications plan to promote awareness of ethics and compliance topics, to conduct Code of Conduct training, and to provide ethical leadership training. They were also required to create a database to track the ethics and compliance training, subject to review by the Ethics Monitor. Furthermore, the BP p.l.c Board of Directors was required to maintain the Safety, Ethics, and Environmental Assurance Committee whose responsibilities were, in part, to review material placed before shareholders which addresses environmental, safety, and ethical performance standards. The committee is to then make recommendations to the Board about their adoption.

On October 5, 2015, the United States Government joined the Gulf States of Florida, Alabama, Mississippi, Louisiana and Texas in announcing a historic settlement to resolve civil claims against BP Exploration and Production, Inc. for economic losses and natural resource damages caused by their gross negligence in the oil spill. Restitution was sought for damages under the Clean Water Act and the Oil Pollution Act. The settlement for \$20.8 billion, is the largest settlement with a single entity in Department of Justice history. Under the terms of the federal-state consent decree, a portion of the BP settlement money was allocated towards the Clean Water Act civil penalty, with 80 percent pursuant to the RESTORE Act. This act was created with the express intent to have restoration projects along Gulf coastlines prioritized, funded, and successfully completed. If you think environmental compliance is trivial, think again. The \$5.5 billion penalty (that is, with interest) paid by BP under the Clean Water Act is (at the time of this writing) the largest civil penalty in the history of environmental law. By the way, federal tax laws do not allow entities to take tax deductions for civil penalties.

The consent decree (finally court-approved and recorded in the year of this writing) is another example of how government can impose a set of ethics and business practices on a company, licensed or not, as a condition to obtaining federal contracts. Cases like these have led licensing boards to require companies or firms to be licensed.



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## **A Group Cover-Up Slicker than Oil**

It should be noted that not all blame was placed on BP or their employees. As with all large projects or operations, there are many parties involved. On September 19, 2013, Halliburton Energy Services, Inc. (“Halliburton”) pleaded guilty to destroying evidence pertaining to the disaster on the very same day that a criminal investigation was filed against one of the contractor’s managers. Halliburton was the contractor hired by BP to recommend designs for the cementing process, as explained earlier. On February 14<sup>th</sup> of this same year, Transocean Deepwater, Inc. pleaded guilty to violating the Clean Water Act, and was sentenced to pay millions of dollars in criminal fines and penalties for its conduct related to the disaster. In a separate civil settlement, the company paid a record \$1 billion Clean Water Act penalty, and was required to take significant measures to improve its performance in order to prevent recurrence of its conduct. At least one other company with a stake in the Macondo well agreed to settlements.

Unfortunately, this course does not allow for an exhaustive listing of all the court record findings, engineering analyses, scientific studies, funding or cleanup efforts that were researched by the author. You can find out more about these topics, and how settlement monies are being used by visiting: <http://www.gulfspillrestoration.noaa.gov/>

## **Equipment Problems Surfacing Faster than Rising Gas**

There existed known problems with blowout preventers, in general. However, in the wake of the Deepwater Horizon incident, historical problems with BOPs were being uncovered rather quickly. It was discovered that in 2009, Transocean commissioned a confidential study of the reliability of BOPs used by deep water rigs. A Norwegian company studied some 15,000 wells drilled in the Atlantic Ocean and North Sea from 1980 to 2006. The good news: There were less than 0.1 percent of cases where crews lost control of their rigs and had to activate BOPs to prevent a spill. The bad news: Of the few cases where the BOP had to be used, 45 percent of them failed to deploy.

Blowout preventer stacks are quite complex structures, and costly to maintain. A typical five-story structure has multiple hydraulic-operated rams, can weigh 450 tons, and must withstand frigid temperatures and extreme pressures (i. e., hydrostatic heads) at depths of over one mile. The **Minerals Management Service (“MMS”)** was the federal agency charged with regulating



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offshore drilling and royalties from oil and gas companies. They imposed federally mandated tests; however, these tests are conducted by those in the industry, and not government inspectors. News reports discovered that the tests do not require regular checks of several important elements of blind shear rams. Consequently, there was no confirmation by the MMS that anyone had ever ensured the proper function of a blowout preventer. In fact, not only did this agency mandate testing, but it commissioned studies which resulted in several warnings about BOP reliabilities.

- 2000: The MMS issues a safety alert urging deep sea oil rigs to include a backup device used to activate blowout preventers in the event of an explosion.
- 2001: Study commissioned by the MMS that advised all subsea BOP stacks used for deep water drilling be equipped with two blind shear rams.
- 2003: Study commissioned by the MMS suggesting that backup systems be implemented and tested along with the rest of the BOP components. MMS declined to make this a requirement. Instead, they sent out a safety alert encouraging their use.
- 2002-2004: Engineering consultants found that calculations used by BOP manufacturers overestimated the cutting ability of the blind shear ram component under real-world conditions. At least the 2004 study was funded, in part, by the MMS.
- 2010: BP and other oil companies helped finance a study promoting the necessity of less frequent inspections, due to the pass rate of government mandated tests.

Even more disconcerting was the Deepwater's own BOP inspection. It uncovered significant problems as early as five years before the accident. Records point to the following history of tests for the blowout preventer installed for the Deepwater Horizon:

- 2000: Engineering consultants were hired by the BOP manufacturer to assess specific vulnerabilities of the equipment. The consultants determined that the blind shear ram and its T-shaped shuttle valve were the most vulnerable components. In fact, the engineers concluded that this one shuttle valve represented 56 percent of the blowout preventer's likelihood of failure. This report was prepared for BP. It was likely unknown to the MMS.
- 2005: Transocean scheduled the last known inspection of the BOP to be conducted by the same engineering company. However, the inspection could not be completed in 2005 due to the fact that it was on another rig at the time. A partial inspection of the structure uncovered significant problems. A full inspection was scheduled for late 2010 – after the tragedy.
- 2010: In January, records show the Transocean maintenance team spent over 145 hours repairing and checking the blowout preventer as it was being transported to the well site, as well as afterwards.



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Indeed, the first six days after the disaster were spent frantically attempting to apply enough hydraulic pressure on the BOP to activate the blind shear ram. After five attempts, engineers abandoned this effort. The *New York Times* reported that underwater robots were used to shear off the riser pipe on the seventh day, but other techniques for completely containing the leak had to be employed. It was not until mid-May when engineers discovered that the blind shear ram's hydraulic system had a leak, and could not fully close. Only one of the ram's blades had fully deployed.

### **A Question Mark for Ethics on the Part of Federal Regulators**

The vulnerabilities of blowout preventers were widely known for years throughout the oil and gas exploration industry, including those at the Minerals Management Service. It wasn't until the year 2003 that the MMS adopted a regulation requiring companies to submit test data proving that their blind shear rams could work on the specific drill pipe used, and under calculated pressures. Companies had to submit this information to obtain drilling permits. Frank Patton, the agency's District Drilling Engineer in the New Orleans office, had nearly three decades of working in the oil industry. He testified in a joint U. S. Coast Guard and MMS hearing that the blind shear ram component of the blowout preventer was the most important factor in maintaining the safety of the well, the rig, and the personnel directly above it. Yet, he approved the permit without requiring proof, and then claimed at his hearing that he was never trained to look for such a written requirement. He appeared almost oblivious to the testing requirement implemented years earlier. Some call it a lack of oversight. Was this a mere lapse in enforcement of the policy, or an ethical dilemma shaped by outside pressure to approve a permit?

It also took the MMS until the year 2003 to require even one blind shear ram, despite much advice from consultants and many safety alerts issued by the agency beforehand. Industry and government records agree that by the time of the Deepwater Horizon disaster, roughly two-thirds of the rigs in the Gulf still had only one blind shear ram. Had the MMS become a little too in consonance with the drilling companies? Suffice it to say, the Minerals Management Service was reorganized as early as May 19, 2010 into three independent agencies, including one with a new enforcement division. By the time of the January 2013 plea agreement, the injunctive relief set forth for BP required two blind shear rams and third-party verification of blowout preventers.





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## Model Laws, Rules, and Exemptions for Licensure Revisited

Sometimes we are so concerned with the legal implications of our actions, that we forget the ethical implications of our inactions. BP had to admit liability under both moral and civil law. The Executive Director of the Corporate Responsibility Officers Association and contributor to *Corporate Responsibility Magazine*, was frank about the ethics of the time in a blog posted soon after the incident.

*“....compliance has become all people do. There’s so much to comply with that’s all people have time to do, and that’s all they aspire to do....While the finger-pointing is disappointing on its face, it highlights something we’ve said in the CROA for a while: you can’t comply your way to greatness. When compliance becomes the goal, no one takes responsibility. When compliance becomes the goal, no one goes above and beyond. If you want a smoking gun, here’s what to look for: If .... Halliburton knew to countermand Transocean’s order but didn’t, or BP knew to test the blowout preventer but didn’t, or if Mr. Patton and the folks at MMS knew they needed to check testing certificates but didn’t. Indeed, if any of a thousand people involved knew to speak up but didn’t, we’ll see that once again groupthink conspired with a culture of risk to bring catastrophe. Unless and until leaders lead, and we hold ourselves to a higher standard, more regulations will close this barn door, but not prevent a future calamity.”*

The National Council of Examiners for Engineering and Surveying (NCEES) Model Rules oblige engineers and surveyors to report known or perceived risks that may cause harm to the public, their employers, their clients, and to other licensees unless prohibited by law. The NCEES publishes both Model Law and Model Rules for promoting the licensure of engineers and surveyors. The Model Law was developed for engineers and surveyors who are in responsible charge of their respective practice. It sets forth broad ideas about the regulation of engineering and surveying licensure to assist in legislation preparation. As noted in hindsight with previous catastrophes, licensees have a duty to report any potential risks to all parties involved, including the appropriate authorities. In our case, the consent decree required BP’s parent company to sign a Non-Retaliation Statement against any individual affiliated with the company who reported, or openly raised good-faith questions or concerns related to violations regarding civic laws, company codes of conduct, or to violations against the agreement itself.



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Professional engineers are licensed at the jurisdictional (e. g., state) level through licensure boards. Kurt Mix was not a licensed engineer, and through his plea, was disciplined under general laws. This was arguably his best option, in that he avoided jail time if a conviction was handed down. And it appeared that a conviction on the first count was pending. By contrast, licensees held accountable under NCEES Model Law can be disciplined by state and territorial boards for pleading guilty or *nolo contendere* to any crime that is a felony, whether or not it is related to the practice of engineering or surveying. A plea bargain could be a tougher decision for a licensed engineer or surveyor.

Ethical practice in engineering and land surveying is based on the Model Rules of the NCEES. The NCEES Model Rules provide licensure boards with rules for guiding the development of engineering and surveying licensing laws and ethics, and are designed to carry out the general concepts set forth in the Model Law. The Model Rules complement the Model Law. However, many states and licensing jurisdictions have exemptions to licensing laws pertaining to work within industry. These exemptions have existed for decades. The industrial exemptions were questioned in the wake of the Gulf of Mexico disaster which did indeed, affect public welfare and safety, as shared above. Over the next six years, engineering professional societies and councils reviewed, commented, and promulgated their positions on exemptions related to manufacturing and utility businesses. The following is a timeline of positions made public by these bodies:

- In 2010, the NCEES released a statement emphasizing the role of engineering licensure in protecting the public from technical incompetence or unethical practices. The Council also charged one of its committees to review the impact of the industrial exemption, and to recommend revisions to its model law.
- In 2011, both the NCEES and the National Society of Professional Engineers (NSPE) voted overwhelmingly at their respective annual meetings to create or revise policies in favor of removing industrial exemptions.

The NCEES Model Law was revised to read as follows: “*Licensed engineers shall be in responsible charge of all engineering design of buildings, structures, products, machines, processes and systems that can affect the health, safety and welfare of the public.*”

The new NSPE policy reads as follows: “*It is the policy of the (NSPE) that all engineers who are in responsible charge of the practice of engineering as defined in the NCEES Model Law and Rules in a manner that potentially impacts the public health, safety and welfare should be required by all state statutes to be licensed professional engineers.*”



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*NSPE recommends the phase out of existing industrial exemptions in state licensing laws.”*

- In 2012, the Council again released a public statement questioning the ethical practices and industrial exemption of the BP engineer after his arrest that April. That same year, the Industrial Exemption Task Force of the NCEES compiled a table of exemption status from individual licensing boards. The table was based on a detailed review of the statutes and laws in each state. This information was prepared in time for the August 2013 NCEES Annual Meeting.

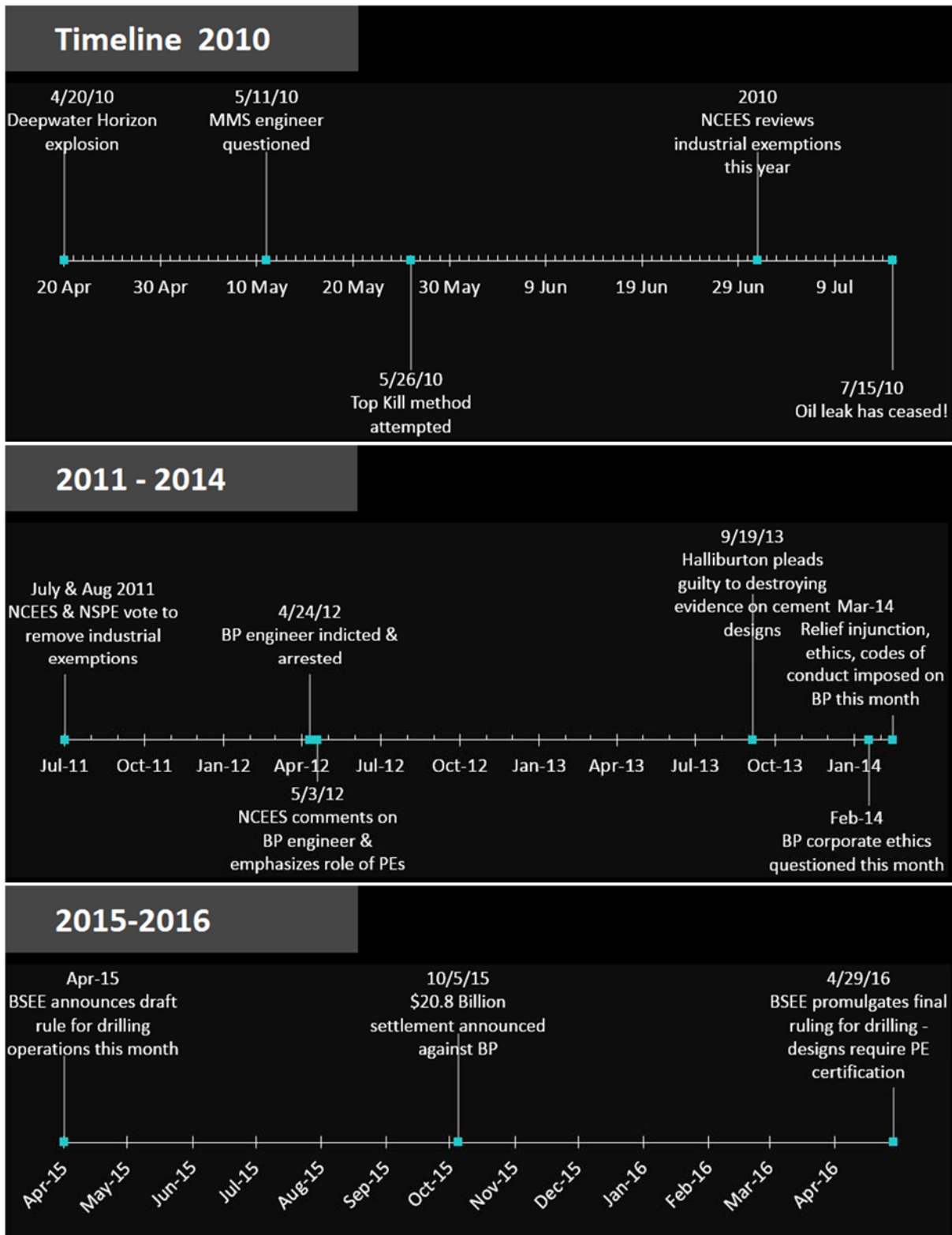
### **Increased Roles for Professional Engineers**

So what good came from the Deepwater Horizon disaster? While the NCEES and NSPE organizations did not phase out age old industrial exemptions, they did manage to persuade the U. S. Department of the Interior to develop a comprehensive set of safety regulations that affect oil and gas operations. On April 29, 2016, the Department’s Bureau of Safety and Environmental Enforcement (BSEE) publically announced final regulations developed in response to the disaster that began in April 2010. Identified as NTL No. 2010-N05, *National Notice to Lessees and Operators of Federal Oil and Gas Leases, Outer Continental Shelf*, this directive specifies that a professional engineer (PE) must certify all well casing designs and cement designs. In addition, this directive mandates independent, third-party verification of BOP functionality, and specifically includes components of the blind shear ram. Secondary control systems are now required for all BOP stacks. These regulations brought an end to a massive six-year effort in which the NSPE was actively involved to increase the PE’s role in protecting public health, safety, and welfare. Upon news of the press release, the NCEES reminded its reading audience that under their Model Rule, and as required by many states, a PE or professional land surveyor is obligated to notify authorities if his or her professional judgement is overruled under circumstances where the life, health, property, or welfare of the public is endangered. Their point was that had there been licensed professionals involved in the design, operations, or even regulations, they would have known by their code of ethics not to allow business decisions to sacrifice the interest of the public or the safety of their colleagues.

Below is a graphical timeline of events as they relate to this discussion:



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