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Congressional Testimony and the Deepwater Horizon Oil Spill

Posted by Heading Out on May 13, 2010 - 10:55am
Topic: Environment/Sustainability
Tags: deepwater horizon, oil spill [list all tags]

Leading officers of BP, Transocean, Halliburton and Cameron appeared before the Subcommittee on Oversight and Investigations, a Sub-committee of the Committee on Energy and Commerce today. There are a number of documents available at the Committee Site, including the opening statements of Chairman of the Committee Waxman, and Congressman Stupak, Subcommittee chair. I am largely going to review the documented information on the Sub-committee web site, since it included virtually all of the information that was also gone over in the subsequent questioning of the witnesses. I am also going to use more extensive quotes than usual, since there was significant information given at the hearing that is useful to know.

In his opening remarks Congressman Waxman focused on four issues. The first was that while the cementing operation of the well may have passed the first positive pressure test, it may not have passed the following negative pressure test. The second related to the pressure monitors and what they told the people on the rig. He then noted that the blowout preventer that sat on the top of the well at the sea bed had, according to Cameron who made it, a leak in a crucial hydraulic system and a defectively configured ram. And the fourth area being examined is the response of the companies to the spill of oil.

To illustrate his concerns he used a submission from BP called "What we Know."

> The first bullet says: "Before, during or after the cement job, an undetected influx of hydrocarbons entered the wellbore." What this means is that there was a breach somewhere in well integrity that allowed methane gas and possibly other hydrocarbons to enter the well.

> The second bullet says: "The 9 7/8" casing was tested; the 9 7/8 "casing hanger packoff was set and tested; and the entire system was tested." BP explained to us that this refers to a positive pressure test in the well. What this means is that fluids were injected in the well to increase pressure and to monitor whether the well would retain its integrity. The well passed this test.
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> Rigs like the Deepwater Horizon keep a daily drilling report. Transocean has given us the report for April 20, the day of the explosion. It is an incomplete log because it ends at 3:00 p.m., about seven hours before the explosion. But it confirms that three positive pressure tests were conducted in the morning to early afternoon.
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> The next bullet says: "After 16.5 hours waiting on cement, a test was performed on the

> wellbore below the Blowout Preventer." BP explained to us what this means. Halliburton completed cementing the well at 12:35 a.m. on April 20 and after giving the cement time to set, a negative pressure test was conducted around 5:00 p.m. This is an important test. During a negative pressure test, the fluid pressure inside the well is reduced and the well is observed to see whether any gas leaks into the well through the cement or casing.
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> According to James Dupree, the BP Senior Vice President for the Gulf of Mexico, the well did not pass this test. Mr. Dupree told Committee staff on Monday that the test result was "not satisfactory" and "inconclusive." Significant pressure discrepancies were recorded.
>
> As a result, another negative pressure test was conducted. This is described in the fourth bullet: "During this test, 1,400 psi was observed on the drill pipe while 0 psi was observed on the kill and the choke lines."
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> According to Mr. Dupree, this is also an unsatisfactory test result. The kill and choke lines run from the drill rig 5,000 feet to the blowout preventer at the sea floor. The drill pipe runs from the drill rig through the blowout preventer deep into the well. In the test, the pressures measured at any point from the drill rig to the blowout preventer should be the same in all three lines. But what the test showed was that pressures in the drill pipe were significantly higher. Mr. Dupree explained that the results could signal that an influx of gas was causing pressure to mount inside the wellbore.
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> Another document provided by BP to the Committee is labeled "What Could Have Happened." It was prepared by BP on April 26, ten days before the first document. According to BP, their understanding of the cause of the spill has evolved considerably since April 26, so this document should not be considered definitive. But it also describes the two negative pressure tests and the pressure discrepancies that were recorded.
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> What happened next is murky. Mr. Dupree told the Committee staff that he believed the well blew moments after the second pressure test. But lawyers for BP contacted the Committee yesterday and provided a different account. According to BP's counsel, further investigation has revealed that additional pressure tests were taken, and at 8:00 p.m., company officials determined that the additional results justified ending the test and proceeding with well operations.

Congressman Stupak began with a list of recent incidents that BP had been involved in, including problems on the North Slope and in Texas City. He focused on problems with the BOP, specifically

> Our investigation is at its early stages, but already we have uncovered at least four significant problems with the blowout preventer used on the Deepwater Horizon drill rig.
>
> First, the blowout preventer apparently had a significant leak in a key hydraulic system. This leak was found in the hydraulic system that provides emergency power to the shear rams, which are the devices that are supposed to cut the drill pipe and seal the well.

I would like to put on the screen a document that the Committee received from BP. This document states: “leaks have been discovered in the BOP hydraulics system.”

The blowout preventer was manufactured by Cameron. We asked a senior official at Cameron what he knew about these leaks. He told us when the remote operating vehicles (ROVs) tried to operate the shear rams, they noticed a loss of pressure. They investigated this by injecting dye into the hydraulic fluid, which showed a large leak coming from a loose fitting, which was backed off several turns.

The Cameron official told us that he did not believe the leak was caused by the blowout because every other fitting in the system was tight.

We also asked about the significance of the leak. The Cameron official said it was one of several possible failure modes. If the leak deprived the shear rams of sufficient power, they might not succeed in cutting through the drill pipe and sealing the well.

Second, we learned that the blowout preventer had been modified in unexpected ways. One of these modifications was potentially significant. The blowout preventer has an underwater control panel. BP spent a day trying to use this control panel to activate a variable bore ram on the blowout preventer that is designed to seal tight around any pipe in the well. When they investigated why their attempts failed to activate the bore ram, they learned that the device had been modified. A useless test ram – not the variable bore ram – had been connected to the socket that was supposed to activate the variable bore ram. An entire day’s worth of precious time had been spent engaging rams that closed the wrong way.

BP told us the modifications on the BOP were extensive. After the accident, they asked Transocean for drawings of the blowout preventer. Because of the modifications, the drawings they received didn’t match the structure on the ocean floor. BP said they wasted many hours figuring this out.

Third, we learned that the blowout preventer is not powerful enough to cut through joints in the drill pipe. We found a Transocean document that I would like to put on the screen. It says: most blind shear rams are “designed to shear effectively only on the body of the drillpipe. Procedures for the use of BSR’s must therefore ensure that there is no tool joint opposite the ram prior to shearing.”

This seemed astounding to us because the threaded joints between the sections of drillpipe make up about 10% of the length of the pipe. If the shear rams cannot cut through the joints, that would mean that this so-called failsafe device would succeed in cutting the drillpipe only 90% of the time.

We asked the Cameron official about the cutting capacity of the blowout preventer on the Deepwater Horizon. He confirmed that it is not powerful enough to cut through the joints in the drillpipe. And he told us this was another possible explanation for the failure of the blowout preventer to seal the well.

And fourth, we learned that the emergency controls on the blowout preventer may have failed. The blowout preventer has two emergency controls. One is called the emergency disconnect system or EDS. BP officials told us that that the EDS was activated on the drill rig before the rig was evacuated. But the Cameron official said they doubted the signals ever reached the blowout preventer on the seabed. Cameron officials believed

> the explosion on the rig destroyed the communications link to the blowout preventer before the emergency sequence could be completed.
>
> In other words, the emergency controls may have failed because the explosion that caused the emergency also disabled communications to the blowout preventer.
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> Still, the blowout preventer also has a "deadman switch" which is supposed to activate the blowout preventer when all else fails. But according to Cameron, there were multiple scenarios that could have caused the deadman switch not to activate. One is human oversight: the deadman switch may not have been enabled on the control panel prior to the BOP being installed on the ocean floor. One is lack of maintenance: the deadman switch won't work if the batteries are dead. The deadman switch is connected to two separate control pods on the blowout preventer. Both rely on battery power to operate. When one of the control pods was removed and inspected after the spill began, the battery was found to be dead. The battery in the other pod has not been inspected yet.
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> And one appears to be a design problem. The deadman switch activates only when three separate lines that connect the rig to the blowout preventer are all severed: the communication, power, and hydraulic lines. Cameron believes the power and communication lines were severed in the explosion, but it is possible the hydraulic lines remained intact, which would have stopped the deadman switch from activating.
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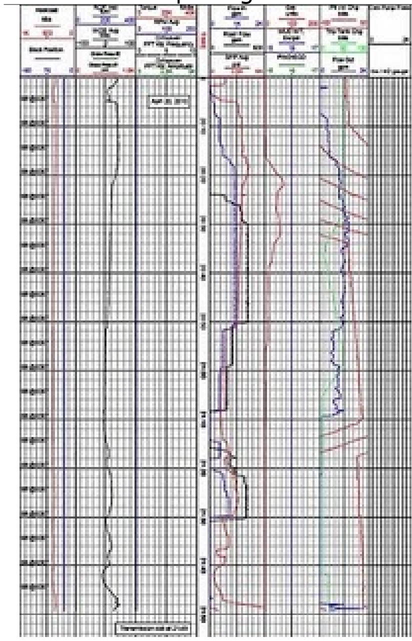
> These are not the only failure scenarios that could impair the function of the blowout preventer. The Cameron official we met with described many other potential problems that could have prevented the blowout preventer from functioning properly. Steel casing or casing hanger could have been ejected from the well and blocked the operation of the rams. The drill pipe could have been severed successfully, but then dropped from the rig, breaking the seal. Or operators on the rig could have tried to activate the shear rams by pushing the shear ram control button. This would have initiated an attempt to close the rams, but it would not have been successful. The shear rams do not have enough power to cut drill pipe unless they are activated through the emergency switch or the deadman switch.

The BP document on what we know notes that BP are focusing on

> Cementing – design and execution
> Casing - design and installation
> Casing Hanger – design and installation
> BOP-- configuration, maintenance and operation;
> Well Control Practices

Halliburton provided the well log for the last two hours of the rig operation



The Daily Drilling Report ends before the fire.

There is a procedure given for the running of the negative pressure test RIH means Run In Hole, POOH means Pull Out Of Hole,
DP is Drill Pipe, DS is Drill String (I believe).

1. Test casing per APD to 250 / 2500 psi
2. RIH to 8367'
3. Displace to seawater from there to above the wellhead
4. With seawater in the kill close annular and do a negative test -2350 psi differential
5. Open annular and continue displacement
6. Set a 300' balanced cement plug w / 5 bbls in DP
7. POOH -100-200' above top of cement and drop neft ball / circulate DS volume
8. Spot corrosion inhibitor in the open hole
9. POOH to just below the wellhead or above with the 3-1/2" stinger (if desired wash with the 3-1/2" / do not rotate / a separate run will not be made to wash as the displacement will clean up the wellhead)
10. POOH and make LIT / LDS runs
11.Test casing to 1000 psi with seawater (non MMS test / BP DWOP) - surface plug
a. Confirm bbls to pressure up on original casing test vs bbls to test surface plug (should be less due to volume differences and fluid compressibility -seawater vs sobm)
b. Plot on chart / send to Houston for confirmation

The Testimony of the President of BP America (Lamar McKay) included spill remediation activities but specifically talked about their ongoing program to seal the well, including continued efforts to activate the BOP; using a containment and riser system to collect the oil still leaking; drilling two relief wells; and looking at a “top kill” where the well will be re-entered at the top and sealed around the area of the BOP. Their analysis of the failure of the well is focused on the failure of the BOP.

Steve Newman, CEO of Transocean testified as to the different subcontractors that had responsibility for the different phases of the operation, from mud monitoring through casing insertion and cementing. He dealt with the actual failure thus:

> the one thing we know with certainty is that on the evening of April 20, there was a sudden, catastrophic failure of the cement, the casing, or both. Therein lies the root cause of this occurrence; without a disastrous failure of one of those elements, the explosion could not have occurred. It is also clear that the drill crew had very little (if any) time to react. The explosions were almost instantaneous.

What caused that catastrophic, sudden and violent failure? Was the well properly designed? Was the well properly cemented? Were there problems with the well casing? Were all appropriate tests run on the cement and casings? These are some of the critical questions that need to be answered in the coming weeks and months.

Over the past several days, some have suggested that the blowout preventers (or BOPs) used on this project were the cause of the accident. That simply makes no sense. A BOP is a large piece of equipment positioned on top of a wellhead to provide pressure control. As explained in more detail in the attachment to my testimony, BOPs are designed to quickly shut off the flow of oil or natural gas by squeezing, crushing or shearing the pipe in the event of a “kick” or “blowout” – a sudden, unexpected release of pressure from within the well that can occur during drilling.

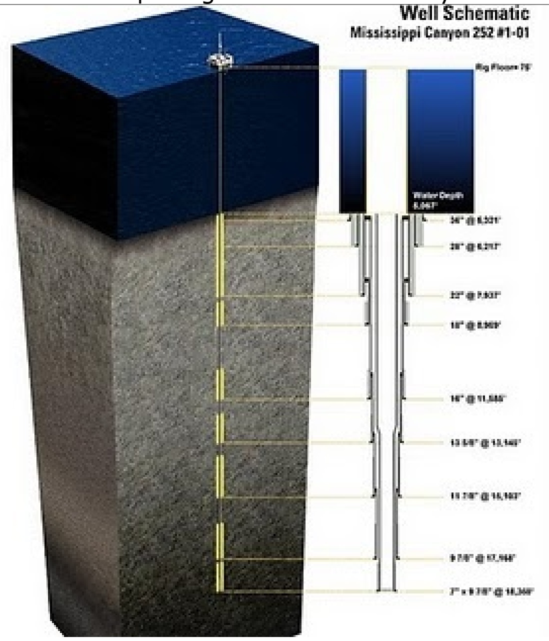
The attention now being given to the BOPs in this case is somewhat ironic because at the time of the explosion, the drilling process was complete. The well had been sealed with casing and cement, and within a few days, the BOPs would have been removed. At this point, the well barriers – the cementing and the casing – were responsible for controlling any pressure from the reservoir.

However he did note that while the BOP failure was not the root cause of the incident, the inability of the BOP to properly function needs investigation.

With the failures of both cementing and the BOP being thus headlined, it was appropriate that testimony also came from the companies involved. Thus Tim Probert, President of Global Business Lines for Halliburton, testified about the cementing. Halliburton’s jobs included:

> With respect to the Mississippi Canyon 252 well, Halliburton was contracted by the well owner to perform a variety of services on the rig. These included cementing, mud logging, directional drilling, and measurement-while-drilling services. In addition, Halliburton provided selected real-time drilling and rig data acquisition and transmission services to key personnel both on board the Deepwater Horizon and at various onshore locations.

He showed a schematic of the well showing the intervals that were cemented, and the stages of casing down the well.



It was interesting to note that he stressed that the well was not fully cemented over its full length, but

> It should be noted that cement is used at specific designated spots and is not designed to be a complete barrier through the entire wellbore.

He noted some of the factors that can influence the cement job:

> There are many external factors that impact the design and execution of a cement job. These include the variability in the hole geometry, relative location of hydrocarbon zones, hydrocarbon content and the prior condition of the wellbore and associated fluids as determined by the drilling fluid provider. Casing strings are typically run with devices to centralize the casing concentrically in the wellbore and prevent incomplete displacement of drilling fluid, or "channeling". . . . . Confirming cement integrity after placement would require the well owner to direct the wireline provider to obtain cement evaluation logs.

(It should be noted that later response to questions elicited the response that running these integrity logs was not always carried out, and was not done on the Mississippi Canyon well).

> Following the placement of 51 barrels of cement slurry, the casing seal assembly was set in the casing hanger. In accordance with accepted industry practice, as required by MMS and as directed by the well owner, a positive pressure test was then conducted to demonstrate the integrity of the production casing string. The results of the positive test were reviewed by the well owner and the decision was made to proceed with the well program.

The next step included the performance of a "negative" pressure test, which tests the integrity of the casing seal assembly and is conducted by the drilling contractor at the direction of the well owner and in accordance with MMS requirements. We understand that Halliburton was instructed to record drill pipe pressure during this test until Halliburton's cementing personnel were advised by the drilling contractor that the negative pressure test had been completed, and were placed on standby.

The final witness before the panel was Jack Moore the President and CEO of Cameron, who made the BOP. He basically said that he did not know enough facts about what went wrong at this time.

There were many questions from the Committee, but the main points that they went after were those which I reviewed as part of Congressmen Waxman and Stupak. I believe that the testimony can be viewed using access from the bottom of the Web Page.

There will be more hearings, and more information will come to light, but this can, perhaps, act as a basis on which to build an understanding as the additional information comes to light.