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# Oil Spill Hearings Begin - 'Nitrogen Cement' and 'Failure to Place Cement Plug' Testimony Likely

Posted by Gail the Actuary on May 11, 2010 - 10:33am
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Congressional hearings will begin today regarding the cause of the Deepwater Horizon blowout. Newspaper reports available this evening indicate one set of testimony may be with respect to **nitrogen cement**, which is "puffier and lighter" than regular cement.

Nitrogen-Cement Mix Is Focus of Gulf Inquiry

> Halliburton, the contractor for the cementing job on the Deepwater Horizon well that blew on April 20, used a type of nitrogen-charged cement to close off the bottom of the well, 13,000 feet below the sea bed. The nitrogen gas was blended into regular cement to make a substance that was puffier and lighter than the cement generally used in oil drilling.
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> Experts said this type of cement can form a stronger bond in certain types of rock, but is also more difficult to use than standard cement, requiring great care in mixing and application.
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> A supervisor on the rig has said he had not seen nitrogen cement used before in the deepest part of a well, and investigators are examining whether it contributed to the catastrophic explosion that killed 11 workers and caused a continuing oil leak estimated to exceed 200,000 gallons a day.

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Testimony is also expected by Halliburton, asserting that cement plugs were not placed at the right time. The Wall Street Journal reports:

Two Oil Firms Tie Rig Blast to 'Plug'

> Tim Probert, Halliburton's president of global business lines, plans to testify Tuesday that his company had finished an earlier step, cementing the casing, filling in the area between the pipe and the walls of the well; pressure tests showed the casing had been properly constructed, he will testify.
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> At this point it is common practice to pour wet cement down into the pipe. The wet cement, which is heavier than the drilling mud, sinks down through the drilling mud and then hardens into a plug thousands of feet down in the well.

The mud then is removed and displaced by seawater; the hardened cement plug holds back any underground gas.

In this case, a decision was made, shortly before the explosion, to perform the remaining tasks in reverse order, according to the expected Senate testimony of Mr. Probert, the Halliburton executive.

"We understand that the drilling contractor then proceeded to displace the riser with seawater prior to the planned placement of the final cement plug...," Mr. Probert says in the prepared testimony, which was reviewed by The Wall Street Journal. The "riser" is part of the pipe running from the sea floor up to the drilling rig at the surface.

**Edit - Another article to consider**: Gas surge shut well a couple of weeks before Gulf oil spill

"One gas kick that occurred as they got toward the bottom of the hole, approximately 10,000 feet below the sea floor, was such a large gas kick that they had to shut down operations," Bea said. "They were concerned about spark sources (on the rig at the surface) so they had to shut it down, because there was so much gas coming out of the rig and they were afraid of the explosion."

Deposits of oil are not in underground caverns; they ooze in the pores of a sponge-like layer of rock, along with natural gas in both gaseous and the crystallized hydrate forms. But the hydrates also exist throughout the drilled rock formations, and like the oil below, they exert upward pressure when a drilling operation opens a path to the surface.

In the incident that forced Deepwater Horizon to shut down drilling temporarily, workers in the rig's drilling mudroom stabilized the situation by putting a heavier form of "mud," actually a mixture of clay and chemicals, into the drill-pipe as a counter-balance, pushing down against the upward pressure of the gas, Bea said.

**'Uh oh'**

A transcript Bea collected from a witness says the companies were confident enough they had a lucrative oil source that they decided to convert from an exploratory well to a more permanent production well, a process that requires them to apply a metal and cement casing to the well hole. They chose casing 7 inches in diameter, Bea said, and that was further sealed with cement pumped in by Halliburton. Bea said his sources reported that Halliburton was using a "new" kind of cement for the seal, something the scientist said made him say, "Uh oh."

"The cement is infused with chemicals and nitrogen, and those chemicals and nitrogen form a frothy cement that is like shaving soap sprayed from a can," Bea said. "It was put in there because of the concern about damage or destruction of the seals by methane hydrates."

The crew on the Deepwater Horizon waited 20 hours for the cement job to cure before opening a key valve at the wellhead so they could place a final cement plug about 5,000 feet down the well. Bea gives Halliburton credit for writing "many excellent papers" in the past two years about the challenge of setting cement seals in the presence of large amounts of methane hydrates, which the Deepwater Horizon crew encountered in

spades.

"Because of the chemicals they've added, they think the cement can cure rapidly," Bea said.

But Halliburton's awareness of cementing's challenges did not stop the cement from failing in the Deepwater Horizon's well. The chemicals they added for the curing process also create a lot of heat, which can thaw the methane hydrate into the gas that causes dangerous kicks, Bea said.

"I call that 'Uh oh' again," he said.

There will no doubt be other finger pointing as well. Commenters are asked to add additional stories, as well as their views on the reasonableness of these assertions.