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BP's Deepwater Oil Spill - What will the Relief Well Find? - and Open Thread

Posted by Heading Out on September 8, 2010 - 10:20am
Topic: Environment/Sustainability
Tags: deepwater horizon, oil spill [list all tags]

> **Update**: Link to new BP report on results of internal investigation into the causes of the accident.

With Labor Day weekend, and the recovery of the blowout preventer from the Deepwater Horizon well in the Gulf of Mexico, the remaining parts of the operation are going to be increasingly directed at plugging the well, so that it can be abandoned. Part of this operation will be to ensure that the bottom plugs at the reservoir end of the well have adequately sealed off the bottom of the well. To do this, the relief well will be used to intersect the top of the unlined section of the original well, and determine the condition and fluid content of the annulus surrounding the production casing at that point.

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There was concern that when the relief well intersected this annulus and then injected fluid into it as part of a possible additional plugging process, that this would increase the fluid pressure in the annulus. This could have raised the fluid pressure to the point that it might have been able to flow past the top seal at the well head, that was separating the annulus fluid channel from the path through the production casing. It was along that second path that the cement travelled to plug the bottom end of the well. Now that a BOP has been installed that can handle 15,000 psi fluid pressure in the well, the concern that a leak in the seal could allow oil to flow into the Gulf is of less consequence. So the relief well can proceed.

At the same time, it is likely that work will continue to prepare the top of the well for additional plugging so that the well can then be abandoned, according to regulation.

One of the remaining issues that will be resolved when the relief well intersects the annulus is over what type of fluid is actually in that channel. In the original sequence of events, before the well failed, the well was full of mud, and then a cement plug was pumped down the center of the well, to the bottom, from where it flowed up the outside of the production casing, filling the lower section of the annulus. In the process, it pushed the mud that was already in the well, up the annulus ahead of the cement. As that cement started to set, and filled the annulus, there should have been no flow path up the annulus to the well head. Thus the fluid in the annulus should still be the original mud that was in the well ahead of that first cement injection.

In a large part of the early thinking of how the well failed, there was a preponderance of opinion that the fluid flow in the well developed up through the cement in the annulus, from the oil reservoir. This then flowed up the outside of the production casing, dislodged the hanger seal at the top of the well, and flowed on up into the BOP and on. But when the second set of cement was sent down the well, to seal it after it had stopped flowing the cement, apparently following the path that the oil had taken in leaving the well, only flowed down the production casing to the bottom of the well, and thence back up to the oil reservoir. This suggests that the early thinking which would leave the annulus full of oil and natural gas was not correct, and rather than oil, the annulus still holds mud.

We won't know which is right until the well is intersected, but once the information is available, then it will make it easier to decide what steps to take to complete the final stages of plugging the well.

At present the DD2 is preparing for these plug and abandon procedures. It is also, given past problems, testing the new BOP to ensure that it is fully functional before the process restarts. With there being sensibly no further likelihood of oil from the well escaping into the Gulf, the pressure to complete the process has diminished, and there is no urgent need for the relief well to be completed (apart that is for such matters as the amount of money that both the drilling rigs are costing BP every day).

As the Admiral instructs, it will be interesting to see when, and what, the relief well finds as it completes its mission in the next week or so.