

From: SCHU

Sent: Sunday, May 30, 2010 3:55 PM

To: Leistikow, Dan

Cc: Hunter, Tom (Sandia); OConnor, Rod; 'Heather_R._Zichal@'; Mueller, Stephanie

Subject: RE: Conf call tps and q&a

Attachments: riser cut q and a-5-29-10 SC additions.doc; final conf call tps 5-30-10 _ sc additions.doc

To all,

I have made additions and changes for future communications.

Steve

Steven Chu

Department of Energy

-----Original Message-----

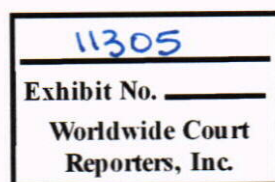
From: Leistikow, Dan

Sent: Sunday, May 30, 2010 12:02 AM

To: SCHU

Cc: Hunter, Tom (Sandia); OConnor, Rod; 'Heather_R._Zichal@'; Mueller, Stephanie

Subject: Conf call tps and q&a



- On Friday night, I returned from four days in Houston, where my team of scientists and I have been monitoring the progress of the "top kill" effort and helping to design the strategies for moving forward.
- We have been getting the data at the same time as BP engineers, and conducting our own independent analysis of the data so that we can verify the conclusions that BP is making at every step.
- More than 150 personnel from our national laboratories have been contributing to this effort. For example, we have helped with high quality 2D radiography that the industry experts have said breaks all records for deep water radiography. That imaging is crucial in helping understand what is happening inside the BOP and informing the approach moving forward.
- This is an incredibly complicated technical and engineering challenge -- we are attempting something that has never been done before at this depth.
- Top Kill Statistics if needed:
 - 3 separate attempts over 3 days.
 - Pumped total 30,000 barrels of heavy mud at rates up to 80 bpm, 1,1000 psi surface pressure, 6,000 psi wellhead.
 - Fired 16 different bridging material shots (varying sized balls, cubes and misc objects).
- – 29 vessels in the area, including 10 ROVs.
- - Top Kill #1 May 26th – Pumped 13,100 bbls, 16.4 ppg, 53 bpm
 - Top Kill #2 May 27th – Pumped 6,800 bbls, 16.4 ppg, 25 bpm with 15 shots of bridging materials
 - Top Kill #3 May 28th – Pumped 9,800 bbls, 16.4 ppg, >70 bpm, with 2 shots of bridging materials
- These efforts did not kill the well.
- It appears that we are not able to force mud into all of the flow path areas that are allowing oil and gas to come up. There is also a chance that the rupture disks between the casings were damaged in the initial explosion. If we continue trying to force mud down, we risk damaging them further.
- So it is time to move on to the next option, which is to put a cap on top of the BOP to contain the spill and pump it to the surface.

- This decision to move is based both on independent analysis from the federal government and review of BP's suggested options.
- To put a cap on the well, BP will need to cut the riser pipe above and below the kink. The cap will then be lowered into place on top of the new cut, with a riser pipe attached so that the oil can be brought up to the surface.
- The entire process will probably not be completed until the second half of this week - about four to seven days.
- This strategy has been in preparation for some time even as we were pursuing the top kill. In fact, two possible caps are already fabricated and in position on the ocean floor.
- We believe that putting this cap on the well will allow us to collect most or all of the leaking oil.
- Ultimately, the permanent solution will be the relief wells which are being drilled and will seal the well in cement from the bottom. Relief well-now at about 12000 feet. Needs to get to over 17000 feet.
- They are ahead of schedule, but is still two months away. In the meantime, we are working every day to bring this leak under control.

Timeline

- **Monday night** – I arrived in Houston and consulted with our scientific team about the "top kill" strategy and how to maximize the chance of success.
- **Tuesday thru Wednesday morning** – BP conducted a series of diagnostic tests on the valves and took pressure readings within the BOP to determine whether to move forward with the "top kill." My team and I got those results in real time and conducted our own analysis of the findings, and verified that it did make sense to go forward with the "top kill" attempt. Simultaneously, my team scrutinized options for other strategies if the top kill is not successful.
- **Wednesday mid-morning** – The U.S. government gave the final go-ahead to proceed with the "top kill"
- **Wednesday at 2 p.m CT** – The "top kill" began. They pumped heavy mud for several hours and it appeared that mud was making it down the drilling casing, but not enough to kill the well.

- **Thursday morning** -- they conducted a series of diagnostic tests and analysis of the initial attempt. Our analysis of that data showed that when the flow rate was kept constant at about 50 barrels a minute, we were getting a steady reduction in the pressure level in the BOP, which probably means they were making progress in “getting ahead” of the leak.
- **Thursday late afternoon** – BP began with an injection of “bridging materials” into the BOP to try to create more resistance, so that more mud goes down the hole instead of out the top.
- **Thursday late evening** – BP switched to injecting the bridging materials to the bottom of the BOP. Based on our analysis, it does seem that there was some success in creating impedance, but the well is obviously still flowing.
- **Friday** – The plan was to inject some more bridging materials, and then attack the well with a very high flow rate for a sustained period. Goal was to drive as much mud down the drilling casing and then back up the annulus. After 10,000 barrels injected at a rate of up to 75 bpm, the well was not killed.

Q: On Saturday, Don Suttles said that the pressure data gathered during the top kill has led them to believe that "cutting off the riser should not have a significant impact on the amount of oil coming out of the well." Do you agree with that assessment?

Our flow modeling team believes that it might be in the range of about 20 - 25 percent more. This estimate is based on pressure measurements at reservoir depth and at various positions in the BOP and modeling of resistances in the kink and riser tube. Since we do not know the exact state of the well bore and the BOP, it is important to keep in mind these are only estimates. We do know that we are not capturing the leaking oil and gas now, and we have to get something on the well that will do that.

We have a team of scientists dedicated solely to monitoring flow rate, and improved instruments methods for measuring the flow rates are being deployed. The team will continue to update and refine these measurements over time and as circumstances change.

Q: If the previous containment dome was floated off due to hydrates, how do we know that the same won't happen with a smaller, more lightweight version?

There are several elements that make the smaller version much easier to control and provide a better opportunity for success:

1. The LMRP cap (Plan B) and the LMRP top hat (Plan B') will be filled with methanol to inhibit hydrate formation.

2. Nitrogen gas will be introduced into the LMRP cap to prevent water from entering the piping.

3. In addition, we can pump hot water down from the Enterprise through an annulus to warm the oil and gas coming up.

These procedures have been shown to work with the extraction of oil and gas through the riser insertion tube. The coffer damn had noe of these capabilities.

Visibility may be compromised during some of the operations, including the cutting of the riser pipe with the diamond wire saw. The saw will be mounted onto a set of guides so that visibility is not needed to guide the saw. It is expected that the a set of guides and the flow itself will self-center the LMRP over the riser stub after the LMRP riser is cut.

Q: How long will it take to cut the pipe?

Deleted: In truth, with the additional holes that have formed in the kink, and with the additional flow from that area it is not clear to us that the kink is still a major source of impedance.

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Deleted: The smaller version is much closer to the source well meaning the oil coming out of the top of the BOP tree is hotter than the oil coming out of the current end of the riser. The higher temperatures help inhibit the formation of hydrates. ¶

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2. The interface attachment that the smaller version will have will be much more controlled than that of the coffer dam - meaning that it is easier to ensure that less water gets entrained into the smaller version (the coffer dam had an extremely poor interface control (i.e. the gooey sea floor). The smaller version will have a well controlled interface - the riser/riser flange interface.

Deleted: 3. The smaller version has inputs for methanol/hydrate inhibitor that can be injected into the top hat/cap and into the flow. The coffer damn had no such capability

Deleted: The smaller version will struggle with visibility during installation - just like the coffer damn - but overall it is much more likely to succeed.¶

We expect that the entire operation may take up to 4 to 7 additional days. But it is important to keep in mind that this plan was being prepared and refined for some time even as other options were being tried. Both the LMRP cap and the LMRP top hat have been deployed on the sea floor bottom for several days. The riser will be cut with guillotine cutter at and the diamond saw have been tested under water already.

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Q: What happens if there is a hurricane? Will the drillship Enterprise remain on site collecting the oil?

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The ship would have to leave during a hurricane. We are currently working on developing a series of options with the science team in parallel with BP engineers., but I want to study them more closely with our science team before commenting further.

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Q: What if the cap doesn't work? What's next?

In addition to the LMRP cap, a compact LMRP top hat is also in place on the sea floor bottom. A third, improved LMRP cap has been designed and is under construction. It is expected to be fabricated by the end of Monday. We are working on additional options if those don't work, but ultimately the only permanent solution will be the relief wells.

Deleted: There are two different cap designs in place already that will be tried.

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Q: What about BOP on BOP?

We aren't ruling anything out at this point, but right now the focus is on the LMRP cap. We want to steer clear of anything that would allow pressure in the well to increase.

Deleted: I am concerned about a solution that could increase pressure in the well. ¶

Q: What is the role of our science team?

- We are getting the data at the same time as BP engineers, and conducting our own independent analysis of the data to understand well flow analysis and potential risks of future steps after each kill and junk shot attempt. We then compare our interpretations and conclusions with the BP scientists and engineers at every step.
- We have stressed the need for additional pressure and flow measurements. These measurements have been very valuable in interpreting the behavior of the well and BOP after each kill and/or junk shot attempt. We have also been offering ideas on which strategies to try next as part of the "top kill" and how to increase the chances of success.
- More than 150 personnel from our national laboratories have been contributing to this effort. For example, we convinced BP to use high energy gamma rays to image parts of the internal state of the BOP. Lab personnel have independently analyzed to the 2D gamma ray images. That imaging is crucial in helping understand what is happening inside the BOP and informing the approach moving forward.

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- We have been evaluating proposed future operational plans to help anticipate and prevent potential problems with future procedures.

Q: Why didn't BP or the Government disclose that pumping had stopped for 16 hours until it resumed Thursday?

- We were clear since we began that this was going to take time, and that we wouldn't know for some time whether it had been a success or not.
- It is normal for a top kill operation that you are going to pump mud, then take a pause to see how the well responds and to make pressure measurements determine if the top kill is working and to see if the internal resistance to flow at various points in the BOP have changes, before pumping again. Sometimes you stop for a few minutes, or sometimes you stop for many hours. The plan did not change.
- The fact that we are pumping or not pumping doesn't indicate whether the operation has succeeded or failed, or whether you are still pursuing a "top kill" strategy.

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