

**From:** "McNutt, Marcia" <marcia@mbari.org>  
**Sent:** Monday, May 31, 2010 3:32 PM  
**To:** Franklin.Shaffer@NETL.DOE.GOV  
**Subject:** RE: Pending developments

Thanks. The Secretary asked me what the chances were of the top kill. I told him it was a nonsense question (although more politely than that). I said that it is not like this is a stochastic process and they are going to have multiple random realizations of this process and thus can put standard statistical probabilities on it. Either this well was going to be killed by a top kill or it wasn't. Period. A more informative answer might have been: "Top kills have worked 60-70% of the time when one has access to the well-head to shut in flow from the top. There has never been success of top kill in other situations, including in the OCS."

Marcia

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**From:** Franklin Shaffer [mailto:Franklin.Shaffer@netl.doe.gov]  
**Sent:** Mon 5/31/2010 10:50 AM  
**To:** McNutt, Marcia  
**Cc:** bill.lehr@noaa.gov  
**Subject:** RE: Pending developments

Marcia,

You asked me if BP had announced a chance of success for the top kill. They did, and it was 60-70% chance of success.

Below is a quote from BP CEO:

"BP CEO: Chance of 'top kill' success 60-70 percent

28 May 2010 19:24:45 GMT , Source: Reuters, By Tom Bergin

OVER THE GULF OF MEXICO, May 28 (Reuters) - BP Plc's chances of succeeding in its "top kill" effort to plug a blown-out oil well beneath the Gulf of Mexico remains at 60 to 70 percent, CEO Tony Hayward told Reuters on Friday...."

>>> "McNutt, Marcia" <marcia@mbari.org> 5/30/2010 1:07 PM >>>  
Should have copied to all...

I told Steve that Bill was way ahead of you, that Bill has already requested the videos through me, I passed the request on to David Rainey, and David passed the request on to the ROVs. So it is being tasked now.

The flow due to the removal of the riser has been modeled, both by the national lab engineers and by BP. They modeled it after they got the results from the gamma ray view into the riser showing a broken pipe on either side of the kink. Paul's conclusion is what basically matches the models. The flow is going to increase, but by only about 20%. The major restriction to the flow is in one or the other or both of the pipe rams in the BOP. What is interesting is that from the flow measurements (static pressure after the top kill) the differential across the BOP didn't change much and there isn't a large mound of mud on the seafloor at the end of the riser, showing that most of the mud from the top kill did go down the well, but was probably lost to the formation at about 12,000 feet through burst pressure disks in the 16" casing. The well cannot be killed from the top. But the fact that so little mud ran through the BOP means that there was little pressure erosion of the resistance in the BOP so that they don't expect much increase in flow from that effect. Caveat: 3 weeks ago I asked them what the chances were that the well shouldn't be shut in from the top because the rupture disks failed in the explosion, and they said unlikely. But that is exactly what happened.

Incidentally, did BP give a percentage probability on the success of the top kill? I heard them say it was their low risk approach to shutting in the well, but I never heard them say it was high probability. Had they gone immediately to a BOP on BOP like some of the engineers had advocated (or had the blind shears worked properly in the original incident), then the hydrocarbons would build up pressure at depth, leaking fluids out through those burst pressure disks in the 16" casing to porous formations. The outcome would have been hydrofracturing to the seafloor, like the Santa Barbara blowout in 1969, which would have been much harder to contain. The only way to kill this well safely is the bottom kill.

Probably too much information....

Marcia

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From: Alberto Aliseda [mailto:aaliseda@u.washington.edu]

Sent: Sun 5/30/2010 8:15 AM

To: pmbommer@mail.utexas.edu

Cc: Franklin Shaffer; pdy@clarkson.edu; McNutt, Marcia; savas@newton.berkeley.edu; pedro.espina@nist.gov; Steven T. Wereley; rileyj@u.washington.edu; lasher@ucsd.edu; bill.lehr@noaa.gov; vlabson@usgs.gov

Subject: Re: Pending developments

Hi All

If memory serves me right, the pressure at the bottom of the BOP was 3800 psia, while the pressure at the top was 2600 psia. So there is definitely going to be a large increase in flow, but it shouldn't be double.

The main change I expect to see is that the oil and gas are going to come out well mixed, since they don't have a mile of horizontal pipe to segregate by density. The pulsatility associated with the slug flow regime should also disappear. There will still be pulsatility but the frequencies will change (I expect much lower frequencies).

I would assume that they will cut the riser when everything is ready. If it doesn't work it will have an effect over long times.

Talk to you soon

Alberto

On May 30, 2010, at 7:27 AM, pmbommer@mail.utexas.edu wrote:

> While I agree that removing the riser no doubt increases the flow  
> area at the well, BP had some reasonable pressure readings from  
> below the BOPS and at the top. The top pressure reading was about  
> 2,500 psi. This suggests to me that the main flow restrictions are  
> down in the well due to the flow up the annulus and through the  
> partially closed BOP rams. So, there is reason to expect that the  
> flow will not be significantly increased.

>  
> Any change in flow should be recorded for science however by use of  
> the ROV.

>  
> Paul Bommer

>  
> Quoting Franklin Shaffer <Franklin.Shaffer@NETL.DOE.GOV>:

>  
>> \*\* High Priority \*\*

>>  
>> I agree strongly with Steve on both points.

>>  
>> Steve's second point really concerns me. There could be  
>> considerable flow resistance (pressure drop) over the length of  
>> riser downstream from where they will cut the riser for the LMRP.  
>> From diagrams I've seen, the riser is bent and crimped in several  
>> locations. So the pressure drop could be much higher than  
>> predicted by Fanning friction in a straight pipe. Also, I've  
>> heard that the opening at the end of the riser where the main  
>> plume is emitting was made significantly smaller than the original  
>> riser cross-sectional area. So if they cut the riser for the  
>> LMRP, both the pressure of the new leak and the cross-sectional  
>> area of the new leak could be increased significantly. This would  
>> increase the oil leak rate significantly. By "significantly," I  
>> do not mean 10% higher, I mean the leak rate could be doubled or  
>> more.

>>  
>> Someone needs to do an estimate of how much the leak might

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>> increase when the riser is cut for the LMRP. And the risk of  
>> increased leak rate if the LMRP fails needs to be included in the  
>> risk-benefit analysis of doing the LMRP. This team could do a  
>> good estimate..

>>  
>> BP engineers must be doing this calculation? But given that they  
>> predicted such a high chance of success with the top-kill makes me  
>> wonder. A simple pipe network pressure drop calculation would  
>> have predicted that the mud injected in the top-kill would flow  
>> out of the openings in the riser where oil is leaking, and that  
>> the pressure with which they could force mud down the riser would  
>> be limited by these openings in the riser.

>>  
>> I'm writing too much. Have a nice weekend...

>> Frank

>>

>>

>>>>> "Wereley, Steven T." <wereley@purdue.edu> 5/30/2010 1:58 AM >>>

>> Hi Marcia, I think you could see that there was considerable  
>> concern on the part of this group for how the press release read.  
>> I was glad to hear the fault doesn't rest with you. Could we  
>> request that the FRTG see the next press release BEFORE it's  
>> released?

>>  
>> On a completely different topic, now that the top kill has failed,  
>> BP seems to be moving ahead with the LMRP cap. When they cut off  
>> the kinked riser pipe, a considerable back pressure will be  
>> removed from the leak flow, allowing the flow speed to increase,  
>> possibly considerably. BP has stated that the increase should be  
>> small but we should have the video images taken to allow us to  
>> verify that claim. Do you have any influence in requesting such  
>> videos be taken? This is nominally within the FRTG's scope  
>> because after the riser cutting operation, I would expect that it  
>> might be a day or two before the new soft coupling is installed  
>> and we should know the flow during that period, especially since  
>> it may be greater, potentially considerably, than previously.

>>

>> Best,

>>

>> Steve Wereley, Professor of Mechanical Engineering  
>> Birck Nanotechnology Center, Room 2019, 1205 West State Street  
>> Purdue University  
>> West Lafayette, IN 47907  
>> phone: 765/494-5624, fax: 765/494-0539  
>> web page: <http://engineering.purdue.edu/~wereley>

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>> From: McNutt, Marcia [<mailto:marcia@mbari.org>]  
>> Sent: Saturday, May 29, 2010 10:04 AM  
>> To: rileyj@u.washington.edu; pmbommer@mail.utexas.edu; Franklin.Shaffer@NETL.DOE.GOV  
>> ; pedro.espina@nist.gov; aaliseda@u.washington.edu; lasher@ucsd.edu  
>> ; savas@newton.berkeley.edu; pdy@clarkson.edu; ira.leifer@bubbleology.com  
>> ; Wereley, Steven T.  
>> Cc: bill.lehr@noaa.gov; vlabson@usgs.gov  
>> Subject: Pending developments

>>

>> Dear Plume Team:

>>

>> First, wanted to say that it is terrific that the team is moving  
>> forward with providing an upper bound with the new data. I cannot  
>> tell you what a nightmare the past two days have been dealing with  
>> the communications people at the White House, DOI, and the NIC who  
>> seem incapable of understanding the concept of a lower bound. The  
>> press release that went out on our results was misleading and was  
>> not reviewed by a scientist for accuracy. It was based on a brief  
>> report that Bill, Vic, and I had prepared, and the communications

>> people "thought" that it reflected our results, but it didn't  
>> because they don't understand what a lower bound is. Bottom line:  
>> if you are at a university, do convince some of your best and  
>> brightest to go into science communication. Please. Let me give  
>> you a flavor of some of the "suggestions" I was getting from the  
>> NIC and from the communications people at the White House and DOI  
>> as recently as yesterday afternoon as to how to "simplify" our  
>> bottom line:  
>>  
>> From a NIC Admiral: How about just saying that the range of flow  
>> rates is 12,000 to 25,000 barrels per day?  
>> (No, because the 25,000 is a LOWER bound, not an UPPER bound...)  
>>  
>> From a White House communications person: How about saying that  
>> several lines of evidence suggest that the flow is 12,000 to  
>> 19,000 barrels per day but that the rate could be as high as  
>> 25,000 barrels per day?  
>> (No, because the 25,000 is a LOWER bound, not an UPPER bound...)  
>>  
>> The message I delivered, with 100 representatives from the media  
>> present, was that 3 lines of evidence raised the minimum rate of  
>> release to 12,000 barrels per day. Two lines of evidence raised  
>> the limit to as high as 19,000 barrels per day. One method  
>> determined the rate to be 25,000 barrels per day OR HIGHER. We  
>> were still working to improve these estimates and get the upper  
>> bound from the flow rate team. This was the least amount of  
>> interpretation I could possibly put on the results.  
>>  
>> Very few representatives from the media really took the time to  
>> understand this. CNN was the best. I want to thank those of you  
>> who also took the time to educate the media on the complexity of  
>> this situation, and especially to those who did so in a fair and  
>> balanced way without trying to cast doubt on the scientific  
>> integrity of other groups. We are all after the truth here.  
>>  
>> In other news, I worked with a wonderfully resourceful Lieutenant  
>> here from the Coast Guard, Joe Kusak, and together we have managed  
>> to mobilize the Woods Hole experiment to directly image the plume  
>> with 1.8MHz imaging sonar and 1200 kHz ADCP. They are at the  
>> airport now awaiting a lift on a Coast Guard chopper to the  
>> Neptune Skandi where they will be integrated into an ROV to image  
>> the plume. We are also trying to get Ti sampling bottles on the  
>> ROV. This requires getting the UNOLS safety standards, which the  
>> bottles meet, crosswalked to ABS standards, which the workboat  
>> ROVs require. As I was chair of UNOLS when the safety standards  
>> were written, I recall that there were words in there that the  
>> UNOLS standards exceed the ABS standards. Just in case, I have  
>> Steve Etchemendy from MBARI standing by to intercede. He was an  
>> Alvin pilot, so knows the origin of the safety requirements for  
>> the Ti bottles, but also worked for Oceaneering, the workboat  
>> operators who need to sign off on the gas sampling.  
>>  
>> My view is that the flux from the plume will be captured in a few  
>> days' time with an LMRP cap. It will be good to have the WHOI  
>> equipment calibrated to that flux so that if there ever is another  
>> blowout in the OCS, we will have calibrated methods for measuring  
>> the release from day 1.  
>>  
>> Sorry this email got so long. Have to send from my MBARI account  
>> as my USGS computer is in service so I am on a loaner and only  
>> have bb access to my USGS mail. But thanks again for your service  
>> to the FRTG and I look forward to more results.  
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>> Marcia  
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