Notes from Flow Meeting 7-30-10

Flow visualization (Plume): Steve Wereley led the presentation

Several PIV measurements with different teams; all got same velocities.

Noted that determining internal velocity of the jet is challenging. Used literature sources to relate internal to external. They used a factor of 1.5 – 3.15.

There was discussion about the influence of geometry and pipes within the well, and how that might have affected the estimate. Steve felt this was less problematic than the uncertainty of exterior vs interior flow.

Art noted that they have a period when there was video of good circular flow; not sure how much video.

Reservoir: Don Maclay led the presentation

He noted that the contractors did more than just provide pressure rates; they carried them through a nodal analysis. Also mentioned the short time that was available for them to conduct the analyses. They did not have the most up-to-date wellbore configuration, so could not generate [outflow?] curves.

Don also mentioned the proprietary data considerations.

He also mentioned that BOEM was told to provide minimal interpretation and input into the contractors' work. They also did not alter or remove any of the contractors' scenarios.

Bill Lehr mentioned the Bommer analysis; they found that the "noise" in the nodal analysis swamped the output.

[Focus on table in slide 33]

Nodal Team: George Guthrie led the presentation

There were questions about the failure and flow scenarios, including whether anyone looked at failure at bottom of well. One of the Gemini scenarios may have covered this.

Described the influence of oil/gas ratio; it was an important parameter in the model.

There was a question of whether the ranges included consideration of the BOP constriction effects. It may be as high as 2000 PSI. George answered that it was taken into account in some models as a DeltaP, but to various degrees by different teams. Overall, some of the ranges of BOP effects examined included a 2000 PSI effect. However, they did not always model flow through annulus and central casing; only through drill pipe. If these flows occurred, could offset the BOP effect [I think I got this right].

There was a question about why the NL results varied so much from the Gemini results, given a comparison of their scenarios. I could not hear the answer clearly. George followed up by saying you can't compare directly, because of differing assumptions re reservoir permeability and other factors.

WHOI acoustics: Andy Bowen overviewed, then Rich Camilli gave details

On April 28th or 29th, BP (?) contacted WHOI for input on the internal configuration of the BOP. They brainstormed various things for several days. After this was done, WHOI proposed to adapt deep ocean hydrothermal vent techniques to the current spill, to understand the fluid fluxes. BP declined to pursue this approach, but several weeks later USCG contacted WHOI to do the work.

Reservoir: Paul Hsieh presented

See notes on hardcopy

Well Shut in flow predictions: Art presented

See notes on hardcopy

Rich Camilli noted that the ethane may be near a phase-transition.

Art feels there is still a lot of work to be done to firm things up. They are working on literature reviews now.

Wrap up: Tom Hunter lead

Secretary Chu's comments

Plume Team should consider:

- unknown how much flow was coming up each pipe and how it might have fractionated the flow.

- we were collecting 27k, and there was still a lot of oil coming from Top Hat (so we can eliminate lower value of 25k)

- there were times we were collecting 27k, and you could see a difference. How much of a difference.

Nodal team should consider:

- we know more now about the reservoir

- we have not seen any evidence of a leak in the well, so any damage would have to be very deep.

- we have pressure difference measurements

Well Shut-in Pressure team:

- is there any reason to think that the first modeling approach may be wrong? [implying this seems like a good approach]

- he thinks the other methods have more "wild cards" to deal with [and complicate the estimate]

Marcia noted that we need to give a new flow estimate but we can clearly state the scientific uncertainties are .

Tom Hunter: We have seven different calculations. They are only two outliers; PIV team (low) and Nodal scenario 2. Everything else is in the mid-50s.

Chu: Most likely is that flow is coming up both the pipe and annulus. A combination of Scenario 1 and 2. He wants them to go back and put in the things that we now know.

Tom: What can the Plume team do to assure themselves of their estimates?

Bill Lehr: So what is the value of doing a new estimate. It is not for response. If it is for liability, we need to go through all of this very carefully. // Marcia: it is for the oil budget. // Bill: then our model is already oversimplified because of other factors. Given these precisions, he thinks a good flow rate number is 50k.

Steve: We need the new estimate for the oil budget, but that does not require high precision. Regarding damages, we only need 10-20% uncertainty as well. He will be happy if we can get to 10% uncertainty/precision; getting below that is overkill. When do we need this? Under no circumstances can we delay for a week just to get finer precision.

Tom: If we can get a reasonable agreement on where we are now (at day ___), the assembled teams can then go back over time and reconstruct past flows. Chu: Agrees, especially once we know the depletion function/rate. Tom: Three teams could calculate the depletion: reservoir, nodal, and Hsieh. Need to figure out the effects of well depletion on flow.

Tom: Do the PIV people think that a low 50s value is unreasonable. Steve (?): if they could see the video after the capping stack… Marcia: that won't happen in the time frame we need, and the video was not commissioned to do this. Chu: would even unofficial, low-grade video work, given the flow is so much better constrained. Rich: And if you adjust the oil/gas ratio, it probably puts it in the right range.

Chu: he is comfortable with waiting a few days while the teams work on this.

Marcia; She already sent a request to David Rainy for the video.

Tom: Nodal group – can they agree to a current rate of a number in the low 50s, while they sharpen up their calculations? George: He is comfortable with that, but wants to talk with Tom about clarifying the follow up questions.

Tom: Wants each team to give input on depletion over time.

Tom: So would we reconvene on Tuesday or Wednesday to focus on these questions? Chu: His Chief of Staff just came in, and said the Cabinet would like to see the oil budget released this weekend, and wants to get to a new number tomorrow so it can be in the papers tomorrow. There are wild rumors flying around about "unaccounted for" oil; the better we can bound this, the better.

Marcia: Basically, if that is our goal, we can do that tomorrow. Bill: If you go with 50k +/- 5%, you have done it. Chu: By noon tomorrow, can we do this rechecking? Bill: PIV can't do anything new by tomorrow, because the video is not in hand.

Bill: We would have to say that this is based on the end of the spill. Chu: We can get to flow over time in time, by backtracking from a current estimate. Bill: There are many complications of riser geometry over time. Chu: The riser is minimum impact, but there is a difference due to depletion.

Chu: Nodal team should compare notes with the other DOE teams.

Steve at __ National Lab: They can calculate a mean and CI based on the independent values.

Questions to answer:

What is depletion vs time? (see Paul H slide 74)

What is effect of depletion on flow? Flow vs date

What is effect of cutting riser?

What is effect of putting on capping stack?

Call on static kill and cementing tomorrow 11:00 – 1:00 (Eastern). Hold our follow up call at 1:00 – 2:00 Eastern (12:00 – 1:00 Central). Use [redacted].

- NEED TO CONTACT SKY BRISTOL RE THE OIL BUDGET TOOL. Can the flow rate be changed every day?

Tom: They will be providing an amount of oil flowing into the sea by day. Can that be used in the oil budget tool? Bill: He believes so.

Tom: Everyone should give their best view of Day 87 flow, and how that has changed over time.

Don: They don't have access to any of the software that was used to generate their contractors' results.

Rod (Chief of Staff): Something will go out tomorrow (probably around 60k), even if we don't come up with something. ____: Why is the WH pushing this? Rod: Not sure it is the WH. There is a public discussion about where the oil is, and the government should provide information or someone else will fill in the blanks. Chu: Does it have to come out in the Sunday paper? Rod: Suggests we see where we are tomorrow.

Tom: Let's use a range 53-63k. Bill: That would work. Tom: Why not just go with 60k? Chu: Lets meet tomorrow at 1:00 Eastern, and decide where we are. Marcia: Good idea. We can also say that it has changed over time from a number near 60 to a number near 50 [due to depletion].

Art: Who do you want in on this call? Chu and Tom: Go with the full group.