

From: Fred Ng
Sent: Saturday, May 29, 2010 10:56 PM
To: Pat Campbell
Cc: David Barnett; David W Moody; Dicky J. Robichaux; Michael W. Allen; Freddy L. Gebhardt; Christopher J. Murphy; Kerry L. Girlinghouse; Michael Drieu; Mike Cargol; William Burch
Subject: Burst disc calculatiuons

Summary

It would be best to re-consider any forward plan decision that is based on the premise that the burst discs have been compromised during the top kill operation. Based on the maximum pressure recorded at the BOP during the past three days of top kill operation, the analysis below indicates that the maximum burst loads experienced by the upper and lower burst discs in the 16" casing would have been substantially less than the 10000 psi rating of the discs.

Assumptions

Maximum BOP pressure (MBOPP) during all top kill was 6100 psi (at 1000 bbl pumped in Kill #1 with 60 bpm)
Reservoir pressure is 12.6 ppg EMW at 18083', or 11848 psi.
Reservoir pressure is balanced by max BOP pressure plus a column of kill mud on top (Lm) and a column of oil at the bottom (Lo).
This is assuming that a significant column of mud actually entered the wellbore, which is a conservative assumption.
Burst load assumes that top kill pressure acts on the 9-7/8"x16" annulus.
Kill mud is 16.4 ppg., or 0.85 psi/ft gradient.
Produced oil is 6.0 ppg., or 0.312 psi/ft gradient. This is also a conservative assumption, as the 3000 GOR oil from the M56 sand should be a lighter oil.
Water depth is 5067'.
Sea water density is 8.6 ppg, or 0.447 psi/ft gradient.
Sea water hydrostatic at mud line is 2266 psi.
Burst discs BD1 and BD2 are located at 6047'/980' MD/BML and 8304'/3237' MD/BML, respectively.
Burst discs are rated for 10000 psi.
Back up gradient for 16" casing below mud line is 8.9 ppg.
Back up pressure (BUP) at the discs are;
BD1 2266 psi + 980' x 0.447 psi/ft = 2704 psi (BUPD1)
BD2 2266 psi + 3237' x 0.447 psi/ft = 3713 psi (BUPD2)
All depths are MD = TVD

Analysis

The above is described by the following simultaneous equations:
 $11848 \text{ psi} - 0.312 \text{ psi/ft} \times L_o - 0.85 \text{ psi/ft} \times L_m = 6100 \text{ psi}$
 $L_o + L_m = 18083' - 5067' = 13016'$
Solving the above equation gives $L_m = 3135'$, $L_o = 9881'$

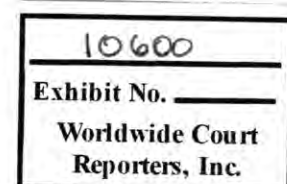
BD1:

Internal pressure IPBD1 = 6100 psi (MBOPP) + 980' x 0.85 psi/ft (mud column) = 6933 psi
Burst load = IPBD1 - BUPD1 = 6933 psi - 2704 psi = 4229 psi.

BD2:

Internal pressure IPBD2 = 6100 psi (MBOPP) + 3135' x 0.85 psi/ft (mud column) + (3237' - 3135') x 0.312 psi/ft (oil column to BD2) = 8796 psi
Burst load = IPBD2 - BUPD2 = 8796 psi - 3713 psi = 5083 psi.

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From: William Burch

Sent: Saturday, May 29, 2010 7:42 PM

To: Fred Ng

Cc: Pat Campbell; David Barnett; David W Moody; Dicky J. Robichaux; Michael W. Allen; Freddy L. Gebhardt; Christopher J. Murphy; Kerry L. Girlinghouse; Michael Drieu; Mike Cargol

Subject: Re: CBS news

Fred,

Mike Cargol heard from his containment group that the latest is that the burst disks are gone. According to his sources, the only option forward is containment until the relief well gets done. Capping is out of the question. Capping with Flowback might still be viable but is very unclear.

I've talked with Kurt Mix to confirm the story. He was in communication with Jon Sprauge earlier and is chasing down with Phil Pattillo. If I'm gathering my information correctly, the analysis was made from the data from pumping yesterday with Dr. Steve Wilson and Phil early this afternoon (I just so happened to stumble in to their conversation while I was talking with Thomas.) Kurt agrees with me that this data could be very misleading and limiting options on uncertain data is not prudent. He will let me know after he talks with Phil. But Jon has confirmed that all efforts are to be focused only on the relief well by Kurt's team - this has been directed by Pat O'Bryan.

Chris is also chasing down Harry for the real story. He is also working with Wayne Sutton to help draft up a third possible option between containment and capping which Wayne brought to us - its got merit and certainly a good play-it-forward for WWCI with Wayne in the future.

Ultimately, it also proves how far out of the loop we are being kept.

I can't wait to see what tomorrow brings.

Sent from my iPhone

On May 29, 2010, at 5:44 PM, "Fred Ng" <fng@wildwell.com> wrote:

CBS news at 17:30 CDT Doug Suttles with BP announced that top kill did not work, and preparations are underway for capping stack option.