

From: Buisine, Jean Paul (Houston)
Sent: Wednesday, May 05, 2010 11:09 PM
To: Tranter, Paul (Geneva)
Cc: Redd, Eddy (Houston)
Subject: RE: Horizon BOP

Paul,
This was compiled with the input from Jeff Jones / Jeff Boughton / Mark Hay / Rob Turlac / Billy Stringfellow / Steve Hand and review of the event log & IADC drilling reports.
We did another review to proof read and OK.

FYI Eddy has not reviewed it yet, so you may want to get his OK too.
Best regards,
J-Paul

Status of BOP prior to the incident:

We know there was a leak on the upper annular surge bottle that had been discussed and reviewed on board.

Indeed. The surge bottle hose had been replaced during the last in-between well maintenance as part of a hose replacement program (40-50 hoses replaced at this time). The leak on this hose (twist in the hose that backed the fitting out) was identified about a week after the BOP had been run at the occasion of the function test. Leak would only occur when the UABOP was operated to close but did not adversely affect its operation. This was indeed discussed and BP was notified.

Any problems during the last BOP test? When was it?

The last BOP pressure test was on the 9th and 10th April. According to the IADC drilling report, no issue arose during the test. According to the IADC daily drilling report the test was done as per the book, using 5-1/2" DP and 6-5/8" DP, using both PODs and from both the Driller Control panel and the Toolpusher control panel.

~~XXX~~ Shear rams test to be confirmed

Also FYI the BOP was tested on the Stump (surface) to full working pressure on February 3rd, a few days prior to be deployed.

Last MMS visit, anything noted (I think we have this already and the answer is no)

~~XXX~~ To be confirmed - Trying to locate report.

Any other issues at all with the BOP prior to the incident?

There was another anomaly with the lower annular BOP: Flow meter would indicate a slow tick on the close position. This was investigated but could not pin point the leak. BP was also notified.

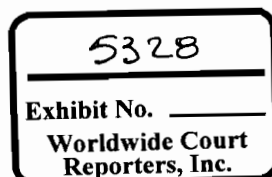
There was another anomaly with Test Rams: Flow meter would indicate a slow tick on the Yellow POD when the Blue POD was selected. This would stop when the function was switch to Block.

Post Incident but before Capsize

We pulled BOP over to how many degrees

BOP at 4 degrees. This was visually verified at the Bull's eye at the WH

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We saw shock when we activated auto shear

Indeed. When the plunger valve poppet was cut, it extended firmly and BOP shook. This did not result in a change in flow from the well.

Any other 'trauma' we induced to BOP?

During this time interval, the following "intervention" was conducted:

- Cut power cables and Hydraulic supply tubing (Deadman)
- Cut plunger valve poppet (Autoshear)

What did we do with the BOP to try and close it?

In addition to the Deadman and Autoshear, the ROV stab were utilized

- Middle Pipe Rams (that later turned out to be the Test rams) though unable to operate (not enough flow from ROV pump)
- BSR, though unable to operate (not enough flow from ROV pump).

What problems did we find, can you confirm what leaks were identified

Main issue then was ROV pumping capability (Flow rate), being unable to shift or fully transition Shuttle valves, hence unable to operate the BOP function.

Post Incident but after Capsize

BOP now back to how many degrees?

There are a number of reports about BOP angle as the Rig was sinking and as the riser was pulling even more by the rig, though unconfirmed.

What we know for sure is that the BOP angle was 0.25 degrees when the ROV were back on site, and this has not changed since.

Any other shocks to BOP?

No. There has not been any action that made the BOP shake or tremble.

What did we do with the BOP to try and close it?

I will summarize this to the functions that were operated. This is not in sequence and does not highlight how many times this was attempted, as this will need a little more work. This also detail the additional "trauma" we inflicted to the BOP control system:

- Upper Annular - CLOSE - Cut hose (Yellow side - Close) and install ROV HIT (Hose Intervention Tool) - No effect on well flow
- Lower Annular - CLOSE - Cut hose (Yellow side - Close) and install ROV HIT - No effect on well flow
- Blind Shear Rams - CLOSE - use existing ROV hot stab - No effect on well flow
- Super Shear Rams - CLOSE - Cut hose (from HP circuit) and install ROV HIT, also disconnect hose (from Blue side - Close) and screw in ROV port - In one occasion the well flow reduced but came back up.
- Upper VBR - No attempt made and system intact.
- Middle VBR - CLOSE - Cut hose (Blue side - Close) and install ROV HIT / Cut hose (Yellow side - Open) - No effect on well flow
- Lower Test Rams - CLOSE - use existing ROV hot stab (while we were thinking we were

attempting to close Middle VBR!) - No effect on well flow
This is as of today.

What problems did we find, can you confirm what leaks were identified

- Again ROV pumping capability limitation, being unable to shift or fully transition Shuttle valves, hence unable to operate the BOP function, though this got resolved after we lowered Subsea accumulator and use a flying lead from it.
- 2 leaks on the ST locks circuit. One of the leaks was addressed by tightening a loose fitting; the other leak is still present.
- ST lock ROV hot stab: ST Lock Hot Stab had been removed and the ST lock function plumbed directly into the ROV Hot Stab Pipe and Shear Ram Functions via a shuttle valve. This took time to figure out.
- ROV hot stab labeled "Pipe Rams" was plumbed to the lower pipe rams, that were later converted to Test rams. The panel is still showing "Pipe Rams". The Response team was under the impression that this was the middle VBR and it took time to figure this out.

Any other issues you think relevant about this BOP

I believe the above covers it.

FYI current plan is to remove the Yellow POD and re-run with MUX cable and Hydraulic supply operable from a support boat.

From: Tranter, Paul (Geneva)
Sent: Wednesday, May 05, 2010 10:30 AM
To: Buisine, Jean Paul (Houston)
Cc: Redd, Eddy (Houston)
Subject: Horizon BOP

JP, need to pull together the recent facts concerning the Horizon BOP.

Looking for a relatively high level narrative (it's for Steven) talking about:

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Any other 'trauma' we induced to BOP?

What did we do with the BOP to try and close it?

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Paul