

From: Fred Ng
Sent: Tue Oct 16 20:36:15 2007
To: Coltrin, George; Sims, David C; Guide, John; Guillot, Craig J; Shaughnessy, John M.; Butler, Carl H; Keeton, John; Steve Wascom; Knudsen, Torben; Pat Campbell
Subject: Mitigations and contingencies - Continuation of Risk Assessment on use of Annular in place of VBR in subsea stack - DW Horizon
Importance: Normal
Attachments: DW BOP RA results table grouped.doc

<<DW BOP RA results table grouped.doc>>

Folks,

Thank you for participating in the recent work session, where we identified significant risk events on this subject, and decided on the following forward plan to complete this Risk Assessment process:

- Summarize and group risk events – WWCI, done.
- Develop mitigations and contingencies (M&C) – Participants, by e-mail.
- Re-rank risk events with M&C in place – Participants, by e-mail.

The risk table in the attached Word document contains the summarized risk events. Please enter your recommendations for mitigations and contingencies in the table, and re-rank each risk event based on the M&C's that you have provided. If each of the participants do this for as many of the listed risk events as they can, the combined results should be quite comprehensive.

For a common reference, mitigation is defined as measures that can reduce the probability and/or severity of the outcome of a risk event. Contingency is back up plan if the risk event does occur.

Please e-mail your input to me by October 23, preferably with a copy to each of the participants in the above CC list.

I should be able to combine these, and provide a report on same by the end of the month. I am hopeful that the various inputs can be grouped and reconciled without too much problem. Otherwise, we may want to meet briefly again to resolve any major difference.

Thanks and best regards,

Fred Ng

Wild Well Control, Inc.

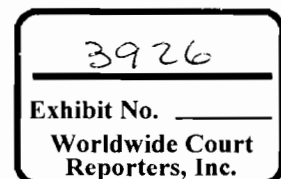
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Deep Water BOP Risk Assessment – Workshop

October 1, 2007

Background

The Transocean Deep Water Horizon, a late generation drilling vessel, is equipped with a five-ram dual annular BOP stack, out of which only two sets of rams are currently installed with pipe rams (VBR) that can close on the drill string. (See attached Figure 1). There had been occasions where one of the VBR's failed its pressure test, which is a condition that does not meet current MMS minimum requirement for two sets of pipe rams that are sized for the drill string. In deep water operations, it can take up to a week of rig time to trip and repair the rams, at a cost of over \$500,000. Two categories of options are being considered to solve this problem and mitigate the costs involved:

- Equipment modification – This includes upgrading the test VBR's to bi-directional rams that can hold pressure in both directions, thus in effect adding one set of back up pipe rams. Another option is to add another ram cavity to the BOP, making it a six ram stack. Both of these are long term solutions, and are over a year away if they are implemented.
- Criteria modification – One option is to continue well operations as long as the top annular preventer and one set of VBR is tested to required pressure (e.g. 9900 psi in the current well). This provides two BOP's for shutting in against the drill string, and is a solution that can be implemented immediately either on a long term basis or as an interim solution, if and while the above equipment changes are being design and manufactured.

Objective

The main objective of this project is to conduct a Risk Assessment (RA) of the option for criteria modification described above. The results will be taken into consideration in making a decision to adopt this or other options.

Participants

Cortez Bank Drilling Team, BOP manufacturer. Wild Well Control will facilitate as well as participate.

Operations category

- Normal well operations – Drilling, tripping, logging, BOP tests, running and testing casing, well testing, completion, squeezing, P&A.
- Conventional well control operations – Shut in, weight up, circulate kick out.
- Non conventional well control operations – Lube and bleed, bull heading, stripping, hang off.
- Contingency operations – Planned disconnect, hang off, emergency disconnect,

accidental drive off.

Risk categories

- Well control – Unplanned events or complications.
- Pressure – Unexpected presence, or higher than planned.
- Circulation options – Restrictions or limited options in circulation paths.
- BOP and elements – Exposing equipment and elements to undesirable conditions: pressure and direction, temperature, load duration (spike or extended periods).

Agenda for the Risk assessment Workshop

Participant self introduction

Background and objective

Brief overview of Risk Assessment Process (Facilitator)

Assign discussion Team Leaders

Risk Assessment Process

- Risk Identification – Guided brainstorming session focused on identifying potential risks, use “yellow sticky” session. Use attached Risk Tables as wall charts. (Group)
- Risk Grouping – Group risks into the appropriate categories, seek clarification if needed. (Team leaders)
- Risk Ranking – Rank risks based on probability of occurrence and severity of incident. Use wall chart sized print of attached ranking matrix. (Group)
- Mitigations and contingencies – Develop mitigations to lower probability or severity of risks, and develop contingency provisions for same. “Yellow sticky” session can also be used for this part of the process. Team should also assign ownership of risk events for follow up. (Team)
- Re-rank – Team Leaders present mitigations and contingencies to Group, conduct re-ranking of risks. (Group)

Workshop Wrap-up – Closing review and comments

Participants

Name	Company
Carl Butler	BP
George Coltrin	BP
John Guide	BP
Craig Guillot	BP
Torben Knudsen	BP
John Shaughnessy	BP
David Sims	BP
Steve Wascom	Transocean
John Keeton	Transocean
Pat Campbell	Wild Well Control
Fred Ng	Wild Well Control

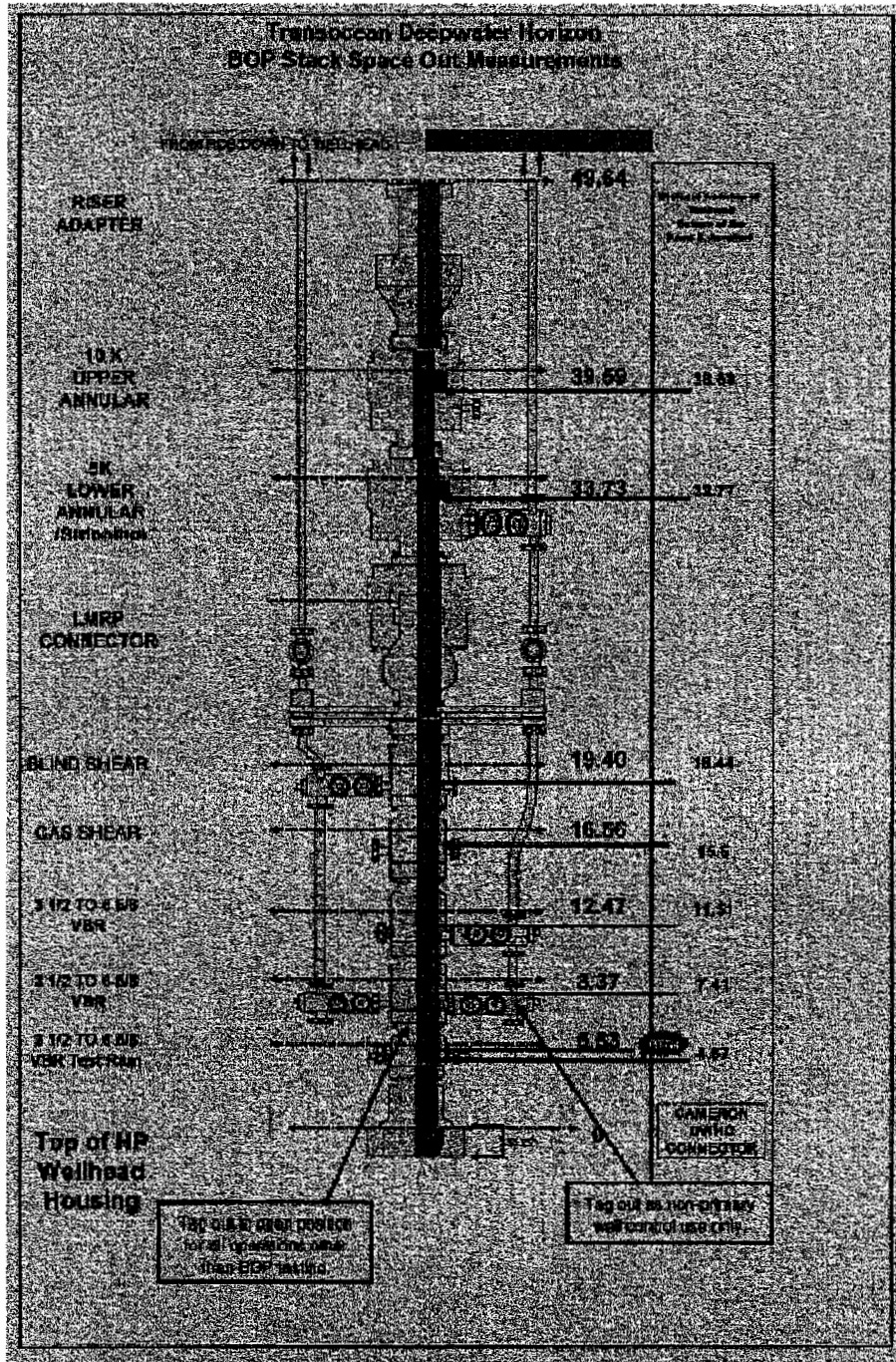


Figure 1 – Transocean Deep Water Horizon BOP stack

Deep Water BOP Risk Assessment – Risk Ranking Matrix

High – Develop mitigations and contingency plans, re-evaluate ranking.
Medium – Develop mitigations and contingency plans
Low – Caution advised.

General terms	Personnel safety	Rig days or cost	Well control occurrence	Undesirable discharge	Very Unlikely ¹	Unlikely ²	Likely ³	Very Likely ⁴
A Avoid at all costs	Severe injury or fatality	> \$5000k or 5 days	Loss of control	Over 100 bbl or reportable	M	H	H	H
B Definitely no	LTA	< \$5000k or 5 days	Uncontrollable by back up device	Reportable	M	M	H	H
C Not desirable	Non LTA	< \$2000k or 3 days	Controllable by back up device	Non -reportable	L	M	M	H
D Part of the business	Less safe than ideal	< \$500k or 1 day	Controllable by normal device	No clean up (e.g. brine)	L	L	M	M

Deep Water BOP Risk Assessment – Risk Table Summary

Risk event	Rank	Mitigation	Contingency	Re-rank
Operational risks				
Wearing out 10k annular and single VBR in LP tests (e.g. LOT)	M-1B			
Annular fails test due to repeated use for HP tests	M-2B			
Have to pull stack if 10k annular fails test.	M-2B			
Well control risks				
Failure of single VBR and 10k annular results in loss of control.	M-1A			
Unable to work pipe because shut-in on annular and have fewer shut-in points	H-2A			
Annular 10k fails during well control operation.	M-2C			
Other risks				
Inconsistent MMS rulings between districts.	M-4D			