From: Paine, Kate (QuaDril Energy LT)
Sent: Fri Mar 19 05:06:10 2010
To: Brannen, John (QO Inc.)
Subject: FW: Lesson learned - Plan forward: Macondo
Importance: Normal

From: Paine, Kate (QuaDril Energy LT)

Sent: Thursday, March 18, 2010 8:45 PM

To: Bodek, Robert

Cc: Bennett, Gord (QO Inc.)

Subject: RE: Lesson learned - Plan forward: Macondo

What is the normalized gas equation? I'm unable to perform that service until I know how you do it.
The high gas we had at 12035 - once it was controlled the decision was made to drill ahead. Everyone was aware of the gas but we decided to drill ahead to stay as close to the prog-casing points as possible. The "prize" was to skip the contingency liner.
After deciding to drill ahead, we encountered the losses. We were aware of the upper limit of the ECD and exceeded it because we didn't believe the MWD LOT values. I'm not sure it was a lack of communication or awareness as much as a "we can get away with this" attitude - after all, the surface LOT provided an additional 0.5 ppg of window. The ECD had already exceeded the closure and propagation values having been exceeded for a long time before we encountered the losses. Given that the MWD LOT value wasn't trusted because it was lower than the surface value, I don't think this is going to be a learned lesson. (Example - our current FIT is 12.55/12.67 but we're justifying raising the MW to 12.3 and drilling with a 12.6 ECD because the shoe saw higher pressures during the kick)
I'm uncomfortable with the declaration of the connection gasses being the 150 over 50 background. In retrospect I'll grant there are 2 connection gasses at 12933 and 13070. But I'd call them 140u max over 125u background and 150 max over 135 background. They weren't apparent on the log while we were drilling but are in 20/20 hindsight. The resistivity and sonic were showing an increasing trend - but they were calibrated to the seismic-predrill based on the previous section's high gas. There weren't drilling parameters and the resistivity/sonic weren't deviating from the most likely trend. Additionally, at the rate we were drilling, we had 1 to 2 connections in the hole, so connection gas is not readily apparent.
Prior to the kick, it was an active decision on the part of the drilling team to drill with a high ROP and let the cuttings take up the mudweight rather than drill at a moderate rate and raise the MW. We then planned to raise the MW at casing point to replace the cuttings load.
At the onset of the well, we were discussing that there would be gas present in the well and we weren't to be spooked into thinking we were underbalanced by its existence. As such, I've looked for second indicators to verify my pp estimation.
I'm sorry to push back on the lessons learned. I know you've got to get something out there to make it look like we wont do this again. But without obvious indicators and with the real push to make hole and skip the contingency liner, I don't see us really learning. The best bet is to hedge the "most likely" to have some centroid built in to the plan initially.
Kate

From: Bodek, Robert

Sent: Thursday, March 18, 2010 11:12 AM

To: Bellow, Jonathan M; Lacy, Stuart C (QO Inc.); 'Gord Bennett'; 'John Brannen'; Brannen, John (QO Inc.); Paine, Kate (QuaDril Energy LT); 'katepaine@aol.com'; Deepwater Horizon, Sperry Sun; Deepwater Horizon, MWD Directional; Guide, John; Hafle, Mark E; Morel, Brian P; Bondurant, Charles H

4516
Exhibit No. _____
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Cc: Johnston, Paul J (Houston); Vinson, Graham (Pinky); Albertin, Martin L.; Wagner, Bruce E

Subject: Lesson learned - Plan forward: Macondo

Importance: High

Macondo Team,

I've collated the responses to Jon's original email below. Additionally, we on the TIGER team have had several discussions over the past few days regarding lessons learnt from previous hole-section, and a way forward, for not only the remainder of Macondo, but future exploration wells. Please browse the attached lessons learnt/plan forward document and provide feedback should you feel obliged.

<< File: Lessons learned_plan forward Macondo SS NPT.doc >>

Thank you,

Bobby Bodek

BP America Inc.

Geological Operations Coordinator

Gulf of Mexico Exploration - Tiger Team

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From: Bellow, Jonathan M

Sent: Friday, March 12, 2010 7:14 AM

To: Lacy, Stuart C (QO Inc.); Gord Bennett; John Brannen; Brannen, John (QO Inc.); Paine, Kate (QuaDril Energy LT); katepaine@aol.com; Deepwater Horizon, Sperry Sun; Deepwater Horizon, MWD Directional; Guide, John; Hafle, Mark E; Morel, Brian P; Bondurant, Charles H

Cc: Bodek, Robert; Johnston, Paul J (Houston); Vinson, Graham (Pinky); Sims, David C; Albertin, Martin L.; Wagner, Bruce E

Subject: Some Thoughts and Help Requested, PP detection, Macando

All: As we have some time while we recover from the Macando stuck pipe and kick event, I want to spend some time re-evaluating how we manage real time pore pressure detection for Macando type wells. By Macando type wells, I mean those wells without thick salt sections that usually have narrow drilling windows for a large part of the well. I believe that we can learn from Macando to allow these kind of wells to be successfully drilled without subsurface NPT events. To that end several conversations will take place over the next couple of weeks to assist us in making better pore pressure detections decisions as we drill the remaining hole sections at Macando.

In writing this note, I want to make sure that no one feels that we made poor decisions with these events. We have been spoiled in exploration on the Deepwater Horizon with having wells like Tiber, Freedom, Kodiak, Big Kahuna, Kaskida that have had salt sections thick enough to allow us a luxury of a wider drilling margin. We are very very good at salt exit now. We have not drilled a huge number of these "no salt narrow drilling window" wells. The purpose of this note is three fold. First I want to raise the issue, second, I want to provide some initial thoughts that we have come up with to assist with improved performance with pore pressure, and third, and most important, we are also asking for your help. This team has a huge amount of experience and we want to hear all of your inputs and suggestions. I am confident, that once we have these discussions and put refined procedures in place, we will be successful as we always are. Please regard these discussions as a huge learning opertunity

As for our initial thoughts, in looking at the kick events there were signs of pore pressure with all events. They were in some cases subtle and again, considering the type wells we usually drill, we get away with having some connection gas or sonic showing a PP increase. With these tighter margin wells, I want to get to a place where we are considering the all data suggesting PP change much more carefully in Macando type wells. We need to have larger conversations on all signs of PP change with these wells and as soon as the change is observed. We need to be prepared to use dummy connections, D exponent, sonic and any other indicator with more rigor. We can perhaps afford wait longer to raise the flag and watch for a PP trend we were confident in thick salt wells. However, in these

narrow window wells, we believe we need to have PP conversations as soon as ANY indicator shows a change in PP. We also need to be prepared to have some false alarms and not be afraid of it. We need to have the entire team more aware and focused on ALL PP indicators with the mentality that a couple of dummy connections and a circulation time costs far less then three kick events.
Specifically to the Macando data, all three events are preceded by gas events. There are indications of a PP increase in the normalized gas values prior to the kicks. The first two kicks have elevated gas levels and occurrences of C2 and C3 levels prior to the kick event. This last event was preceded by two connections gas peaks. In this last event there was a significant event with the D exponent from the normal trend at least 150 feet below the kick. There were also cavings that although not PP related, gave us an indication of other issues that would require more mud weight. The sonic data also showed an upward trend in PP. All of these signs were present but at 85 feet per hour, occur quickly in "real time". We just need to refine our process to allow quicker conversations to occur and ensure that we are monitoring all relevant PP trend data.
Once we recover from this event, Bobby Bodek is planning to be on the rig to assist with implementing the improvements thought of in this conversation. I would ask that all of you think of the last events and offer suggestions and improvements to our process. WE will capture these comments and suggestions and use these to create a better proceeds to allow us to drill Macando and future similar wells with the same low NPT that we drilled Tiber. Thanks for all of you help folks. This effort will not be successful without your help and input. We appreciate your help in starting this conversation.
Jon

Jonathan M. Bellow
Operations Coordinator