Preliminary Conclusions – Managerial

Observations

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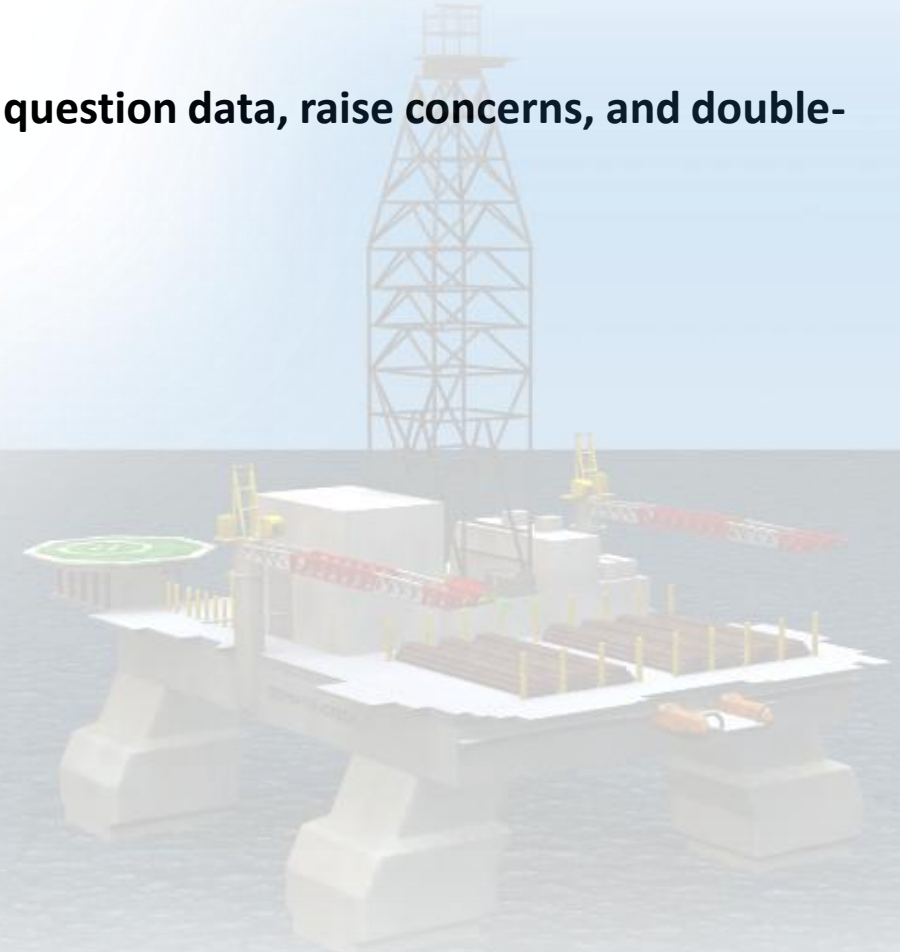
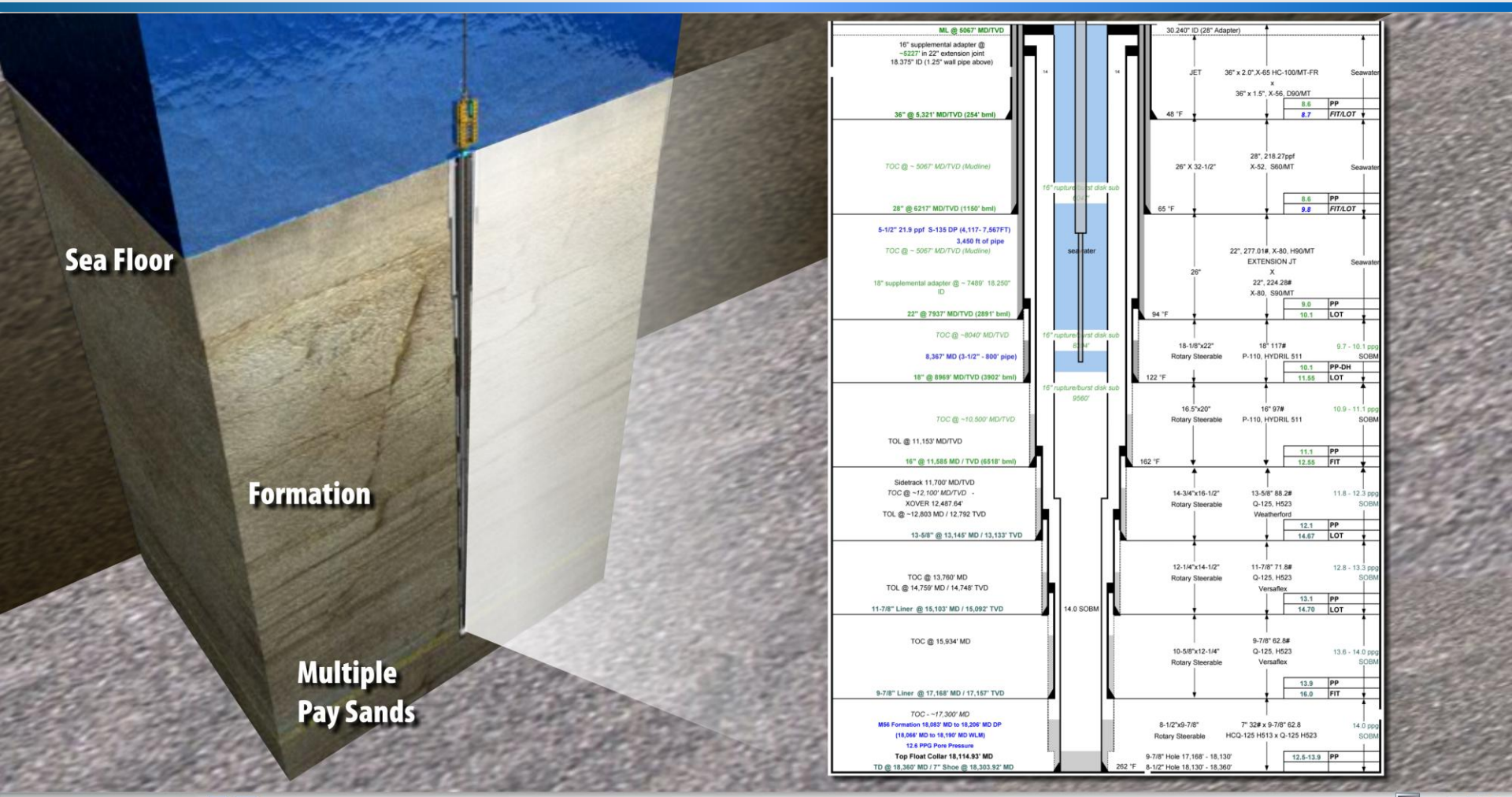


Macondo Well



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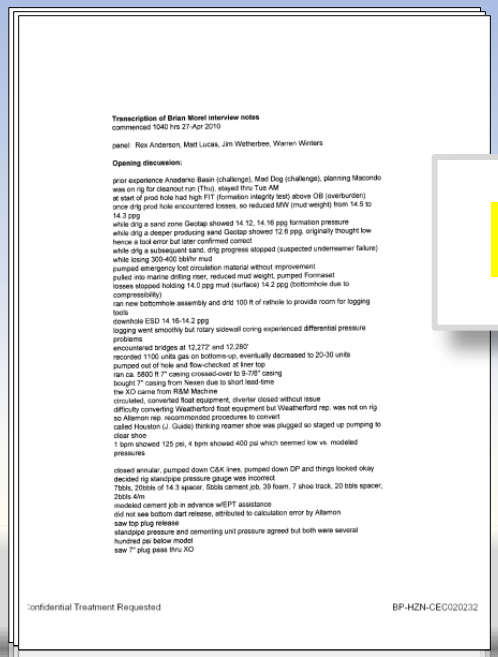
OIL SPILL COMMISSION OSC

TRIAL GRAPHIX

Low Circulation Pressure: Post-Conversion Conversation

Bly Team Brian Morel Interview Note

April 27, 2010



Transcription of Brian Morel interview notes
commenced 1040 hrs 27-Apr 2010

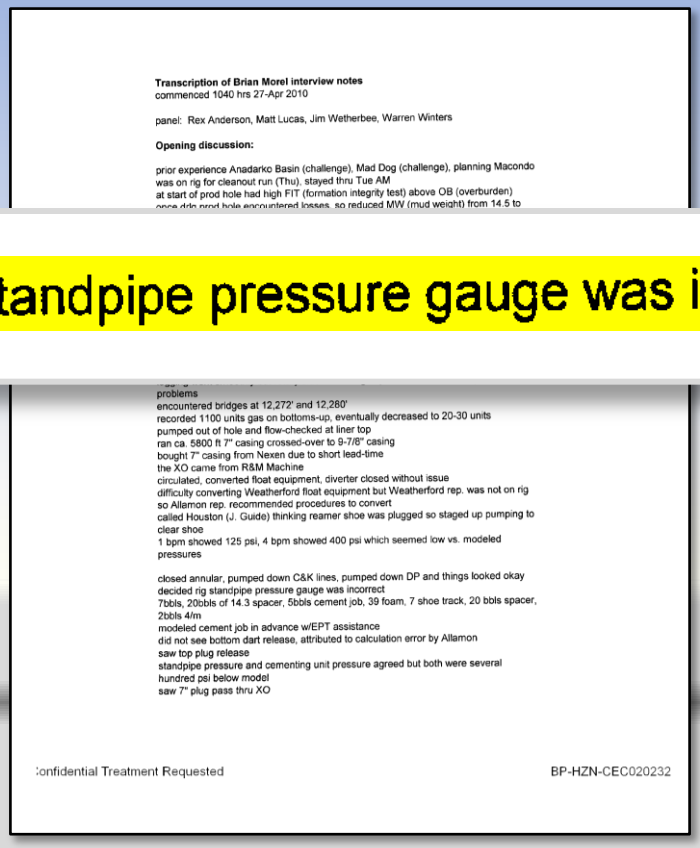
panel: Rex Anderson, Matt Lucas, Jim Wetherbee, Warren Winters

Opening discussion:

prior experience Anadarko Basin (challenge), Mad Dog (challenge), planning Macondo
was on rig for cleanout run (Thu), stayed thru Tue AM
at start of prod hole had high FIT (formation integrity test) above OB (overburden)
once drlg prod hole encountered losses, so reduced MW (mud weight) from 14.5 to 14.3 ppg
while drlg a sand zone Geotap showed 14.12, 14.16 ppg formation pressure
while drlg a deeper producing sand Geotap showed 12.6 ppg, originally thought low hence a tool error but later confirmed correct
while drlg a subsequent sand, drlg progress stopped (suspected underreamer failure)
while losing 300-400 bbl/hr mud
pumped emergency lost circulation material without improvement
pulled into marine drilling riser, reduced mud weight, pumped Formaset
losses stopped holding 14.0 ppg mud (surface) 14.2 ppg (bottomhole due to compressibility)
ran new bottomhole assembly and drld 100 ft of rathole to provide room for logging tools
downhole ESD 14.16-14.2 ppg
logging went smoothly but rotary sidewall coring experienced differential pressure problems
encountered bridges at 12,272' and 12,280'
recorded 1100 units gas on bottoms-up, eventually decreased to 20-30 units
pumped out of hole and flow-checked at liner top
ran ca. 5800 ft 7" casing crossed-over to 9-7/8" casing
bought 7" casing from Nexen due to short lead-time
the XO came from R&M Machine
circulated, converted float equipment, diverter closed without issue
difficulty converting Weatherford float equipment but Weatherford rep. was not on rig so Allamon rep. recommended procedures to convert
called Houston (J. Guide) thinking reamer shoe was plugged so staged up pumping to clear shoe
1 bpm showed 125 psi, 4 bpm showed 400 psi which seemed low vs. modeled pressures

closed annular, pumped down C&K lines, pumped down DP and things looked okay
decided rig standpipe pressure gauge was incorrect
7bbls, 20bbls of 14.3 spacer, 5bbls cement job, 39 foam, 7 shoe track, 20 bbls spacer, 2bbls 4/m
modeled cement job in advance w/EPT assistance
did not see bottom dart release, attributed to calculation error by Allamon
saw top plug release
standpipe pressure and cementing unit pressure agreed but both were several hundred psi below model
saw 7" plug pass thru XO

Confidential Treatment Requested BP-HZN-CEC020232



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Bladder Effect Is Not an Explanation for 1,400 psi

- "The investigation team could find no evidence that this pressure effect exists."

  BP Deepwater Horizon Accident Report, p. 40

- "[H]ave you ever heard of a concept that we have heard of in these hearings called the bladder effect? No, sir."

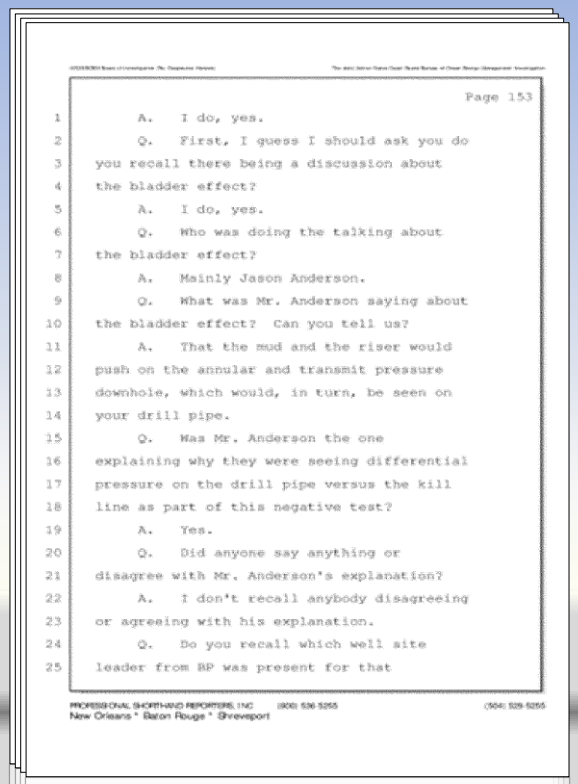
  Testimony of Daun Winslow, Transocean General Manager of Gulf of Mexico, MBI Hearing, 8/24 AM Tr. 246

- "Have you ever heard of something called a 'bladder effect'? Not before this happened."

  Testimony of Ronnie Sepulvado, BP Well Site Leader, MBI Hearing, 7/20 AM Tr. 150

- **None of the witnesses or experts we spoke with had ever heard of the bladder effect**

Bladder Effect?



Page 153

A. I do, yes.
Q. First, I guess I should ask you do you recall there being a discussion about the bladder effect?
A. I do, yes.
Q. Who was doing the talking about the bladder effect?
A. Mainly Jason Anderson.
Q. What was Mr. Anderson saying about the bladder effect? Can you tell us?
A. That the mud and the riser would push on the annular and transmit pressure downhole, which would, in turn, be seen on your drill pipe.
Q. Was Mr. Anderson the one explaining why they were seeing differential pressure on the drill pipe versus the kill line as part of this negative test?
A. Yes.
Q. Did anyone say anything or disagree with Mr. Anderson's explanation?
A. I don't recall anybody disagreeing or agreeing with his explanation.
Q. Do you recall which well site leader from BP was present for that

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Q. First, I guess I should ask you do you recall there being a discussion about the bladder effect?

A. I do, yes.

Q. What was Mr. Anderson saying about the bladder effect? Can you tell us?

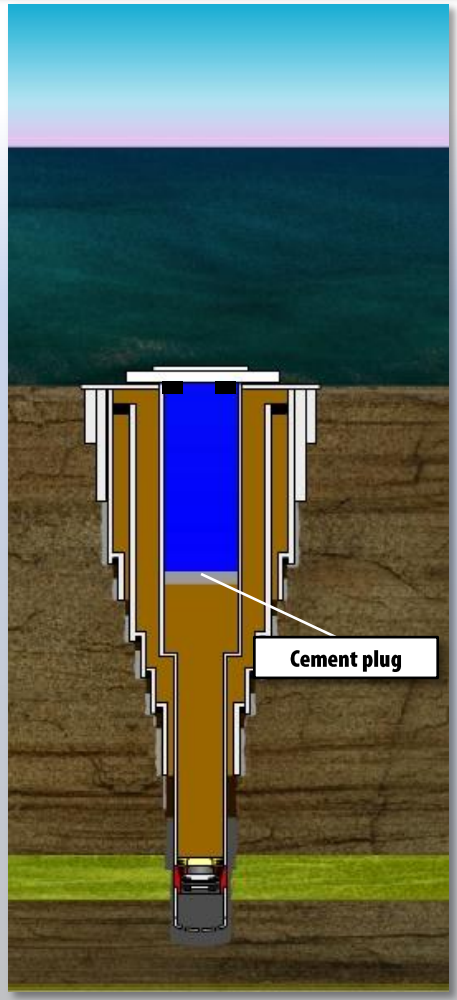
A. That the mud and the riser would push on the annular and transmit pressure downhole, which would, in turn, be seen on your drill pipe.

Q. Did anyone say anything or disagree with Mr. Anderson's explanation?

A. I don't recall anybody disagreeing or agreeing with his explanation.

Testimony of Lee Lambert, BP Well-Site Leader Trainee, USCG 7/20 PM Tr. 153

Irregularity of Setting Cement Plug So Low



Q. But it was somewhere around 8300, right?
A. Yes, yes.
Q. A lot deeper than you had probably seen before, right?
A. Yes.

Testimony of Ross Skidmore, BP Contract Vendor, MBI Hearing 7/20 PM Tr. 60

Q. You testified earlier that one of the unusual aspects of the displacement here was down to 83 –
A. 67, that's true. Usually it's 300 feet below the mud line, and 8367 is much further down than usual.

Testimony of Leo Lindner, MI-Swaco Mud Engineer, MBI Hearing 7/19 PM Tr. 86

Q. Well, the additional pressure, give the depth of this well, the displacement of mud with water in a volume much greater than is standard, is normal?
A. We were going to do a displacement at roughly 8,300 feet. It was a little bit – well, it was deeper than normal.

Testimony of John Guide, BP Wells Team Leader, MBI Hearing 7/22 PM Tr. 124

Preliminary Conclusions – Managerial

Observations

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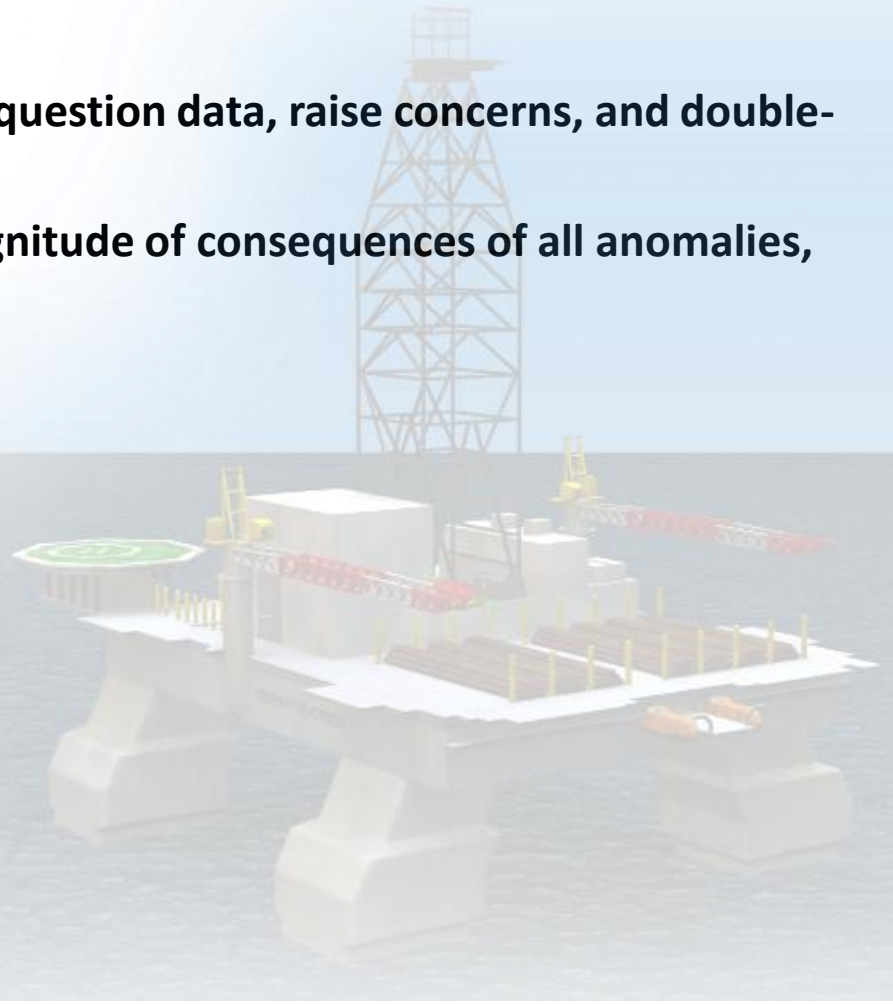
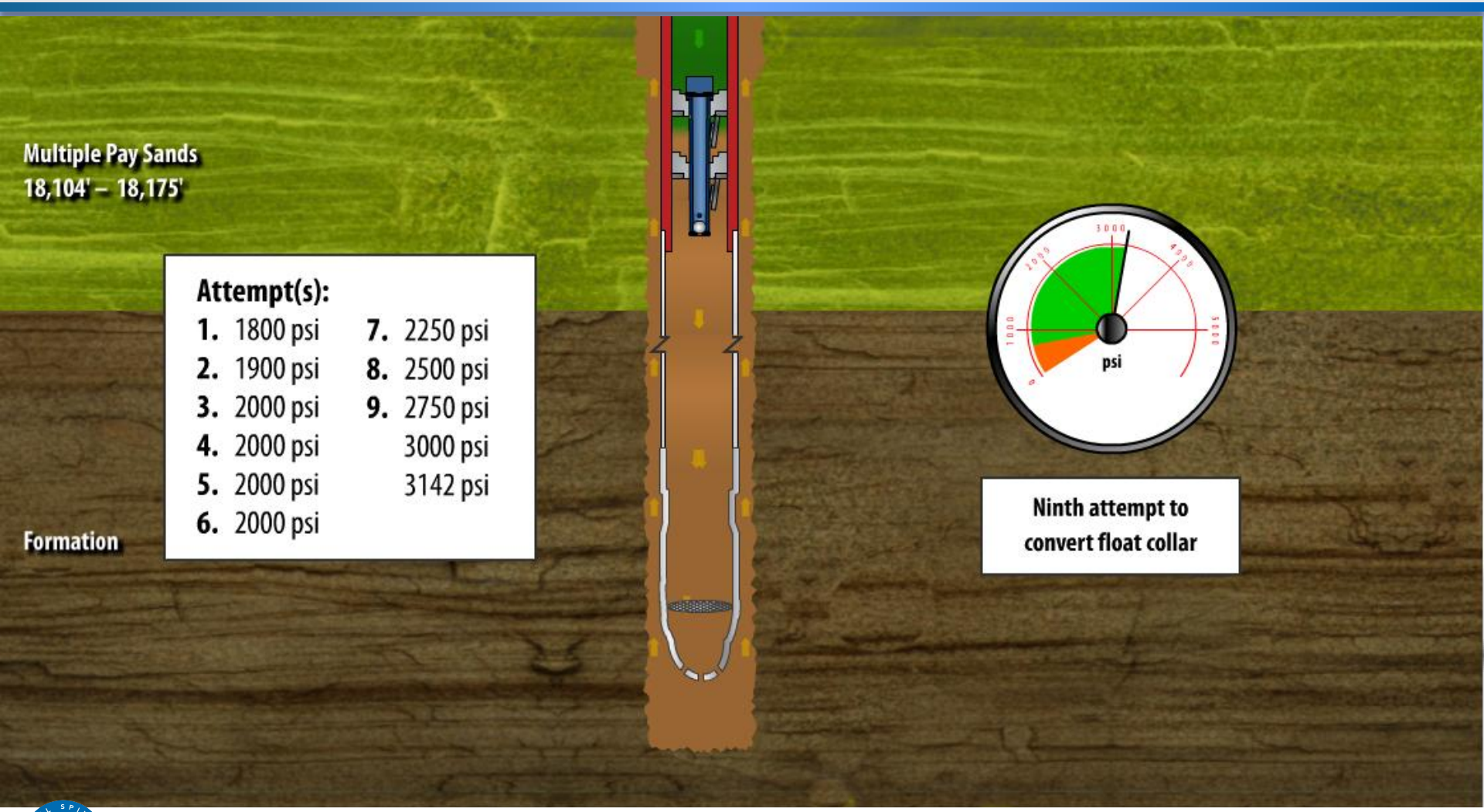
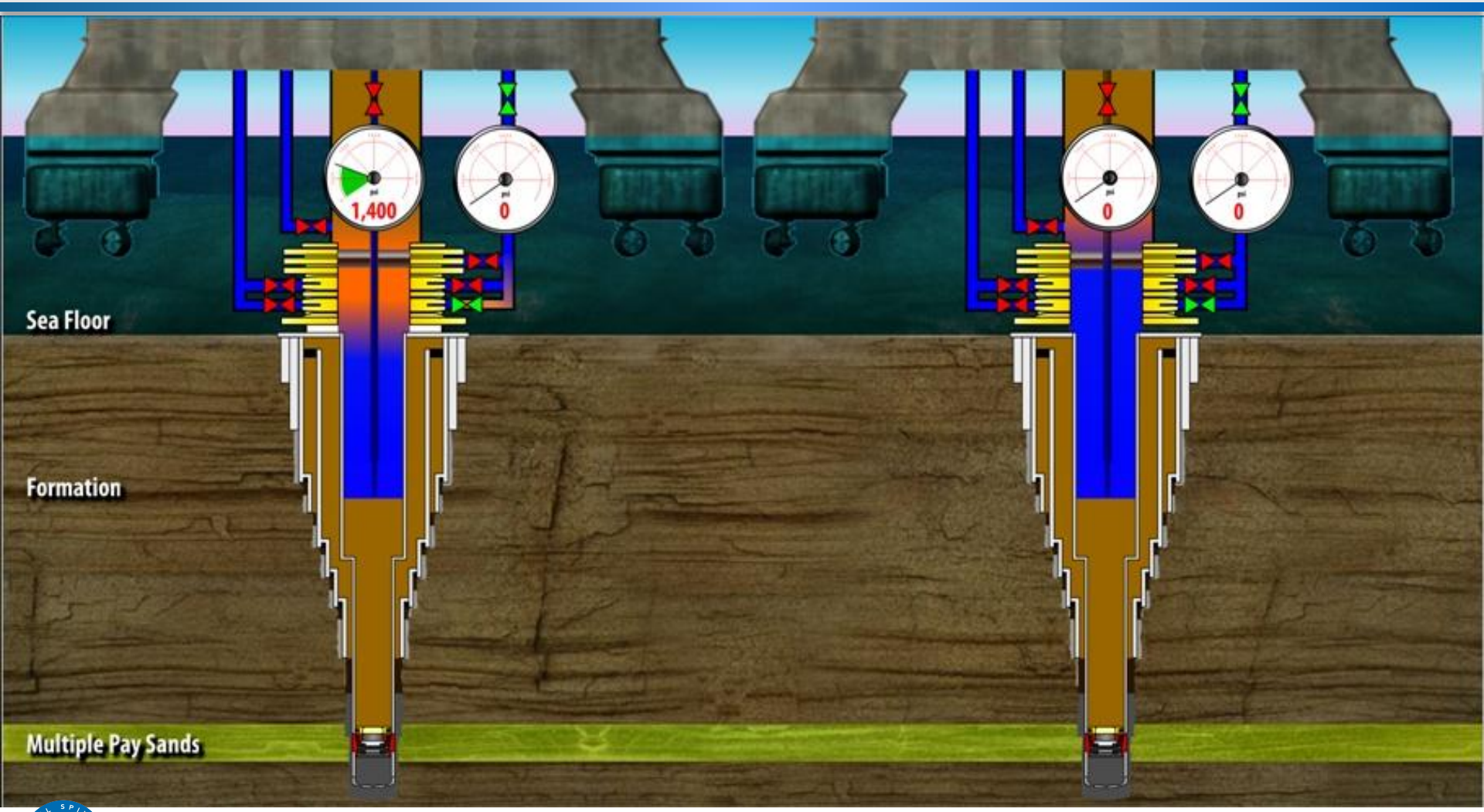


Float Collar Conversion Assumed



Negative-Pressure Test at Macondo



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Last Two Hours: Explosion at 21:49 (9:49 PM)

BOP open – cement is only barrier

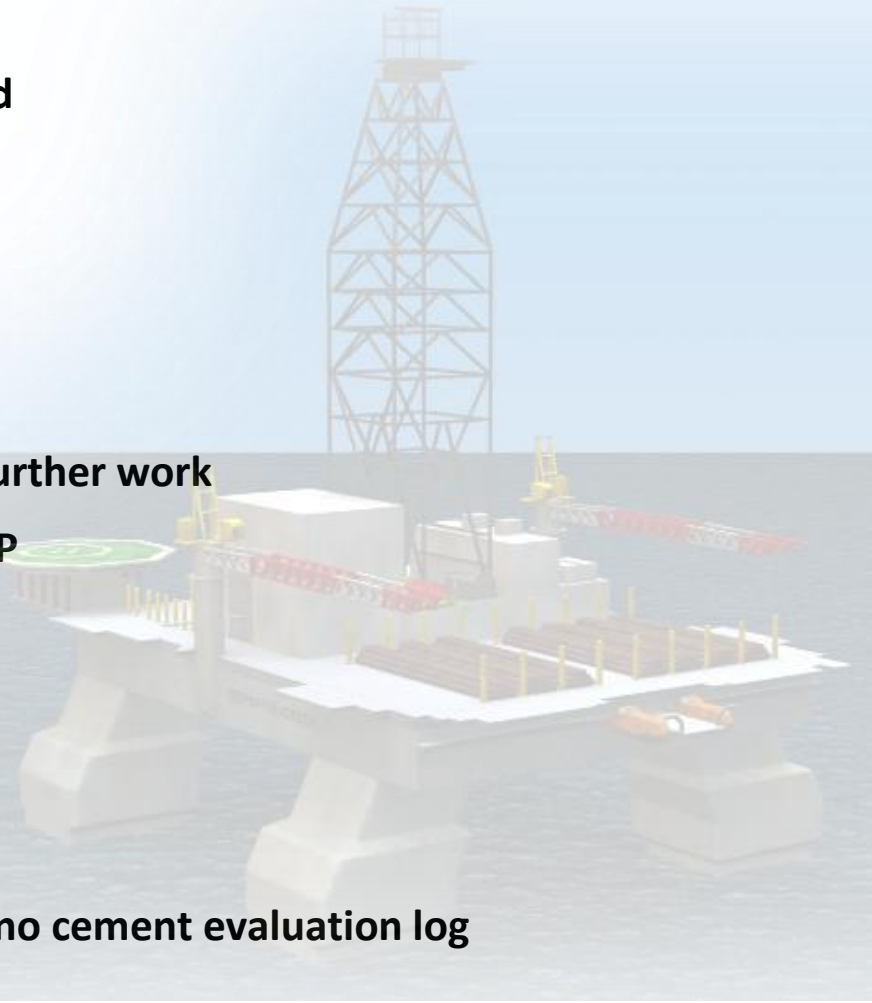
Time	Event
20:02	Negative-pressure test over, begin to remove heavy mud and replace it with lighter seawater
20:52	BP report calculates well underbalanced
21:01 – 21:08	**Anomalous drill pipe pressure: subtle increase while displacing heavy fluid with lighter fluid**
21:08 – 21:14	**Anomalous drill pipe pressure: increase while pumps off**
21:38	BP report calculates hydrocarbons in riser
21:40	Mud begins to overflow on rig floor
21:41	Annular preventer activated, BP report calculates 1,000 bbl gain
21:42	Nearby ship told to move
21:46	Gas emerges onto drill floor
21:49	First explosion, power lost, BP report calculates 2,000 bbl gain

Yesterday: ~ 21:31 to 21:40, TO crew sees anomaly

Yesterday TO: Mud came up

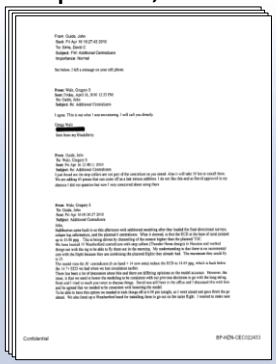
Situation at Time of Cement Job – April 19, 2010

- Difficult drilling conditions
- Serious lost returns in the zone to be cemented
- Forced to stop drilling earlier than planned
- Difficulty converting float equipment
- Low circulating pressure after conversion
- No bottoms up circulation
- Cement jobs are known to occasionally need further work
- Cement modeling perceived as unreliable by BP
- Complicated cement job
- Low rate of cement flow
- Low cement volume
- Uncertain centralization
- No direct indicators of cementing success and no cement evaluation log



Last-Minute Decision Not to Use Additional Six Centralizers

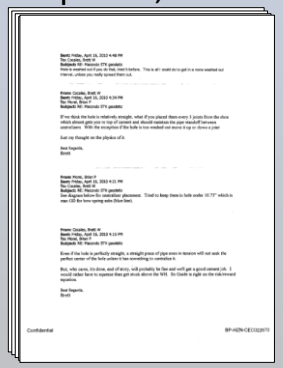
April 16, 2010



From: Guide, John
To: Walz, Gregory S
Sent: Fri Apr 16 12:48:11 2010
Subject: Re: Additional Centralizers

I just found out the stop collars are not part of the centralizer as you stated. Also it will take 10 hrs to install them. We are adding 45 pieces that can come off as a last minute addition. I do not like this and as David approved in my absence I did not question but now I very concerned about using them

April 16, 2010



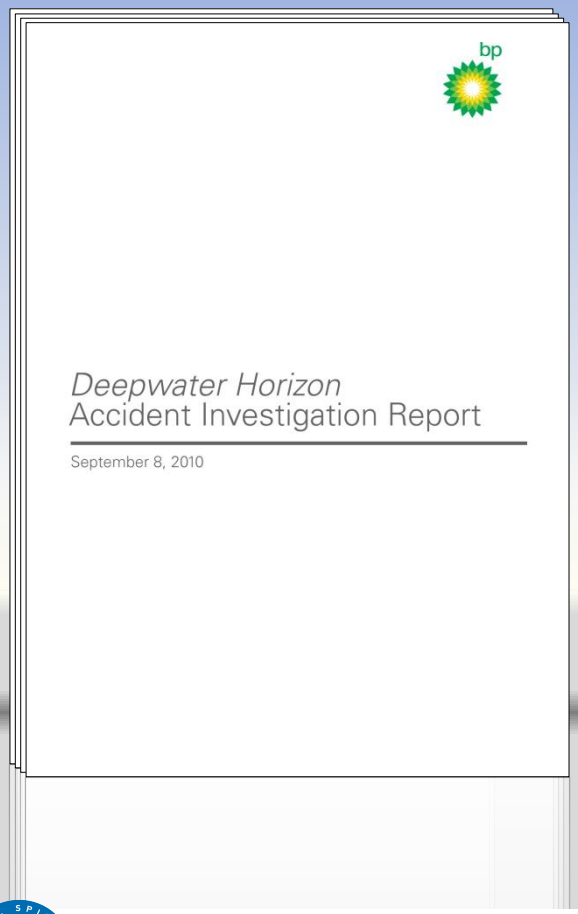
From: Cocales, Brett W
Sent: Friday, April 16, 2010 4:15 PM
To: Morel, Brian P
Subject: RE: Macondo STK geodetic

* * *

But, who cares, it's done, end of story, will probably be fine and we'll get a good cement job. I would rather have to squeeze than get stuck above the WH. So Guide is right on the risk/reward equation.

Missed Opportunity for Risk Assessment

September 8, 2010



A formal risk assessment might have enabled the BP Macondo well team to identify further mitigation options to address risks such as the possibility of channeling; this may have included the running of a cement evaluation log.

BP Deepwater Horizon Accident Investigation Report p. 36

Preliminary Conclusions – Managerial

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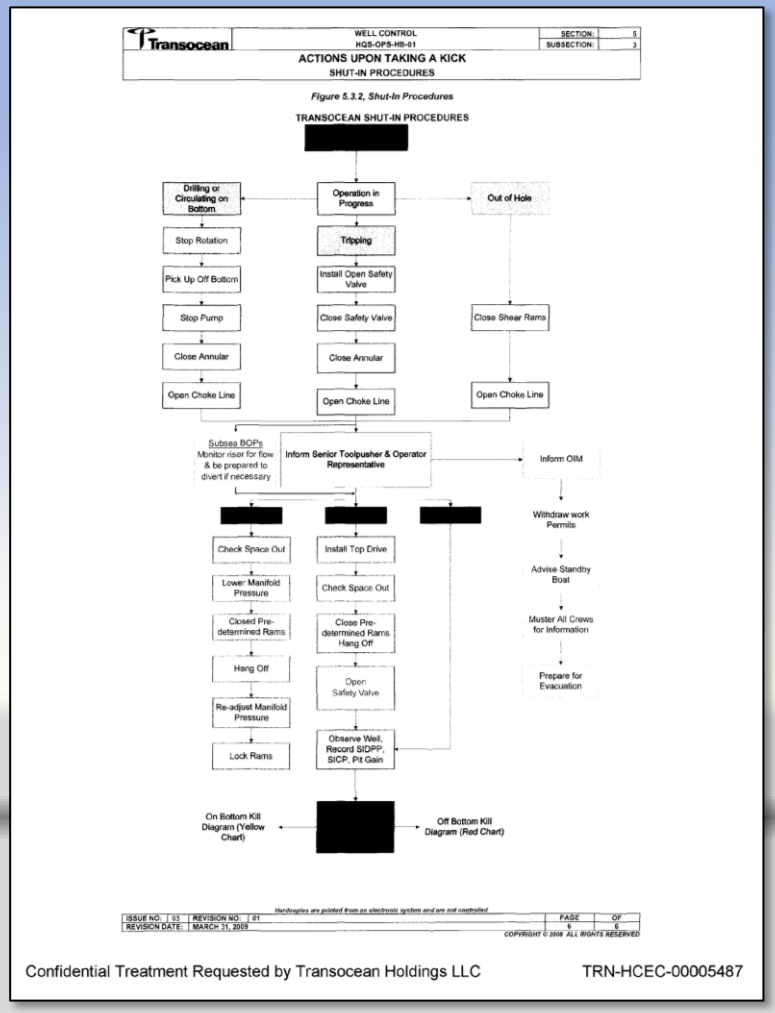
Actions Upon Taking a Kick



Transocean | WELL CONTROL HQS-OPS-HS-01 | SECTION: 5 | SUBSECTION: 3

ACTIONS UPON TAKING A KICK
SHUT-IN PROCEDURES

Figure 5.3.2, Shut-In Procedures

TRANSOCEAN SHUT-IN PROCEDURES

[redacted]

Drilling or Circulating on Bottom
Operation in Progress
Out of Hole

Stop Rotation
Tripping

Pick Up Off Bottom
Install Open Safety Valve

Stop Pump
Close Safety Valve
Close Shear Rams

Close Annular
Close Annular

Open Choke Line
Open Choke Line
Open Choke Line

Subsea BOPs Monitor riser for flow & be prepared to divert if necessary
Inform Senior Toolpusher & Operator Representative
Inform OIM

[redacted]

Withdraw work Permits

Check Space Out
Install Top Drive

Advise Standby Boat

Lower Manifold Pressure
Check Space Out

Muster All Crews for Information

Closed Pre-determined Rams
Close Pre-determined Rams Hang Off

Hang Off
Open Safety Valve

Prepare for Evacuation

Re-adjust Manifold Pressure

Lock Rams
Observe Well, Record SIDPP, SICP, Pit Gain

[redacted]

On Bottom Kill Diagram (Yellow Chart)
Off Bottom Kill Diagram (Red Chart)

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ISSUE NO: 03 | REVISION NO: 01 | PAGE: 5 | OF: 6
REVISION DATE: MARCH 31, 2009

Transocean Well Control Handbook

- The use of a second PVT system on the riser should be considered while circulating the riser. This provides a better indication of an approaching large gas bubble and its associated liquid slug.
- However, if large volumes of gas have entered the riser, it will flow rapidly on its own and there will be no way to control it by adjusting the circulation rate. Then, the surface gas and liquid rates become very high, especially as the gas bubble reaches surface and the flow must be diverted overboard.

9.2 EQUIPMENT FOR HANDLING GAS IN THE RISER

The diverter system above the telescopic joint with two (2) overboard lines and a system to remove gas from large volumes of mud and return it to the mud system (such as a mud box on the overboard line) is preferred.

The diverter and overboard lines should be designed to handle high flow rates and be as straight as possible.

This system is not designed to choke or control high gas or liquid flow; rather, it is a

At any time, if there is a rapid expansion of gas in the riser, the diverter must be closed (if not already) and the flow diverted overboard.

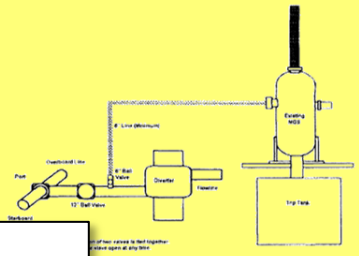
using the MGS to remove gas from the mud is shown in Figure 8.4.12.

are coordinated.

An override switch should be available that will allow the manual opening of the 12" valve if the need arises. Also, automatic opening of the 12" valve should be tied to the separator pressure so that the separator rating is not exceeded or an automatic pressure relief bypass should be included.

A small volume circulating system should be isolated so that a volume totalizer can be used while circulating and monitoring the riser. This could be the trip tank if available.

Figure 8.4.12, Using Existing MGS to Clean Gas from the Mud



S FOR HANDLING GAS IN THE RISER

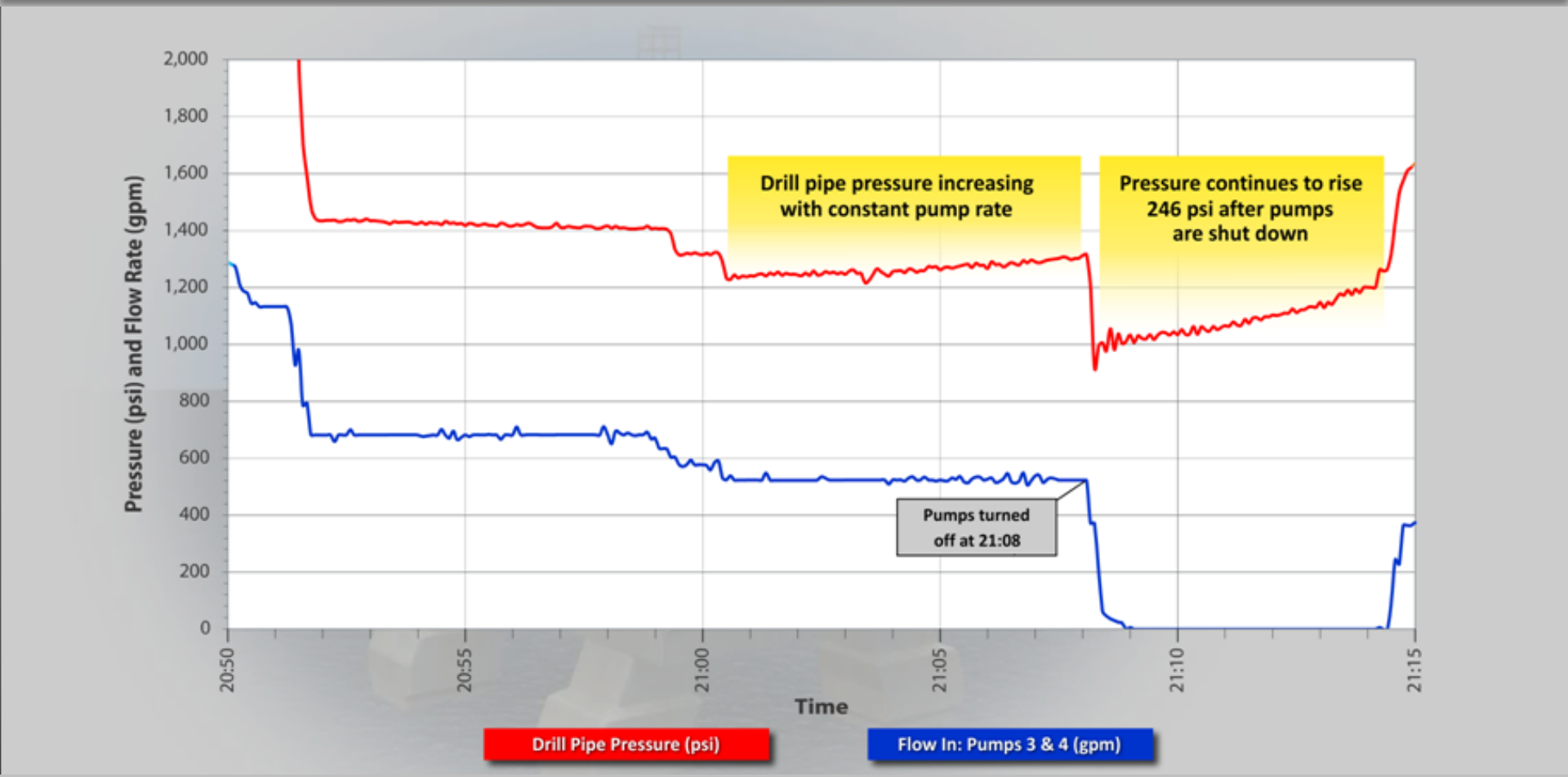
to be conducted along with the shut-in procedures for Subsea Section 5.

re of gas that may be taken above the BOP stack (early

suspected, shut off the mud pumps. This will help avoid gas above the BOP stack.

- Shut-in the well as quickly as possible.
- Conduct a riser flow check. If the riser is flowing, divert the flow overboard. If so equipped, the flow can be diverted through a gas handling system or MGS.
- If the riser is not flowing or has stopped flowing, continue to monitor it for flow. Do not leave it unattended.
- If so equipped and if the MGS is not being used for the primary well control operations, the riser fluid may be circulated through the MGS at slow rates to remove the gas from the fluid.

Sperry-Sun Data Turned Sideways



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- **There was a failure to develop or adopt clear procedures for crucial end-of-well activities.**

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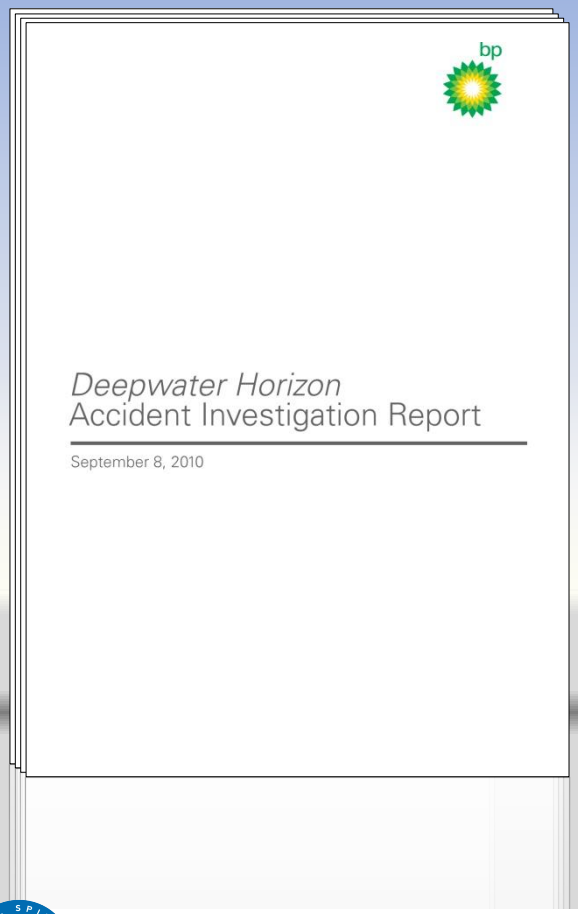
- There were muddled lines of authority within BP and as between BP and its contractors.

Lines of Authority

September 8, 2010



- Communication between BP and Halliburton personnel involved in the cement job was not effective in relation to the challenges and associated risks with the slurry design (i.e., stability of the foamed cement) and placement.

* * *

- The investigation team had no information as to the extent, if any, that Halliburton supervised or provided technical support to the Halliburton in-house cementing engineer on the Macondo well job. The investigation team was also unaware of any direct engagement between Halliburton supervisory personnel and the BP Macondo well team regarding the design of the Macondo well job.

BP Deepwater Horizon Accident Investigation Report p. 77

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Preliminary Conclusions – Technical

- Flow path was exclusively through shoe track and up through casing.
- Cement (potentially contaminated or displaced by other materials) in shoe track and in some portion of annular space failed to isolate hydrocarbons.
- Pre-job laboratory data should have prompted redesign of cement slurry.
- Cement evaluation tools might have identified cementing failure, but most operators would not have run tools at that time. They would have relied on the negative pressure test.
- Negative pressure test repeatedly showed that primary cement job had not isolated hydrocarbons.
- Despite those results, BP and TO personnel treated negative pressure test as a complete success.
- BP's temporary abandonment procedures introduced additional risk.

Preliminary Conclusions – Technical

- Number of simultaneous activities and nature of flow monitoring equipment made kick detection more difficult during riser displacement.
- Nevertheless, kick indications were clear enough that if observed would have allowed the rig crew to have responded earlier.
- Once the rig crew recognized the influx, there were several options that might have prevented or delayed the explosion and/or shut in the well.
- Diverting overboard might have prevented or delayed the explosion. Triggering the EDS prior to the explosion might have shut in the well and limited the impact of any explosion and/or the blowout.
- Technical conclusions regarding BOP should await results of forensic BOP examination and testing.
- No evidence at this time to suggest that there was a conscious decision to sacrifice safety concerns to save money.