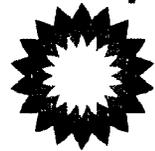


bp



Drilling Doghouse
GoM Standard Operating Practice
Formation Pressure Integrity Tests

Terry Jordan
Mark Alberty

Sept 10, 2007

4532
Exhibit No. _____
Worldwide Court Reporters, Inc.

CONFIDENTIAL

BP-HZN-2179MDL01920075

BPD210-024824

Purpose of Formation Pressure Integrity Tests



- Confirm previous casing/liner and its associated cement has seal around casing shoe
- Give us a “guide” to the formation strength that may lay ahead.
- Reality: formations as you drill ahead may have greater or lower formation pressure integrity.

Need to standardize



- BP GoM realized that different rig teams were not always consistent in their operational procedures on formation pressure integrity tests
- BP GoM wants a standard on how we perform formation pressure integrity tests, and to confirm a standard in reporting test data with the MMS.

Methodology to getting Standard Operating Procedure



Collected and Compared procedures and spreadsheets currently in use

Team reviewed different procedures to identify best practices

“Middle of the road” approach to the amount of detail

Wanted a standard workbook that linked to the advanced LOT analyzer tool

Major Issues of Differences



- Surface mud weights vs. Downhole mud weights
- How to pump the test?
- What value is leakoff ?
- When do you stop pumping?
- What does the MMS want reported?
- What is plotted (press vs. volume, press vs. time, press vs. volume and time)?
- What data do you record?

Major Issues



- Surface mud weights vs. Downhole mud weights
 - ? Use surface mud weights when reporting to MMS.
 - ? Record surface and downhole EMW's (if PWD in use)

Major Issues



- How to pump the test?
 - ? Pump down drill pipe and down casing via choke or kill line to make friction pressure negligible.
 - ? Pump a maximum of $\frac{1}{2}$ bpm
 - ? Record data surface pressure consistent with pump rate (e.g. if pumping $\frac{1}{2}$ bpm, record data every $\frac{1}{2}$ bbl).

Major Issues



- What value is leakoff ?

Show examples

Major Issues



- When do you stop pumping?
 - ? When FIT is achieved
 - ? If leakoff occurs, continue pumping until the pressure flattens or decreases

Major Issues



- What does the MMS want reported?

What does the MMS say?



- **250.427 What are the requirements for pressure integrity tests?**
- **You must conduct a pressure integrity test below the surface casing/liner and all intermediate casings/liners.**
- **You must conduct each pressure integrity test after drilling at least 10 feet but no more than 50 feet of new hole below the casing shoe.**
- **You must test to either formation leak-off pressure or to an equivalent drilling fluid weight if identified in an approved APD.**

What does the MMS say?



- You must use the pressure integrity test and related hole-behavior observations, such as pore-pressure test results, gas-cut drilling fluid, and well kicks to adjust the drilling fluid program and setting depth of the next casing string.
- While drilling, you must maintain the safe drilling margin identified in the approved APR. (generally interpreted as <math><0.5</math> ppg, with special permission to 0.3 ppg). When you cannot maintain this safe margin, you must suspend drilling operations and remedy the situation.

Record on IADC (official MMS record)



Formation Pressure Integrity Test (PIT) data:

Maximum Surface Pressure = 1113 psi

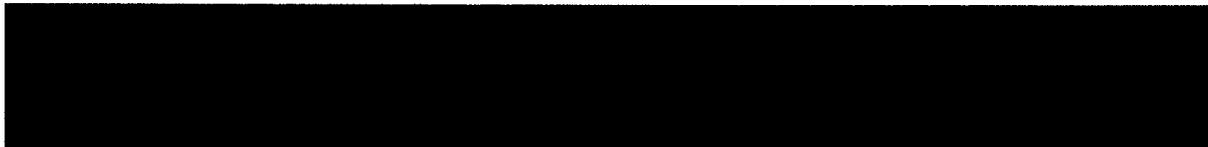
Test Surface Mud Weight = 15.2 ppg

Surface Equivalent Mud Weight = 16.1 ppg

Major Issues



- What is plotted (pressure vs. volume, pressure vs. time, pressure vs. volume and time)?
 - ? Workbook graphs pressure vs. volume and time
- What data do you record?
 - ? Workbook has standard data to record



- Show workbook



Back-Up



Record on DIMS morning report



Formation Pressure Integrity Test (PIT) data:

Maximum Surface Pressure = _____ psi

Test Surface Mud Weight = _____ ppg

Surface Equivalent Mud Weight = _____ ppg

Downhole Measured Formation Pressure Integrity Test (PIT) data = _____ ppg

If leak-off reached:

Surface Measured Leak-off Test (LOT) data = _____ ppg

Downhole Measured Leak-off Test (LOT) data = _____ ppg