High-Performance WBM with CLAYSEAL® PLUS Shale Stabilizer Eliminates Need for OBM for Monobores in Shale Play

DENVER-JULESBURG BASIN, U.S. ROCKY MOUNTAINS

CHALLENGES

The operator wanted a high-performance, low-density WBM to drill a long lateral in shale.

- Conventional WBM required high density to hold back sloughing shale
- OBM created cuttings disposal issues

SOLUTIONS

An engineered WBM containing CLAYSEAL® PLUS shale stabilizer and an effective lubricant helped deliver performance on par with OBM without the environmental impact.

RESULTS

- The well was drilled with penetration rates up to 350 feet/hour (107 meters/hour) in the lateral.
- Several motor failures required the well to be open for 12 days, twice as long as normal. No signs of wellbore instability occurred during time, confirming the effective inhibition of the WBM.

OVERVIEW

The unstable Sharon Springs shale created problems in monobore wells drilled in the Denver-Julesburg Basin. The results of x-ray diffraction (XRD) testing on the shale formation showed a high smectite clay content (> 50%).

"This CLAYSEAL® fluid has met our performance expectations.

We plan to continue using this fluid for our long lateral projects in the future."

– Operator Representative

Conventional water-based muds (WBMs) had been used on offset wells, but a density range of 10.0.2–10.5 ppg was required to stabilize the Sharon Springs shale. Oil-based muds (OBMs) used on previous wells were able to inhibit reactive shale without increasing the mud density over 9.5 ppg, but the costs associated with cuttings management were high.

The operator wanted to use a low-density WBM system that would inhibit the clays while providing good lubricity and minimizing torque and drag. The subject well had a measured depth of 11,500 feet (3,505 meters) and a true vertical depth of 7,193 feet (2,192 meters).

CUSTOMIZED HIGH-PERFORMANCE WATER-BASED MUD REPLACES OBM

A high-performance WBM system was formulated with 3.0% v/v CLAYSEAL® PLUS shale stabilizer and 2.0% v/v BaraLube™ W-661 lubricant. This lubricant, designed for use in WBM systems, has been recently established in the basin and has proven to deliver high performance at a low cost.

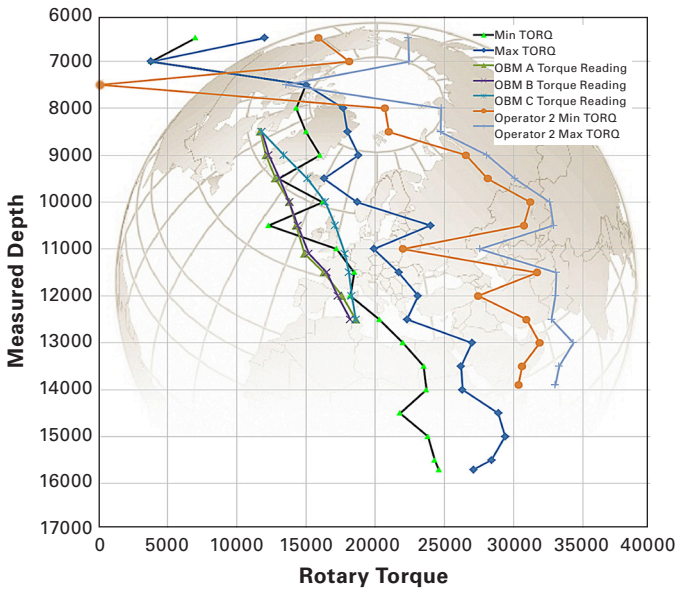
The concentration of CLAYSEAL PLUS stabilizer was customized to provide reliable inhibition of the problematic clays throughout the operation. The lubricant was maintained at 2-3% v/v for torque and drag control.

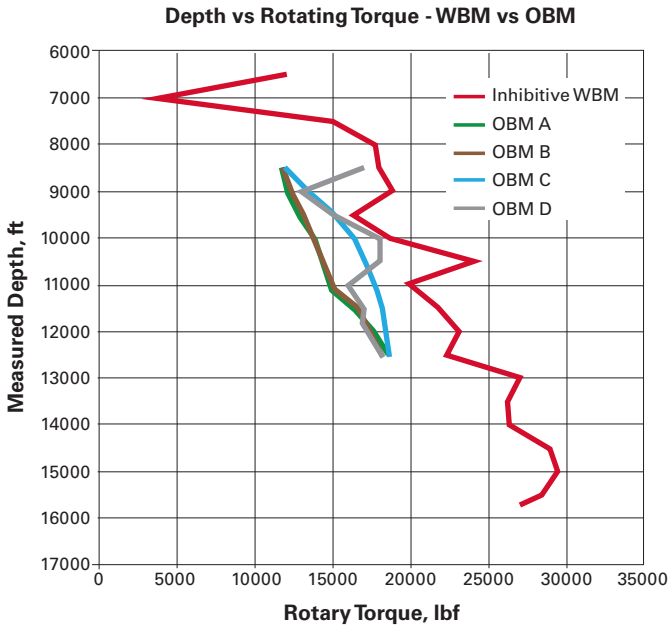
FAST DRILLING, LOW MUD WEIGHT, AND REDUCED CUTTINGS DISPOSAL COSTS

The high-performance WBM system proved successful in inhibiting the reactive clays with a 9.8-ppg mud weight, approximately 0.5 ppg less than on previous wells drilled with WBM. Drilling performance was similar to that observed with OBM. Torque and drag values were lower than those recorded on offset wells drilled with conventional WBM systems, but not quite as low as those achieved with OBM (see plots).

The operator was able to stay at the desired lower mud weight, which reduced the equivalent circulating density and helped deliver fast rates of penetration – 350 feet/hour (107 meters/hour) observed while drilling the lateral.

Several downhole tool failures caused drilling delays, and the wellbore was open for 12 days total, twice as long as a normal trouble-free operation. No wellbore instability occurred during this time, confirming the effective inhibition of the WBM.





www.halliburton.com

HALLIBURTON