

STEELSEAL[®] Lost Circulation Material and BARACARB[®] Bridging Agent Help Apache Improve Wellbore Stability

CUSTOMIZED SOLUTION CUTS OPERATOR'S COSTS BY 50 PERCENT

NEUQUÉN, ARGENTINA

CHALLENGES

- » Solve issues of wellbore instability and excessive cuttings that were preventing a return to bottom
- » Avoid NPT and costs associated with stuck pipe, casing issues, and additional trips to condition the wellbore

SOLUTION

Baroid personnel recommended an engineered water-based mud to address wellbore instability issues, and the system was further customized with STEELSEAL[®] LCM and BARACARB[®] bridging agent to seal microfractures and strengthen the formation during drilling operations.

RESULTS

- » No problems with wellbore stability issues or stuck pipe were experienced.
- » A short trip was executed successfully at TD.
- » Based on total rig costs, the Apache Corporation was able to save USD 1.15 million on the well.
- » Fluid costs were 9 percent lower than planned.

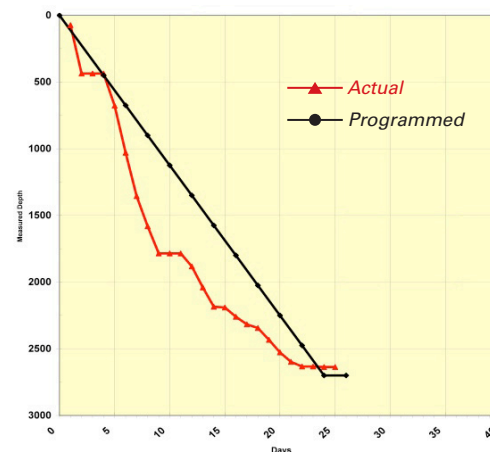
OVERVIEW

While drilling operations in 2010, at 1,800 meters (5,906 feet) measured depth (MD), a short trip was initiated to the conductor shoe at 400 meters (1,312 feet). After the trip, wellbore instability and excessive cuttings prevented a return to bottom. A total of 12 days was spent attempting to reach total depth (TD). Significant nonproductive time (NPT) and costs were associated with stuck pipe, casing issues, and additional trips to condition the wellbore.

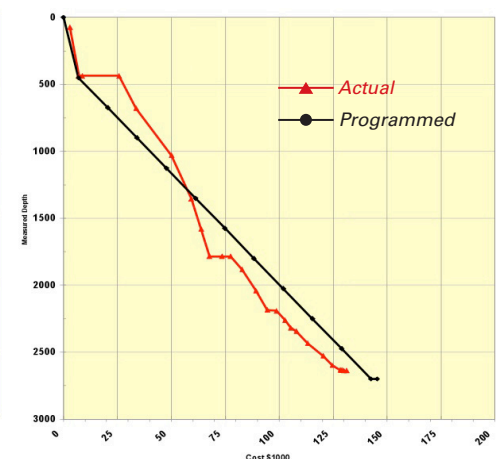
The Quintuco, Vaca Muerta, Quebrada del Sapo, and Lajas formations also proved extremely unstable. Bridging and sealing materials had not been incorporated in the fluid. A sidetrack was drilled successfully, and the well was completed at 2,700 meters (8,858 feet) TD in 49 days, 24 days longer than planned.

A local mud company provided fluid services for the original and sidetrack wells. The original well was drilled with a polymer water-based mud (WBM). The sidetrack well was drilled with a potassium chloride (KCl)/polyacrylamide system.

**Baroid-Serviced Well
Depth vs. Days**



**Baroid-Serviced Well
Depth vs. Costs**



Based on total rig costs, the Apache Corporation was able to save USD 1.15 million.

SOLUTION

Baroid personnel recommended an engineered WBM formulated with polyacrylamide, a locally sourced, partially hydrolyzed polyacrylamide (PHPA) shale stabilizer and KCl brine. To address wellbore instability issues, the system was further customized with STEELSEAL® lost circulation material (LCM) and BARACARB® bridging agent to seal microfractures and strengthen the formation during drilling operations.

This formulation was used to drill the well to 2,000 meters (6,562 feet), where the PHPA shale stabilizer and KCl were allowed to deplete before drilling the reservoir. A total of 25 days was required to drill the well.

No problems with wellbore stability issues or stuck pipe were experienced. A short trip was executed successfully at TD.

RESULTS

Based on total rig costs, the Apache Corporation was able to save USD 1.15 million on the well drilled with Baroid's engineered fluid. The actual mud costs for the Baroid fluid were also 9 percent lower than planned.

www.halliburton.com

Sales of Halliburton products and services will be in accord solely with the terms and conditions contained in the contract between Halliburton and the customer that is applicable to the sale.

H07861 10/17 © 2017 Halliburton. All Rights Reserved.