Customized Lost Circulation Material Strategy Reduces Operator's Costs by 35% per Well in the Marcellus Shale

ENGINEERED DRILLING FLUIDS SOLUTION APPLIES A UNIQUE COMBINATION OF LCM PRODUCTS TO IMPROVE WELLBORE STABILITY AND INCREASE DRILLING PERFORMANCE

UNITED STATES

CHALLENGE

- Mitigate wellbore instability
- Prevent stuck pipe
- Reduce downhole losses
- Maximize hole cleaning for successful tripping and casing run

SOLUTION

- Increase mud weight to assist with hole stability
- Customized LCM strategy for wellbore stability, integrity, and loss reduction
- Sweeps to promote good hole cleaning and increase LCM effectiveness

RESULTS

- Reduced average cost by 35% per well for the remaining pad
- Reduced average downhole loss reduction by 40% for the remaining wells
- Increased drilling performance, with a 35% reduction in drilling time

OVERVIEW

While drilling in the Marcellus Shale formation of northern Pennsylvania, an operator encountered unexpected hole stability issues, which resulted in excessive downhole losses. In addition, overall drilling performance suffered in terms of low rate of penetration (ROP), excessive torque, and extended days on well. These factors all contributed to elevated costs, calling for a change in the existing drilling program.

CHALLENGE

Upon reaching the loss zone, wellbore stability became an immediate problem for drilling engineers to resolve. Large cuttings and high torque also began to plague the drilling operation, greatly hindering performance and increasing time to drill the well. Wellbore instability significantly increased the risk factors involved with stuck pipe and eventually with running casing. Realizing the excessive losses needed to be remedied, the operator sought a new strategy that would mitigate loss, risk, and elevated drilling costs for a better overall outcome.

SOLUTION

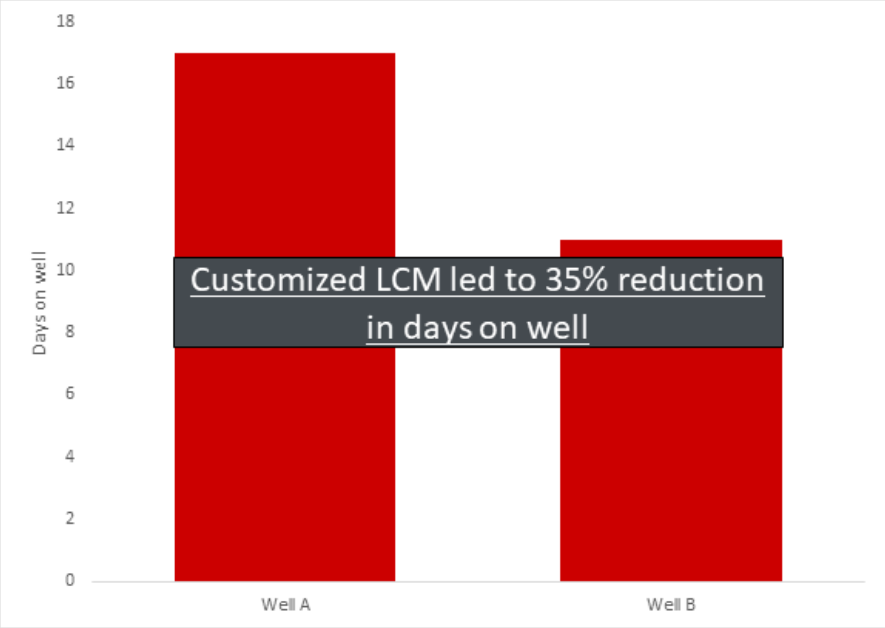
The client's original drilling program called for a mud weight ranging from 11.5 – 12 ppg. The first action in Halliburton Baroid's engineered drilling fluids solution was to increase that weight to a final target of 13 – 13.5 ppg to stabilize the wellbore.

A customized lost circulation material (LCM) strategy was then implemented for the loss zone to further improve the integrity of the wellbore, as well as reduce excessive downhole losses. The LCM was sent downhole in the form of weighted sweeps to increase effectiveness and clean the wellbore to improve drilling performance. The approach was to pump an unweighted LCM sweep 500 ft before the anticipated loss zone. This was followed by weighted LCM sweeps at 2 ppg over system weight pumped every 1,000 ft. A final unweighted sweep was pumped 500 ft after the loss zone to increase the background LCM concentration and ensure the entire loss zone had been treated. These LCM sweeps consisted of the following proprietary Halliburton Baroid products:

- BARACARB® 150
- BARACARB® 50
- STEELSEAL® 100

RESULT

While implementing the customized solution, a 40 percent reduction in downhole losses was seen, on average, for the remaining wells on the pad. Drilling performance significantly increased, which resulted in a reduction of well time, from 17 days to 11 days. This contributed to a 35 percent average cost reduction for the remaining wells. In one instance, the operator intended to compare downhole losses by withholding the LCM strategy used on prior wells. The downhole losses increased by almost 80 percent compared to the well that had utilized LCM. The proven LCM strategy was subsequently reintroduced on the following wells, driving maximum asset value in the region.



Comparative bar graphs showing superior performance of Well B due to application of the new LCM strategy.

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