

BaraDriIN™ Reservoir Drilling Fluid And N-FLOW™ 408 Filter Cake Breaker System Improve Productivity

BAPETCO DRILLS TIGHT GAS HORIZONTAL WELL IN LOW PERMEABILITY, ABRASIVE SAND FORMATION WITH MINIMAL RESERVOIR AND BIT DAMAGE

WESTERN DESERT, EGYPT

CHALLENGES

- » Drill 6,562-ft (2,000-m) lateral section through a depleted reservoir with a 2,000-psi overbalance and 300°F (150°C) bottomhole temperature (BHT)
- » Minimize formation damage to complete the well as an unsupported, barefoot completion
- » Increase rate of penetration (ROP) and bit life in highly abrasive sand formation

SOLUTIONS

- » Use BaraDriIN™ reservoir drilling fluid (RDF) with engineered BaraCarb® bridging package
- » Run permeability tests on offset cores to optimize RDF
- » Set fluid parameters to maximize ROP and ensure good hole cleaning
- » Use customized N-FLOW™ filter cake breaker system to maximize production

RESULTS

- » Reservoir sections drilled with BaraDriIN and treated with N-FLOW 408 exceeded production expectations
- » Eliminated the need for a multi-frac operation
- » Delivered a potential savings of USD 6M

OVERVIEW

Badr Petroleum Co. (BAPETCO) was planning a campaign of horizontal wells in a tight gas reservoir with a 6,562-ft (2,000-m) lateral 6-in. section to be drilled with water-based mud. To avoid expensive, multi-frac completions, they opted for a barefoot completion as the simpler and more economical option.

The increased damage potential in a low permeability (0.5-5.0 mD) formation required a customized drilling fluid and filter cake breaker system to ensure maximum well productivity.

CHALLENGE

BAPETCO was concerned about formation damage and the risk of low production from the tight reservoir permeability and planned barefoot completion method. All the other wells in the field had previously been fracked to maximize production.

The drilling fluid design would need to be suitable for horizontal well conditions with 2,000 psi overbalance and have demonstrated proven stability at the anticipated 300°F reservoir temperature downhole.

SOLUTION

Baroid's Technical Team collaborated with BAPETCO to engineer a customized BaraDriIN reservoir drilling fluid (RDF) system with low solids content and a BaraCarb® ground marble bridging package. The fluid rheology was tuned to enhance the rate of penetration (ROP), while providing required hole cleaning and fluid stability.

Several return permeability tests were run on natural cores from offset wells to optimize the RDF, select the proper lubricant, and examine the effect of the filter cake breaker on enhancing the final permeability. The N-FLOW™ 408 filter cake breaker system was engineered to ensure uniform removal of filter cake from the lateral section, to help the well produce to its maximum potential.

RESULTS

The engineered BaraDriIN RDF provided superior drilling performance, achieving an ROP of 39-59 ft/hr (12-18 m/hr), compared to 6-13 ft/hr (2-4 m/hr) achieved on offset wells drilled with oil-based mud. Two pilot wells were drilled to test this BaraDriIN fluid, and good hole conditions were attested by freely tripping in and out of hole.

The N-FLOW 408 filter cake breaker was spotted in the open hole before testing the first

**SAVE
USD 6M**

well. The production rate exceeded expected production, indicating no damage to the producing formation. The skin damage was <5.

The second well was drilled with the same BaraDrillN RDF in close proximity to the first well. BAPETCO elected to test this well without spotting N-FLOW 408 system in an open hole, and the production rate was significantly lower than the first well. After spotting N-FLOW 408 in the open hole, the production rate exceeded expectations.

BATPETCO successfully reached the desired production rates without the need for an expensive, multi-frac operation, and with a potential cost savings of USD 6M. Based on the positive drilling and completion results of these initial wells, BAPETCO has decided to continue the campaign and drill an additional five wells.

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