MATURE FIELDS

CASE STUDY

Combo Systems Optimize Drilling and Completion Phases of Reservoir Interval

SOLUTION MINIMIZES FORMATION DAMAGE AND ENABLES FASTER DRILLING

OFFSHORE, U.K.

CHALLENGES

- Minimize formation damage
- Avoid differential sticking in a 2,100-foot (640-meter) length of an 8.5-inch x 9.5-inch horizontal section
- Maintain ECD within a 13.5-lb/gal limit

SOLUTIONS

Baroid proposed:

- A reformulation of INNOVERT® non-aqueous drill-in fluid
- N-FLOW™ 325 delayed-reaction breaker system and BaraKlean®-648 casing cleaner for effective wellbore cleanout operations

RESULTS

- INNOVERT® fluid maintained the ECD limit within the 13.5 lb/gal density range
- Achieved skin factor of 0.5 after running completion and well testing operations
- Avoided differential sticking and lost circulation issues
- Provided greater ability to inject and produce from the asset
- Saved operator up to two days of rig time, valued at USD 400,000

OVERVIEW

2 DAYS
OF DRILLING TIME
SAVED

An operator in the U.K. was using a competitor's breaker system for well completions, resulting in an average formation-damage skin factor of 5.5.

The operator challenged Baroid for a better solution to minimize the formation damage and differential sticking potential in a 2,100-foot (640-meter) length of an 8.5-inch x 9.5-inch horizontal section while maintaining the equivalent circulating density (ECD) within a 13.5-lb/gal.

CUSTOMIZED INNOVERT® FLUID SYSTEM BRINGS SUCCESS

As a solution, Baroid proposed a reformulation of INNOVERT® non-aqueous reservoir drill-in fluid due to its proven track record in the area. The goals were to decrease the risk of formation damage, achieve higher penetration rates, reduce pressure drops, and optimize hydraulics with minimal ECD.

The reformulation of the INNOVERT fluid contained the BARACARB® 5 and BARACARB 50 bridging agents to minimize formation damage and achieve the required density. The reformulation also included CMO-568™ drilling fluid additive to provide optimum cake lubricity. The rheology profile was designed to keep ECD levels below the limits.

The wells were drilled to total depth ahead of the scheduled timing, while maintaining adequate hole cleaning capability and achieving 75 feet/hour (23 meters/hour) rate of penetration (ROP) as opposed to an average of 50 feet/hour (15 meters/hour) on the previous well.

No differential sticking or lost circulation issues were experienced; the drillpipe was pulled out of the hole with ease, showing good hole conditions. The 270-micron sand control screens were installed, and a production screen test and a pressure-dependent leak-off test were performed. These indicated an intact filter cake.

COMBO SOLUTION PROVIDES EFFICIENT WELLBORE CLEANOUT OPERATION

During the completion phase, the Baroid team tested wellbore cleanout formulations to determine the optimum cleaners and filter cake breaker concentrations. To achieve the target clarity values at relatively low concentrations, the team selected its BaraKlean®-648 surfactant-based casing cleaner due to its strong solvent action and high cleaning capacity. BaraKlean-648 cleaner proved to be more powerful than available alternatives, and was

Baroid delivered a skin factor of 0.5, compared to an average skin factor of 5.5 delivered by competitors.

ideally suited to the technical constraints presented. It is also a product that is approved by the U.K.'s Centre for Environment, Fisheries and Aquaculture Science (Cefas), and is on the Offshore Chemical Notification Scheme (OCNS) list without a substitution warning.

The N-FLOW™ 325 delayed-reaction breaker system was placed across the entire interval before it was activated, so it delivered a uniform, targeted treatment. An additional benefit of this system was its ease of handling. The N-FLOW 325 system remains neutral at the surface, eliminating safety concerns and the need for special equipment that would be required for mineral or organic acids. It can be batched, mixed, and spotted with a conventional rig.

RESULTS

Baroid delivered the combined solution designed to optimize drilling (maintaining the ECD limit within the 13.5 lb.gal density range target) and completion phases of the reservoir interval with less tripping operations and with a skin factor of 0.5 after running the completion and well testing operations. This achievement provided a greater ability to inject and produce from the asset.

As an additional benefit, because this solution enabled faster drilling on this well, the operator was able to save up to two days of rig time, valued at USD 400,000. Consequently, this solution will likely be applied to future injectors in this field.

HALLIBURTON