

Customized BaraXcel™ HP NAF Cleans Out Heavy Steel Cuttings During Deepwater Milling Operation

BAROID FLUID EFFECTIVELY REMOVES STEEL CUTTINGS, SAVING RIG TIME

OFFSHORE CAMPECHE, MEXICO

CHALLENGE

Provide a customized and cost-effective cleanout procedure for milling a window in 3-5/8-inch casing, which would generate 600 kg (1,323 lb) of heavy steel cuttings (approximately 7.85 SG) that normally would be difficult to remove without pumping costly high-viscosity pills

SOLUTION

- » BaraXcel™ HP NAF system with BAROLIFT® synthetic-fiber sweeping agent to further enhance carrying capacity without significantly altering BaraXcel fluid's rheological properties
- » DFG™ hydraulics modeling software to determine optimal properties for milling and cleanout procedures

RESULTS

Effectively removed steel cuttings without the need for high-viscosity pills, thus saving 3–4 hours of rig time and more than USD 500,000

OVERVIEW

In 2016, the subject well was initially drilled directionally to investigate three reservoirs in the Middle Miocene formation. Then it was drilled vertically, starting from inside the 3-5/8-inch casing until total depth (TD). It was necessary to mill a long section in the 3-5/8-inch casing to open the vertical window. This operation produced about 600 kg (1,323 lb) of steel cuttings, demanding a specific program and mud properties to ensure proper cleaning.

CHALLENGE

In similar cleanout operations, the customer's typical approach has been to pump high-viscosity pills (over 250 sec/sq funnel viscosity) to remove steel cuttings. For this particular operation, the cleanout task could be difficult, expensive, and time-consuming to achieve by using a conventional non-aqueous fluid (NAF) system.

SOLUTION

The Baroid team recommended the organophilic clay-free BaraXcel™ high-performance (HP) NAF system, which is designed to deliver excellent suspension and carrying capacity without generating excessive pressures in the wellbore. Baroid took advantage of the BaraXcel system's unique hole-cleaning properties to customize a solution for this cleanout procedure.

The optimal properties for milling and cleanout were determined, using the Baroid Drilling Fluids Graphics (DFG™) hydraulics modeling software. Multiple simulations were run to analyze the effects of different mud properties. These simulations verified that effective steel cleanout would be dependent on yield stress (τ_0).

The Baroid team proposed an engineered solution to obtain an optimized τ_0 value that would effectively remove heavy steel cuttings (7.85 SG on average). This solution prevented excessive pressure on the wellbore, and eliminated the high cost and hours needed to prepare high-viscosity pills.

**USD 500K
SAVED
IN RIG TIME**



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An engineered cleanout procedure, which included the identified optimal fluid properties and a sweep plan, was developed for this milling operation.

BAROLIFT® synthetic-fiber sweeping agent was added to the BaraXcel HP NAF to further enhance carrying capacity without significantly altering the rheological properties, resulting in low pressures while optimizing suspension characteristics. The BAROLIFT additive was especially helpful in maintaining good suspension in the large riser annulus.

RESULTS

The milling operation was successful. Approximately 600 kg (1,323 lb) of steel cuttings were removed. By eliminating the need to mix and pump high-viscosity pills, the operator saved 3–4 hours of rig time, valued at more than USD 500,000.

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