Operator Runs Casing to Bottom in Offshore Well, Saves 11 Days of Rig Time

PERFORMADRIL® WATER-BASED FLUID SYSTEM DELIVERS EXCELLENT SHALE INHIBITION

MIDDLE EAST

OVERVIEW

A major Middle East operator planned to drill its second well in this specific field. A challenging shale section in the intermediate interval had caused multiple problems on prior wells drilled with a competitor’s high-performance water-based mud (HPWBM) system, including extensive back-reaming, hole pack-offs, and multiple cleanout runs, which increased overall well costs.

Due to the extreme mechanical instability of the shale sections, the primary objectives on the third well were to reduce exposure time to the fluid, run casing to bottom quickly without encountering tight spots, and ensure that all operations were conducted safely.

DRILLING THROUGH A DIFFICULT SHALE FORMATION

Offset data and past experience in country indicated that the primary challenge in the 16-inch interval was a shale formation containing a high percentage of kaolinite. Mechanical instability caused pack-offs and tight spots that obstructed casing running operations. The required directional trajectory through this section was a critical factor in fluid design.

ENGINEERED FLUID PROVIDES EXCELLENT SHALE INHIBITION

Based on extensive testing, Halliburton Baroid technical experts customized the PERFORMADRIL® HPWBM system to drill the troublesome section. X-ray diffraction analysis on shale samples provided by the client revealed that mixed layers were present with a high kaolinite content as the primary clay. The cation exchange capacity (CEC) was low, confirming that the shale was mechanically sensitive to water-based fluid invasion and was mostly dispersive. This type of shale is generally drilled with a non-aqueous fluid when the angles are above 35°.

The optimized 10.8-ppg formulation included two powerful components: 3 percent PERFORMATROL® and 3 percent (by volume) BaraSure™ W-674 shale stabilizers. A third key component was 3 percent (by volume) Latex 3000™ cement additive, which would help control equivalent circulating density (ECD).

The recommended formulation underwent a complete suite of shale testing, including capillary suction testing, linear swell metering, and testing for both shale erosion and shale integrity. Its lubricity performance was checked, as was its tolerance for solids and calcium contamination.
OPERATOR REDUCES TIME AND COST, MAXIMIZES ASSET VALUE

Using the PERFORMADRIL system in this section helped the operator achieve an average rate of penetration (ROP) of 43.7 fph – which was 62 percent higher than in the offset well. A total volume of 7,550 bbl was mixed for this well, which was approximately 30 percent less than the volume required on the offset well. Fluid costs decreased as a result.

The casing was run to total depth (TD) with no issues, saving 11 days compared to the offset well drilled with a competitor’s HPWBM system in the same field.

The PERFORMADRIL fluid optimization helped the operator save an estimated USD 1 million in overall cost. Due to this success, the operator awarded Baroid more wells to be drilled with the PERFORMADRIL system.

The PERFORMADRIL® HPWBM system helped increase ROP, lower fluid costs, and significantly decrease time for casing to reach bottom.

<table>
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<th>Drilling Fluid Performance Comparison</th>
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