DEEP WATER

CASE STUDY

BARADRIL-N® CT fluid yields effective deepwater coiled-tubing cleanout in one circulation

VERSATILE DRILL-IN FLUID REPLACES HIGH-VISCOSITY SWEEPS, SAVING OPERATOR TIME AND MONEY

GULF OF MEXICO

CHALLENGES

- Providing alternative to high-viscosity HEC sweeps for a deepwater cleanout
- Avoiding stuck coiled tubing in a deepwater cleanout, where low pump pressures were critical to success

SOLUTIONS

- Customize BARADRIL-N® CT drill-in fluid system to yield reliable shear thinning and suspension properties
- Utilize the already-in-use hydrate-inhibitive $CaBr_2/CaCl_2$ blend as the base fluid for the workover

RESULTS

- Successful cleanout with improved rate of penetration, lower pump pressures, and zero stuck-pipe incidents
- Single circulation of BARADRIL-N CT drill-in fluid system was effective, thus simplifying logistics
- Overall fluid costs were reduced by using a workover fluid already in use as the base fluid

OVERVIEW

A client had a deepwater well that was slated for abandonment but in need of intervention. The operator was seeking an alternative to high-viscosity sweeps, so Halliburton Baroid provided BARADRIL-N® coiled-tubing (CT) drill-in fluid system, and the resulting cleanout operation succeeded in a single circulation.

CHALLENGE: AVOIDING STUCK COILED TUBING IN A DEEPWATER CLEANOUT

In 2010, a deepwater well in the Gulf of Mexico that was slated for abandonment had several issues requiring intervention. Situated in waters 3,000 feet (914 meters) deep, the well had tubing full of trapped hydrocarbon fluid all the way to the wellhead, with a surface pressure of 7,337 psi and an expected reservoir pressure over 13,000 psi. The bottomhole temperature was 205°F (96°C), and the production tubing was sanded to approximately 1,000 feet (305 meters) above the screens at around 23,150 feet (7,056 meters).

A 12.2-ppg fluid treated for hydrate inhibition was required to kill the well and wash out the sand to surface. The operation would be performed with coiled tubing. The operator sought an alternative to high-viscosity sweeps using hydroxyethyl cellulose (HEC), which are effective in heavy brines for carrying solids out, but can create high pump pressures and will not provide static suspension. During previous HEC sweeps, pumping problems halted operations, which led to sand settling in the annulus. The coiled tubing became stuck, requiring a costly fishing job that lengthened the operation.

VERSATILE HYDRATE-INHIBITIVE DRILL-IN FLUID REPLACES HIGH-VISCOSITY SWEEPS

The most cost-effective hydrate-inhibitive fluid was a calcium bromide/calcium chloride ($CaBr_2/CaCl_2$) blend, which was already being used for the workover. The Baroid team engineered a solids-free BARADRIL-N CT fluid system, using the $CaBr_2/CaCl_2$ workover brine as the base fluid.

Using the BARADRIL-N® CT drill-in fluid system, the cleanout operation succeeded with an improved rate of penetration, lower pump pressures, and zero stuck-pipe incidents. Instead of multiple sweeps, achieving success with just one circulation of the BARADRIL-N system simplified logistics, and using the already-in-use workover fluid as the base fluid kept overall fluid costs low.

The BARADRIL-N CT system was customized in the laboratory with Baroid's polymer and starch technologies to yield reliable shear thinning and suspension properties. This allowed the fluid to be pumped at 1.5 bpm while washing down with the coiled tubing at 8 feet (2.4 meters) per minute all the way to the screens. The maximum pump pressure was approximately 9,000 psi. Once the tubing was cleaned out, injectivity was established and the zone could be squeezed with cement.

OPERATION ACHIEVES SUCCESS WITH A SINGLE FLUID, A SINGLE CIRCULATION

Using the BARADRIL-N CT drill-in fluid system, the cleanout operation succeeded with an improved rate of penetration, lower pump pressures, and zero stuck-pipe incidents.

Instead of multiple sweeps, just one circulation of the BARADRIL-N CT drill-in fluid system simplified logistics. The operator was also able to keep overall fluid costs low by using the $CaBr_2/CaCl_2$ workover fluid that was already in use as the base fluid.

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