

Customized Kill Mud Enables Operator to Abandon Well Ahead of Time, Saving USD 1 Million

NORTH SEA, U.K. SECTOR

CHALLENGES

- » Minimize ECD while working with collapsed tubing
- » Develop a low-solids/low-rheology kill-weight mud within a tight time frame

SOLUTION

Baroid recommended a high-density NaBr kill mud:

- » Brine-based kill mud reduced amount of solids needed to achieve target kill weight, and also reduced viscosity of final fluid
- » Low-solids fluid improved ECD control

RESULTS

- » Baroid designed and delivered kill-weight mud within 28-day window
- » Well killed and partially abandoned four days ahead of customer's plan, saving USD 1 million in rig costs

INFLUX AND TUBING COLLAPSE CALL FOR HIGH-DENSITY, LOW-SOLIDS KILL MUD

During a plug-and-abandon (P&A) operation on a workover rig in the North Sea, downhole pressures at 9,400 feet (2,865 meters) measured depth (MD) exceeded 80 percent of the 4.5-inch completion tubing collapse rating before the well was shut in. The annular pressure reached 3,045 psi (with no gas present), making it likely that the influx came from the Zechstein formation. The 2.7-inch outside-diameter (OD) drift hung up at a shallow depth, indicating that the completion tubing was deformed.

A low-solids/low-rheology 16.5-lb/gal kill-weight mud was required to help minimize equivalent circulating density (ECD) while working with the collapsed tubing.

HIGH-DENSITY BRINE MINIMIZES SOLIDS CONTENT, VISCOSITY, AND ECD

The Baroid team proposed a sodium bromide (NaBr) water-based mud (WBM) as the fluid system for the abandonment operation. The 12.4-lb/gal density of the NaBr brine decreased the amount of solids needed to achieve the target kill weight, and also reduced the viscosity of the final fluid. The 16.5-lb/gal kill weight was easily achievable and the low 22-lb/100 ft² yield point (YP) value did not exert excessive pressure on the collapsed casing/well.

BAROID DESIGNS AND DELIVERS CUSTOMIZED KILL MUD AHEAD OF SCHEDULE

Working within a tight 28-day deadline, Baroid lab personnel were able to design and fully test the NaBr mud system, providing a customized solution for the challenge. The fluid was then mixed in the liquid mud plant and shipped to the rig in specification and ready to use.

This rapid response saved valuable critical path time, allowing the customer to maintain its workover schedule without making costly changes. With the NaBr system, the operator was able to safely kill the well and partially abandon it four days ahead of schedule, saving USD 1 million in rig costs.



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