Inhibitive Seawater-Based Fluid Saves US$130,000 on Offshore Well

36 HOURS SAVED IN RIG TIME
OFFSHORE TABASCO, MEXICO

OVERVIEW
When planning the Tsimin 34 well, PEMEX wanted to optimize multiple aspects of the operation to help ensure a fast rate of penetration (ROP), no lost circulation incidents, and improved logistics related to mud mixing. The upper hole interval contained reactive clays, as well as clay matrix sections where the lost circulation risk was high while drilling and cementing. The initial mud density was 1.08 g/cc (9.0 ppg) and the maximum expected density was 1.14 g/cc (9.5 ppg) at 800 m true vertical depth (TVD).

CHALLENGE
Offset wells drilled with basic potassium chloride (KCl) fluids had encountered lost circulation, backreaming, stuck pipe, and torque and drag issues causing slow drill rates. The lost circulation incidents required large amounts of additional water for rebuilding the lost mud volumes; for the construction of mud, support vessels were needed to supply water and mixing assistance. PEMEX wanted to overcome these issues on the Tsimin 34 well by using a drilling fluid customized for these specific conditions.

SOLUTION
The Baroid team conducted extensive lab testing to develop an inhibitive fluid that could deliver reliable polymer performance at relatively elevated temperatures. Since water additions had become a problem in prior wells, the new fluid was seawater-based to ensure that an ample and economical supply of water was available. The inhibitive properties of the proposed fluid were tested by using formation samples to confirm the fluid’s ability to stabilize reactive clays.

Two additives were selected to help ensure that the seawater-based fluid would deliver the same or better inhibitive properties as the KCl fluid.

» EZ-MUD® shale stabilizer is a synthetic polymer, dispersed in a liquid carrier, that absorbs onto cuttings and clays on the borehole wall, which helps to prevent dispersion. It is readily soluble in fresh, brackish, or monovalent salt waters, and remains effective up to 300°F (149°C).

RESULT
The interval was drilled, cased, and cemented with zero incidents of stuck pipe or lost circulation, saving PEMEX 36 hours and US$130,000.
» CLAYSEAL® PLUS shale stabilizer is effective in seawater and high-salinity brines, and is suitable for use up to 400°F (204°C). It helps reduce the potential for bit balling and clay accretion on the drillstring, and also facilitates solids removal.

RESULT

When the engineered seawater-based fluid was implemented, the drilling performance exceeded expectations with no excessive torque and drag incidents or stuck pipe. Tripping and backreaming time were significantly reduced. The ROP was consistently higher when compared to offset wells. The system exhibited excellent hole-cleaning effectiveness, and no lost circulation events occurred.

Before the casing was run and cemented, bridging agents were added to the fluid to help seal off the fractures that might cause lost circulation. This treatment, based on engineered particle size distribution, was a success. There were zero losses during the casing and cementing operations.

Logistically, the use of seawater as the base fluid created many efficiencies and cost savings. Approximately 80 percent of the additives used to create the fluid system are in liquid form, which simplified mixing operations. The crews were able to prepare 40 m$^3$ of fluid in 20–30 minutes, due to the easy availability of the seawater and trouble-free blending of liquid additives. This approach also eliminated the need for support vessels to provide fresh water and mixing assistance.

All these optimization efforts combined to reduce rig time by 36 hours, for a savings of US$130,000.