



Drilling solution exceeds project's goals, reduces operational costs



An operator drilling an exploratory well in the Gulf of Mexico wanted to improve drilling performance over offset wells. Vibration issues in the Garden Banks field of the Wilcox reservoir had often led to tool failures and unplanned trips.

In an effort to improve drilling performance and reduce operational costs, Cobalt International Energy contracted Baker Hughes, a GE company (BHGE), to assist with drilling services, drill bits, and drilling fluids.

The operator needed to maintain a vertical hole with as little inclination as possible to fulfill the well objectives. Maintaining directional control (verticality) and vibration in the 26-in. section were key to the integrity of the well, planned to be drilled in excess of 30,000 ft (9144 m). The 26-in. section would drill through sediment, salt entry, and a salt formation.

Riserless drilling solution

Working in water depth of 4,566 ft (1391 m) with no riser between the drill ship and the sea floor, BHGE recommended a complete riserless drilling solution of a BHA comprising the

Kymera™ hybrid drill bit, AutoTrak™ rotary steerable system (RSS), the OnTrak™ integrated measurement-while-drilling/logging-while-drilling service, and the CoPilot™ real-time drilling optimization service.

The Kymera hybrid bit combines fixed cutter PDC and roller cone bit technologies into a single, patented design. It provided smoother drilling, superior torque management, and precise steerability in the 26-in. section.

Combining the OnTrak directional, gamma, and resistivity services and the AutoTrak near bit inclination helped avoid expensive remedial directional work, while the CoPilot service detected drilling problems for informed real-time decision making.

One run in 26-in. section

The operator also needed to keep the riserless drilling fluid near salt saturation to provide a gauge hole while drilling the salt section, known for extended fluid storage and transport issues. To address this, BHGE chose its USS-DKD supersaturated salt fluid system.

Results

- Drilled 26-in. section in one single run
- Maintained verticality during the entire section (an average of 0.17° inclination)
- Controlled vibration during the entire section
- Achieved a net ROP of 157 ft/hr for the section (three times higher compared to the offset wells)
- Drilled 1,274 ft of sediments with a net ROP of 219 ft/hr
- Drilled 1,586 ft of salt with a net ROP of 128 ft/hr

Challenges

- Deepwater well more than 30,000 ft in water depth of 4,566 ft
- Maintain directional control while drilling 26-in. section through sediment, salt entry, and salt formation
- Control vibration leading to frequent tool failures and unplanned trips
- Keep riserless drilling fluid near salt saturation to provide a gauge hole while drilling the salt section

USS-DKD is an ultrasaturated saltwater polymer mud used for dual gradient drilling in deepwater applications. It is considered ultrasaturated because of additives that allow the salt content to be carried higher than saturation. This allows the weighted fluid to be cut back with water to increase available volume in dynamic-kill-drilling scenarios.

The drilling solution drilled the 26-in. section in one single run, with an average of 0.17° verticality maintained during the entire section. BHGE achieved a net rate of penetration of 157 ft/hr (48 m/hr) for the section—three times higher ROP compared to the offset wells. A total of 1,274 ft (388 m) of sediments was drilled with a net ROP of 219 ft/hr (67 m/hr). A total of 1,586 ft (483 m) of salt was drilled with a net ROP of 128 ft/hr (39 m/hr). Vibration remained low during the entire section.

Significantly higher ROP than planned resulted in no additional trips or nonproductive time due to directional issues. This also resulted in lower volumes of the USS-DKD supersaturated salt system, which maintained excellent salt concentrations, solids suspension, and density.

The combination of services enabled the operator to successfully exceed all project goals and significantly reduce operational costs.



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