

RheGuard Fluid System Improves ROP in 2,472-m, High-Angle Interval Offshore Norway

North Sea debut validates flat rheology drilling fluid system as solution to narrow hydraulics window

CHALLENGE

- Improve drilling rates in high-angle, 2,472-m [8,110-ft] 12¼-in section offshore Norway.
- Minimize equivalent circulating density (ECD) and sag potential when running and cementing casing.

SOLUTION

Use the RheGuard* flat rheology drilling fluid system with the MicroBar* micronized weighting additive to enhance drillability while decreasing ECD and sag potential.

RESULTS

- Drilled intermediate section at higher-than-expected ROP.
- Cemented casing with minimal losses and full returns.



Drill intermediate section and minimize losses while running casing and liner

For drilling the 2,472-m [8,110-ft], 12¼-in section of its latest well in a mature field offshore Norway, an operator requested a drilling fluid that would minimize heavy losses when running and cementing 13½-in and 9½-in casing and liners. The deviated intermediate section was to be built from 5° to 67° and was originally planned to be 13½ in, but the operator chose to drill to section TD with a 12¼-in bit. Thus, properly managing ECD and reducing losses while running and cementing casing was a necessity.

Use RheGuard fluid to meet dual challenge

M-I SWACO, a Schlumberger company, suggested that the operator use the RheGuard system to help drill the challenging section. Engineered with rheological properties between a conventional invert emulsion-based mud and more specialized ultralow-ECD drilling fluids, the RheGuard system includes the MicroBar additive that enables the fluid to maintain a low rheology and reduce the risk of barite sag. Compared with API-grade conventional barite that can be up to 75 µm in size, the particle size of the MicroBar additive ranges from 5–8 µm to approximately 25 µm with a comparably higher surface area.

Delivered high-quality hole cleaning and high drilling rates

The RheGuard system exceeded all KPIs set by the operator. The system drilled the 12¼-in section with zero losses and demonstrated exceptional hole cleaning and overall stability. The average ROP throughout the interval was 16.3 m/h [53.5 ft/h], exceeding the target of 15.0 m/h [49.2 ft/h]. Average instantaneous ROP approached 27.1 m/h [88.7 ft/h] with a maximum instant ROP of 52.6 m/h [172.6 ft/h].

The fluid maintained low 6- and 3-rpm readings that contributed to reducing the ECD for improved tripping speeds with the casing run. The operation was completed with a cumulative loss of only 25 m³ [157 bbl]. The cement job was carried out with full returns, validating the minimal impact of ECD throughout the operation. The ability of the RheGuard system to minimize sag was demonstrated in a minimal mud-density reduction of 0.0355 relative density, compared with a KPI of 0.05 relative density, prior to running casing.

Using the RheGuard system with MicroBar additive enabled the operator to achieve an average instantaneous ROP of 27.05 m/h from kickoff to TD, exceeding the target average ROP by 80%. The maximum instant ROP achieved was 52.6 m/h.

