A major operator in the UAE planned to drill a slim hole sidetrack at 80° inclination though a limestone reservoir. During the well planning phase, high reservoir temperatures were identified, as well as high torque and drag, presenting significant challenges for the well. A review of offset wells indicated bottomhole assemblies (BHAs) were previously lost in hole due to the high torque and drag conditions. The operator had also experienced non-productive time (NPT) using a competitor's lubricant/fluids as a consequence of severe foaming, emulsions, and pressure fluctuations while drilling the reservoir section.

The main challenge of the 4¾-in. side track section was the elevated torque of over 5,000 ft/lb when drilling the 2,150-ft interval with 2⅞-in. drill pipe from the main wellbore to a final inclination of 80°. A high bottom hole static temperature (BHST) of 280° F was a further challenge for the biopolymer-based BaraDrilN fluid application. The section would be drilled and logged before completing the well.

**OVERVIEW**

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**CHALLENGE**

- Minimize drilling torque and drag in a 4¾-in. horizontal section
- Mitigate foaming tendencies experienced with competitor fluid and lubricant
- Prevent any incompatibilities with reservoir fluids

**SOLUTION**

Addition of 1% v/v BaraLube W-941 to BaraDrilN drilling fluid for:

- Enhanced lubricity
- Wellbore stability

**RESULTS**

- Achieved excellent wellbore stability, with no foaming tendency
- Reduced torque by 76%, compared to offset wells drilled with competitor's fluid and lubricant
- Increased ROP by 10%
- Experienced zero NPT

**EXTENSIVE FLUID QUALIFICATION TESTING IN BAROID LAB**

The Halliburton Baroid Technical Team performed extensive qualification testing to evaluate the performance of lubricants before use in this demanding application. The BaraLube® W-941 drilling lubricant proved compatible with formation fluids and exhibited a significant reduction in the coefficient of friction, with minimal foaming tendencies at 1% v/v addition. Results of the laboratory tests were shared with the operator and the lubricant was approved for deployment. The Baroid Operations Team also developed a comprehensive Design of Service (DOS), with an engineered 9.6 lb/gal BaraDrilN™ inclusive of BaraLube® W-941 for the high temperature conditions downhole.
SUCCESSFUL IMPLEMENTATION OF DRILLING FLUID AND LUBRICANT BLEND

The customized BaraDriIN with BaraLube W-941 was successfully deployed with notable improvement in drilling performance, compared to offset wells drilled. The BaraDriIN system was stable for 24 hours static during logging, with no changes to the rheology profile at 280° F. Torque was reduced by 76% and ROP was increased by 10% when compared to offsets drilled by a competitor’s fluid and lubricant combination. No NPT was experienced during drilling and completion operations. Based on the successful deployment of BaraDriIN with BaraLube W-941, Halliburton Baroid has subsequently been awarded further work in the field.

Torque comparison chart shows superior drilling performance of BaraLube W-941 over that of offset wells using competitor’s product solution.