SHALEDRIL™ Family of Water-Based Fluids

Shale Plays Meet Their Match: Customized Water-Based Fluids Sharpen Drilling Performance and Minimize Nonproductive Time

Challenge

Shale varies widely in mineral composition. With over 20 years of development in the shale basins, operators understand that best practices and lowering costs come from understanding local conditions. Tight economics govern many shale plays and may have little room for transport and disposal costs. These ancillary costs can account for up to 40% of total fluid costs. Water-based fluids could eliminate most of these ancillary costs but must overcome the challenge of wellbore stability and comparative drilling performance.

Solution

The SHALEDRIL™ family of water-based fluids helps operators maintain low costs while maximizing the production potential in each well. These fluids are formulated to specific formation characteristics of each shale basin. Laboratory analysis utilizing XRD (X-ray diffraction) of core lithology in the various shale plays coupled with operational fluid design testing allows Baroid to customize SHALEDRIL formulations for specific basins. These fluids offer maximum wellbore stability, improved efficiency, faster penetration rates, fewer trips, and reduced torque and drag. Avoiding the expense of cuttings handling and disposal is another solid benefit of SHALEDRIL water-based systems.

Benefits

- Maximum wellbore stability
- Minimize environmental impact
- Inhibition of highly reactive shale
- Improved lubricity
- Reduced fluid costs
- Customized to a specific shale formation

Features

All SHALEDRIL systems share features that help avoid NPT and make them a reliable while drilling, although the systems may vary in chemical composition:

- Effective up to 425°F with weights up to 17.5 lb/gal
- Stable rheological profile with minimal PV and shear strength after static aging
- Enhanced filtration control
- Robust contamination resistance
- Improved lubricity
- Operational ease of maintenance while drilling

Dealing with Delamination: SHALEDRIL F system

The mixed smectite and chlorite layers in the Fayetteville shale play require a highly inhibitive fluid that will help prevent delamination and sloughing problems. The clay-free SHALEDRIL F fluid seals the microfractures that lead to delamination. The glycol and potassium chemistry included in the formulation provide excellent inhibition without creating a burden on the drilling budget. The images below show the positive impact of using a customized SHALEDRIL F fluid.

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High Performance in High Temperatures: SHALEDRIL H System

The SHALEDRIL H system is specifically designed for the thermally-demanding Haynesville shale, where bottomhole temperatures often exceed 300°F (149°C). Typically, operators must default to oil-based fluid to drill hot wells, but the SHALEDRIL H system provides an environmentally friendly alternative that saves time during drilling.

- Enhanced ECD control with outstanding high-temperature rheological properties
- Tested up to 400°F (204°C) with weights up to 17.5 lbm/gal (2,097 kg/m³)
- Reduced dilution, low rheology and gel strength values, and high solids tolerance
- Minimal cuttings erosion
- Effective CO₂ resistance
- Excellent filtration control
- Impressive lubricity for high-solids fluid

On one Haynesville well, a bottomhole circulating temperature of 347°F (175°C) caused the operator to shut down repeatedly to cool downhole tools, but the SHALEDRIL-H fluid exhibited no adverse effects. The SHALEDRIL-H system was exposed to elevated levels of CO₂ throughout the well: rheology, gel strengths, and fluid loss remained stable.

Reducing Low-Gravity Solids: SHALEDRIL B

Older solids-control equipment in the Barnett area can mean a high rate of dilution, low-gravity solids, and increased torque and drag. SHALEDRIL B has outstanding tolerance for low-gravity solids, is able to tolerate contamination up to 10 percent, and is effective up to a weight of 16.0 lbm/gal (1,917 kg/m³). Its design allows it to be run with potassium-based products, enabling easier maintenance, and freshwater can be used for dilution.

- Gives stability to the microfractured, highly reactive and dispersible shale
- Can tolerate CO₂ contamination up to 250°F (121°C)
- High percent of fluid can be recovered

No Limits on Shale-Matching Chemistry: SHALEDRIL E

Extensive testing on shale samples and analysis of X-ray diffraction patterns led to the development of SHALEDRIL E, used in the troublesome Eagle Ford shale. This potassium/glycol formulation offers superior shale inhibition and excellent lubricity at elevated temperatures in extended lateral sections.