

## Case History

### High Performance Water-Based Fluid

## Engineered HYDRO-GUARD® High-Performance Water-Based Fluid and TORQ-TRIM® II Lubricant Saved Operator \$1.5M While Drilling 8½" Deviated Hole

Location: Egypt, Western Desert

**OPERATOR'S CHALLENGE** – Khalda, an Apache JV working in the Western Desert region of Egypt, planned to drill a deviated well with a 38 degree inclination in the Umbarka field. The required fluid hydrostatic pressure stabilizing the reactive shales resulted in a 3000 psi overbalance against the depleted 3700 psi reservoir sands pore pressure. Consequently, high torque and differential sticking was expected. The operator required a high-performance water-based fluid to replace the oil-based fluid used in the offset wells.

**HALLIBURTON'S SOLUTION** – Based on the field data submitted by the operator, Baroid engineers customized a formulation based on the offset data with intensive lab testing on side by side shale samples.

- HYDRO-GUARD® high-performance water-based fluid was recommended as an inhibitive solution for the reactive formation anticipated.
- BARO-TROL® PLUS shale stabilizer was also applied in order to minimize shale sloughing and swelling.
- Sized 40 ppb BARACARB® bridging material was engineered to effectively bridge across porous sands to minimize filtrate and whole mud invasion, filter cake build up, seepage loss, differential sticking and formation damage.
- TORQ-TRIM®II lubricant was introduced to decrease the torque while drilling.



*HYDRO-GUARD® fluid showed very good inhibition with reactive shale drilled in 8.5" section*

**ECONOMIC VALUE CREATED** – The successful application of HYDRO-GUARD fluid with BARACARB bridging material and TORQ-TRIM II lubricant at the optimized concentration ultimately helped achieve the drilling targets. No losses or differential sticking were encountered during drilling through the depleted reservoir. Moreover, the drilling torque was reduced by 25% at the same weight on bit by 15,000 lb compared with the offset wells. Electric logs were run successfully as per the planned program and a 7" liner was set as per casing design. Baroid's customized solution helped the operator run wire line logging without issue, and eliminating the need to make a dedicated trip with LWD (Log While Drilling) required in offset wells. In addition, replacing the oil-based fluid with customized high-performance water-based fluid resulted in reduced waste management costs. A total of \$1,500,000 in cost savings were realized on this challenging well.