UNCONVENTIONALS

CASE STUDY

Custom Water-Based Fluid Achieves New Drilling Record in Iraq's Rumaila Field

CUSTOMIZED FLUID SYSTEM SAVES 6.4 DAYS OF OPERATION

BASRA, IRAQ

CHALLENGE

To stabilize a wellbore's production section in a shale formation, as the instability of this section had been causing:

- Partial or total losses
- Flow of sulfurous water
- Significant change in pore pressure along the wellbore
- Tight hole and caving

SOLUTION

A customized KCl-polymer-BXR-L™ system to provide shale stabilization and fracture sealing

RESULTS

- Achieved drilling record of 27.3 days, saving 6.4 days relative to offset wells in the field
- Recorded no fluids-related NPT
- Eliminated previous problems related to wellbore instability, poor inhibition and hole cleaning

OVERVIEW

6.4 DAYS SAVED,
VALUED AT
USD 575,426

Challenging formation conditions in the Rumaila field in southern Iraq were causing significant difficulties for drilling and cementing operations, thus extending well delivery times and inflating well costs. Issues encountered were typical of the geology of the field:

- In the 12-1/4-inch section, severe to total drilling fluid losses commonly occurred in the fractured limestones of the Dammam and Hartha formations. Cementing operations were significantly impacted, making zonal isolation and well integrity difficult.
- In the 8-1/2-inch reservoir section, fractured, semi-reactive shales interbedded with limestones and sandstones in the Tanuma, Ahmadi, Nahr Umr and Zubair formations caused significant washouts, cavings and oversized cuttings. As a result, poor hole cleaning, debris accumulation, stuck pipe and extensive backreaming were necessary to maintain wellbore integrity. The operator challenged Baroid to provide a single fluid solution for the 12-1/4-inch and 8-1/2-inch sections that would reduce the risk of lost circulation and washouts, thus improving hole conditions and integrity of zonal isolation.

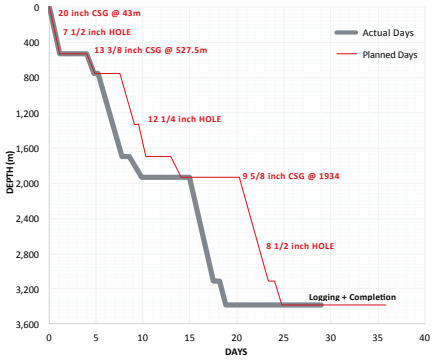

Figure 1 Drilling time chart

SOLUTION

Working in collaboration with other Halliburton product service lines, Baroid reviewed formation characteristics and drilling practices from offset well data to build a detailed picture of the challenges.

Baroid determined that a potassium chloride (KCl)-polymer-based system enhanced with BXR-L™ borehole stabilizer, a specialty product for shale stabilization and fracture sealing, provided the most optimum and robust solution. BXR-L stabilizer, a blend of natural hydrocarbons, is a liquid product that rapidly disperses in water-based fluids, providing an efficient base treatment for unstable shales and fractured formations. Using cuttings and cavings samples collected from the troublesome 8-1/2-inch shale intervals, comprehensive shale analysis techniques and testing were employed to determine the optimal amount of

The customer was extremely satisfied and commented on the economic impact created by Baroid.

polymer and KCl needed to stabilize and inhibit the formation. Analytical testing using X-ray diffraction (XRD) and scanning electron microscope (SEM) technology showed the presence of a heterogeneous mix of smectite, kaolinite and illite. Fine-tuning for the optimum blend of inhibition products was determined by capillary suction time (CST) testing.

Additionally, mud weight and rheology specifications for the drilling fluid were optimized to ensure full effectiveness for wellbore stabilization and hole cleaning. Lastly, drilling practices were collectively reviewed with the operator in order to agree on the best processes and procedures to follow during operations to ensure success.

RESULTS

Application of the optimized KCl-polymer-BXR-L system and drilling practices was an outstanding success. The well was delivered in a record 27.3 days, saving 6.4 days relative to offset wells in the field. No fluids-related nonproductive time (NPT) was recorded.

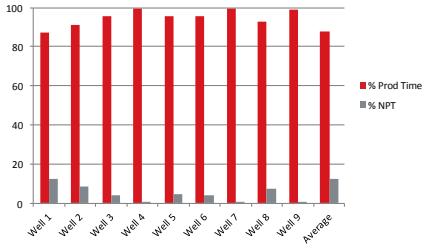

Figure 2 Post-performance review of wells drilled in the area

Relatively minor, manageable and acceptable fluid losses were encountered in the 12-1/4-inch section, which neither impeded drilling nor cementing operations – a significant improvement over earlier wells. For the 8-1/2-inch section, conditions were just as good and allowed for significantly improved logging operations, log quality and final well delivery. Previous problems related to wellbore instability, poor inhibition and hole cleaning were eliminated.

The customer was extremely satisfied and commented on the economic impact created by Baroid. Moreover, the customer determined that the optimized fluid solution and drilling practices would be implemented in future wells on the field.

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