Case History

Drill-In Fluids

BARADRIL-N® Drill-In Fluid System Helped Increase Production on Multilateral Horizontal Wells

Location: Western Siberia, Russia

OPERATOR’S CHALLENGE – As drilling costs increase, operators are looking to increase reservoir exposure while minimizing formation damage. The operator, LukOil Western Siberia, wanted to increase production by drilling multilateral horizontal wells in a depleted reservoir with a low pore pressure gradient. Although several wells had been drilled successfully with KCl/polymer fluids, the typical density around 1.1sg provided a substantial overbalance. The opportunity to minimize formation damage, due to solid and fluid invasion, called for a fluid with a density less than 1.0sg.

HALLIBURTON’S SOLUTION – BARADRIL-N® clay-free, acid soluble reservoir drilling fluid is designed to achieve maximum productivity. However, conventional BARADRIL-N fluids are based on water or brines and the minimum density which can be achieved is around 1.07sg, considerably higher than the requirements for this application. In response to this challenge, Halliburton Baroid developed a stable oil in water emulsion base using XP-07™ fluid. This was formulated into a BARADRIL-N drill-in fluid with a density of only 0.98sg. The customized low density BARADRIL-N fluid was applied successfully to drill three horizontal sections for a multilateral well.

Throughout the reservoir drilling phase the BARADRIL-N fluid properties were stable without fluid replacement. The fluid deposited an exceptionally thin filter cake and produced very low filtrate volumes. All tripping operations were performed without delays and the liners were run with no extra overpull or drag. In previous wells conventional BARADRIL-N fluids produced ECD values in excess of 1.2sg. The combination of the low fluid density and the emulsion base reduced ECD to less than 1.1sg:

- Fluid density 0.98sg
- ECD limited to 1.1sg
- PV 12 cP YP 19 lb/100ft2
- API filtrate 2.2ml
- The total length of horizontal sections was 1515m

ECONOMIC VALUE CREATED – The reduction of hydrostatic and ECD pressures together with an engineered bridging package proved to be very protective towards the formation. Well productivity improved by more than 30% from previous wells. Production rates were higher when compared to drilling three separate horizontal wells, and the cost per barrel of oil was reduced. The engineered BARADRIL-N system helped eliminate damage to the reservoir and provided excellent borehole stability. To date, 15 wells have been drilled successfully using this technology.