Efficient ECD Control to Aid in Extended Laterals in Frank Field
Location: Northeast Oklahoma

OPERATOR’S CHALLENGE – A major operator in Oklahoma began drilling horizontal wells in the Mississippi and Woodford formations in 2011. In 2013, their newest project began by attempting an Extended Reach Drilling (ERD) lateral in the Woodford formation, hoping to improve production numbers and lower overall drilling costs. Some of the challenges this operator faced included:
• Controlling Equivalent Circulating Density (ECD) and mud weights through the Mississippi formation
• Applying a fluid system that would provide sufficient hole cleaning properties
• Providing a solution for any possible torque and drag issues

Total well cost for this project was a key component as it would allow future projects with its success.

HALLIBURTON’S SOLUTION – Halliburton Baroid’s low solids, non-dispersed (LSND) system has proven successful in previous wells and was initially chosen due to highly reactive clays in the upper hole section of the wellbore. In addition, Baroid engineers used the Drilling Fluids Graphics (DFG™) software to optimize fluid properties and help control Equivalent Circulating Density (ECD) and lost circulation.

Normal procedure for ERD wells in this area has been to set 7” casing at 70 degrees through the curve. Once the 70 degree angle was reached on this first project, the operator made the decision to go in with a 12 ¾” hole opener and set the 9 5/8” casing. The casing was set with no issues and the project began drilling the 8 ¾” lateral.

ECD management was the key to minimizing severe loss circulation considering that this area is prone to loss circulation if mud weight exceeds 9.4 ppg or 9.7 ppg ECD. DFG software was used to simulate multiple scenarios daily to optimize hole cleaning capabilities, fluid properties / hydraulics and ECD management. Low end rheology were adjusted for efficient hole cleaning based on DFG results.

Prior to the completion on the well, torque issues were observed once the lateral hole passed midway, possibly as a result of rig equipment. The choice of lubricant was selected based on lubricity coefficient testing conducted at the Baroid Laboratory. Based on Baroid’s laboratory capability, customer was able to run the most cost effective lubricant with maximum results.

ECONOMIC VALUE CREATED – Using DFG software for effective ECD management and hole cleaning optimization, the operator was able to drill the longest lateral hole to date, exceeding 11,000 foot lateral hole section. Through the success of the DFG software application; the extensive knowledge of the Baroid technical team in this area; and the excellent laboratory support, the operator has been able to drill two additional successful ERD wells.