An operator in the North Caucasus Region of Russia was drilling an ultra deep (5,800 meters) High-Pressure/High-Temperature vertical exploratory well. During the fifth interval at 4,811m, the operator experienced lost circulation. The high mud weight of 2.15sg and high ECD values prompted the customer to engage Baroid to develop a solution to stop the lost circulation and allow successful drilling to the interval total depth (TD) of 4,820m. The operator also wanted to minimize the risk of additional lost circulation while cementing casing.

Baroid’s LCM pill recommendation, coupled with advanced hydraulics and lost circulation simulations from the DFG™ software helped the operator reduce mud losses by nearly 500 m³. Additionally, by stopping the mud losses and preventing further fractures, the operator was able to avoid approximately 15 days of non-productive time (NPT) and reduce overall costs of the well.
The Baroid team applied the LCM pill and effectively stopped the lost circulation in the fifth interval. The team was then able to shift focus to the cementing job. Baroid tech professionals recommended running Drilling Fluids Graphics (DFG™) software simulations prior to pumping cement in order to gain better insight into the fracture mud weight (FMW) and calculate the equivalent circulating density (ECD) for the cement job. The DFG™ simulations (Figure 2) predicted that lost circulation would occur at 2.188 sg. The operator had planned to pump cement at 12 L/sec, however this would result in additional losses. The lowest flow rate of 5 L/sec still produced ECD of 2.192 sg.

Figure 2: DFG™ Software Simulation

Based on Baroid’s recommendation, the operator decreased the cement flow rate from 12 L/sec to 5L/sec. The DrillAhead® Hydraulics Modeling within DFG™ software indicated that there would be slight increases to ECD (Figure 3) prior to the casing run. Though the newly simulated ECD values were slightly higher than the 2.188 sg fracture limit, the operator was able to cement and run casing with no further losses.
ECONOMIC VALUE CREATED

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