

## Digital Solutions

## Baroid Drilling Fluids Graphics (DFG™) software helps formulate proper weighted pill density to improve wellbore stability

Location: Northern United States

### Operator's Challenge

An operator in the Northern United States was drilling an 18,785-ft foot measured depth (MD), 7,528-ft true vertical depth (TVD) well in an area with historically high fluid losses and hole instability. The operator had already lost one well in the field and nearly lost a second well prior to switching fluid providers. The operator chose to engage Baroid to help develop a solution that would maintain wellbore stability in situations with very narrow mud weight windows.

### Halliburton's Solution

The Baroid team recommended a customized 13.8-ppg INVERMUL® fluid system with a background lost circulation material (LCM) treatment to help prevent fluid losses. Additionally, Baroid personnel utilized Drilling Fluids Graphics (DFG™) software to model equivalent circulating densities (ECD) and Surge and Swab pressures throughout the well. The simulations indicated a 1/2-lb window for mud weight with wellbore collapse likely if the weight dropped too low, and fractures and significant fluid losses predicted if the weight exceeded the 1/2-lb window.

The Baroid team used the DFG software Surge and Swab simulations (Fig. 1) to help formulate a 40-bbl weighted pill to spot throughout the curve. Average swab pressures were calculated to help design a pill with the proper weight to minimize pressure losses when tripping out of the hole, while also staying inside the fracture gradient to prevent induced losses.

DFG software was able to accurately model the behavior of the fluid and weighted pill while drilling and enabled the operator to continue without complications. This helped greatly reduce instances of wellbore instability and losses.

### Economic Value Created

Baroid's combination of DFG software simulations, customized INVERMUL fluid system with background LCM treatments, and weighted pill recommendation enabled the operator to avoid significant non-productive time and drill the well successfully. The operator's original plan called to drill the well in 48 days, and with the Baroid team's help, the operator was able to drill the well in 44 days. The 4-day reduction in drilling time helped the operator save approximately \$220,000, based on a \$55,000 operating day rate for the rig.

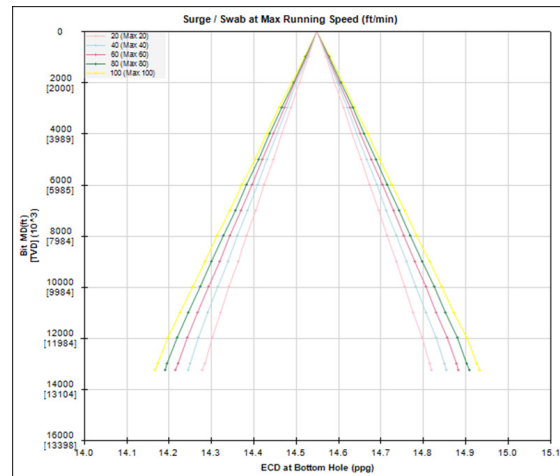


Fig. 1: DFG™ Software Surge and Swab Simulation