

Case study: North Sea

Dual GaugePro echo on-command digital reamers reduced rathole, drilled to TD in one run, saved 3 days

During a recent run in the Brage field, an operator faced issues with wellbore stability and equivalent circulating density (ECD) while drilling a 12¼-in. section in the Draupne formation. The formation is known to be unstable and can cause tight spots that pose risks for pulling the bottomhole assembly (BHA) out of hole or running casing down to desired depths. The planned total depth (TD) for the section was below the Draupne shale, where calcite stringers were present. This meant the length of the rathole had to be reduced to a minimum in order to successfully install the 10¼-in. casing. Exposure of the formation in the opened hole also had to be minimized to reduce the possibility of hole collapse.

Unfortunately, the placement of the underreamer above the measurement-while-drilling or logging-while-drilling tools would leave a 154-ft (50-m) long rathole and increase the risk of a poor casing cement job and hole stability problems in the section. Baker Hughes recommended the use of the GaugePro™ Echo on-command digital reamer, placed close to the bit, to eliminate the need for an additional rathole elimination run, removing the risks associated with it and saving rig time.

Baker Hughes built a BHA that included a secondary near-bit GaugePro Echo reamer directly behind the steering unit, with its cutter blades placed 33 ft (10 m) behind the bit, and the main GaugePro Echo reamer placed 105 ft (32 m) behind the bit.

In one run, the entire section was simultaneously drilled and underreamed to TD. The first 3,491 ft (1064 m) were drilled while simultaneously opening the hole to 13½-in. with the main underreamer. The remaining 233 ft (71 m) were drilled and reamed with both the main and the near-bit reamers activated. The rathole length was reduced to 33 ft (10 m) in the same drilling run, saving 3 days of rig time. The 10¼-in. liner was then run to the desired depth. Minimal vibrations were recorded in the interval where both reamers were activated and stick/slip was nominal. After the run, an inspection of the reamer blades showed good performance and little wear.

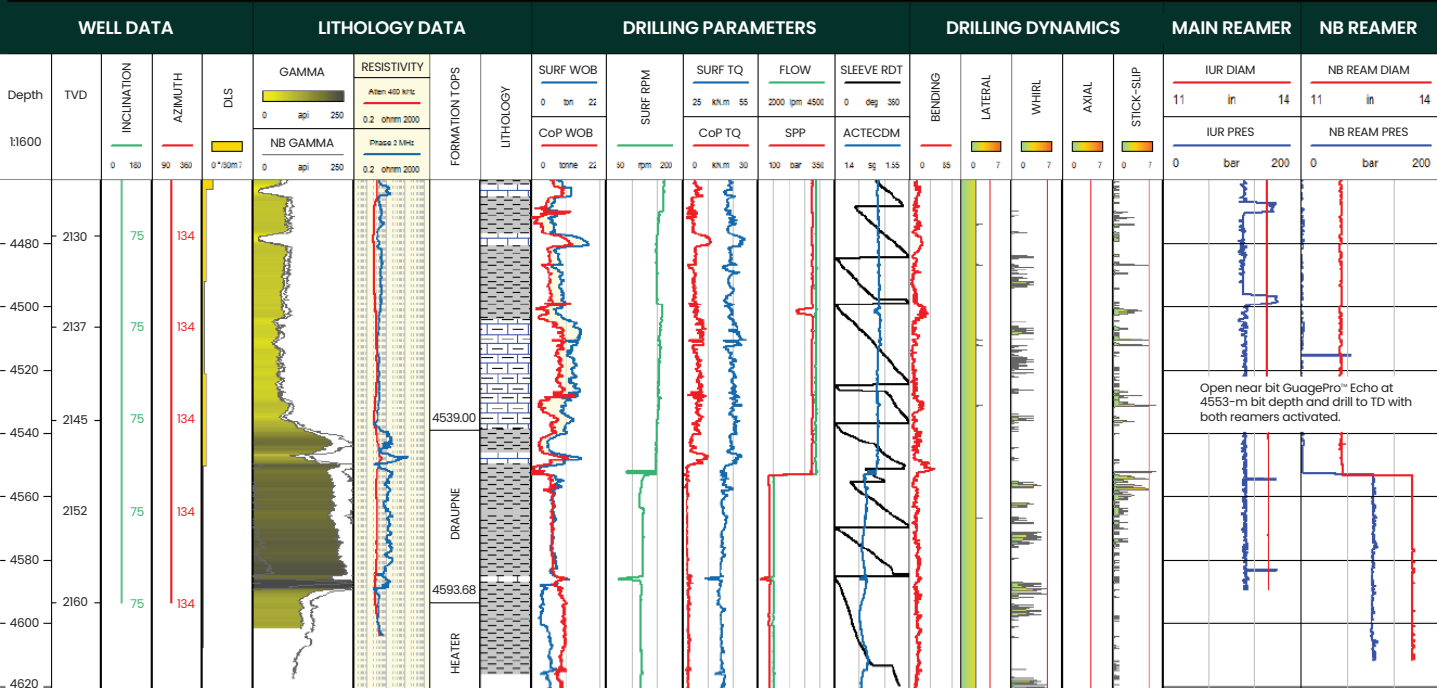
As a normal practice, operators using a near-bit reamer typically drill to TD with the main reamer activated, and then pull back to ream the rathole with the near-bit reamer. For the first time, the GaugePro Echo main and near-bit reamers were simultaneously activated while drilling and run in tandem to TD. This removed the need to pull back to open the rathole with the near-bit reamer after reaching TD. The main reamer stabilized the BHA while the near-bit reamer eliminated rathole and reduced downhole vibration. Simplification of the drilling and reaming operational workflow resulted in rig-time savings and superior drilling performance.

Challenges

- Unstable Draupne formation and casing program required underreaming operations
- Place the casing shoe as close to the reservoir top as possible

Results

- Saved 3 days of rig time
- Reduced rathole length to 33 ft (10 m)
- Saved additional 3 hours of rig time typically used to pull up BHA for rathole elimination
- Drilled 3,724 ft (1135 m) in one run, reaching TD at 14,177 ft (4621 m)
- Shortened exposure of unstable formation
- Drilled the last 233 ft (71 m) before TD with both reamers activated
- Stabilized BHA to minimize any vibrations
- Simplified drilling and reaming operational workflow



Dual GaugePro Echo reamers were activated to drill the last 233 ft (71 m) to TD, delivering superior drilling performance.