

NOV's along-string measurement tool helps confirm effective fluid barrier

Innovation in action

Total E&P Norge AS is developing a field that consists of an oil reservoir and several deeper, structurally complex, high-pressure gas and condensate reservoirs. The wells are being drilled with restricted pressure windows.

NOV has provided along-string measurements through high-speed wired drillpipe telemetry, resulting in an improved understanding of the environment along the entire hole. This real-time data enabled informed decision making and better control of the operation.

Technology

NOV provides real-time measurements from sensors embedded throughout the drillstring at regular intervals. Our **BlackStream™** along-string measurement (ASM) tools acquire temperature, annular and bore pressure, rotational velocity, and three-axis vibration data at high frequencies. The data is streamed to surface via our high-speed wired drillpipe telemetry network.

Performance

Our BlackStream ASM tools were used to monitor annular pressure trends while displacing well to completion fluid, providing Total E&P Norge AS with a real-time follow-up of displacement at the bottom of the well. The heavier fluid moved up along the annulus until a homogenous fluid column was established. Downhole temperature was also measured, enabling confirmation of the rheological model and an assessment of high-well temperature's effect on fluid.

Results

The operation confirmed the impact of downhole temperature on caesium formate fluid. When no other downhole measurement was available, data from the BlackStream ASM tools helped confirm that an effective fluid barrier was in place. This enabled Total E&P Norge AS to verify that safe conditions were indeed fulfilled prior to continuing with completion operations.

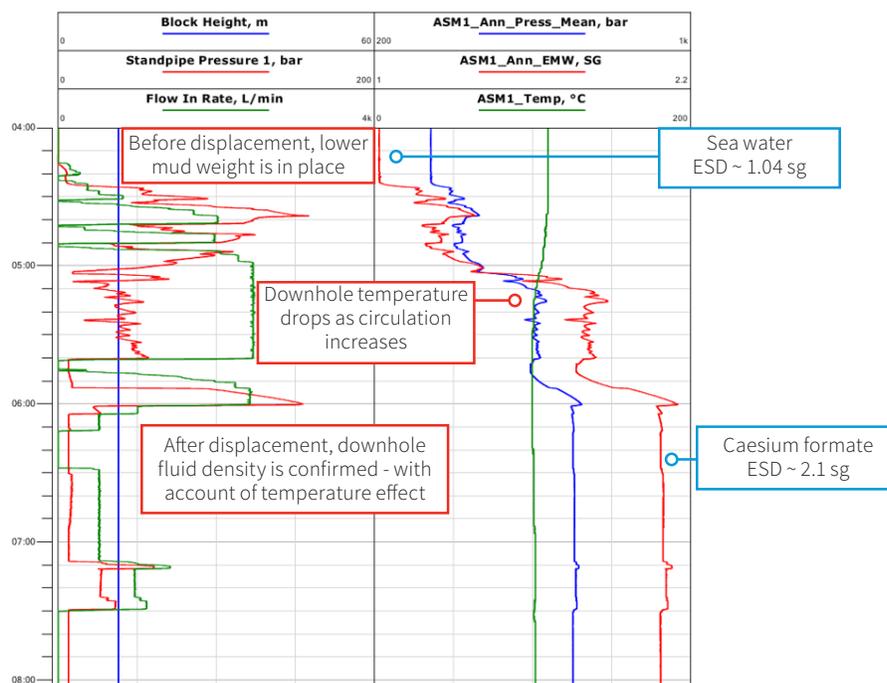


Figure 1 – This time-based log shows measurements acquired by the BlackStream ASM tool placed in the string. The annular pressure and equivalent mud weight were used to monitor fluid displacement, from a lighter to a heavier mud weight.