Case study: Gulf of Mexico, United States

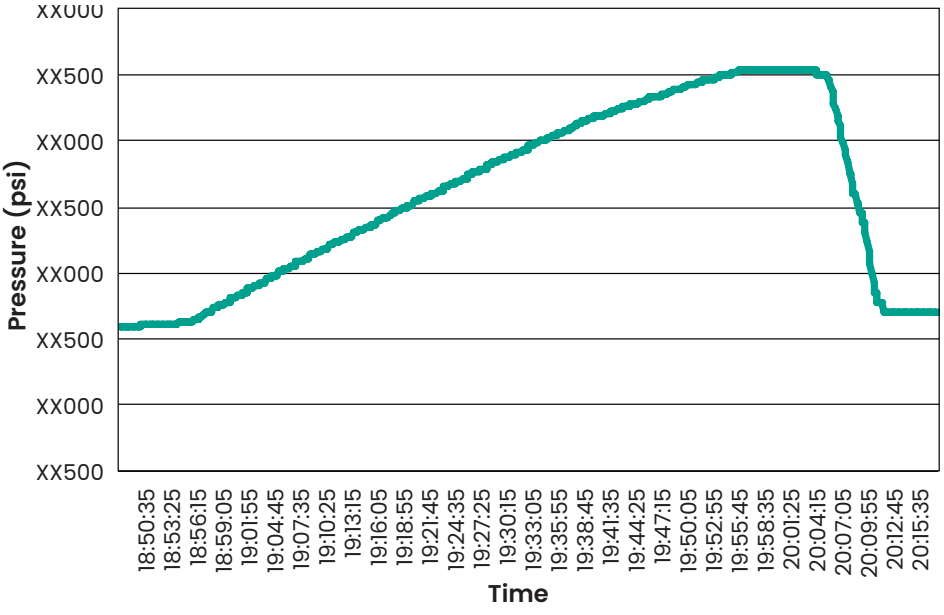
AccuFIT service delivered high-resolution downhole flow-off pressure data in real time for improved hydrostatic pressure management

In the Gulf of Mexico, an operator needed to drill a deep, deviated well in a challenging formation. Accurate leak-off testing and real-time monitoring of the hydrostatic pressure window were required to evaluate and maintain the necessary mud weight for well control purposes. The operator's main objective was to drill the well in a predefined number of BHA runs within a narrow hydrostatic pressure window and obtain all required logging-while-drilling (LWD) data in real time.

During the planning phase, Baker Hughes recommended the **AccuFIT™ real-time flow-off pressure data service** integrated with the **OnTrak™ service** tool's in-situ pressure sensors to monitor the downhole annular pressure during connections and conduct leak-off testing (LOT) and formation integrity testing (FIT).

To optimize reservoir navigation and improve borehole quality, Baker Hughes used the **AutoTrak G3™ rotary steerable system** to enable steering in the challenging formation and the **CoPilot™ drilling optimization service** to get a clear view of the downhole operating conditions in real time.

Other Baker Hughes LWD services included the **ZoneTrak™ G near-bit gamma-ray service** for early identification of formation changes, the **LithoTrak™ bulk density and neutron porosity service** to quantify hydrocarbons, the **TesTrak™ formation-pressure testing service** to identify reservoir fluids in real time using pressure-gradient analysis, and the **SoundTrak™ acoustic service** for accurate reservoir characterization.



Downhole flow-off annular pressure profile during leak-off test

Challenges

- Drill challenging formation in predefined number of BHA runs
- Accurately monitor narrow hydrostatic pressure window and perform leak-off tests in real time

Results

- Delivered accurate flow-off pressure measurements in real time
- Reduced risk of misinterpreted downhole pressure values based on surface measurements
- Monitored downhole annular pressure during connections to understand downhole flow-off pressure

Using a proprietary compressed data format, the AccuFIT service quickly obtained high-resolution downhole flow-off pressure profile data for LOTs and during connections.

The first 60-point dataset of the overall flow-off annular pressure profile was delivered automatically after the pumps began circulation, saving several minutes of downlink time. For further detail, subsequent 60-point datasets were sent at a high resolution of 10 seconds or higher, starting at the base of the ramp up. Each measured pressure point provided actual time and annular pressure information, calculated depth, total vertical depth (TVD), and equivalent static density (ESD) information.

The service's telemetry continued to send flow-off annular pressure datasets until the entire high-definition LOT and FIT was telemetered without interrupting normal measurement-while-drilling (MWD)/LWD operations. The compressed dataset reduced the telemetry time needed for the transmission of real-time measurements.

Real-time data transmission enabled the operator to quickly make informed pressure-related decisions during the drilling operation. The well was successfully drilled within the narrow hydrostatic pressure window and evaluated in the planned number of BHA runs.

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