Case History

Evolution Fluid Remains Stable, Drills HPHT Wells to 420°

Cooper Basin, Australia

Challenge:

An operator in the Cooper Basin with no unconventional High-Pressure High Temperature (HPHT) shale experience sought a reliable, robust drilling fluid capable of withstanding temperatures in excess of 420°F. Interested in a water-based solution, the operator asked Newpark about the capabilities of the Evolution system. Shortly before the project launched, the operator hired a consultancy company for advice about the well. The consultancy firm's experience with HPHT well was with oil-based fluid. Therefore, the consultancy firm recommended an oil-based fluid.

Recommendation:

In order to be certain that a water-based solution was capable of withstanding the high bottomhole temperatures, the operator asked Newpark to formulate and test a fluid to specified requirements. Newpark tested various fluid formulations. The laboratory testing included pilot-testing and hot-roll aging tests. The HPHT Evolution results were presented to the client. The stability of the hot-rolled test results and the ability of the fluid to be reused from well to well convinced the client to use the Evolution fluid for the main production section.

Results:

The operator drilled a total of four vertical wells drilled with depths of between 3,495 m and 4,050 m. The bottom hole temperatures varied between 386°F and 421°F and the mud weights in the main production section were between 11.5 ppg and 13.0 ppg. On the first well, the intermediate section fluid was seamlessly converted to an Evolution system through premixes. The fluid was used in the production interval and then reused on subsequent production intervals.

The operator drilled the wells without any hitches and the drilling fluid showed remarkable consistency and predictable behavior over the 4 well period. On one of the wells, the well stood open without circulation for 5 days for logging. When the bit was run to bottom, no fill was found at the bottom of the well and the rheology had hardly changed from prior to the logging run, which is truly remarkable for such a high temperature, high-pressure environment.

The well campaign was a remarkable success with regards to the drilling fluid. The fluid properties were very stable at high temperatures and especially the gels were flat and non-regressive. The client appreciated the stable and predictable drilling fluid, remarking about it on many occasions, not believing that a water-based fluid can give such properties.