North Sea Operator Improves Cement Bonding to Achieve High Waterflood Injection Rates Near a Weak Shale Zone

CemFIT Shield system eliminates mud channeling by interacting with oil-based drilling fluid left after mud removal and improving isolation across the shale.

To achieve waterflood isolation requirements in a well with mud removal constraints, a North Sea operator turned to an innovative technology that delivered competent, highly bonded cement.

Protect weak shale to enable waterflood
For a new injector well, a deviated 300-m (984-ft) well segment was drilled through the unconsolidated sandstone formation and the shale caprock formation using oil-based mud. Achieving competent cement isolation across the weak shale was critical to enable high-pressure water injection into the sandstone and achieve target production rates from the heavy oil reservoir.

Overcome mud removal challenges
The 9¾-in liner for the section was run with only one centralizer per joint to minimize torque and drag force to ensure the liner would reach TD. Previous experience with placing conventional Class G cement across the interval under similar constraints showed that challenges related to removing oil-based mud inhibit optimal cement bonding, often leaving permeable mud channels even after following industry best practices.

Interact with leftover drilling fluid
CemFIT Shield* mud-sealing cement system improves bonding by interacting with nonaqueous drilling fluid left on downhole wellbore surfaces after hole cleaning to limit channeling—without detrimental effects on slurry or set cement properties.

Deliver cement, log the well, test injection
A volume of 11 m³ (69 bbl) of CemFIT Shield system was mixed and continuously pumped into place without operational issues. A wireline ultrasonic imaging tool (USIT) log result showed highly competent, well-bonded cement across the 288-m (945-ft) cemented interval, including 63 m (207 ft) of highly bonded cement across the unconsolidated sandstone. The log showed no mud channels.

After the operator perforated the sandstone, an injectivity test verified water injection at the desired high pressure to optimize the waterflood.