

Case study: Offshore deepwater, Brazil

DELTAFLOW drill-in fluid optimizes liner placement in extended lateral, saving \$150,000 USD in displacement and rig time

The operator planned to drill a high-inclination production well at a water depth of 835 m (2,740 ft) in the Marlim Sul field in the Campos Basin, offshore Brazil. The lithology profile of this well combined shale intervals and high-porosity, unconsolidated sandstone intercalations. Because Marlim Sul is a mature field with depleted pore pressure, the resulting narrow operating pressure window increased the risk of lost circulation and poor wellbore cleanup in the horizontal section. The well was to be drilled in five sections, with the last section comprising a horizontal interval longer than 2,000 m (6,562 ft) and requiring a slotted liner as part of the completion.

Given the well trajectory, reactive formation profile, and selected completion model, the operator asked Baker Hughes to develop a specific drill-in fluid system that would ensure well integrity and lubricity.

Developing the optimal fluid solution

Baker Hughes proposed its **DELTAFLOW™ low-impact reservoir drill-in fluid**, a stable emulsion fluid designed to minimize rock-fluid interactions, avoid completion slot obstructions, and deliver high lubricity to reduce risks while positioning the slotted liner in the complex horizontal reservoir interval. This operation marked the first synthetic-based mud (SBM) application with this customer in Brazil.

The DELTAFLOW drill-in fluid was evaluated through a wide range of laboratory tests to assess if the

emulsion fluid system would remain stable through the liner positioning operation. The results demonstrated that the DELTAFLOW drill-in fluid preserved fluid integrity, showing no meaningful shifts in key properties and sustaining a robust, stable emulsion structure across the entire 28-day test window. Thanks to its flat rheology features, the DELTAFLOW drill-in fluid significantly reduced the risk of induced fractures and mud losses, resulting in lower risks and costs associated with nonproductive time (NPT).

Drilling the lateral per plan

The 8½-in. extended lateral section was drilled with the DELTAFLOW drill-in fluid, weighted with calcium carbonate mix to bridge the formation and provide minimum fluid invasion and formation damage. The maximum inclination was 90° and the mud weight was set at 9.31 lb/gal. The interval was drilled successfully with no mud-related NPT. The non-aqueous drill-in fluid allowed the liner to be positioned in the open hole without slot obstructions, fluid contamination, and surge/swab problems.

The DELTAFLOW drill-in fluid design demonstrated excellent flexibility and high lubricity. Other benefits included low rock/fluid interaction, minimal contamination and fluid interface problems, and improved control of the reactive formation. Additionally, the system delivered a low-pressure impact on the formation within the critical mud-weight window. This technology demonstrated remarkable performance with stable properties

Challenges

- Deepwater, high-inclination (90°) well
- Increased risks of poor wellbore clean up in horizontal section
- An extended horizontal interval with a length of more than 2,000 m

Results

- Reduced operational risks and improved well integrity during positioning of slotted liner
- Generated 60% less fluid interface
- Reduced displacement time and fluid contamination risks
- Avoided screen obstruction risks
- Saved four hours of rig time, equivalent to approximately \$150,000 USD

throughout the displacement, which, despite the low rheology profile used, helped minimize pump pressure and reduce wellbore stability risks.

The customer was highly satisfied with this first SBM application for their wells. The operation's success was a team achievement, with the operator providing critical inputs that the Baker Hughes fluid team used to evaluate the DELTAFLOW system.

This successful job, from the initial fluid design to best-in-class rig execution, highlighted the Baker Hughes team's commitment to quality and to delivering customer goals, even in complex projects. It also demonstrated how Baker Hughes fluid systems and products combine flexibility with high performance.



First

SBM deployment for the customer's well



Four

hours of rig-time savings



\$150K USD

savings



Avoided

screen obstruction risks



Zero

mud-related NPT

Baker Hughes 

Rewriting The Energy Equation™