

DELTA-TEQ system reduced downhole losses by 50% while running and cementing liners

A customer in the Norwegian sector of the North Sea needed to drill and navigate through complex geological formations and a low fracture gradient, where maintaining low equivalent circulating density (ECD) was essential in protecting the formation against excessive hydraulic pressure.

The **DELTA-TEQ™ low-impact, non-aqueous drilling fluid system** was chosen for the job because of its highly stable properties and ideal rheology for low hydraulic impact.

The DELTA-TEQ system was formulated to reduce hydraulic impact on the wellbore, minimize the delta between static and circulating density, protect against surges, and ensure that solids remain in suspension to avoid sag issues.

Traditional challenges in offset wells include a very narrow operating window, hole cleaning complications, and excessive downhole losses while running and cementing the liner.

The objectives for Baker Hughes, a GE company (BHGE), were:

- Deliver low ECD margins
- Minimize the risks associated with drilling a 7,874-ft (2,400-m) section through the overburden

- Successfully drill into a reservoir with a low fracture gradient, ranging from 14.99 – 14.56 lbm/gal (1.80 – 1.75 sg), and a complex geological formation

The DELTA-TEQ system was used to drill 8 ½-in. and 6-in. sections in a water depth of 1,358 ft (413.9 m) with a maximum inclination of 85° and a mud weight set at 13.2 lbm/gal (1.58 sg). Successful drilling intervals were recorded with no mud-related nonproductive time (NPT). The DELTA-TEQ system displayed remarkable performance with stable properties throughout all intervals. Despite the low rheology profile provided by the system, no barite sag or hole cleaning incidents were observed.

Additionally, the system delivered low pressure impact on the formation within the critical mud-weight window, minimizing risks throughout the 8 ½-in. and 6-in. sections, with an average range of 1.0 lbm/gal (0.12 sg) between ECD and equivalent static density (ESD). Total losses while cementing both 7-in. and 4 ½-in. liners were reduced more than 65%.

The low hydraulic impact of the DELTA-TEQ system reduced surge pressures against the formation which allowed the customer to successfully

Challenges

- Narrow operational window
- Highly deviated wells
- Uncertain geological information
- Excessive downhole losses during casing runs

Results

- Reduced pressure on the formation while drilling
- Lowered downhole surge pressures and ECD, downhole losses, NPT, and associated costs
- Preserved wellbore integrity by reducing pressure spikes
- Decreased time to run casing by reducing downhole losses

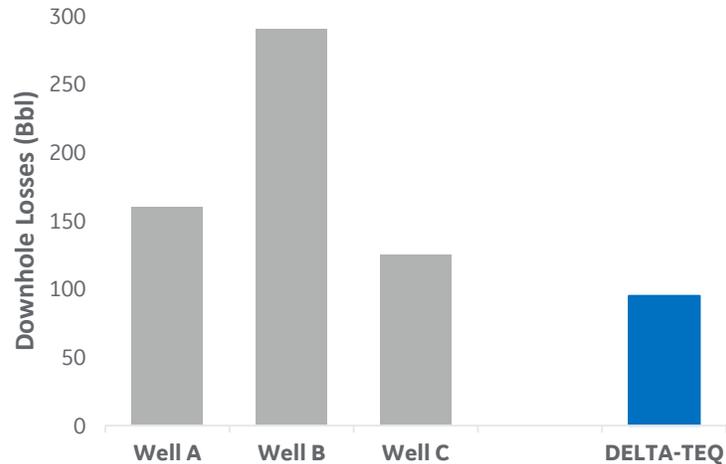




drill the well and cement 7-in. and 4½-in. liners in what they classified as one of their toughest wells drilled.

The DELTA-TEQ system balanced the hydraulic profile and improved the hole-cleaning ability, while adding flexibility to the customer's well design and drilling program. The fluid system enabled smooth operations across drilling, casing, and cementing segments of the well, and helped avoid downhole losses.

Performance Evaluation



Compared with averages in offset wells, the DELTA-TEQ system reduced downhole losses by 50%.