

Namibia

Specialized cement solution helps operator achieve objectives in exploration well

Tuned® Defense™ E cement spacer mitigates losses and iCem® cementing service provides accurate TOC estimate

CHALLENGE

- Losses while running liner
- No pre-job circulation performed because of severe losses before cement operation
- Accurate TOC estimate required immediately after cement operation

SOLUTION

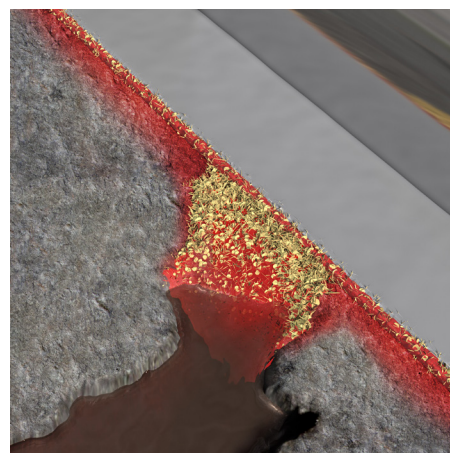
- Deployed Tuned® Defense™ E cement spacer for loss mitigation
- Estimated TOC with losses considered with iCem® service TOC Wizard

RESULT

- Successful completion and liner hanger expansion
- Achieved TOC despite partial losses observed during the operation
- Predicted accurate TOC above shallowest formation with iCem® service TOC Wizard
- CBL confirmed TOC prediction

Overview

Drilling exploration wells with estimated formation pore and fracture pressures presents a high risk of unexpected lost circulation. Engineers must simulate multiple downhole hydraulic scenarios to design an effective cement operation and prepare for contingencies. Accurate downhole pressure prediction and lost-circulation mitigation require consideration of all restrictions, which includes the liner hanger geometry, drill pipes, crossovers, and float valves. Considerations must also include accurate fluid rheologies, rates, densities, and centralization. Predictive technologies can significantly reduce risk and minimize expensive remedial work and rig time.



Challenge

While drilling an exploration well in Namibia, an operator aimed to cement the 9 5/8-in. liner string with the top of cement (TOC) at least 100 m above the shallowest sand for isolation.

While drilling, the operator encountered losses and used lost-circulation material (LCM) for mitigation. After control was regained, the liner was run in hole but losses resumed. To avoid further losses, the operator elected not to circulate the hole and condition the mud before the cement operation.

A cement bond log (CBL) was planned after the cement set to confirm TOC. However, an accurate TOC prediction immediately after the cement operation was required to guide decisions and proactively plan for potential remedial work to meet regulatory isolation requirements.

Solution

Halliburton proposed the Tuned® Defense™ E cement spacer to minimize losses, improve mud displacement, and achieve the planned TOC. A total of 100 bbl of 12.7-lbm/gal Tuned Defense E cement spacer was pumped ahead of the 248 bbl of 15.8-lbm/gal cement slurry. Displacement was performed with 12.2-lbm/gal synthetic-based mud at optimized rates.

To estimate the TOC before the CBL was run, Halliburton recommended the use of iCem® cementing service as part of post-job analysis. This proprietary software includes the TOC Wizard feature, which quickly performs a post-job evaluation calculation to predict TOC upon completion of the cement operation.

Result

The operation was executed and completed as planned. Positive results were observed, especially when the Tuned Defense E cement spacer turned around the shoe and lift pressure was observed at the end of the operation.

iCem service was used to estimate the TOC. The software considered fluids pumped, final lift pressure, and total losses observed during the operation. Because the exact depth of the loss zone was unknown, two estimation approaches were applied.

Scenario 1: TOC Wizard analysis without specific depth of losses estimated TOC at 3523 m MD.

Scenario 2: TOC analysis with specific depth of losses at (3200 m MD) estimated TOC at 3226 m MD.

The iCem® service predicted a TOC in the interval range of 3523 to 3226 m MD. Seven days after the operation, a CBL confirmed TOC at 3333 m MD, which was a close match to the iCem service estimate.

In a second well, the same approach was applied for the 9 5/8-liner section. The iCem service estimated TOC at 4219 m MD while the CBL measured it at 4190 m MD.

The operator was pleased with the Tuned Defense E spacer performance and the accuracy of the iCem service estimations and confirmed plans to use both in future wells.

For more information, contact your local Halliburton representative or visit us on the web at www.halliburton.com

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