

Case study: Mexico

Baker Hughes cementing solution restored lost circulation in a single trip, saved approximately \$500,000 USD

An operator in southern Mexico was drilling an offshore exploratory well when it discovered an area of constant gas flow with a very tight pore and fracture gradient window. The operator was forced to gradually increase the density of the drilling mud, leading to a total loss of circulation in that zone. They reached out to Baker Hughes for a cementing solution that would recover circulation of the well in the presence of high gas and density and restore zonal isolation.

Baker Hughes recommended the **SealBond™ Ultra cement spacer system**, combined with the **SealBond Ultra Plus additive** to restore lost circulation. The Sealbond family of cement spacer systems is designed to work in high permeable formations or formations with low fracture gradient. It creates a film barrier across formation walls via differential pressure, minimizing fluid leak-off to formation. In wells with critical fracture gradients, the SealBond system enables the use of standard slurry designs and densities where highly-extended or special lightweight slurries were previously required. This eliminates the need to compromise on thickening times and compressive strength. The performance of the SealBond Ultra Plus additive was used to further enhance the performance of the SealBond system, enabling a tight seal even in their highly permeable fractures. This technology is a proprietary coarse granular blend of 100% organic biodegradable material proven to seal permeable gaps up to 4 mm (4,000 microns).

Baker Hughes cementing engineers recommended pumping 70 bbl of Sealbond Ultra spacer system containing 20 lb/bbl of Sealbond Ultra Plus additive, followed by a slurry with excellent gas control properties to eliminate gas influx into the wellbore. During the execution of the cement job, partial circulation was observed once the cement exited the casing into the annulus, a good indication of the loss zone being sealed by the spacer.

The designed fluid systems were extensively modeled using Baker Hughes **CemMaster™ zonal isolation cementing software**, including the precision displacement module, to ensure effective mud removal and cement placement. At the conclusion of the cementing job, all pressure tests and cement bond logs showed excellent hydraulic seal after the first attempt, ensuring proper zonal isolation.

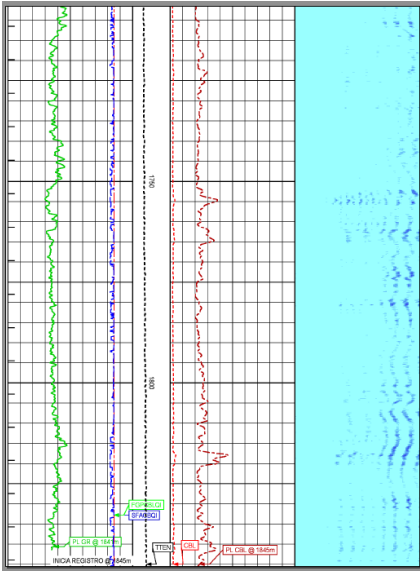
The operator was pleased that they were able to recover lost circulation in a single attempt, saving four rig days, and approximately \$500,000 USD. They were also able to forego remediation, eliminating workover squeeze jobs, realizing another \$60,000 USD in savings. Due to the success of the SealBond Ultra spacer system and SealBond Ultra Plus additive, the client is planning to use this combination in all of their wells with similar downhole conditions.

Challenges

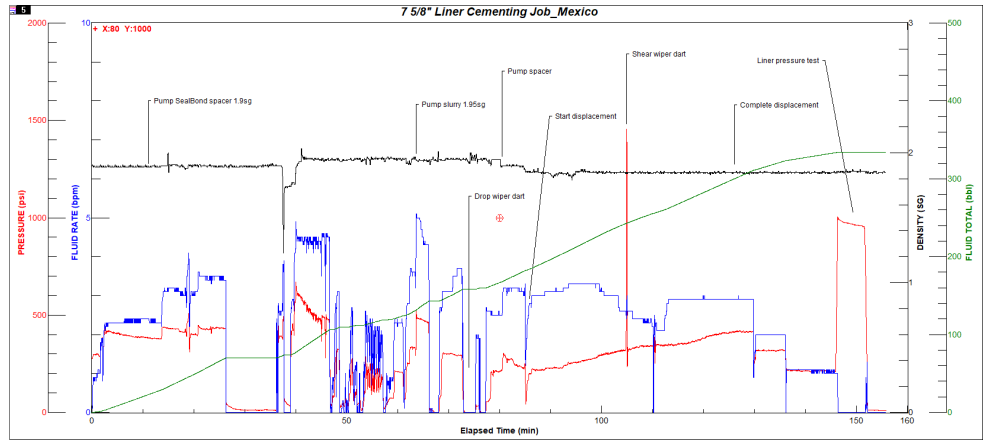
- Offshore exploratory well with limited formation data
- Continuous gas inflow zone
- Severe loss circulation during drilling
- Narrow pore and fracture pressure window
- Achieving zonal isolation for future fracturing operations

Results

- Restored zonal isolation in an area with very narrow pore and fracture pressures
- Recovered lost circulation in a single trip, saving four rig days and \$500,000 USD
- Avoided remediation costs, saving another potential \$60,000 USD



Cement bond log displaying effective zonal isolation at the zone of interest.



Job summary chart showing pressures, pump rate, fluid density and volumes pumped.