

Flexible, Self-Healing Cement Provides Pressure Seal and Prevents Cross Flow Downhole

CemFIT Heal system protects against hydrocarbon leaks and assures reduction of CO₂ footprint by eliminating remedial operations and associated unintended emissions

CemFIT Heal* flexible self-healing cement system enabled operator to seal leak and reduce pressure in the well to avoid underground cross flow.

Observed SCP conditions downhole

An operator in the Gulf of Mexico observed a well (Well 1) exhibiting sustained casing pressure (SCP) in its B annulus during the production phase. SCP could indicate that a downhole situation leading to an underground cross flow may develop or has already developed. When SCP is observed, operators are required to notify mineral management services (MMS).

What was tried first

For more than a month the operator performed lubricate and bleeding operations to control and mitigate the SCP with no success. This resulted in not just the HSE risk and monetary loss but additional unplanned greenhouse gas (GHG) emissions impacting the environment as well.

Eventually, it became possible to skid the rig from Well 2 to Well 1. At that time, the operator contacted Schlumberger. The operator could not clearly identify the zone that needed repair. Well evaluation revealed that a block-down squeeze at the 7⁵/₈-in top of liner was required to control the oil flow.

What Schlumberger recommended

Schlumberger recommended CemFIT Heal system to ensure well integrity from drilling to abandonment. As a fit-for-purpose solution, it provides a competent annular pressure seal and protects against hydrocarbon leaks and SCP at the wellhead.

With a wide range of application for density (10.7 lbm/galUS to 16.2 lbm/galUS) and temperature (70 degF to 280 degF) CemFIT Heal system is a robust, reliable, and affordable solution with premium performance. CemFIT Heal system is also a reduced-impact technology that minimizes carbon footprint. Due to heavy 15.2-lbm/galUS brine present in the well, a 16.1 lbm/galUS slurry design was used for this case.

What was achieved

Execution exceeded operator’s expectations, achieving a 95% accuracy that restored pumpability to a greater level than the minimum design volume specified.

After the job, the B annulus was bled down to 250 psi to activate any potential leaks. Both a spectral noise logging log and a circumferential acoustic scanning tool log were run to evaluate the condition of the well. Both methods reconfirmed good cement coverage across the interval, indicating likely isolation of the leak source and SCP in B annulus (Fig 1).

To complement all the evaluations performed, the B annulus was systematically monitored after the job. A constant pressure decline trend appeared over time, further confirming the self-healing nature of the system. About a week after the job, the operator handed the well back over to production.

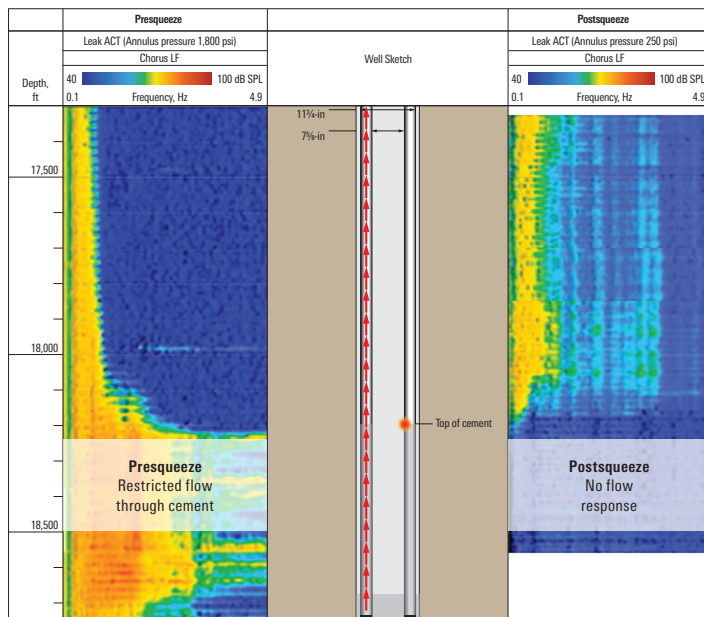


Fig 1. Comparison of logs before and after the CemFIT Heal system cement operation.