

North America

Corrosion-Resistant Cement Systems Achieve Zonal Isolation in CO₂ Storage Well

CorrosaLock™ and CorrosaCem™ cement systems successfully placed on production liner in CCUS well

CHALLENGES

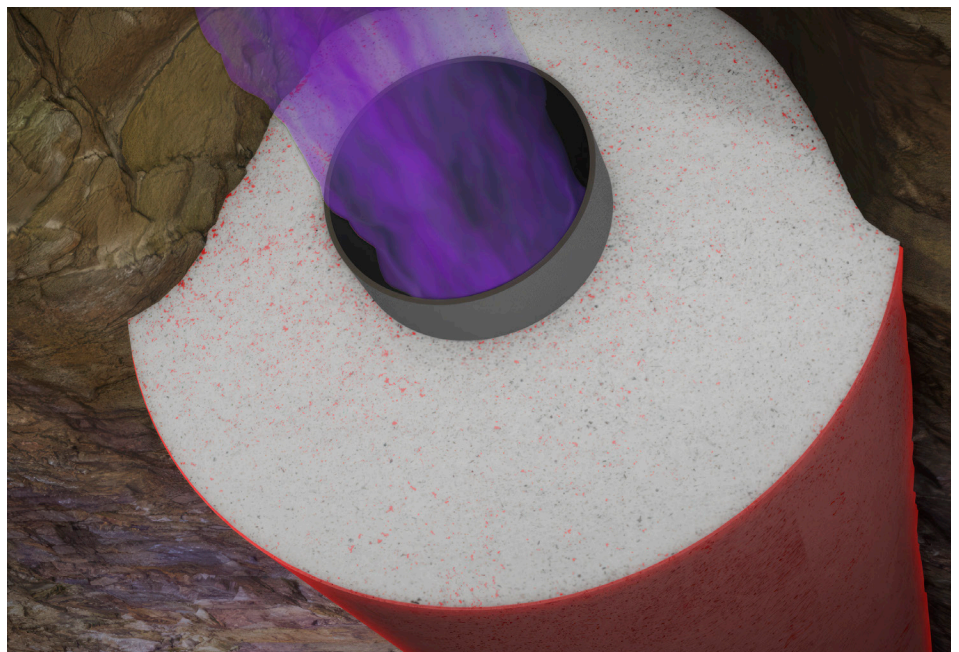
- Design and deploy cement barrier to ensure long-term integrity in CO₂-laden, corrosive environment.
- Achieve full coverage in wellbore where lost circulation is anticipated.

SOLUTION

- Deploy CorrosaLock™ cement system lead followed by CorrosaCem™ cement system tail.

RESULTS

- Achieved CO₂ corrosion-resistant barriers.
- Successfully placed CorrosaLock™ and CorrosaCem™ cement systems.
- Maintained full circulation throughout operation.



CorrosaLock™ cement system provides a significant permeability reduction and enhanced mechanical properties to enable superior corrosion resistance in CO₂ environments.

Overview

With the industry focus on a low-carbon future, carbon capture, utilization, and storage (CCUS) is a rapidly growing market. Regulatory bodies, such as the Environmental Protection Agency (EPA), require operators to fulfill specific and rigorous requirements to obtain permits for CCUS wells.

Challenge

An operator in North America required a CO₂ corrosion-resistant cement system to obtain a CCUS well permit. The primary purpose of this well is to



store the CO₂ captured from a nearby treating facility. The CO₂ is a natural byproduct from natural gas production of nearby wells. Injection of excess CO₂ back to the subsurface formation was planned. Because of a relatively low fracture gradient in the injection section, lost circulation also posed a challenge.

Solution

To address the corrosive nature of the injected stream, along with slim equivalent circulating density (ECD) margins, a relatively low-density/low-rheology 13.5-lbm/gal CorrosaLock™ cement system lead and 14-lbm/gal CorrosaCem™ cement system tail were deployed. The CorrosaLock corrosion-resistant system is a composite mixture of Portland-based cement and Wellock® resin additive. The resin component helps enhance the system's mechanical properties by increasing elasticity, which helps mitigate the effect of cyclic loading on the cement sheath. Inclusion of resin also reduces the permeability and porosity of the composite system, which enhances corrosion resistance. The CorrosaCem cement system is a reduced Portland system with cement replaced by supplementary cementitious materials (SCMs) that do not react with CO₂ to help improve CO₂ corrosion resistance. Additives to reduce permeability and further enhance corrosion resistance were also included. Additionally, CorrosaCem cement is designed with additives that enhance elasticity to help improve resistance to mechanical failure caused by cyclic injection operations.

Results

Full circulation was maintained throughout pumping and displacement operations. A total of 64 bbl of CorrosaLock cement lead and 60 bbl of CorrosaCem cement tail slurries were effectively placed over the entire length of the liner. Low-pressure and high-pressure liner top tests were successfully performed. Additionally, a successful negative test was performed. A cement bond log (CBL) verified the quality of the cement sheath behind the liner and confirmed excellent cement coverage throughout the wellbore.

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