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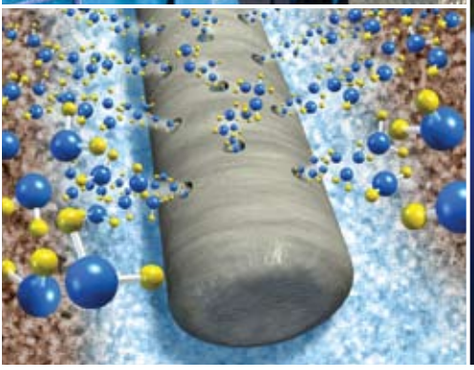

EverCRETE

CO_2-resistant cement for long-term zonal isolation

EverCRETE

EverCRETE technology resists CO_2 attack, which allows long-term underground storage of greenhouse gases.

An enduring solution to a growing global challenge

APPLICATIONS

- Carbon capture and storage wells
- EOR CO_2 injection wells
- Temperature ranges from 104 degF to 230 degF [40 degC to 110 degC]
- Density ranges from 12.5 lbm/USgal to 16 lbm/USgal [1,497 kg/m^3 to 1,917 kg/m^3]

EverCRETE* CO_2-resistant cement—the zonal isolation technology dedicated to CO_2 geological storage—provides an enduring solution to well leakage risks in carbon capture and storage (CCS) and CO_2 enhanced oil recovery (EOR) projects during injection, storage, monitoring, and after well abandonment.

CARBON CAPTURE AND STORAGE WELLS

Carbon dioxide (CO_2) is a greenhouse gas that is released into the atmosphere from burning fossil fuels and from power plant, iron and steel production plant, and natural gas separation plant emissions. With the increasing demand for energy, the concentration of CO_2 in the atmosphere is rising significantly. By capturing CO_2 at these major sources and injecting it into selected geological formations, CCS has the potential to make a critical difference in reducing the amount of CO_2 released into the atmosphere. CCS is also widely considered the most effective, safe, long-term, and low-cost CO_2 storage technology.

ENSURING WELL INTEGRITY—LONG TERM

One of the key requirements in CCS is long-term zonal isolation. Subsurface pressure and temperature changes can compromise the stability and integrity of a CO_2 injection well. Compromising well integrity can quickly lead to CO_2 leakage at the surface, putting containment at risk. That's why the cement sheath used in the wellbore must be exceptionally durable and able to maintain its integrity for hundreds of years.

EverCRETE CO_2-resistant cement, developed by the zonal isolation experts at Schlumberger, ensures lasting zonal isolation at subsurface well conditions. The long-term durability of the EverCRETE system was tested under simulated CO_2 injection/storage downhole

EverCRETE technology allows long-term, reliable well integrity in CO_2 injection/storage wells.

environments (temperature, pressure, wet supercritical CO_2, and water-saturated CO_2 fluids). In laboratory tests, the system proved highly resistant to CO_2 attack, with stable mechanical properties after exposure to CO_2 fluids at downhole conditions.

Portland cement has been used successfully for decades in oil and gas well cementing. However, such cements are thermodynamically unstable in CO_2-rich environments and tend to degrade once exposed to CO_2 in the presence of water. As CO_2-laden water diffuses into the cement matrix, the dissociated acid is free to react with the free calcium hydroxide and the calcium-silicate-hydrate gel. The reaction products are soluble and migrate out of the cement matrix. Eventually the compressive strength of the set cement decreases and its permeability and porosity increase, leading to loss of zonal isolation. For this reason, well integrity has been identified as the largest risk contributing to leakage of CO_2 from underground storage sites. Long-term isolation of CO_2 injection wells clearly needs to be improved to ensure well integrity and protect against leaks.

The EverCRETE cement system, which is 100% compatible with portland cement and can be used in combination with conventional portland cement slurries as lead or tail slurry, can be blended, mixed, and pumped using standard field equipment.

As fossil fuel demand continues to grow, durable EverCRETE CO_2-resistant cement will enhance zonal isolation of CO_2 injection, storage, and monitoring wells. The EverCRETE system reduces the risk of CO_2 degradation and leakage and can be used to cement new CO_2 injection wells or plug and abandon existing injection/production wells at the end of the project.

CO_2 ENHANCED OIL RECOVERY

CO_2 flooding technology is another process to reduce CO_2 emissions. This process involves pumping CO_2 into declining oil fields through an injection well, which forces the oil toward a production well where it rises to the surface. Some CO_2 EOR projects actually have the potential to become CCS projects in the near future, with the dual benefit of increased oil recovery and CO_2 underground storage.

Worldwide CO_2 capture and storage

Schlumberger is committed to supporting worldwide initiatives to capture and safely store CO_2 in geological formations. Our scientific research focuses on innovative technology development and testing to address the challenges raised by these initiatives. Our goal is to have a positive impact on the communities in which we operate.

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