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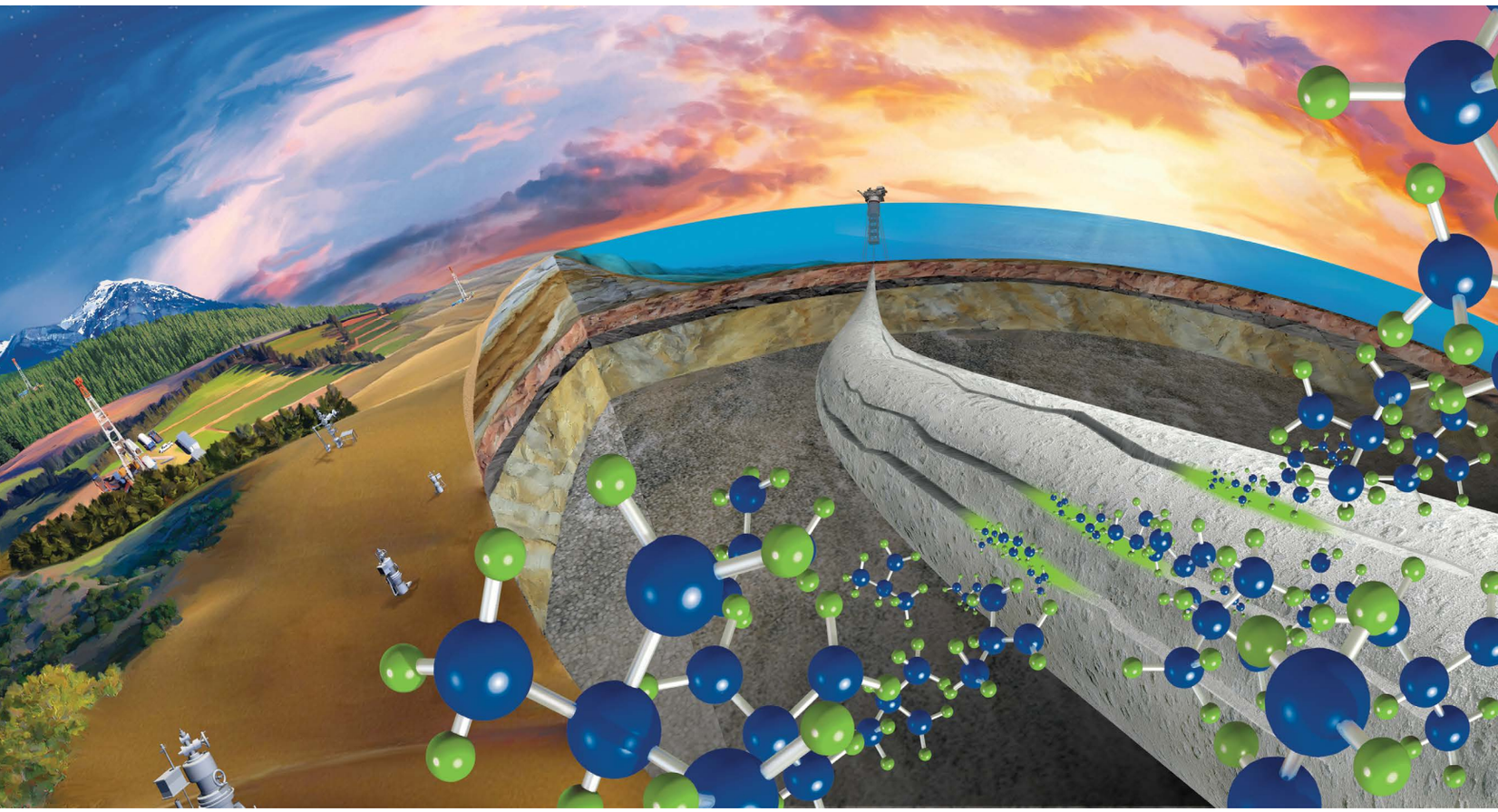


FUTUR

Self-healing cement system

From placement and production to abandonment and beyond, FUTUR self-healing cement reacts to hydrocarbons and repairs hydraulic seal integrity.

Block hydrocarbon migration in oil and gas wells

Upon contact with hydrocarbons, FUTUR* self-healing cement system reacts to close flow paths. Within hours, it repairs cracks and microannuli, restoring the cement sheath to its original strength and durability. Laboratory- and field-test results demonstrate this technology can restore a broken cement sheath's integrity when conventional cementing systems cannot.

Throughout the life cycle of a well, changes such as unexpected stresses can compromise hydraulic seal integrity. The resulting uncontrolled migration of hydrocarbons is an ongoing challenge during production and after abandonment. Sustained casing pressure and surface casing leaks, as well as crossflows that may occur downhole, can result in costly repairs, lost production, and even the loss of a well.

Conventional slurry designs and gas migration prevention tools are effective only during cement placement—before the cement sheath has cured. FUTUR self-healing cement technology provides continuous, long-term protection.

Help mitigate costly remediation

Achieving long-term zonal isolation is critical in the construction of safer, environmentally sound, and profitable oil and gas wells. FUTUR cement can extend the productive life of both oil and gas wells by helping eliminate remedial well costs.

Each year, millions of dollars are spent on remedial repairs relating to cement sheath failure. Despite modern advances in well construction processes and materials, a high percentage of wells throughout the world suffer from hydraulic seal failure, resulting in problems such as sustained casing pressure (SCP) or surface casing vent flow (SCVF). In Western Canada alone, there are detailed reports of more than 18,000 instances of SCVF that, in some cases, require shutting in wells and suspending production.

Respond to cement sheath stresses after setting

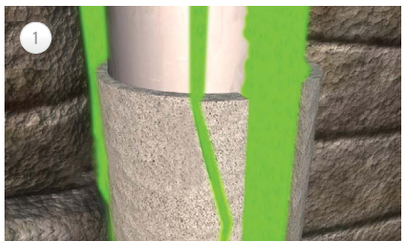
Conventional cementing methods cannot respond to damage or loss of hydraulic seal once the cement has set. FUTUR cement provides long-term zonal isolation with a material that has self-healing properties within the cement after it has set. This technology is designed for long-term durability of the cement sheath, as well as cement sheath repair without the need for expensive well intervention.

Damage to the cement sheath can be caused by unplanned events or operational changes that can occur during drilling, perforation and stimulation, and subsequent production, and even after abandonment. This innovative technology can be used in any primary cement job, in any part of the well where extra protection is needed against future degradation of the cement sheath caused by unplanned well stresses.

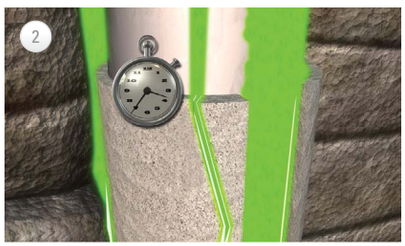
Apply advanced slurry with conventional equipment

With properties comparable to conventional cement systems, FUTUR cement can be pumped without special surface equipment as part of any primary casing or liner cementing operation.

How the FUTUR self-healing cement system works



Exposure to hydrocarbons initiates the self-healing response when and where it is needed.



The self-healing matrix reacts to create a complete hydraulic seal across the annulus.

The cement matrix remains active after the cement has set—for as long as there is cement in the annulus.

Applications

- Lead and tail systems used during primary cementing of any well section
- Oil, condensate, and gas wells
- Plug and abandonment operations
- Areas requiring enhanced protection against sustained casing pressure or surface casing vent flow

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