Preserving Cement Sheath Integrity for the Life of the Well
Suncor Energy uses FUTUR self-healing cement to mitigate risk of future gas leaks in Central Alberta Foothills

**CHALLENGE**
Reduce gas migration and resulting surface casing vent flow (SCVF) from shallow gas-bearing formations.

**SOLUTION**
Apply FUTUR* self-healing cement technology, which automatically closes cracks in the cement sheath when exposed to hydrocarbons.

**RESULTS**
Enhanced well integrity with no signs of pressure buildup or gas flows to surface after more than 3 years after cementing operations.

More than 3 years after implementation, the wells show no signs of pressure buildup in the annulus or at surface.

Surface casing leaks threaten well integrity
Suncor Energy frequently encounters shallow gas formations when drilling heavy-oil wells in the Central Alberta Foothills. Cement sheath damage or debonding can allow nuisance gas from these formations to migrate to surface, resulting in SCVF or sustained casing pressure (SCP). The presence of such flows can require a well to be shut in for remediation or abandoned altogether.

The issue is not unique to the Central Alberta Foothills region. There are thousands of wells in Central Europe, the Middle East, the US, and Canada that suffer SCP or SCVF. When the cement sheath is damaged and hydrocarbons begin to flow, confirming that damage or its location can be difficult. Actually fixing the damage in order to restore well integrity can be expensive or impractical.

FUTUR self-healing cement technology uses standard cementing equipment.
CASE STUDY: Suncor Energy uses FUTUR self-healing cement to mitigate risk of future gas leaks in Central Alberta Foothills

A gas shutoff test conducted at ambient temperatures and 21 MPa [3,000 psi] shows initial flow rate established using nitrogen gas, after which the system switched to natural gas. After 30 min, FUTUR self-healing cement technology reduced the flow to negligible quantities.

New cement technology preserves producing wells
Suncor Energy chose FUTUR self-healing cement technology to eliminate gas migration and SCVF in its Alberta wells. This technology provides long-term zonal isolation and prevents the flow of hydrocarbons through potential leak paths up and along the annulus. When the cement contacts hydrocarbons, its self-healing properties activate, healing cracks or fissures in the cement sheath and reestablishing the hydraulic seal. If the cement sheath is damaged again, FUTUR technology will continue to self-repair on multiple, independent occasions.

This responsive self-healing cement can be strategically placed behind any string of casing as part of normal primary cementing operations. FUTUR cement continues to work for the life of the cement sheath, reactivating when hydrocarbon leaks occur during production or after abandonment. The responsive material eliminates the need for well intervention by ensuring long-term protection and preventing costly repairs.

For the Suncor Energy wells, the slurry incorporating FUTUR cement was mixed using standard cementing equipment and procedures and was pumped just like standard cement. The cement design was adjusted for the anticipated well and drilling fluid conditions.

Tests confirm no annular or gas flow
More than 3 years after implementation, the wells showed no signs of pressure buildup in the annulus or at surface.