Combined Cementing Technologies Achieve Long-Term Zonal Isolation in MOL’s UGS Wells

Case study: Successful primary cementing prevents gas migration to surface in 44-well campaign in Hungary

Challenge
Control gas migration and ensure long-term zonal isolation across an underground gas storage (UGS) reservoir to withstand the stresses caused by gas storage cycles throughout the life of the well.

Solution
Used the D600G GASBLOK* gas migration control cement additive, in combination with CemNET* advanced fiber technology to control losses, FlexSTONE* advanced flexible cement technology, and AccuSET* broad temperature range engineered cement hydration control system to contain sustained casing pressure (SCP).

Results
Achieved long-term zonal isolation in 44-well campaign with no remedial cementing and no QHSE incidents.

SCP in UGS reservoir in Hungary
The Hungarian oil and gas group MOL, one of the largest corporations in Central Europe, converted the Szoreg reservoir in Hungary’s Algyo Basin to a UGS facility. Because there is evidence of SCP in other UGS fields in the area, MOL contacted Schlumberger for a solution to

- ensure long-term zonal isolation across the UGS reservoir to withstand the stresses caused by gas storage cycles
- bring cement to surface across the low-fracture-gradient formations
- control gas migration during cement setting.

Combination of technologies for primary cementing
The wells in this project included 34 vertical wells and 10 horizontal wells. The CemSTRESS® cement sheath stress analysis software was used to gain a better understanding of the stresses in the cement sheath through analyses of tensile strength, Young’s modulus, and expansion properties. The CemSTRESS analysis led to the selection of FlexSTONE cement technology as the most appropriate cementing system. Under the challenging conditions of the Szoreg reservoir, FlexSTONE cement system reduces the risk to zonal isolation by creating a robust cement sheath matched to the specific stress environment of the reservoir.
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The combination of Schlumberger services helped MOL achieve its goals, ensuring long-term zonal isolation across the UGS reservoir.

The D600G GASBLOK cement additive created an impermeable barrier that prevented gas migration into the cement slurry by improving cement bond to the casing and formation interfaces. When cementing casing, some of the cement can be lost into natural fractures, fissures, vugs, or highly porous zones even when the fracture pressure is not exceeded. CemNET advanced fiber cement was used in the lead slurry to cover low fracture gradient zones to ensure top of cement to surface. CemNET cement is composed of an inert, fibrous material capable of forming a network across the loss zone.

AccuSET smart cement hydration control technology was used to shorten compressive strength development time, a benefit in the horizontal wells where additional drilling occurred for the openhole completion.

**Long-term zonal isolation**

Zonal isolation was achieved on all 44 primary cementing jobs, preventing gas migration to surface and requiring no remedial cementing for cement to surface. The cement slurry’s short compressive strength development saved waiting-on-cement time. In addition, there were no QHSE incidents during the process. The success of this combination of services proved that this package can be deployed at any location to ensure safer, properly executed cementing jobs and long-term zonal isolation.