Slurry with CemNET Fibers Restores Lost Circulation

Case study: Lightweight cement ensures full returns for Norsk Hydro in low pressure formation

Challenge
Norsk Hydro’s Well 6407/7-A-4 experienced severe losses during drilling out after the primary cement job. Several lost circulation material (LCM) pills were pumped, but losses soon recurred.

Solution
On January 27, after 87 h spent trying to cure the losses with conventional methods, it was decided to pull out of hole with the BHA and use the running squeeze method to place a cement slurry incorporating CemNET LCM fibers.

Results
Slurry with CemNET fibers was successful when other loss control treatments had failed. Circulation losses were cured and full circulation was reestablished after the CemNET squeeze.

Severe losses during drilling out after primary cement job
Norsk Hydro’s Well 6407/7-A-4 experienced severe losses during drilling out after the primary cement job. The primary cement job had been conducted with a gas-tight cement slurry at 1.8 g/cm³. The job went as planned—the top plug was bumped and liner successfully pressure tested. The shoe track, plugs, float, and cement were then drilled out. However, after the ratheole was cleaned out and the hole was pulled out of above the 7-in liner shoe for circulating, losses occurred at 2 m³/h in static conditions and up to 16 m³/h at 200 L/min circulation.

Cementing

The mud log shows the pressure increase and immediate return of circulation when the CemNET slurry was squeezed in the open hole.

Circulation with full returns reestablished
Several LCM pills were pumped, but losses soon recurred. On January 27, after 87 h spent trying to cure the losses with conventional methods, it was decided to pull out of hole with the BHA and use the running squeeze method to place a cement slurry incorporating CemNET LCM fibers.

On January 29 at 03:30, the cement stinger was placed 159 m above the 7-in liner shoe and the cement line was pressure tested to 15 MPa. A pump test was performed to establish the final injection rate and pressure before 6.5 m³ of base oil, 8.5 m³
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CemNET fibers are inert, require no special handling, and can be readily dispersed in water-base fluids such as cement. The interlocking network that forms allows the cement to bridge and resume circulation.

of 1.66-g/cm³ WELLCLEAN II* spacer, and 7.3 m³ of 1.80-g/cm³ CemNET cement slurry were pumped. The cement was displaced with only a small volume, 1 m³ of spacer and mud. The base oil and 5.5 m³ of the spacer were displaced out of the stinger at 1,000 L/min and 17.5 MPa without any returns.

The pipe rams were closed and injection started at 200 L/min in the loss zone below the 7-in liner shoe. At 07:45, when the first cubic meter of CemNET slurry reached the loss zone in the open hole, the 100-kPa pressure increased to 1.4 MPa. Injection was stopped, the pressure bled down through the choke, and the pipe rams opened. At 07:52, the cement slurry remaining in the stinger was displaced out of the hole with the pump and pull method. Circulation losses were cured and full circulation was reestablished after the CemNET squeeze.

CemNET squeeze saves rig time

Following similarly good results with CemNET fibers for loss control in other Norsk Hydro installations, CemNET products are now part of a loss control contingency package for Norsk Hydro drilling operations. The effectiveness of the Norsk Hydro CemNET results is consistent with Schlumberger worldwide experience. The engineered CemNET fibers are much more efficient than traditional LCMs and are easy to handle and mix at the wellsite.

Compatible with most cementing systems and additives, CemNET advanced fiber is added during the cementing process to recover lost circulation. Because the inert fibrous material does not affect specified cement properties, no laboratory testing is required before CemNET fibers are added on the fly at the mixing tub. This compatibility enables adding CemNET additive to only the slurry portion that will be pumped to zones where losses are expected.

CemNET fibers are engineered to an optimal size for dispersion in the slurry. They create a physical network that allows the cement to bridge off zones with circulation losses, resulting in resumed cement circulation during the treatment. CemNET fibers added to a cementing program can save valuable rig time by stopping drilling fluid loss to the formation and bringing the top of the cement above the lost circulation zone.