Curing Mud Losses of 2,000 bbl in the Costero Field, Mexico

Team drills to TD and cements well without lost circulation using system of fibers and solids

**Challenge**
Reduce mud losses of 2,000 bbl [317.9 m³] for a carbonate formation in Mexico.

**Solution**
Use the Losseal® family of reinforced composite mat pills to create an impermeable grid of solids and fibers.

**Results**
Completely cured mud losses. Increased mud density, drilled to TD, and cemented well without any losses.

**Facing lost circulation in Mexico**
As one of the primary causes of nonproductive time (NPT), lost circulation is a major problem for operators in Mexico. Operating on behalf of PEMEX in the carbonate Costero field near Villahermosa, Mexico, Schlumberger Integrated Project Management (IPM) experienced oil-base mud (OBM) losses of 2,000 bbl in a 5-5/8-in [14.3-cm] hole. Casing was set at 18,963 ft [5,780 m], and losses occurred between 18,963 and 19,173 ft [5,780 and 5,844 m]. The operator attempted to reduce the mud density from 1.12 to 1.01 relative density, but a kick followed. The well stabilized at 0.97 relative density, but maintaining this density would not allow drilling into deeper formations.

Furthermore, little data was available about fracture width, density, and temperature after the losses. These complications, along with the high cost of OBM, prompted the IPM team to seek an alternative solution.

**Applying fiber system for lost circulation solution**
The Losseal fiber pill was selected to reduce mud losses. This system, applicable for natural fractures, includes a specially engineered pill that comprises fibers and solids, which creates an impermeable grid to stop mud from flowing through. It is pumpable through most of the BHA and does not require any special lab tests. The water-base pill was made compatible with the OBM through the use of surfactants.

Based on loss rate and temperature, the team determined optimal particle size for the Losseal system in the Costero well—a pill of 90 bbl [14.3 m³], with 2.9 lbm/bbl [8.3 kg/m³] of fibers and 217 lbm/bbl [620 kg/m³] of coarse, medium, and fine solids. The Losseal pill was placed as a balanced plug, and a squeeze pressure of 200 psi [1,378.95 kPa] was applied.

Without requiring a trip, the system created an impermeable grid that withstood the additional pressure generated by a mud density increase, as well as any additional pressure from future drilling or cementing operations. Also, the lack of chemical reaction from the Losseal pill minimized the risk of the BHA getting plugged.

**Curing losses through drilling and cementing phases**
Using the Losseal fiber pill, both static and dynamic losses were cured. The IPM team was able to increase mud density to 1.15 relative density without any losses and resumed drilling to TD. The subsequent cementing job was also completed without losses. And because no trip was needed, time was saved and risk was reduced.
CASE STUDY: IPM drills to TD and cements well without lost circulation using system of fibers and solids

Placement of the Losseal pill—the pressure fluctuations indicate the interaction of the pill and the loss zone, and the positive slope shows the Losseal pill plugging the lost circulation zone.