

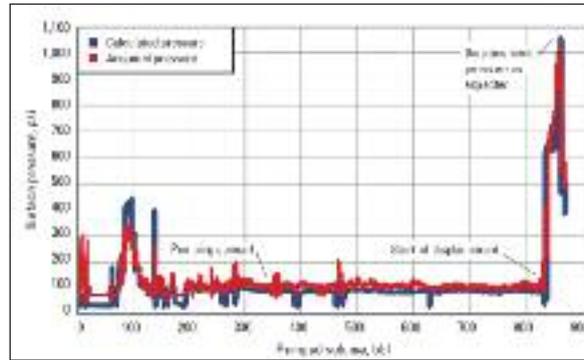
Engineered Solution for Lost Circulation

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Schlumberger is showcasing its Losseal family of reinforced composite mat pills, which are designed to reduce nonproductive time (NPT) caused by lost circulation during drilling and cementing operations. The pills are an engineered blend of fibers and optimally sized solids that create a strong impermeable grid to stop drilling or cementing fluids from flowing into permeable thief zones. The technology is suitable for a wide range of environments, including natural fractures, dolomite, and carbonate zones. It is suitable for deployment as a pill while drilling or in spacers ahead of cement slurries. The Losseal system can be designed to pump through bottomhole assembly nozzles as small as 10/32 in., eliminating the need to pull out of hole.

Traditional lost circulation fiber materials have often required information about fracture width for effective bridging and plugging. The Losseal design combines fibers with different mechanical properties and high solids content. This engineered design makes it less sensitive to fracture sizes because the particle size of the solids is optimized to plug the network fibers rather than the fractures themselves, so it can be applied effectively without the need for detailed formation measurements.

The Losseal pill is a combination of flexible and structural additives that can plug natural fracture formations and fissures with a fracture width ranging from 1 mm to 5 mm. It is normally applied to nonreservoir formations. Placement can be done in circulation mode, and experience indicates that 30 minutes of soaking time provides optimal and sustained plugging performance, especially if some squeeze pressure can be applied. It creates an im-



Fluid returns to seabed and matching pressure profiles confirmed structural well integrity on the deepwater cementing project. (Image courtesy of Schlumberger)

permeable grid strong enough to withstand additional pressure from mud or cement density increases and any future drilling or cementing operations.

An international oil and gas company encountered severe lost circulation problems while drilling a well in an unconsolidated, faulted formation in deep water offshore Malaysia. Drilling fluid was being lost through the unconsolidated and faulted zones in the tophole riserless section. After switching the fluid from seawater to heavier mud, no returns were observed at the seabed. The loss of fluid to the formation presented well construction cementing challenges because any fluid heavier than seawater could cause circulation losses and compromise the structure required to secure the BOP stack. Proper cementing was critical to ensuring that the casing and formation would support the weight of the wellhead, BOP, and riser. It also would allow the operator to drill the sub-

sequent hole sections.

After conventional methods of establishing full circulation proved to be ineffective, Schlumberger proposed Losseal W composite mat pills to plug the thief zones. In addition, CemNET advanced fiber technology to control losses was added to the DeepCRETE cement system. The DeepCRETE deepwater cement slurry reduces waiting-on-cement time because it isolates the formation and rapidly develops compressive strength, even in cold deepwater environments. The CemNET fiber additive is engineered to an optimal size for sealing loss zones. It is an inert, reticular material capable of forming a network across the loss zone. The use of this fiber additive eliminated the cost of excess cement that would otherwise have flowed into fractures, fissures, vugs, or highly porous zones.

Fluid returns to seabed and matching pressure profiles confirmed structural well integrity on the deepwater Malaysia cementing project. The job pressure profile showed that the final displacement pressure met expectations. The engineered fiber technologies had controlled fluid losses, and top-of-cement reached the desired depth despite the loss of circulation prior to cementing. The combination of engineered fiber-based technologies in the spacer and cement fluids enabled structural casing support to be achieved. The treatment saved thousands of barrels of fluid during placement and reduced NPT caused by lost circulation. Compared with similar wells that had failed due to lost circulation problems, the oil and gas company reduced drilling time and avoided at least two days of remedial cementing operations. To learn more about solutions to lost circulation, visit Schlumberger at booth 4441 or go to slb.com/lost-circulation. ■

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