



DEEP WATER



MATURE FIELDS



UNCONVENTIONALS

# SentinelCem™ Cement Cures Severe Losses in Malaysia

## THIXOTROPIC CEMENT SOLUTION HELPS CONTROL LOSSES ACROSS A LONG INTERMEDIATE SECTION OF UNIDENTIFIED THIEF ZONES IN AN OFFSHORE WELL

MALAYSIA

### CHALLENGE

- » Control severe losses and stabilize the well to finish section drilling
- » Minimize NPT and impact on drilling and production timeline

### SOLUTION

- » 12.5 lb/gal of SentinelCem™ cement placed through the BHA

### RESULT

- » Cured severe losses
- » Continued drilling well to planned TD
- » Reduced extra RIH for additional treatment, significantly reducing rig time
- » Saved operator USD 550,000

### OVERVIEW

Lost circulation is commonly encountered during drilling and cementing operations and can be a costly problem that increases nonproductive time (NPT). Various methods can be applied to help control losses, ranging from the application of operational best practices to the incorporation of lost-circulation materials (LCMs). Halliburton has achieved major success curing lost circulation globally with the introduction of SentinelCem™ cement.



### CHALLENGE

An operator experienced severe losses while drilling the intermediate section of an offshore well in Sarawak, Malaysia. Losses of 1,000 barrels per hour (bph) occurred, which conventional LCM mud pills were unable to address.

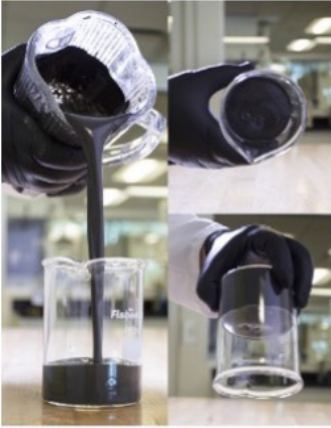
Losses were observed in a 17 1/2-in. section, drilled mainly through claystone formation with traces of sandstone, while pumping at 900 gal/min. A 140-lb/bbl LCM pill was spotted at total depth (TD) and soaked to help mitigate losses with no success. The most probable loss zone was suspected on a shallower interval, in a thick sandstone patch, close to the previous casing shoe. Two additional LCM pills (140 and 120 lb/bbl, respectively) were spotted and soaked with coarse formulation, also without success. Severe losses, an unknown thief zone depth, weather conditions, and a limited amount of mud on board risked impacting the entire drilling and completion timeline and well integrity.

### SOLUTION

Halliburton proposed the use of SentinelCem cement, a lost-circulation system designed to help mitigate severe losses, achieve zonal isolation, and enable further drilling. Because SentinelCem cement is a low-abrasion cement system, it can be pumped through the bottomhole assembly (BHA) without damage, a benefit that helps reduce overall time and costs. Rapid gel-strength development further reduces time by helping achieve early compressive strength and minimizing wait on cement (WOC) time.

A 12.5-lb/gal SentinelCem cement slurry was designed with an existing blend on the rig and was tailored to develop rapid gel strength once placed and left static in the fractured formation. The first SentinelCem cement treatment pumped through the BHA consisted of 20 bbl of Tuned® Defense™ cement spacer (TDCS) followed by 80 bbl of SentinelCem cement displaced with 10 bbl of TDCS and mud. The well remained static while being

## CASE STUDY



**Curing Losses >** SentinelCem™ cement's rapid static gel strength coupled with early compressive strength helps plug thief zones and mitigate lost circulation.

monitored on a trip tank and exhibited stable levels, a good sign of cured losses. After WOC time, reaching a compressive strength of 100 psi, the BHA was run in hole (RIH). Circulation was then applied while washing and reaming down until new dynamic losses of 150 bph were detected. A second SentinelCem cement treatment of 100 bbl was pumped. After 12 hours, the BHA was washed down to section TD with losses completely cured.

### RESULTS

After two effective SentinelCem cement treatments, severe downhole losses were completely cured, and the operator was able to continue drilling to section TD with no further losses. The casing run and cementing were successfully completed to meet the section objectives with full returns. The SentinelCem cement application cured losses in a challenging hole section with an unknown thief zone. The efficiency of SentinelCem cement in adverse and challenging operational conditions not only prevented a potential well-control situation, but also saved an estimated three days of offshore rig time and approximately USD 550,000.

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