

# Collaborative Solution Cures Total Losses for Offshore UAE Operator

## SENTINELCEM™ CEMENT AND HYDRO-PLUG® LCM OPEN A NEW WINDOW FOR EXTENDED-REACH DRILLING

UNITED ARAB EMIRATES

### CHALLENGE

Cure total lost circulation in a vugular dolomite/limestone formation

### SOLUTION

SentinelCem™ cement + HYDRO-PLUG® LCM combo treatment, which is designed to cure losses during drilling

### RESULTS

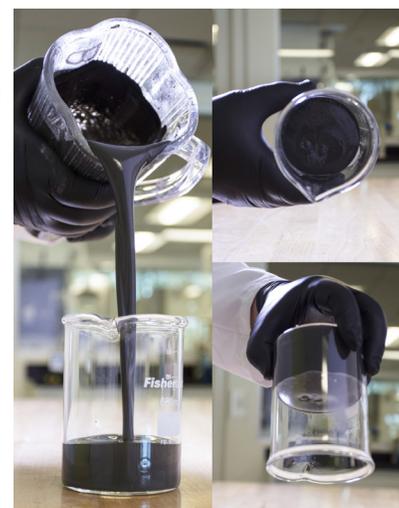
- » Cured static losses completely and reduced dynamic losses by 92 percent in the first treatment and by 99 percent in the second treatment
- » Continued drilling the well to its planned total depth
- » Enabled operator to achieve estimated cost savings of USD 930,000 per day

### OVERVIEW

The construction of multiple artificial islands as part of an integrated drilling service project is one of the most important and complex projects within the United Arab Emirates (UAE). Extended-reach drilling has been used to optimize the well architecture by increasing reservoir exposure and, ultimately, production. A major operator's well plan included a particularly challenging hole section with a large length of exposed vugular formation that involved a high risk of causing total losses. The 16-inch section was required to increase the inclination to almost 70 degrees, exposing more formation. The objective was to evaluate, plan, and execute a combined solution between the Halliburton Cementing and Baroid product service lines (PSLs) in order to overcome the scenario of incurring total losses while drilling – and to also reduce or eliminate non-productive time (NPT) on the rig, along with additional costs related to mud loss.

### CHALLENGE

While drilling an extended 16-inch hole section at a 70-degree inclination, the operator experienced total losses, which threatened the viability of the well. A heavily fractured and vugular dolomite/limestone formation caused the operator to lose oil-based mud at 800 bbl/hour dynamically and 230 bbl/hr statically. Several unsuccessful attempts to cure the losses with standard lost circulation materials (LCMs) resulted in 48 hours of rig time at a total cost of USD 360,000. Typically, the operator would switch to brine cap drilling with the high losses, but the inclination increased the risk of differential sticking and insufficient hole cleaning. On previous wells in the section, the operator spent numerous days attempting to cure the losses before resuming drilling. In some instances, the hole had to be abandoned, losing multiple days of rig time.



SentinelCem™ cement's enhanced thixotropic properties are shown in the laboratory.

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### SOLUTION

The operator's demanding losses required a collaborative approach between Cementing and Baroid to tailor the right solution. Local Halliburton experts recommended a combined solution of 100 bbl of 9.5 lb/gal HYDRO-PLUG® LCM (Baroid) and 100 bbl of 10.5 lb/gal SentinelCem™ cement (Cementing). The treatment was pumped through open-ended drillpipe.

For one operator, the combination treatment from Halliburton cured static losses completely and reduced dynamic losses by 92 percent in the first treatment and by 99 percent in the second treatment.

SentinelCem cement was designed to reduce the velocity while entering the formation. A second treatment was designed with an increased volume of SentinelCem cement (135 bbl) in the event the losses occurred again.

**Advantages of SentinelCem cement:**

- » Rapid gel strength development once fluid movement is reduced, thus stopping the losses and helping to achieve early compressive strength to minimize “waiting on cement” time

**Advantages of HYDRO-PLUG LCM:**

- » Contains a specialized hydratable polymer and a delayed reaction to control swelling, which allows for the treatment to be easily pumped through any drillstring and still be able to seal large subterranean apertures.

**RESULTS**

The first treatment was performed with 100 bbl of HYDRO-PLUG LCM, followed by 100 bbl of SentinelCem cement. After the treatment, the static losses were reduced to 0 bbl/hr and dynamic losses to 65 bbl/hr while washing down. After continued drilling, a new loss zone was encountered from 3,589 feet (1094 meters) to 4,235 feet (1291 meters). The losses in the new zone were 600 bbl/hr dynamically and 200 bbl/hr static.

A second treatment was pumped with 100 bbl of HYDRO-PLUG LCM, followed by 135 bbl of SentinelCem cement. The static losses after the treatment were reduced to 0 bbl/hr, and dynamic losses were reduced to 6–10 bbl/hr. The operator could then resume drilling successfully, and the section’s total depth (TD) was reached at 7,300 feet (2225 meters) with a 1,200 gal/min circulation rate.

The combination treatment from Halliburton cured static losses completely and reduced dynamic losses by 92 percent in the first treatment and by 99 percent in the second treatment. Savings for the operator were estimated to be USD 930,000 per day (USD 180,000 in rig costs and USD 750,000 related to mud losses).

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