



## Lost Circulation Materials

# Pills built with STOPPIT® and HYDRO-PLUG® lost circulation materials can cure total losses and prevent wellbore collapse

Location: Saudi Arabia

### Overview

An operator drilling in Saudi Arabia was seeking a solution to address lost circulation concerns in a particularly challenging area. The Shu'aiba and Wasia formations are especially well-known for their complexity and severe loss-circulation potential. The Shu'aiba formation comprises limestone, and the Wasia formation comprises unconsolidated sandstone with intercalated shale members. Wasia is a highly permeable formation that presents a severe-loss zone, as it also harbors a water aquifer. The Shu'aiba formation is a naturally fractured carbonate rock, and losing circulation at the top of it is a chronic problem.

The offset data indicated the following potential challenges:

- Severe to total losses in both the Wasia and Shu'aiba formations across the Saudi field
- Stuck pipe
- Potential borehole collapse, leading to loss of the hole section
- Lost circulation material (LCM) selection limited to the use of aquifer-friendly products

CHALLENGE	SOLUTION	RESULT
Two shallow formations notorious for severe lost circulation, with one formation containing a water aquifer that must be protected from contamination.	Combining two powerful, eco-friendly LCM materials in a pill formulation to help restore full circulation after total losses were encountered.	Two pills formulated with STOPPIT® and HYDRO-PLUG® LCM saved operator US\$50,000 and prevented hole collapse in highly unconsolidated formations.

### Solution

The Baroid in-country technical team discussed the lost-circulation challenges for these two formations and decided to combine engineered STOPPIT® LCM and hydratable HYDRO-PLUG® LCM to combat these losses. Both the HYDRO-PLUG and STOPPIT products are aquifer-friendly. The 17-in. hole section was drilled from 896 ft to 1,556 ft when total losses were encountered. A mud cap was pumped to maintain hydrostatic pressure while the LCM pill was mixed.

A 160-bbl pill was mixed containing the following LCM products:

- 60-ppb HYDRO-PLUG engineered composite material
- 50-ppb STOPPIT engineered composite material
- 30-ppb STEELSEAL® 100 sized resilient graphitic carbon
- 0.1-ppb BAROLIFT® synthetic fiber

This initial pill was pumped through the bit, which had one 16/32 and three 20/32 nozzles. A 55% regain in circulation was immediately observed. Drilling resumed from 1,556 ft to 1,571 ft without the use of a mud cap since the fluid level in the active pit could be maintained.

To further improve circulation volume, a second 160-bbl pill was mixed containing the following LCM products:

- 80-ppb HYDRO-PLUG engineered composite material
- 30-ppb STEELSEAL 100 sized resilient graphitic carbon
- 0.2-ppb BAROLIFT synthetic fiber

This pill was pumped at 1,571 ft and resulted in 90% returns. The fluid level could be maintained in the annulus. The remainder of the 17-in. hole was drilled to the next casing point at 2,645 ft with conventional LCM to prevent further losses. This hole section is prone to collapse when total losses occur, which further contributes to shale instability in the Wasia formation. However, no stuck pipe or hole stability issues were reported. These problems were averted by curing the losses with combined HYDRO-PLUG and STOPPIT LCM pill applications.

### **Economic Value Created**

Baroid's recommendation to pump STOPPIT and HYDRO-PLUG LCM pills helped save the operator US\$50,000. Additionally, preventing the loss of a hole section helped the operator avoid up to one month in lost time, valued at US\$1,800,000. Other issues often encountered on offset wells, including stuck pipe and difficult sidetracking operations, were also averted on this well.