**CHALLENGE**
Mitigate significant and costly lost circulation issues in high-perm, low-pressure sands

**SOLUTIONS**
- Identify optimal PSD for LCM treatment to seal existing microfractures and prevent induced fractures
- Use DFG™ software to match PSD to formation conditions
- Customize EZ-PLUG® LCM blend to target specific loss type

**RESULTS**
- Cured lost circulation issues after one treatment with EZ-PLUG LCM pill
- Saved 72 hours of rig time
- Eliminated need for replacement drilling fluid
- Saved operator USD 48,000 in rig time

** إيزي-بلوغ® مركبات خليط لعلاج التدفق المفقود من الأحجار العالية الجاذبية، حفظ 72 ساعة من وقت الريج**

**HIGH-PERM SANDS CAUSE LOST CIRCULATION, DELays ON OFFSET WELLS**
The operator wanted to avoid losses in a series of high-permeability sands that had severe lost circulation issues in previous wells. Costs on these wells had escalated due to days lost battling the losses, and to the replacement of mud volumes.

Selecting lost circulation material (LCM) with an effective particle size distribution (PSD) would be a key factor in preventing and/or minimizing any losses that might occur. A combination of LCM types would offer the best sealing results and help strengthen the wellbore against induced fractures.

**DFG™ MODELING IDENTIFIES OPTIMAL EZ-PLUG® LCM BLEND**
Baroid’s Drilling Fluids Graphics (DFG™) modeling software includes a module for optimizing PSD in LCM treatments. This module can calculate the width of a potential induced fracture and determine the correct LCM combination to efficiently prop and plug that fracture. On this well, the main objective was to increase the tangential stress in a near-wellbore area.

The Baroid technical team designed a pill to match the reservoir conditions, identifying a d50 PSD that would help cure expected seepage losses. The recommended formulation included both EZ-PLUG® LCM (an acid-soluble blend of particulates and fiber suitable for use in reservoirs) and a finely ground calcium carbonate. This treatment would seal microfractures and could be removed later during completion operations. The concentrations for the pill are shown below:

<table>
<thead>
<tr>
<th>Products</th>
<th>Concentration (lb/gal)</th>
</tr>
</thead>
<tbody>
<tr>
<td>CaCO₃ Fine</td>
<td>44</td>
</tr>
<tr>
<td>EZ-PLUG® LCM</td>
<td>40</td>
</tr>
</tbody>
</table>

The pill was spotted across the high-perm zone (~ 2,376 feet/724 meters) where a loss rate of 10 bbl/hr had been observed. The treatment was allowed to “soak” for six hours. Circulation and drilling were then resumed with no further indication of losses.

**CUSTOMIZED LCM PILL MITIGATES LOSSES, SAVING RIG TIME**
The successful application of the customized LCM pill saved 72 hours of rig time valued at USD 48,000, compared to time lost on offset wells while fighting lost circulation. The operator was also able to preserve the active volume of BARADRIL-N® reservoir drilling fluid, resulting in another reduction in overall well costs.

www.halliburton.com

Sales of Halliburton products and services will be in accord solely with the terms and conditions contained in the contract between Halliburton and the customer that is applicable to the sale.

H012702 10/17 © 2017 Halliburton. All Rights Reserved.