



## Lubricants

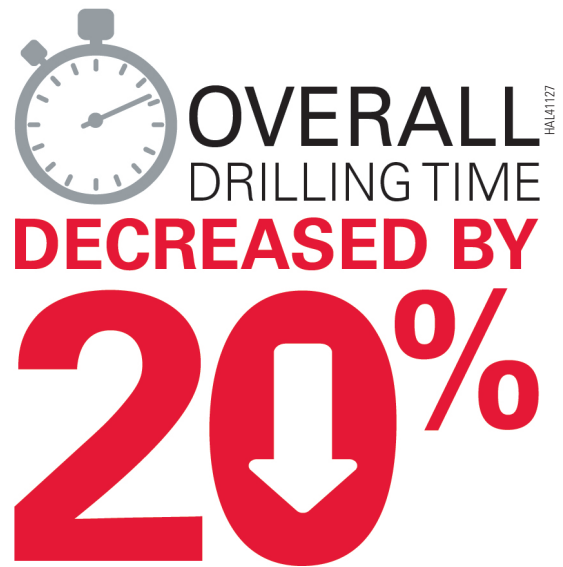
### DRIL-N-SLIDE™ lubricant eliminates bit balling and more than doubles rate of penetration

Lubricant stabilized reactive clay and decreased drilling time to normalize weight on bit

Location: Kurdistan, Iraq

#### Overview

While drilling the previous well in this field, the operator had encountered severe bit balling and accretion on the bottomhole assembly (BHA) due to reactive clay throughout the 24-in. interval. As a result, the rate of penetration (ROP) was very low (averaging 3.6 m/hr), and the operator had to apply significantly higher weight on bit (WOB) while drilling. The 11.2-ppg KCl/polymer, water-based fluid system needed additional treatment to overcome the reactive clay formation. While planning the next well, the operator requested a solution to the issues.



CHALLENGE	SOLUTION	RESULTS
<ul style="list-style-type: none"> <li>Severe bit balling and accretion on the BHA due to reactive clay was causing very low ROP</li> </ul>	<ul style="list-style-type: none"> <li>Apply a 3% to 5% concentration by volume of DRIL-N-SLIDE™ lubricant to help stabilize the clay and improve ROP, which would enable the operator to run a more normalized WOB while drilling</li> </ul>	<ul style="list-style-type: none"> <li>The average ROP for the 24-in. interval increased to 8.3 m/hr, approximately 120% faster than the previous well</li> <li>Bit balling became insignificant</li> <li>Overall drilling time decreased by 20% compared to the previous well</li> </ul>

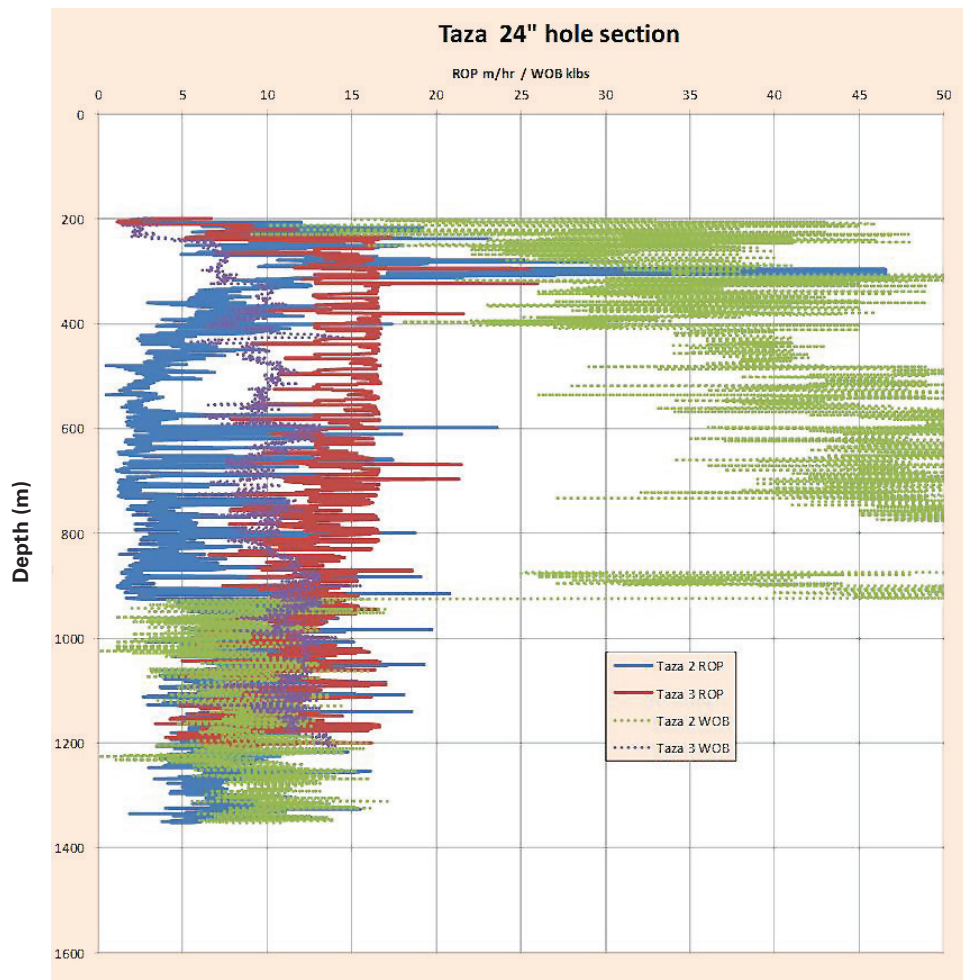
### Halliburton solution

The Baroid team developed a solution to overcome bit balling and related issues. Shale samples were tested to determine which additives would yield the most effective performance. The results indicated that the additive of DRIL-N-SLIDE™ lubricant would help stabilize the clay and improve ROP, which would enable the operator to drill the section without excessive WOB. The primary function of DRIL-N-SLIDE lubricant is to provide lubrication, but it also has an excellent track record as an ROP enhancer and shale stabilizer. The lubricant's shale inhibition properties minimize the effects of bit balling and accretion on the BHA.

### Economic value created

The DRIL-N-SLIDE treatment delivered immediate and dramatic improvement on the new well. The average ROP for the 24-in. interval increased to 8.3 m/hr, more than 120% faster than the previous well. The addition of DRIL-N-SLIDE lubricant to the mud formulation decreased overall drilling time by approximately 20%, compared to the previous well.

### Taza-2 vs. Taza-3 24-in. Hole Section



Comparison of ROP and WOB values on offset well vs. well drilled with a 3% to 5% concentration by volume of DRIL-N-SLIDE™ lubricant in the active mud system.