Substantial ROP increase accomplished with NOV tools

First combined run of a 6¾” FluidHammer and a 6½” Agitator™PLUS system outperformed the previous RSS run, achieving an ROP increase of 222%.

Challenge:
To drill the difficult 8½” section of the well with a competitive ROP while maintaining the tangent inclination of 17 degrees.

Solution:
Before running the FluidHammer and the Agitator™PLUS system combination, the directional company was drilling with an RSS that was POOH at 5,454 m MD after drilling only 60 m due to low ROP and high drag. In order to improve performance, the 6¾” FluidHammer, fitted with a 7/8 5.0 ERT™ power section and a 1.5° bend, was made up to the BHA along with a 6½” Agitator™PLUS system. From the beginning of the run, drilling time decreased dramatically, drilling with constant parameters (ROP: 6.6 m/hr | WOB: 4-8 Tonnes | RPM: 40 Rotary, 102 Motor | TQ: 7.5k–9 klbs/ft | GPM: 350). At 5,471 m MD, drilling parameters were changed in order to maximize performance, achieving an ROP of up to 7.5 m/hr until reaching 5,499 m MD. At 5,552 m MD, with an average ROP of 6.43 m/hr (Rotating: 6.7 m/hr | Sliding: 3.4 m/hr) and a total interval drilled of 98 m, drilling operations were stopped and well control operations were implemented to control the well.

The cretaceous formation drilled was composed mainly of a high-compressive strength limestone.

Results:
• 222% increase in ROP (6.43m/hr vs 2.00 m/hr) compared to the previous RSS run on the same section of the well.
• Improved weight transfer to the bit and decreased drag.

<table>
<thead>
<tr>
<th>Run</th>
<th>Bit Type</th>
<th>Depth in (m)</th>
<th>Interval Drilled (m)</th>
<th>Drive Type</th>
<th>Avg. WOB (tonnes)</th>
<th>Avg. ROP (m/hr)</th>
<th>Dull Grade</th>
</tr>
</thead>
<tbody>
<tr>
<td>Run 1</td>
<td>813</td>
<td>5394</td>
<td>60</td>
<td>RSS</td>
<td>10</td>
<td>2.00</td>
<td>1-1-LT-A-X-I-CT-PR</td>
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<tr>
<td>Run 2</td>
<td>813</td>
<td>5454</td>
<td>98</td>
<td>FluidHammer</td>
<td>9</td>
<td>6.43</td>
<td>1-0-WT-C-X-I-CT-HP</td>
</tr>
</tbody>
</table>

Fig 1. Performance of the 8½” section