Halliburton’s Hydra-Jet\textsuperscript{SM} TS Perforating application overcomes excessive formation damage and boosts anticipated production 313%.

Location: Ecuador, South America

Overview
Well C is an onshore, cased-hole, and perforated oil wellbore producing from a mature, high-permeability, sandstone reservoir located in the Ecuadorian rainforest. Well C was to be completed in two different sands. When Halliburton was called in, the well had already sustained disproportionate skin damage in Sand A. The damage had been caused by excessive barite-based mud invasion during the drilling stage. Based on experience from offset wells, conventional acid treatments proved unsuccessful in removing the mud skin. The operator approached Halliburton to provide alternatives for bypassing the near-wellbore damage in Sand A and perforating a new upper interval (Sand B). High fluid losses to the formation during the perforation stage posed additional reservoir challenges. Principally because of the depletion stage.

With the limiting factors mentioned above, reservoir engineers expected well production of no more than 400 to 600 BFPD applying conventional perforating techniques.

<table>
<thead>
<tr>
<th>Payzone Interval</th>
<th>Sand A</th>
<th>Sand B</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reservoir Pressure</td>
<td>2100 psi</td>
<td>2000 psi</td>
</tr>
<tr>
<td>Permeability</td>
<td>347 mD</td>
<td>50 mD</td>
</tr>
<tr>
<td>Porosity</td>
<td>17%</td>
<td>13%</td>
</tr>
<tr>
<td>BHT</td>
<td>215°F</td>
<td>212°F</td>
</tr>
</tbody>
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Halliburton recommended Hydra-Jet\textsuperscript{SM} perforating to improve operating flexibility, reduce job time, and significantly enhance health, safety and environmental (HSE) performance. The proposal consisted of sixteen stages of a 9.6 ppg abrasive fluid including Relative Permeability Modifier (to avoid excessive gel invasion) pumped through a 4.5” Hydra-Jet\textsuperscript{SM} TS Tool. The TS tool can last 10-40 times longer than other jets in the industry under the same flow velocity conditions.

Upon completion of the sixteen stages, Well C produced beyond the customer’s expectations in terms of total fluid production from both sands compared to offset wells. The pumping parameters behaved as simulated. No abrasive fluid was lost into the formation in spite of the low reservoir pressure. 100% of the fluid was returned to surface. After 3 hours of abrasive pumping (60800 lbs of 20/40 sand), tool condition was deemed excellent. Best of all, the well is currently producing at 1880 BFPD—a production increase of 313% over what was anticipated.
CASE STUDY

16 stages of abrasive fluid pumped through Hydra-JetSM TS tool

No abrasive fluid loss into formation

100% of fluid returned to surface

313% increase in anticipated production

Hydra-JetSM Perforating Services

For safe, deep perforating penetration, turn to Halliburton’s Hydra-JetSM Perforating Services. It takes hydrajetting technology to the next level and is particularly effective for challenging well conditions, providing a proven, versatile technique that can improve stimulation efficiency and well economics.

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