Halliburton stimulation treatment increases well’s production by 13,093 barrels of oil per day in an HP/HT reservoir

Location: Ciudad del Carmen, Campeche, Mexico (Offshore Well)

Overview
A well was under-producing in Mexico’s Yaxche-Xanab field, a naturally fractured carbonate reservoir with a bottomhole temperature of 322°F (161°C) and reservoir pressure of 15,058 psi. Previous production tests had detected several zones with high skin values in the openhole section, which were causing the well to perform far below its expected maximum production potential of 18,500 bopd with a 1-in. choke. Since the formation is naturally fractured, an effective diversion treatment was required. Pemex enlisted Halliburton’s support for this operation.

Working collaboratively, Pemex and Halliburton agreed on a well cleaning with N-Ver-Sperse O™ dispersant to prepare the wellbore for the main treatment stage. Then two systems from Halliburton’s Carbonate 20/20™ acidizing service were selected according to the rock and reservoir fluid properties: MOD-PAD™ gel (HCl at 12%) and HTA-PAD™ gel (HCl at 12%).

To ensure proper acid stimulation treatment effectively across the entire pay zone, the matrix stimulation treatment was performed using proprietary Guidon AGS™ acid diversion system, with a slurry rate ranging from 10 bpm to 15 bpm.

The results were impressive, as, prior to this stimulation treatment, the well had shown only an initial production of 7,434 bopd – and, after the stimulation, testing measurements showed production at 20,527 bopd with a 1-in. choke, which actually exceeded initial expectations. Plus, as a result of the stimulation, the well began producing with 55% less drawdown (Pres – Pwf) compared to prestimulation.

### CHALLENGES

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<th>CHALLENGES</th>
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<td>Underperforming High-Pressure/High-Temperature (HP/HT) Well</td>
<td>Effective Carbonate 20/20™ Stimulation Treatment Halliburton provided well cleaning with N-Ver-Sperse O™ dispersant, followed by a stimulation treatment with MOD-PAD™ gel (HCl at 12%) and HTA-PAD™ gel (HCl at 12%).</td>
<td>After the stimulation, there was an increase in production from 7,434 bopd to 20,527 bopd, plus a 55% decrease in drawdown (Pres – Pwf). This well is currently the highest hydrocarbon producer in Mexico (champion producer well, September–October 2015).</td>
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<td>Significant permeability contrast in some wells</td>
<td>Agent diverted treatment to less-permeable zones The Guidon AGS™ agent diverted acid treatment from highly fractured and permeable zones, where the acid was not needed, to other less-permeable areas.</td>
<td>Effective acid diversion allowed covering the whole targeted area. The Guidon AGS agent is selective and does not substantially affect hydrocarbon permeability. Therefore, a cleanup stage was not required, thus saving Pemex time and money.</td>
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Solving challenges™
CASE STUDY: Successful acid stimulation treatment exceeds customer expectations

HIGH-PRESSURE HIGH-TEMPERATURE WELL

15,058 PSI
161°C at BOTTOM HOLE

GUIDON AGS™
ACID DIVERSION SYSTEM

ENABLED DISTRIBUTION ACROSS PAY ZONES

ACID TREATMENTS RESULT IN 13,093 BOPD INCREASE
**Halliburton’s Sigma® Process can help increase production**

The Sigma® Process facilitates collaboration between the operator and Halliburton to optimize economic returns. In this particular instance, Pemex was able to take advantage of Halliburton’s expert application of carbonate stimulation fluid technologies to successfully improve well performance. We believe integration of fluid technologies with operational surface efficiency can lead to our customers achieving the lowest cost per BOE plus improved profitability.

**Halliburton Mexico has a history of helping operators succeed**

Halliburton has more than 35 years of experience in Mexico’s offshore regions. Our stimulation fleet is the largest in Mexico, with three stimulation vessels capable of handling:

- Acid stimulation service
- Frac acid service
- Conformance
- Scale inhibition
- Sand control
- Miscellaneous pumping

**CASE STUDY: Successful acid stimulation treatment exceeds customer expectations**

Based on understanding the formation properties, Halliburton’s Carbonate 20/20™ acidizing service has been shown to provide better production results, both initially and long term.