Williston Basin Operator Produces 26% More Oil with HiWAY Channel Fracturing Service

Flow-channel hydraulic fracturing eliminates screenouts while using 53% less proppant and 15% less water than offset wells.

**CHALLENGE**
Improve oil production and operational efficiency in the screenout-prone Three Forks shale.

**SOLUTION**
Apply HiWAY* flow-channel hydraulic fracturing service to create stable, highly conductive channels within the proppant pack, increasing effective fracture half-length.

**RESULTS**
- Increased 240-day cumulative oil production 26%.
- Reduced proppant consumption 53%.
- Used 15% less fracturing fluid.
- Reduced screenout rate from 5% to zero.

Operator needed to stimulate tight oil production from Three Forks shale reservoir
A large operator working in the Williston Basin’s Three Forks shale sought to increase production while reducing screenout frequency. The formation consists of limestone and shale with:
- 3% to 8% porosity
- 0.001 to 0.03 mD
- 2.7 to 5.4 million psi Young’s modulus
- 220 to 250 degF bottomhole static temperature.

Challenging geomechanical properties led to screenouts and NPT
Production from the Three Forks shale is mainly driven by effective fracture half-length and proppant-pack conductivity. Because of complex geomechanics, wells in the area are prone to screenouts and premature job termination. Unplanned flowback time due to screenout complications led to wasted time and costs.

To avoid screenouts, the operator tried reducing job designs in the toe and getting more aggressive in the heel, but that method sacrificed production from the early stages. The operator partnered with Schlumberger to apply HiWAY channel fracturing service on a pilot well.

Engineered fracturing fluids improved stability and proppant placement
The operator wanted to use a zirconate-base crosslinked fluid to reduce gel damage to the proppant pack and enhance proppant placement. To fulfill this requirement, Schlumberger recommended ThermaFRAC* dual-crosslinked fluid.

The well stimulated with HiWAY channel fracturing service showed 26% higher 240-day cumulative oil production than average offset wells treated with conventional fracturing fluids and techniques.
CASE STUDY: HiWAY channel fracturing increases production 26% with less proppant and water, Williston Basin

Channel fracturing increased oil production 26% with less than half the proppant

In total, Schlumberger stimulated 27 stages with the HiWAY service. The operator compared the results to 17 offset wells with similar stage count, reservoir characteristics, and lateral lengths.

During the first 240 days of production, the well treated with the HiWAY technique produced 67,706 bbl of oil—26% higher than wells treated with conventional treatments. What’s more, these results were obtained with 53% less proppant and 15% less water than offset wells. The operator avoided transporting over 900,000 lb of proppant and 3,900 bbl of water, eliminating more than 44 round trips to the wellsite.

Operator eliminated screenouts

While offset wells averaged one or more screenouts per well, the 27-stage HiWAY job was pumped without a single screenout. This reduced remedial costs associated with cleaning the well via coiled tubing and the amount of time needed to flow back the well.

As a result of this successful field trial, the operator expanded the field study and plans to use HiWAY technology on future wells.

<table>
<thead>
<tr>
<th>Fracturing Technique</th>
<th>Lateral Length, ft</th>
<th>Fracturing Fluid, bbl</th>
<th>Proppant, lbm</th>
<th>240-Day Cumulative Oil Production, bbl</th>
</tr>
</thead>
<tbody>
<tr>
<td>HiWAY service (1 well)</td>
<td>9,598</td>
<td>21,723</td>
<td>819,220</td>
<td>67,706</td>
</tr>
<tr>
<td>Conventional service (17 wells)</td>
<td>9,293</td>
<td>25,665</td>
<td>1,745,167</td>
<td>53,748</td>
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<tr>
<td>Difference</td>
<td>+3.3%</td>
<td>-15%</td>
<td>-53%</td>
<td>+26 %</td>
</tr>
</tbody>
</table>

*Average completion data per well