OptiPort System Reduced Footprint, Saved Time, and Increased Daily Production by 100%
Location: Granite Wash Play, Anadarko Basin, Texas Panhandle

Wanting to compare the Baker Hughes OptiPort™ multistage fracturing system to a plug-and-perf-style completion, an operator identified two wells in the Texas Panhandle region of the Anadarko basin with very similar characteristics. The operator engaged Baker Hughes to deploy the OptiPort system on one well and a competitor to perform a typical plug-and-perf completion common to the Granite Wash.

The OptiPort system allows a nearly unlimited number of frac stages, while providing exceptional speed, reliability, and flexibility. The integrated system is comprised of multiple pressure-balanced OptiPort sleeves that are hydraulically opened using a specially designed coiled tubing bottomhole assembly (BHA). The BHA consists of a mechanical casing collar locator used to position the BHA across the sleeve, and a packer that is used for opening the sleeves and providing isolation from the previous fractured zone. After stimulation of a single zone is complete, the BHA progresses to the next collar, marking the next fracture stage, and the process continues.

Both the plug-and-perf well (Well A) and the OptiPort system well (Well B) had similar reservoir and rock properties, with nearly identical expected ultimate recovery (EUR) and estimated production rates. The wells were drilled as similarly as possible to 12,000 ft (3658 m) total vertical depth (TVD) and 18,300 ft (5578 m) measured depth (MD) through similar formations and target zones.

Well A was completed using a typical plug-and-perf configuration for the Granite Wash, consisting of 10 stages with three clusters per

Results
- Increased daily gas production rate by 100% after 50 days compared to an identical well with perf-and-plug completion
- Produced 61% more gas in the first 90 days, worth an estimated USD 1,457,200
- Increased EUR 107%
- Reduced required HHP by 60%
- Decreased footprint, time to complete, operations cost, and HSE risks

Challenges
- Operator wanted a solution to increase operational efficiency and reduce cost
- Two similar horizontal wells (12,000 ft TVD and 18,300 ft MD) staged to compare a standard plug-and-perf completion to the OptiPort multistage fracturing system

Baker Hughes solution
- Deployed 30-stage OptiPort multistage fracturing system
- Identified two identical wells to test OptiPort and plug-and-perf results
- Stimulated over half the OptiPort well within 72 hours
CASE HISTORY

Stimulation design, fluid volume, and proppant volume were approximately the same in both wells during fracturing, which maintained as much consistency as possible. The data logged during treatment and through the first three months of production clearly illustrated advantages of using the OptiPort system.

As shown in the Stimulation Results table, the OptiPort system reduced the required maximum required hydraulic horsepower (HHP) by 68% compared to the plug-and-perf operation, significantly reducing horsepower charges. The OptiPort system also lowered the required fracturing rates by 60%, reducing the overall footprint, simplifying logistics, reducing wear and tear on surface equipment, and providing a more environmentally sound operation.

Twenty days into production, Well B exhibited significantly higher production rates than Well A, and was producing twice as much gas by day 50. Over the first 90 days of cumulative production, the OptiPort system outperformed the plug-and-perf well by 61%. Based on a price of USD 4 per 1,000 cu ft of gas (MCF), the OptiPort system completion generated USD 1,457,200 more than the plug-and-perf well over that same 90 day period.

The advantages of using OptiPort extend beyond the first 90 days of production. Flowback pressure in Well B was significantly higher than that of Well A. Analyzing the decline curve, the operator estimated the EUR at 6,493 MMCFE for Well B and 3,143 MMCFE for Well A, showing a 107% increase in expected recovery of gas in the OptiPort well.

In this head-to-head comparison performed using identical wells, the OptiPort system stimulation saved time, reduced the footprint, and decreased the fracturing rate while simultaneously increasing daily gas production by 100% and EUR by 107%.

### Stimulation Results — Comparative Summary Table

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Well A (Plug-and-Perf)</th>
<th>Well B (OptiPort)</th>
<th>Variance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of frac stages</td>
<td>10 (3 clusters per stage)</td>
<td>30</td>
<td>-</td>
</tr>
<tr>
<td>Frac spacing</td>
<td>165 ft</td>
<td>164 ft</td>
<td>-</td>
</tr>
<tr>
<td>Fluids type</td>
<td>HCl spearhead, slickwater fluid</td>
<td>HCl spearhead, slickwater fluid</td>
<td>-</td>
</tr>
<tr>
<td>Proppant type</td>
<td>100 mesh sand, 40/70 Ottawa white with 2% resin coating</td>
<td>100 mesh sand, 40/70 Ottawa white with 2% resin coating</td>
<td>-</td>
</tr>
<tr>
<td>Total clean fluid pumped</td>
<td>9,344,170 gal</td>
<td>9,568,993 gal</td>
<td>+2.4%</td>
</tr>
<tr>
<td>Total proppant placed</td>
<td>3,675,280 lbm</td>
<td>3,772,380 lbm</td>
<td>+2.6%</td>
</tr>
<tr>
<td>Average frac rate</td>
<td>99 bbl/min</td>
<td>40 bbl/min</td>
<td>-60%</td>
</tr>
<tr>
<td>Average treating pressure range</td>
<td>5,852 to 6,801 psig</td>
<td>4,125 to 6,935 psig</td>
<td>-30% to -2%</td>
</tr>
<tr>
<td>Average HHP range</td>
<td>13,889 to 16,387</td>
<td>3,004 to 5,517</td>
<td>-78% to -66%</td>
</tr>
<tr>
<td>Maximum HHP required</td>
<td>20,630</td>
<td>6,693</td>
<td>-68%</td>
</tr>
</tbody>
</table>

Gas Rate

Days Online

- Well B – OptiPort System
- Well A – Plug-and-Perf