An Eagle Ford operator wanted to better understand diversion results in order to improve cluster performance and reduce operational complexity prior to scaling up operations. Model the diversion so that results are more consistent, diverter responses are more predictable and operational complexity is reduced.

Using Drill2Frac’s OmniLog® lateral profile, combined with flow simulations performed with PerfAct™ equations, an alternate diversion was designed in collaboration with the operator.

KEY ACTIONS INCLUDED

- Evaluating the lateral heterogeneity in the horizontal wells by analyzing drilling data.
- Using PerfAct application to select perforation placements for each stage based on the rock hardness values.
- Reducing operational complexity by decreasing the number of diverter drops from three to two drops per stage.

CASE STUDY

Improving Perforating Cluster Efficiency using Engineered Diversion

CHALLENGE

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SOLUTION

Model the diversion so that results are more consistent, diverter responses are more predictable and operational complexity is reduced.

RESULTS

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Drill2Frac’s Engineered Diversion application analyzes a well’s lateral heterogeneity and integrates the analysis with the completion design. This helps model diversion performance. As a result, clusters are stimulated in a consistent, predictable manner resulting in maximum productivity while minimizing screen outs.

(Further: ‘Getting More From Fracturing With Diversion’, S. Rassenfoss JPT June 2017.)
CASE STUDY

The chart compares the Drill2Frac technique to two direct offset wells drilled on the same pad, to the same target zone and completed at the same time with a conventional diversion technique.

Pressure response showed that diversion drops were on average 25% more effective when designed around lateral heterogeneity and resulted in 66% fewer stages being terminated early due to excessive diversion pressures.

Results & Validation

The Drill2Frac Engineered Diversion was validated with a clear indication of positive diversion and a significant reduction in operational complexity for the stages being pumped, going to two diversion drops from three.

One well was completed using the Drill2Frac Engineered Diversion technique. At the same time two offset wells were completed on the same pad, using a conventional diversion design.

Post-job fracture treatment reports showed that 88% of the diversion drops in the Drill2Frac recommendation were successful. In contrast, the two offset wells averaged 64% effectiveness. Also, the number of screen-outs in the Drill2Frac well was just one-third the number of screen-outs in each of the offset wells.

Engineered Diversion Results vs. Conventional Diversion Results

The chart compares the Drill2Frac technique to two direct offset wells drilled on the same pad, to the same target zone and completed at the same time with a conventional diversion technique.

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