RESERVOIR ANALYTICS: CASE STUDY

Unlocking Smarter Completions: How IntelliStim™ Reservoir Analytics Transformed Design Strategy in the Delaware Basin

CHALLENGE

Managing well-to-well communication and potential depletion while identifying the most effective completion design for infill wells.

SOLUTION

Solution: NexTier's real-time IntelliStim pressure monitoring technology was deployed to analyze offset pressure behavior during frac operations.

RESULTS

The optimal completion strategy to minimize frac hit impact and enhance well performance was identified based on VFR analysis, which showed a 23% increase—highlighting improved cluster engagement and suggesting superior perforation efficiency.

A West Texas operator was engaged in the completion of a three-well pad in the Delaware Basin, adjacent to two offset wells that had been in production for almost six years. The operator was concerned with potential depletion and communication between the new and existing wells.

To address these challenges, several completion strategies were tested by varying cluster count per stage (8, 10, and 12) while keeping cluster design constant and experimenting with two pumping rates - 70 and 90 bpm. Using NexTier's IntelliStim pressure monitoring technology deployed on two offset wells, the team identified the most effective design by analyzing real-time pressure responses to varying completion strategies.

Optimal Completion Strategy Identification

Volume to First Response (VFR) was used as the primary metric to evaluate the efficiency of different completion designs, where VFR indicates the earliest interaction with an offset well during fracturing. Typically, a low VFR is associated with rapid cluster propagation that may indicate an ineffective perforation strategy.

The study compared three perforation strategies (8, 10, and 12 clusters per stage) by normalizing VFR values based on the number of clusters. Using the IntelliStim pressure monitoring technology platform to analyze Fracture-Driven Interactions (FDIs), it was observed that increasing the number of clusters per stage led to a reduction in normalized VFR, indicating a decline in perforation efficiency. Specifically, the 10-cluster design showed a 15% reduction, and the 12-cluster design a 23% reduction in normalized VFR relative to the 8-cluster baseline (Fig. 1).

When assessing the impact of pumping rate, higher rates were associated with increased normalized VFR values—suggesting improved cluster engagement and perforation efficiency. This effect was most notable in the 8- and 10-cluster designs, with VFR increases of 22% and 18%, respectively (Fig. 2).

Based on IntelliStim pressure monitoring technology data, optimal perforation efficiency is achieved with fewer clusters per stage (8 clusters) and higher pumping rate (90 bpm).

These insights enabled the operator to tailor completion designs for their infill wells, to mitigate the impact of depletion and enhance overall well performance, all while reducing the risk of costly well integrity issues.

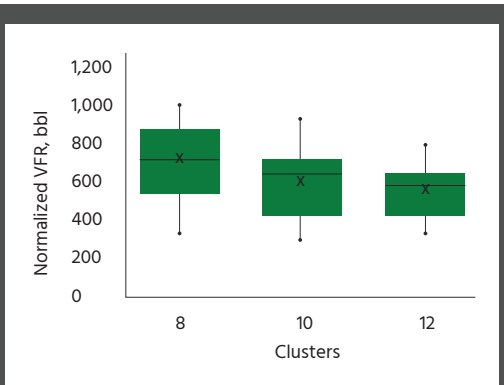

Figure 1. The impact of cluster count on VFR.

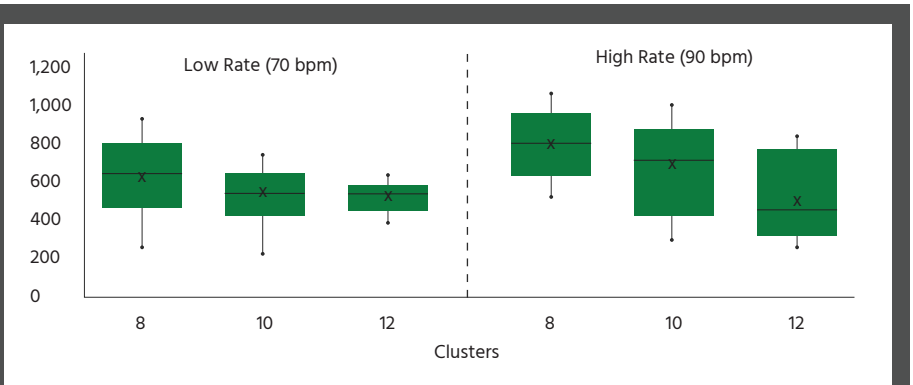

Figure 2. The impact of pump rate on VFR.