'BOUTIQUE FRAC' METHOD AIMED AT INCREASING BONE SPRINGS RECOVERIES

A novel methodology featuring boutique designs engineered for every frac stage, using readily accessible mud logging response data, shows promise in optimizing reservoir drainage from the Bone Springs, a former back-out zone and now the premier horizontal target in New Mexico's Permian Delaware basin.

The once-ignored Bone Springs emerged quickly when advanced logs revealed a much thicker horizontal pay zone than that seen in earlier generation logs. Thus, the placement of laterals with several frac stages gained steam, boosted in no small part to the superb well control realized when landing horizontal sections between mature and deeper vertical wells.

The fully interconnected stimulation methodology devel-

Typical log of a Bone Springs well indicating the lateral landing position. Source: STRATAGEN



oped by STRATAGEN, a CARBO business, essentially customizes individual frac stages to quantify permeability and reservoir quality throughout the lateral. Preliminary results have shown "appreciable increases in per-well recoveries," said Lyle V. Lehman, STRATAGEN managing principal consultant.

Lehman said the boutique design addresses a major drawback of a typical homogenous strategy where every frac stage is stimulated identically, thereby resulting in inadequate coverage of the total play. "Fracing uniformity across the lateral left little opportunity to optimize stage efficiencies, as both lower and higher permeability zones were equally stimulated, which considerably restricted cumulative reservoir drainage. The key to optimizing production is to precisely determine the permeabilities in each zone of the lateral, and tailor each frac stage to capitalize on the identified degree of permeability in individual zones."

Lehman said one of the primary advantages of the boutique fracing approach is that it does not rely on premium logging suites. Rather, it exploits mud log data response and historical frac data analysis to "quantify permeabilities and reservoir quality throughout the lateral."

In a related development, Lehman said evenly distributing fluid across all frac stages assumes all perfs are sufficiently open. However, more recent data from Bone Springs wells suggests only a 48% efficiency rate, meaning some clusters are understimulated and others not stimulated at all. "In other words, if you shoot 100 clusters, you may only have 48 open and after awhile the whole cluster is lost and you are not sufficiently contacting the reservoir," he said.

He pointed to recent work by NCS Energy Services, which used single-point injection to deliver predictable frac spacing and consistent propped volume, with the end result being improved production response.

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