Carrizo Oil and Gas Improve Well Performance in Multi-Well AccessFrac® Service Field Study

EAGLE FORD SHALE PLAY, TEXAS

OVERVIEW
Carrizo Oil and Gas used AccessFrac® stimulation service on a large-scale field trial in the Eagle Ford shale play in an effort to increase the number of effectively stimulated perforation clusters and to improve well performance. Results have shown the wells utilizing the AccessFrac service maintain higher flowing pressures indicating an increase in stimulated reservoir volume.

CHALLENGE
The key to a highly productive well in a shale reservoir is generating a high density of conductive fractures along the wellbore. This is achieved by stimulating multiple tightly spaced perforation clusters in a single fracture treatment. A challenge with this method is ensuring that all perforation clusters are effectively stimulated and that proppant is equally distributed to each fracture. Recent studies performed by Halliburton have shown that, in most cases, clusters are left understimulated, and, therefore, do not contribute to production.

SOLUTION
Halliburton recommended that the operator incorporate AccessFrac stimulation service into its current stimulation design. Carrizo Oil and Gas utilized AccessFrac service on a 32-well field study across 5 pad locations in La Salle and McMullen counties to gain a comprehensive understanding of the service’s impact. Figure 1 shows the location of the 5 pads. Of the 32 wells, 13 were selected for the AccessFrac design, and 19 were used as control wells. Additionally, a fiber-optic cable was permanently installed in one of the wells designed with AccessFrac service in order to obtain additional

Figure 1. Location of the 5 pads in the AccessFrac® service trial. In order to determine the effectiveness of AccessFrac Service across all of Carrizo’s acreage, wells were selected in both undisturbed and drained parts of the reservoir.
diagnostics and subsurface insight. The fiber-optic cable used distributed temperature sensing (DTS) and distributed acoustic sensing (DAS) to monitor real-time treatment responses and long-term production analysis. Figure 2 shows real-time DAS data of how AccessFrac service was incorporated into the fracturing treatment, resulting in an increased number of stimulated clusters.

Figure 2. Real-time DAS data showing flow distribution before and after the use of AccessFrac® stimulation service.

Figure 2A. Before the use of AccessFrac® stimulation service, the fracture network shows understimulated clusters and ineffective lateral coverage of the stage.

Figure 2B. After the use of AccessFrac® stimulation service, the fracture network shows improved cluster efficiency and increased reservoir contact.
RESULT

The 32-well study proved that AccessFrac service consistently provided better-performing wells by stimulating more clusters and contacting more reservoir rock. All wells in the study were held to a constant production rate, so the metric to determine success was flowing wellhead pressure vs. cumulative oil. Figures 3 and 4 shows the flowing pressure for the first two pads in the study. The AccessFrac service wells maintained higher flowing pressure, indicating an increased cluster efficiency and fracture coverage along the lateral. Results show that trial wells consistently outperform offsets by achieving 10-25% higher flowing pressures with equivalent cumulative production.

Figure 3. Pad 1 of the AccessFrac study showing two AccessFrac wells flowing at higher pressures than offsets after equivalent cumulative production.

Figure 4. Pad 2 of the AccessFrac study showing the AccessFrac well flowing at a higher pressure than offsets after equivalent cumulative production.