As more operators in unconventional basins adopt chemical diverting technology as part of their stimulation treatments, operators have been focused on achieving optimum cluster completion efficiency. Cluster efficiency describes the percentage of clusters that receive effective stimulation for a given interval. Previously, there were limited methods available to provide accurate and consistent data to evaluate the entire length of the wellbore. SPECTRUM Diagnostic Services quantifies fracture initiation points across the wellbore, validating the effectiveness of a fracture treatment.

A major operator used SPECTRUM Diagnostic Services to evaluate two wells that had been completed with unique stimulation designs. One well was treated with AccessFrac® Stimulation Service, and the other was stimulated with a standard customer design. SPECTRUM Diagnostic Services was deployed after each stimulation treatment. The fiber-optic analysis determined that, by using diverter technology, greater stimulation cluster efficiency was achieved and the completion design was optimized by reducing the number of intervals in the well.

The operator had two cemented lateral wells (Well A and Well B) on the same pad that were completed using different stimulation techniques. Well A was completed with 20 stages, using a hybrid fracture design with diverter technology. Well B was treated with 28 stages, using a similar fracture treatment, but no chemical diverter was employed. The operator needed a method to determine the relative effectiveness of treatment across the wellbore and the impact of diversion on stimulation performance.

SPECTRUM Diagnostic Services was used to assess the fluid distribution across each well and to determine the optimum stimulation treatment. Fiber-optic distributed temperature sensing (DTS) and distributed acoustic sensing (DAS) results helped evaluate the stimulation cluster efficiency of each well 40 days after the wells had been treated. For each well, all stimulated intervals were evaluated simultaneously in a single trip, providing reliable evaluation of cluster efficiency in real time.
RESULTS
Data acquired after the wells were completed indicated that the number of fracture initiation points for Well A was 20 percent greater than those for Well B. The operator was able to lower stimulation costs, reduce time spent completing the well by pumping fewer stages, and achieve better well performance based on the insights gained from SPECTRUM Diagnostic Services.

DID YOU KNOW
SPECTRUM Diagnostic Services delivers coiled-tubing-conveyed, fiber-optic distributed sensing to assess reservoir performance and completions effectiveness by monitoring fluid movement across the entire wellbore and visualizing treatment efficiency in real time.

This service leverages fiber-optic DTS and DAS measurements to monitor fluid injection and to profile production along the entire length of the wellbore.

An alternative to traditional production logs, SPECTRUM Diagnostic Services can be coil-conveyed to total depth and can simultaneously monitor several time series of data for evaluation, as opposed to single snapshots in time. For example, shut-in DTS data can provide information regarding the location of fracture initiation points, while steady-state flowing results are used to determine production profiling.

SPECTRUM Diagnostic Services can be combined with standard coiled tubing applications and downhole tools to obtain vital well data in conjunction with other well intervention services on a single run in hole.

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DAS results shown during production illustrate which clusters are producing fluid.