

BroadBand Sequence Service Delivers 21% Increase in Productivity in the Eagle Ford

Fracturing service significantly increases stimulation effectiveness compared with conventional plug-and-perf technique

CHALLENGE

Improve production during plug-and-perf completions in Eagle Ford horizontal shale wells.

SOLUTION

Apply the BroadBand Sequence* fracturing service for sequential stimulation of additional perforation clusters through engineered application of a proprietary, fully degradable composite fluid comprising a blend of particles and fibers.

RESULTS

Increased 115-day cumulative oil production per foot of lateral by 21% while maintaining a high level of efficiency in completion operations.



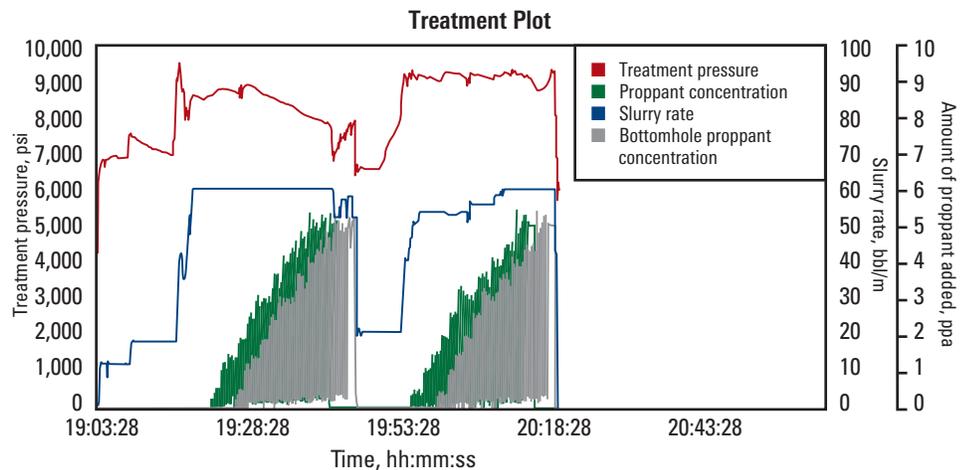
Large percentage of unproductive perforation clusters

Operating in the Eagle Ford Shale, Marathon Oil Company has been working with Schlumberger to improve production through completion optimization of cemented horizontal wells. The wells exhibit fracture gradients of 0.85–0.95 psi/ft, TVDs of 10,000–12,000 ft, and bottomhole temperatures ranging from 270 degF to 310 degF. Typical completions are based on the plug-and-perf technique, with six perforation clusters per interval isolated by bridge plugs.

Production logging tools and tracer logs had shown that when perforation clusters in a horizontal completion were regularly spaced, several clusters did not take stimulation fluid or contribute to production. One technique for increasing the number of stimulated clusters is to reduce the length (and hence the number of clusters) per stage and increase the number of stages. However, the larger number of bridge plugs required and the lengthier operation can make this solution prohibitively expensive.

Effective solution through sequenced fracturing service

The operator decided to evaluate the effectiveness of the BroadBand Sequence fracturing service in addressing these challenges. The candidate well selected was drilled and landed parallel to an offset well on the same pad. Both wells had toe-down horizontal laterals and were completed with the plug-and-perf technique, using the same distance between bridge plugs (constant interval length). The BroadBand Sequence service was implemented in one well by splitting the stimulation treatment for each interval into two stages separated by a proprietary pill of composite fluid. The total amount of proppant used per interval was identical for the two wells.



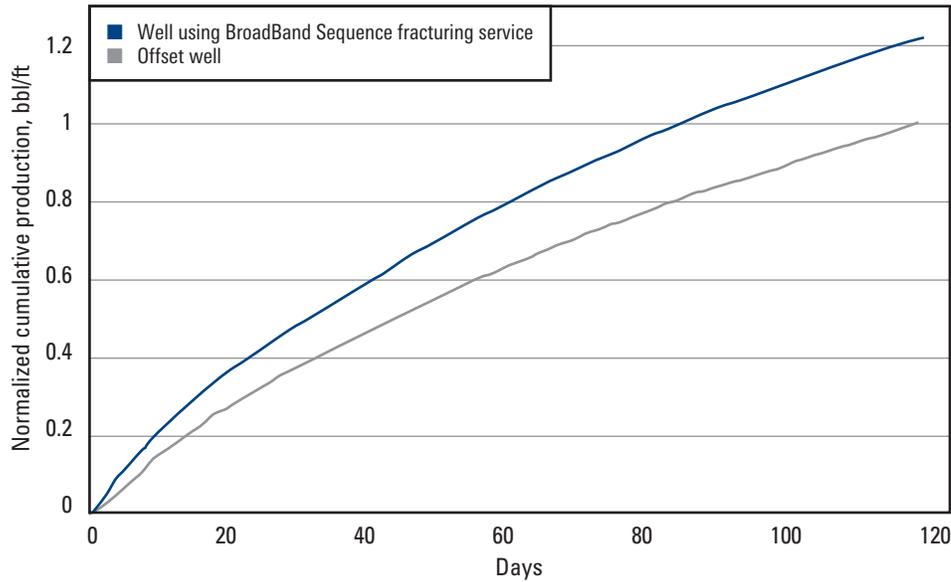
With the BroadBand Sequence fracturing service, the proppant was pumped in two stages for each interval (the length of lateral between two plugs). The composite fluid was pumped between the two stages.

CASE STUDY: Sequenced fracturing increases well productivity by 21%, Eagle Ford

21% higher production without loss of efficiency

Following the treatment, the wells were flowed back and produced using similar choke sizes. After 115 days, a comparison of cumulative oil volumes normalized by lateral length showed that use of the BroadBand Sequence service increased production by 21%, achieving the operator's goals. As a result, the operator has applied the service on additional wells.

Cumulative Oil Production



Fracturing Technique	Comparative Cumulative Oil Production in 115 Days, Normalized by Lateral Length
BroadBand Sequence fracturing service	121%
Conventional plug-and-perf technique	100% (Reference)

Cumulative oil production per foot of lateral, measured over 115 days, was 21% higher for the well completed through use of the BroadBand Sequence fracturing service.

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