

# Geoengineered, Integrated Well Program Improves Oil Production by 80%–86%

Combining ThruBit services, Kinetix Shale software, and BroadBand Sequence service increases production for Lonestar Resources in the Eagle Ford Shale

## CHALLENGE

Improve oil production and field economics by optimizing drilling, completion, and stimulation plans across long laterals while avoiding impairments from ash beds, faults, and nearby water-bearing zones.

## SOLUTION

Improve knowledge of downhole hazards and rock properties with ThruBit\* through-the-bit logging services; use the data in Kinetix Shale\* reservoir-centric stimulation-to-production software to plan completion and stimulation treatments; maximize production and economics with the Broadband Sequence\* fracturing service, including diverters for more complete stimulation of long intervals.

## RESULTS

- Increased production by 80% compared with offset wells in one field.
- Increased production by 86% compared with offset wells in second field.

**“Lonestar is encouraged by the results of the [geoengineered integrated well program] to date and will seek to apply them across its portfolio.”**

**William Kreimeier**  
 Completions Manager  
 Lonestar Resources Ltd.



## Pinching off reservoir contact in ash beds

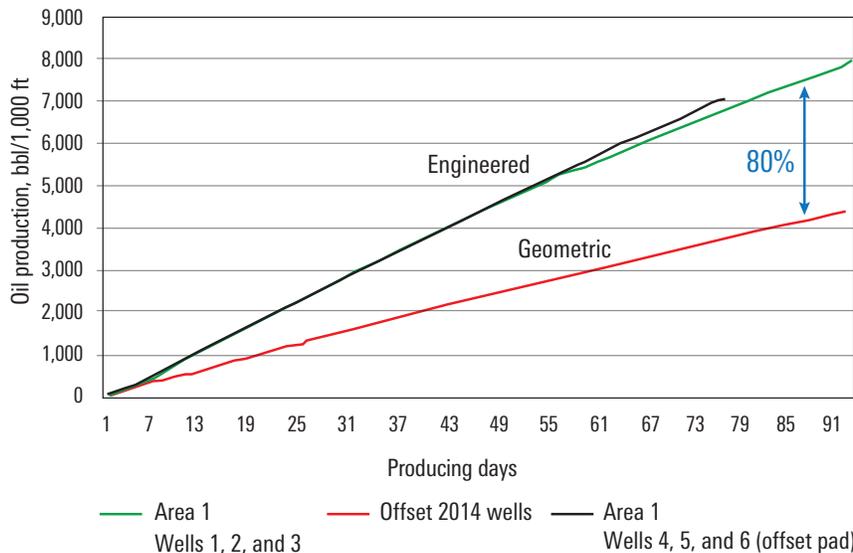
Lonestar Resources Ltd. drilled and completed 18 wells in the Eagle Ford Shale around Dimmit County, Texas, using geometric plug-and-perf completions and a generic pump schedule with average results. Engineers thought production might be lagging because proppant embedment in softer rock was pinching off reservoir contact at the wellbore and shortening productive fracture length. In other wells, they believed hydraulic fractures might be initiating in a nearby fault and nearby water-bearing zones. Lonestar wanted to increase production by solving these problems—but the solution would have to manage economics as well.

## Continuously improving completion and stimulation

Schlumberger proposed a geoengineered integrated well program to enhance field productivity by integrating multiple services in an iterative plan for continuous improvement.

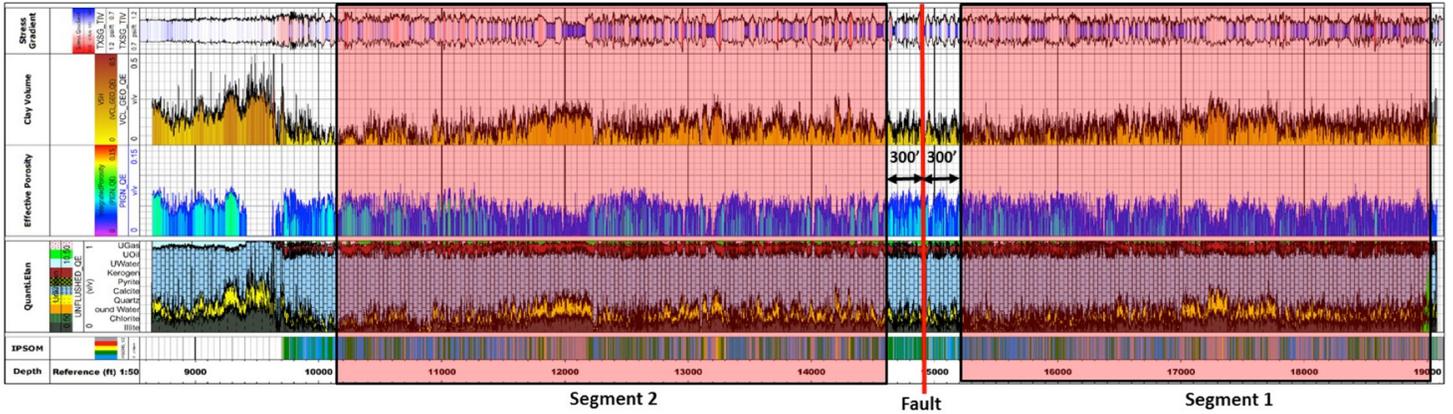
Well 1 was drilled by a third party before the program began but was logged using ThruBit services to minimize risk and time while obtaining critical data. The logging information, rock properties from an outcrop, and other related data were imported for Kinetix Shale software to optimize the completion and stimulation. The engineered completion was designed to stimulate approximately 3,000 ft [914 m] of lateral in 15 stages with 5 perforation clusters. The fracture design included an aggressive proppant ramp to overcome near-wellbore embedment issues expected in 6 intervals that had been landed in ash beds. Subsequent production logging determined that the stages in the ash beds still contributed 75% less hydrocarbon production than the other 9 stages.

Area 1, 90-Day Initial Cumulative Oil Production per 1,000 ft of lateral



Engineered wells in one area of the Eagle Ford Shale outperformed prior geometric completions by 80%.

**CASE STUDY:** Integrated services and continuous improvement raise production for Lonestar Resources in the Eagle Ford Shale



Thurbit services lateral log showed the suspected fault section in the lateral.

The logging, geological, and stimulation response data from Well 1 were integrated to inform a detailed completion and stimulation plan for two new wells. Wells 2 and 3 were designed as geometric completions on 200-ft [61-m] stage spacing with 5 clusters per stage. The designs were iteratively calibrated with pressure-match data from prior treatments to maximize conductivity in ash beds.

The iterative design process was then applied to new wells in a high-GOR area southwest of the first wells. Well A was designed to stimulate about 8,500 ft [2,590 m] of lateral in 34 engineered stages of 5 clusters. Well B was a geometric completion on 250-ft [76-m] spacing with 5 clusters.

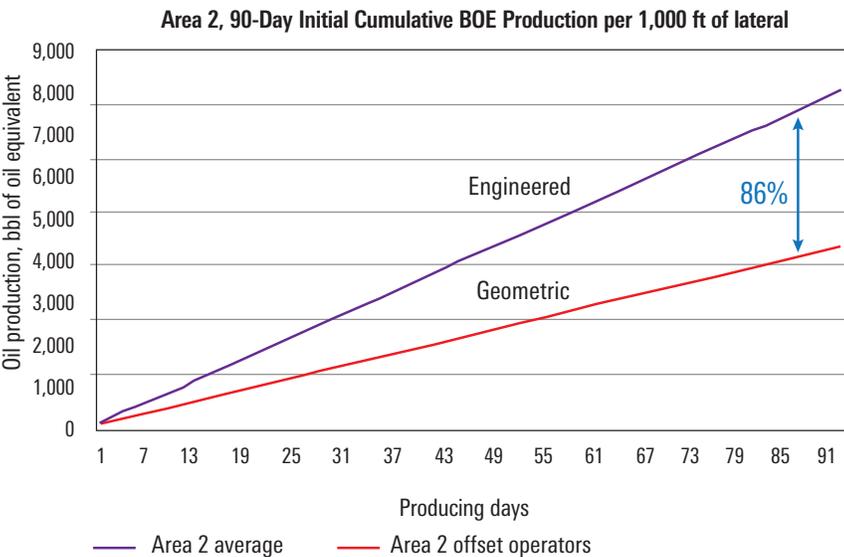
For the next set of wells, in the initial area, Lonestar asked for efficiency improvements in the completion design. Wells 4–6 were designed with more economical 300-ft [91-m] stage spacing with 8 clusters. To ensure complete stimulation of all clusters in these longer intervals, the designs called for Broadband Sequence fracturing service with interstage diversion to cut total completion time without reducing the volume of proppant

pumped. Broadband Sequence service combined a proprietary blend of degradable diversion materials with engineered design and a diagnostic workflow to ensure effective stimulation of the additional clusters placed using the engineered completion strategy.

**Improved wells with engineered iterations**

All of the engineered wells are performing better than offset wells drilled, completed, and stimulated with generic completion and stimulation designs. On average, engineered Wells 1–6 produce 80% more hydrocarbon per 1,000 ft [305 m] of lateral compared with offsets. Wells 4–6, stimulated after improvements of the initial fracture treatment designs, have higher production than the prior wells and are expected to become the best producers in the area. The four engineered wells in the high-GOR area produce an average of 86% more hydrocarbon per 1,000 ft of lateral compared with offsets.

For more detail, see URTeC 2461822.



Engineered wells in the second area of the Eagle Ford Shale benefitted from earlier design iterations to outperform prior geometric completions by 86%.

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