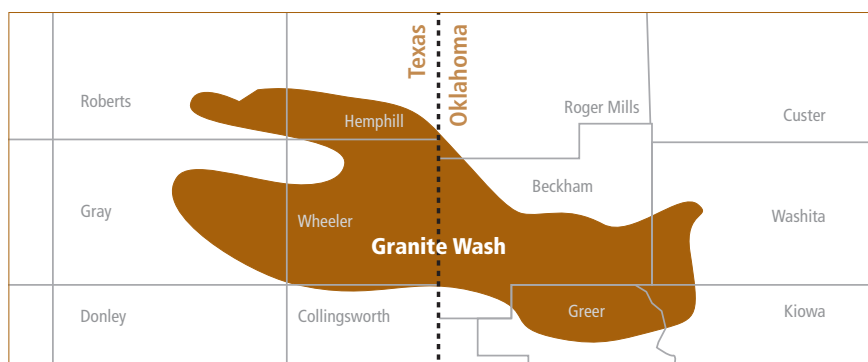


Packers Plus® Case Study



Packers Plus StackFRAC system provides superior production and economics compared to cemented liner plug and perf in the Granite Wash



Background

The Granite Wash formation is a tight-sand, oil and gas rich reservoir located in the northern Texas Panhandle and western Oklahoma. At depths of 9,000 to 12,500 ft, the formation is comprised of several thick sequences of sand separated by shale ranging in thickness from 1,500 to 3,500 ft. Because of the higher market value, the Granite Wash is an attractive play for operators due to the high amount of natural gas liquids it produces.

In addition, good pipeline infrastructure and a positive regulatory environment in the area contribute to the popularity of the formation. Although the Granite Wash was first developed over 40 years ago, continued advancements to horizontal drilling and completions are allowing operators to improve recovery in the area.

Challenge

Due to the heterogeneity in the mineralogy, pore pressure and hydrocarbon type in the Granite Wash, production potential varies greatly throughout the formation. Because of this, determining the best completion method can be difficult and must be

evaluated. Low permeability and porosity indicate a requirement for hydraulic fracturing to effectively drain wells in the Granite Wash.

The two main methods for completion are the Packers Plus StackFRAC® open hole multi-stage fracturing system and cemented liner “plug and perf” (CLPP). In order to maximize the productivity and overall economics of their wells, an operator working in the Granite Wash analyzed these two methods to determine which was most effective.

Solution

Although both of the completion methods used in the Granite Wash aim to access the reservoir by initiating fractures, they differ significantly in operations. Packers Plus StackFRAC systems use RockSEAL® II hydraulically set mechanical packers to isolate zones together with ball-actuated, hydraulically activated FracPORT™ sleeves to provide access to the formation. Each fracture treatment can be performed in a single, continuous operation, which reduces treatment time and allows for immediate flowback after all stages have been stimulated. In contrast, CLPP

completions require cementing of the casing, pumping down of bridge plugs to isolate sections, followed by repeated perforating and fracturing in each zone for the number of stages requiring stimulation. The bridge plugs are removed after the stimulation process, typically with coiled tubing.

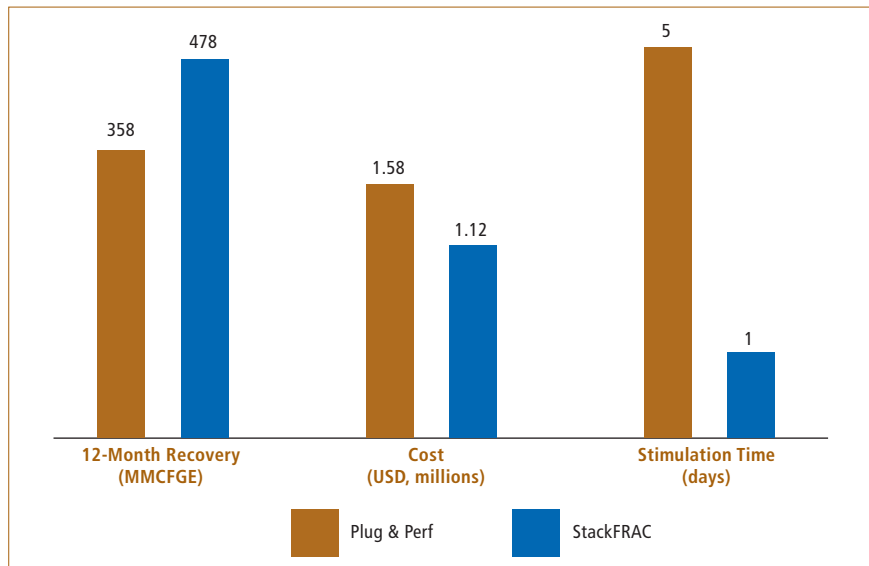
A comparison of these two methods was highlighted in a study done in the Granite Wash, which analyzed six wells completed using the Packers Plus StackFRAC system versus 24 CLPP wells. The area of study was selected by categorizing wells in the Granite Wash according to completion method. Both StackFRAC and CLPP completed wells were found in the Central area, commonly known as Northwest Mendota and Hemphill Fields, which included wells in central Hemphill up to the Hemphill/Roberts county line. Cumulative production, cost and completion time were used to evaluate the production and economic performance of each method.

Results

The study showed that, after 12 months of production, the StackFRAC system outperformed the CLPP completions by 120 MMCFGE, a 33% increase. Cost savings were also realized using the StackFRAC system, as the operator saw a \$350,000 to \$460,000, or ~30%, savings per well compared to the CLPP method. These cost savings are largely associated with the efficiency of the StackFRAC system as it is able to perform all fracture treatments within as little as 24 hours, compared to the CLPP method, which can add an additional four days to pump all the stages.

The most significant costs associated with the CLPP method include additional horsepower, as this method requires higher pressures to fracture the formation, and the cost of employing fracture crews for the extra days. In addition, CLPP requires wireline and/or coiled tubing to convey the perforating guns and bridge plugs.

Packers Plus StackFRAC systems ensure efficient completions and optimal production to attain economic wells in the Granite Wash. The obvious advantages presented by this study motivated the operator to use Packers Plus technology in all their Granite Wash wells, as well as the Cleveland Sand where they are currently focusing their exploitation efforts.



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