



Packers Plus and Schlumberger increase gas production 20-fold from an open hole horizontal in Southwest China

Background

The Guang'an gas field is located in the Sichuan Basin in Southwest China. This field covers a surface area of 5,100 square kilometers and is estimated to contain in excess of 100 billion m³ of gas reserves. The main formation in the Guang'an field is the heterogeneous Xujiahe reservoir, which is separated into Xu-1 to Xu-6, the latter of which is the main reservoir. The Xu-6 is a tight gas sandstone reservoir with low porosity and permeability in the range of 6 to 12% and 0.01 to 5 mD, respectively.

The Challenge

In 2005, the Operator decided to increase reservoir contact by drilling horizontal wells in the hopes of improving drainage of the Guang'an area. However, one of their horizontals came on production at 0.24 MMcf/d, far below expectations and not economical.

Conventional stimulation methods for treating poor-producing horizontals were to either bullhead or pump acid through coiled tubing. These treatments only removed the near wellbore damage and the results were not satisfactory. Therefore, the Operator looked to multi-stage proppant fracturing to stimulate this well.

The Solution

Four intervals were selected for treatment based on reservoir characteristics and evaluation. Additionally, a section at the toe of the well that was suspected to contain high water saturation was isolated without stimulation to reduce water production.

After caliper logging the open hole and a reamer run to remove any restrictions or tight spots, the StageFRAC* system was run into the 3,085 ft lateral to a total depth of 10,335 ft. The fracture treatment placed 200,000 lb of proppant into the four stages using 3,700 bbl of fluid.

The Results

The stimulation was performed as a continuous operation taking only 5 hours to complete. Each stage showed a unique pressure signature, indicating that the packers provided mechanical isolation. The well was immediately flowed back and 100% gas was observed after 48 hours at a rate of 5.8 MMcf/d. This was a 20-fold increase in production compared to the pre-stimulation rate.

The well was such a success that the Operator and Schlumberger presented the results at the SPE Asia Pacific Oil and Gas Conference and Exhibition held in Jakarta, Indonesia, 4 – 6 August, 2009 (SPE 119927).



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