Schlumberger

Integrated Hydraulic Fracturing Operations Double Efficiency and Increase Production in Tight Sand

First combination of plug-and-perf-system and Salik fracturing service worldwide achieves both operational and production success, China

CHALLENGE

Maximize hydraulic fracturing operational efficiency in a tight gas formation in the Ordos Basin, China.

SOLUTION

Use the Schlumberger plug-and-perf system in conjunction with Salik* local-sand-enabled flow-channel fracturing service.

RESULTS

- Increased operating efficiency by 112%.
- Lowered proppant costs by USD 95,000.
- Achieved superior production.
- Eliminated CT milling runs.

Heterogeneous tight sand challenges gas production

The Ordos Basin is the largest onshore gas-producing basin in China. Lateral heterogeneity and a high Young's modulus create technical challenges for successful gas production from the tight sands. PetroChina Coalbed Methane Company Ltd. (PCCBM) wanted to maximize efficiency for the multistage stimulation of a 4.5-in cased horizontal well in the Daji Field.

Dissolvable technology and channel fracturing provide effective solution

The Schlumberger plug-and-perf system enhances operational efficiency by using degradable fracturing balls and seats instead of plugs to isolate zones during stimulation. The patented aluminum-based material degrades completely and predictably within hours or days, ensuring that production reaches its full potential. There is no need for additives and no mechanical intervention is required to mill out the balls and seats, reducing cost, risks, and time to first production.

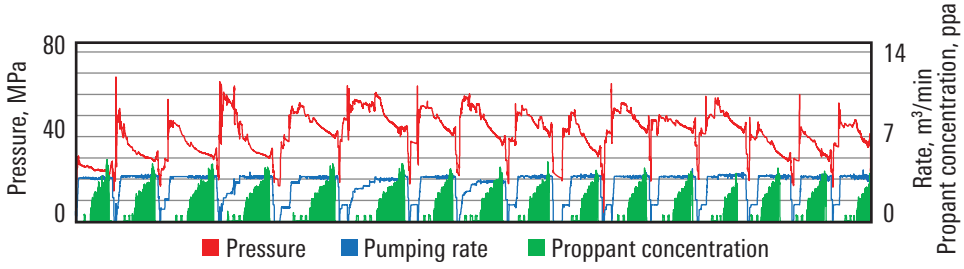
The degradable balls and seats of the Schlumberger plug-and-perf system eliminated milling runs.

Salik local-sand-enabled flow-channel fracturing service uses locally sourced sand with the HiWAY* flow-channel fracturing technique. Replacing a large percentage of the usual ceramic proppant with local sand further increased the cost efficiencies provided by the plug-and-perf system. The HiWAY technique creates open pathways inside the fracture, enabling hydrocarbons to flow through stable channels instead of through proppant, resulting in infinite fracture conductivity and higher production. At the same time, proppant and water usage are reduced.

Integrated system more than halves stimulation time and delivers superior production

Pumpdown operations proceeded smoothly and 16 stages were successfully stimulated in 4.5 days with no premature screenout. This integrated system outperformed a third-party alternative used on another well for comparison (3.6 stages/day vs. 1.7 stages/day, respectively). Also, the Salik service enabled replacement of 80% of the ceramic proppant with sand, reducing costs a further USD 95,000.

A CT run after 7 days confirmed the dissolution of the plug-and-perf system seats, eliminating CT milling runs. The improved flowback ratio (21.4%) in the early days confirmed enhanced fracture conductivity and the superior production potential of this newly treated well.



The synchronized pressure response for the 16 stages shows that the pulses of locally sourced sand were injected effectively into the fractures, despite the high near-wellbore friction.

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