Reduce Water Cut, Increase Production with Foam-Based Fracturing Fluid
FoamFRAC treatment brings LUKOIL-WS success in West Siberian wells

CHALLENGE
Decrease water cut and increase production in wells where traditional fracturing treatments aren’t successful.

SOLUTION
Use FoamFRAC* foam-based fracturing fluid with crosslinked gel.

RESULTS
Increased oil production, reduced water cut, improved fracture conductivity and permeability, and sped up fracture cleanout work.

After two months, daily oil production rates rose an average of 50% in the wells using the FoamFRAC fluid compared to nearby wells stimulated with traditional fracturing treatments.

High water cut after traditional fracturing methods
LUKOIL-WS, one of the largest oil producers in Russia, was experiencing high water cut and minimal oil production in its West Siberian wells—specifically in the Achimov, Jurassic, and BS10 formations. Average TVD is 2,700 m, and formation temperatures range from 80–90 degC. The operator tried traditional oil-base fluid fracturing systems with little success. The operator also reduced proppant concentration in an attempt to limit fracture growth in water zones. However, water cut stayed high and oil production remained low. LUKOIL-WS contacted Schlumberger for a technologically advanced solution. LUKOIL-WS decided to apply FoamFRAC foam-based fracturing fluid.

Innovative solution
The operator used FoamFRAC foam-based fluid (with greater than 50% foam quality) with crosslinked gel—a combination also known as SuperFOAM foam-based fracturing fluid—in select wells. After two months, daily oil production rates rose an average of 50% in the wells using the FoamFRAC fracturing fluid compared with nearby wells stimulated with traditional methods.

Post-stimulation, the water cut in wells treated with FoamFRAC fluid averaged 13%. Nearby wells treated with conventional fracturing fluids average 36% water cut. The reduction in water production helped LUKOIL-WS improve control of fracture-height growth.

The FoamFRAC treatment reduced gelling agent loading by 40% compared with conventionally fractured wells. FoamFRAC fluid reduced fluid volume by replacing up to 60% of fluid with nitrogen. The average gel concentration per ton of proppant pumped was 12 kg/ton for the FoamFRAC fracturing fluid versus 19 kg/ton of fracturing fluid for an average job. This led to smaller formation and fracture damages than regular stimulation treatments.
CASE STUDY: FoamFRAC treatment reduces water cut, increases oil production in West Siberian wells

Ultimately, the use of FoamFRAC technology resulted in better fracture conductivity in the zones stimulated. Analysis showed that the estimated fracture permeability retain factor in wells that used FoamFRAC fluid is 60%. Traditional fracturing treatments usually retain 30% permeability.

**Efficient fluid also a time-saver**

The FoamFRAC fluid also sped well cleanout, which helped reduce stimulation time by up to 50%. Thirty percent of the foam-based treatment fluid was able to flow back immediately after job placement. The compressed nitrogen in FoamFRAC fluid creates additional pressure in the fracture, which helps push broken gel out of the formation and assist well cleanout.

LUKOIL-WS is currently studying the future use of FoamFRAC technology in old and new West Siberian wells, as well as in depleted formations and water-sensitive zones.

*Mark of Schlumberger
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