

ThermaFRAC Shear-Tolerant Fracturing Fluid Increases Production 500% in HPHT Well

Thermally stable, low-shear fracturing fluid improves proppant transport, enabling Pakistan operator to overcome HPHT barriers

CHALLENGE

Improve proppant transport—and increase production—in a HPHT well with a depth of 3,200 m and bottomhole temperatures as high as 340 degF [171 degC].

SOLUTION

Apply ThermaFRAC* shear-tolerant high-temperature fracturing fluid, which was engineered to provide thermal stability in high-temperature wells with long boreholes.

RESULTS

- Placed 112,560 lbm of proppant with minimal shearing in less than 12 h.
- Increased well production 500% to 2.5 MMcf/d.
- Returned broken frac fluid in 2 days.



Long tubulars in HPHT environment complicated fracturing operations

When a high-temperature, high-pressure well was producing at a rate of just 0.5 MMcf/d, a Pakistan operator applied a hydraulic fracturing treatment to increase production. First, the HPHT well needed a fracturing fluid that could withstand the well's harsh conditions. The bottomhole temperature exceeded 340 degF [171 degC] at depths of 3,200 m. In addition, long tubulars created extremely high shear that degraded conventional fluid's viscosity and its ability to evenly distribute proppant.

ThermaFRAC fracturing fluid provided thermal stability and low shear

Schlumberger recommended ThermaFRAC shear-tolerant high-temperature fracturing fluid for the HPHT environment. It provides long-term thermal stability without sacrificing viscosity, which is critical for the creation of fracture width. This dual-crosslinker fluid features an early low-temperature reaction and a secondary temperature-activated reaction—providing low shear and thermal stability at temperatures beyond 375 degF.

The combination of low shear and thermal stability is critical in HPHT conditions. If the fluid crosslinks too late, the resulting fracture width may be too small to place proppant. However, if the fluid crosslinks too early, it is subject to shear, which can degrade the fluid's viscosity. The ThermaFRAC shear-tolerant fluid provides better proppant transport and uses fewer chemicals compared with conventional metallic crosslinker fracturing fluids.

Treatment improved proppant transport, increasing production by 500%

Schlumberger successfully placed 112,560 lbm of proppant, evenly distributing throughout the fracture and creating the correct fracture width. The use of the ThermaFRAC fluid helped the operator increase production and save time. The entire mixing operation and pumping was completed in less than 12 h because fewer chemicals needed to be mixed. Production of the well increased from 0.5 MMscf/d to 2.5 MMcf/d—an increase of 500% compared to the previous production rate. In addition, most of the frac fluid returned to the surface within 2 days. The success of the ThermaFRAC fluid helped the operator reduce costs, improve fracture placement, and increase production without costly workovers. ThermaFRAC became the preferred high-temperature fracturing fluid for Pakistan operators with more than 20 fracturing stages pumped since and more than 2.8 million pounds of proppant successfully placed.



To stimulate this high-shear-rate well, Schlumberger applied the ThermaFRAC fluid using conventional hydraulic fracturing equipment. The treatment increased production 500%, enabling the Pakistan operator to attain economic flow rates without costly workovers.