

ClearFRAC LT Surfactant

Schlumberger

Viscoelastic surfactant versatility makes development of fluid systems for specific applications possible. The ClearFRAC[®] LT surfactant was developed for conditions facing operators in the Canadian shallow gas play, where marginal economics made it necessary for operators to find an alternative to conventional completion methodology. Requirements called for a base fluid to be prepared in ammonium nitrate brine and be used in nitrogen foam fracturing treatments at a maximum temperature of 100°F. Areas targeted by the fluid design included fluid cost, treatment volumes, and well completion efficiency.

ClearFRAC LT surfactant meets the Canadian shallow gas play economic criteria. It is mixed continuously, eliminating the standard process of batch mixing polymer-based fluids in the fracturing tanks, saving a consid-

erable amount of time on location and resulting in more zones being stimulated in a day. Another process improvement was the implementation of CoilFRAC[®] stimulation through coiled tubing technology to isolate and treat the pay sands with added precision. This process reduced the total amount of fluid needed to effectively stimulate the entire well and again increased the number of intervals that could be stimulated in a day.

The ClearFRAC LT fluid is generally prepared with less than 2% surfactant concentrations in ammonium nitrate brine. ClearFRAC LT fluids will break as do other ClearFRAC fluids upon contact and mixing with hydrocarbons, dilution with formation brine, and the addition of chemical breakers as needed. ClearFRAC LT fluids can also be formulated with potassium chloride or ammonium chloride.

Applications

- Nitrogen foam fracturing treatments in temperatures less than 100°F
- Marginal plays
- Fracture height containment

Benefits

- Environmental compatibility because return fluids become fertilizer
- Improved stimulation by increasing the effective fracture half-length
- Lower hydraulic horsepower requirements or higher pump rate potential at maximum surface pressure as a result of lower friction pressure
- Unimpaired production because proppant pack remains undamaged

Features

- Compatible with ammonium-nitrate brine
- Effective proppant transport characteristics
- Polymer-free
- Excellent drag reduction properties resulting in low friction pressure

The fracturing treatment is monitored and controlled using the FracCAT[®] data acquisition system.



Canadian pilot program results beneficial

Initial pilot program tests of ClearFRAC LT surfactant performed on seven Canadian wells resulted in all wells being successfully pumped to completion, achieving improved well economics and demonstrating stimulation of marginal pay zones. Three wells were completed with ClearFRAC (J508W) surfactant and the remaining four wells were completed with ClearFRAC LT (J551) fluid.

Field test conditions of J551 concentration in the four wells completed with ClearFRAC LT fluid included J551 concentration ramping from 2.2 to 1.2%. In all seven wells, foam quality ramped from 76 to 44%, blender proppant concentration ramped from 2.1 to 17.5 ppa, and borehole proppant concentration ramped from 0.5 to 10.0 ppa.

Test results showed no changes in surface treating pressure, same flowback fluid appearance and volume, and equal production performance. Benefits experienced during the tests included logistically simple operations, compatibility with the CoilFRAC through-tubing fracturing service, and environmentally friendly fertilizer from decomposition of flowback fluid.

The large shallow gas plays in southern Alberta have benefited from ClearFRAC treatments. More zones are fractured per day and total volumes of gas recovered have increased.

