

Permian Basin Operator Optimizes Fracturing Fluid Efficiency with Customized Chemicals

ASCEND PROPRIETARY BLEND OF SURFACTANTS HELPS BOOST WOLFCAMP WELL PRODUCTIVITY.

UNITED STATES

CHALLENGE

- » Stimulate production of unconventional wells with carbonate and clay-rich formation rock
- » Maximize production with optimal additive placement

SOLUTION

Use Halliburton's customized Ascend™ surfactant with ratio and concentration based on:

- » Core cuttings analysis
- » Well fluid analysis

RESULT

- » Deeper penetration of surfactant into the rock matrix
- » Uplift in daily initial production up to 150% relative to offsets with alternate or no surfactant

OVERVIEW

A major operator was drilling unconventional wells in the Wolfcamp Shale play in Reagan County, Texas where hydraulic fracturing is required to enhance oil and gas recovery. Fracturing fluids utilized in hydraulic fracturing treatments often incorporate surfactant chemistry in order to lower surface tension and capillary pressure so that potentially trapped hydrocarbons can be more readily produced to surface.

In addition to low permeability/high temperature conditions typically encountered, the area of interest was also characterized by rich carbonate and clay formations further complicating the fracturing process. On

such types of rock, traditional surfactant chemistry tends to be adsorbed, sometimes as much as 99%, before it can travel the full length of the fracture. The client's main goal was to increase the contact area between the fracturing fluid and the fractured rock surface, and ultimately maximize reserves recovery.



CHEMICAL ENGINEERING SERVICES

Multi-Chem, a Halliburton service, provided chemical engineering expertise to design a solution to ensure the surfactant would reach all the way into the reservoir. The PowderPerm patented procedure was performed on formation cuttings and reservoir liquids which allowed Multi-Chem to optimize the concentration ratio of the primary surfactant and a secondary component into a customized blend.

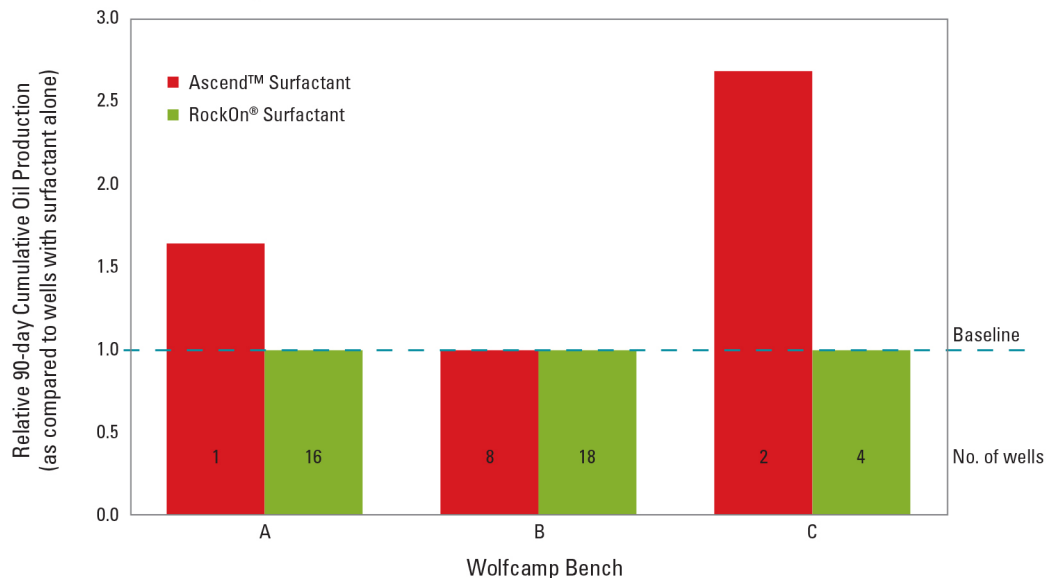
Initially, a 30-day field trial was conducted on a two-well pad in the Permian Basin. The recommended Ascend™ surfactant package was applied to test the secondary component's ability to coat the rock surface first, likely in the near wellbore region, and allow the primary surfactant to penetrate further into the formation. Multi-Chem engineers worked in close collaboration with the customer at the wellsite, delivering the surfactant, setting up micromotion pumps, and monitoring and measuring flow rate into the blending equipment.

LEADING EDGE SURFACTANT

The field trial demonstrated little to no surfactant adsorption, with the customized chemical blend allowing the surfactant to travel at the leading edge of the fracturing fluid. During this period, oil and gas production appeared to be significantly higher than the average production from offset wells previously fractured using surfactant without the secondary component. The secondary component in the Ascend surfactant package allowed Multi-Chem’s RockOn® surfactant to penetrate further into the rock matrix and enable production of otherwise trapped fluids.

The trial wells showed an increase in daily production of up to 500 BOE per day compared to offset wells with alternate or no surfactant. In the first 20 days, cumulative BOE production improved 84% compared to offset wells allowing for recuperation of surfactant investment in less than two weeks’ time. After 90 days producing, cumulative oil production in Wolfcamp A and C wells using the Ascend surfactant package was 1.6 and 2.7 times higher, respectively, as compared to wells using surfactant alone.

Comparison of Relative 90-day Cumulative Oil Production of Wells Using Ascend™ Surfactant Solution and Surfactant Alone



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