

# Custom Chemistry Improves Well Performance

## ROCKPERM™ SERVICE ENABLES CUSTOMIZED FRACTURING FLUID SOLUTION

DELAWARE BASIN, REEVES COUNTY, TEXAS

### CHALLENGE

- » Improve well production in an existing field
- » Utilize produced water in fracturing operations

### SOLUTION

- » RockPerm™ service to determine a customized surfactant package for improving fluid mobility
- » PermVis™ VFR-10 friction reducer for use with produced water

### RESULT

- » RockPerm service and PermVis™ VFR-10 friction reducer helped operator improve load recovery and achieve a 40 percent increase in BOE, compared to equivalent offset wells utilizing more conventional surfactants.

### OVERVIEW

J Cleo Thompson Oil & Gas utilized Halliburton's custom chemistry to optimize fracturing treatments in its field in the Delaware Basin in Reeves County, Texas. Taking a structured approach to the design, Halliburton customized the chemical package required in the fluid system for the fracturing treatments. The result of using this customized fluid in the fracturing treatments resulted in improved load recovery and a 40 percent increase in barrels of oil equivalent (BOE) when compared to equivalent direct offset wells utilizing more conventional surfactant packages.



### CHALLENGE – Increase Production

J Cleo Thompson had an active drilling and completion program in the Delaware Basin for a year. The fracturing designs were aggressive, including high water and sand volumes. While the company's production results aligned with expectations, J Cleo Thompson challenged Halliburton to provide a solution to improve well production. However, the company did not want to make drastic changes to its existing completion program. Although J Cleo Thompson chose to utilize Produced Water in this area, there is an abundance of Fresh Water available. While utilizing produced water has numerous benefits, including using less fresh water use and minimizing disposal costs, produced water use in fracturing treatments can present unique challenges. Fluid compatibility with chemical additives, such as friction reducers, can be difficult to overcome. Ultimately, these compatibility issues may reduce the effectiveness of the treatment or, in extreme cases, result in unusable treatment fluid.

### SOLUTION – Custom Chemistry

Halliburton designed a targeted approach to improve J Cleo Thompson's production. At the core of this solution was the Halliburton RockPerm™ service, which provides a testing protocol solution based on sound stimulation fluid and reservoir engineering

principles that can optimize stimulation fluid additives to the well. RockPerm service is a laboratory testing service performed by specially trained technicians in local area labs. This process provides prestimulation scientific testing with actual formation cuttings, reservoir fluids, and stimulation treatment fluids and additives. The testing assesses the fluid to reservoir response of stimulation fluid additives to allow optimization of the fluid design to reservoir characteristics. J Cleo Thompson agreed to provide cutting and formation fluid samples. Using these and the proposed stimulation fluids, RockPerm service was performed to determine an optimized surfactant package to improve fluid mobility in the formation, ultimately resulting in increased production. Figure 1 illustrates the results from the RockPerm service.

The next step was to determine a friction reducer additive compatible with the produced water, as well as the total fracture fluid chemistry. Halliburton PermVis™ VFR-10 is based on novel polymer chemistry. Initially, it provides excellent friction-reducing properties. Exhibiting a unique self-contracting property, with sufficient temperatures and residence time in the formation, the polymer can hydrolyze, resulting in a reduction in viscosity. When used with a breaking agent, PermVis™ VFR-10 enables excellent cleanup and conductivity. In this case, testing of PermVis™ VFR-10 with the produced water indicated better compatibility than traditional anionic friction reducers.

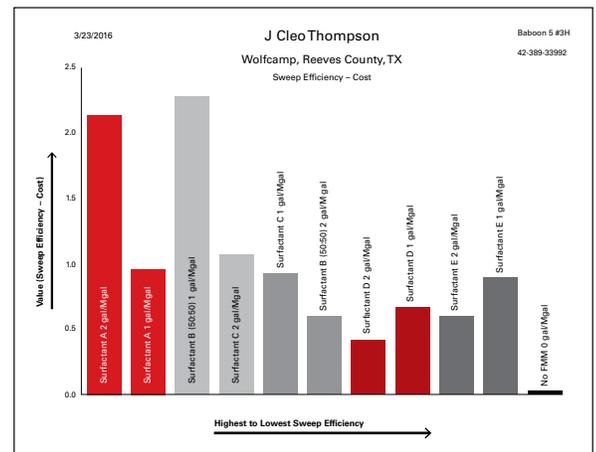


Figure 1 RockPerm™ service results

**RESULT – Improved Production**

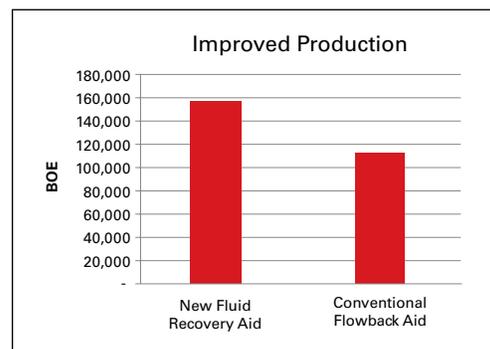


Figure 2 Based on an average of the first 6 months of production results show a 40 percent increase in production

After the testing and analysis were complete, J Cleo Thompson agreed with the Halliburton fluid recommendations. Well production was improved by applying robust testing methods through RockPerm service and by customizing the fracturing fluid. As compared to similar offset wells, the wells treated with the Halliburton customized fluid showed improved load recovery and 25 percent increase in the gas/oil ratio (GOR). Initial production improved dramatically, as well, with a 40 percent increase in BOE.

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