ABSTRACT

Environmental concerns and public opinion have elevated the visibility of hydraulic fracturing. Currently oil companies and operators acquire fresh water for fracturing treatments on the front end and pay to dispose or transport the flowback or produced water on the back end, increasing dramatically the cost of the hydraulic fracturing job. We report a newly developed fracturing fluid system utilizing 100% untreated produced water which eliminates the upfront costs of purchasing fresh water. In addition, the back end costs are significantly reduced by transporting produced and/or flowback water to locations for re-use rather than to disposal well(s) located miles away or even in other states.

This new system uses conventional gelling agents and crosslinkers used in active US shale plays, addressing the fracturing focus initiative.

This new fluid system was developed for temperature ranges between 120-300+ °F. Field tests prove shear stability and good proppant transport at 20 BPM through a 1.25 in sliding sleeve baffle. The fracturing fluid system can be designed for instant or delayed crosslinking in recycle water with total dissolved solids exceeding 300,000 mg/L with hardness exceeding 30,000 mg/L. Another concern in the past was the presence of boron in produced water. This system can be used in water containing boron levels exceeding 500 mg/L.

The code for recycle water has been broken utilizing this unique fracturing fluid system designed to conserve fresh water aquifers and recycle produced and flowback waters, reducing significantly disposal costs.

This paper reports laboratory testing of the fluid characteristics in untreated produced water from the Bakken as well as the outcome of hybrid fluids in field applications, recommendations for field applications and economic impacts on fracturing fluid systems.

To order the full paper, visit https://doi.org/10.2118/173602-MS