Exclusive Treatment Allows Operator to Use 100% Produced Water for Frac Operations

CONTINUOUS APPLICATION OF ACROCLEAR© REMOVES H_2S AND IRON SULFIDE SOLIDS FROM SWD-SOURCED WATER

NORTH AMERICA LAND

CHALLENGE

For the operator, using water from the SWD facility in frac operations would provide a significant cost-savings over purchasing fresh water, but three obstacles needed to be overcome:

- H_2S levels were high and the toxic gas needed to be eliminated to be safe for frac operations.
- FeS solids can damage the formation and interfere with chemicals used for frac operations.
- Standard chemical treatments would cause delays in operations while the chemical worked to eliminate or reduce H_2S and FeS.

SOLUTION

Multi-Chem assessed the operations and conducted water analysis to determine the best approach to meet the requirements. We recommended:

- Continuous application of AcroClear, an acrolein-based product that scavenges H_2S and dissolves solids such as FeS.
- Injections at two locations in the line to allow for sufficient contact time and proper mixing.
- Continuous monitoring during the field trial to adjust treatment rates and ensure KPIs were met.

RESULTS

The approach worked, with a constant supply of in-spec water available for the fracking operations.

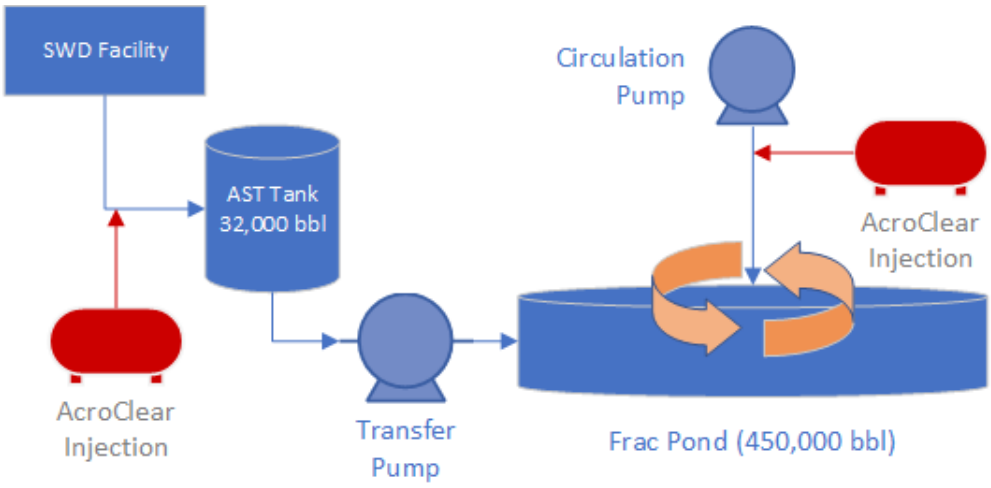
- H_2S presence was eliminated completely.
- The amount of FeS solids were reduced significantly.
- Fracking operations using 35,000 BWPD have been able to proceed without interruptions since treatment began.

OVERVIEW

A producer in West Texas was planning to use water from a salt water disposal (SWD) facility for hydraulic fracturing operations, but the presence of hydrogen sulfide (H_2S) and iron sulfide (FeS) solids in the water needed to be addressed first. Time was also a key factor, as the producer couldn't afford delays to frac operations that would come with the standard periodic batch treatments. Multi-Chem was engaged to resolve the issue and recommended a dual-injection and continuous application of AcroClear®, an acrolein treatment designed to eliminate toxic H_2S gases and FeS solids. The approach enabled the operator to draw produced water continuously as the pond was being treated for H_2S and FeS.

CHALLENGE

Produced water from the SWD facility was being continuously pumped into a 32,000 bbl tank before the water was pumped to the frac pond, which holds 450,000 bbls of water. The operator needed to completely eliminate the presence of H_2S and significantly reduce the level of FeS solids from the source water to safely use in its fracking operations, which consisted of three wells and required on average 35,000 bbls of water each day.



SOLUTION

Multi-Chem technical professionals visited the customer site to assess the operations and conduct water analysis to determine the best treatment approach. Our detailed water analysis showed high levels of dissolved H_2S/total sulfides (up to 15 ppm).

Multi-Chem recommended treating the water with AcroClear, an acrolein-based H_2S scavenger and iron sulfide dissolver that consistently outperforms conventional chemical solutions. AcroClear is a simple organic molecule that is non-corrosive and does not affect the

pH of an aqueous system. The reaction between H_2S, iron sulfide and acrolein produces a low molecular weight, highly water soluble by-product called thiopyran. The by-product is stable and never regenerates H_2S or FeS.

To effectively treat the water to meet specifications, Multi-Chem recommended establishing two continuous injection points of AcroClear. The first injection was placed in the line from the SWD before the AST tank, which allowed for proper mixing and greater contact time to react with the sulfides dissolved in the water. The second injection was placed in the frac pond itself, specifically into the suction side of the pit's circulation pump to scavenge any remaining sulfides.

AcroClear was injected at 5.5 ppm per 1 ppm of total sulfides.

RESULTS

The treatment was a complete success. The H_2S was eliminated with quantities reduced to 0 ppm. The FeS was also effectively dissolved. There were no interruptions to fracking operations, which were ongoing continuously for a three-week period and used about 35,000 bbls of water each day.

The reduction in solids helps to protect the integrity of the formation and preserve the efficiency of chemicals, such as friction reducers.

In total, Multi-Chem's AcroClear treatment regimen effectively treated 694,000 bbls of water over a three-week period.

Water samples taken from the SWD facility, from the transfer pump and the pit show the effectiveness of the AcroClear treatment.

The operator's frac pond before and after treatment with AcroClear.

HALLIBURTON