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FlowSure™

CONTROLLED RELEASE SCALE INHIBITOR

LONG-TERM SCALE DEPOSITION SOLUTION

For years, the industry has looked for a program where an inhibitor, placed in the formation, provides scale deposition protection for longer than one year. Fritz Industries manufacturers a scale inhibitor technology that places a robust scale inhibitor onto a solid matrix. This technology, **FlowSure™ SI-503**, is a controlled release scale inhibitor that has been applied in several fracture jobs in ***coalbed methane (CBM)*** wells in the Appalachian area. In some cases, the residual data shows that the scale inhibitor lasts up to five years.

CARBONATE SCALE DEPOSITION

Traditionally, there are three common approaches to carbonate scale inhibition—continuous, batch, or squeeze applications. In virtually all cases, a liquid inhibitor is applied to the well, or to the near-wellbore in the case of a squeeze. The application concentrations vary depending on the expected longevity. Continuous treatments require a dilution that readily mixes and diffuses into the produced or injected fluid. This provides a continuous dosage rate in the production, which requires a pump and chemical tank placed on location.

Batch treatment, practiced in some areas, is not recommended when treating for scale. When used, it eliminates the need for equipment and inventory at each well that requires treatment. A treater truck makes regular and frequent stops at each well to apply and flush a concentrated inhibitor. Applications are typically spaced 7 to 14 days apart. In all of these cases, the level of scale

APPLICATIONS

Fracturing fluid systems.

FEATURES AND BENEFITS

- Solid, concentrated product
- Easy to add to a fracture
- Robust inhibitor technology
- Replaces continuous, squeeze or batch treatments
- Ideal for remote locations with operational obstacles
- Increases production
- Reduces downtime due to scale in the near-wellbore
- Cost-efficient
- Cost added to the authority for expenditure; reduced operational expense for scale inhibition

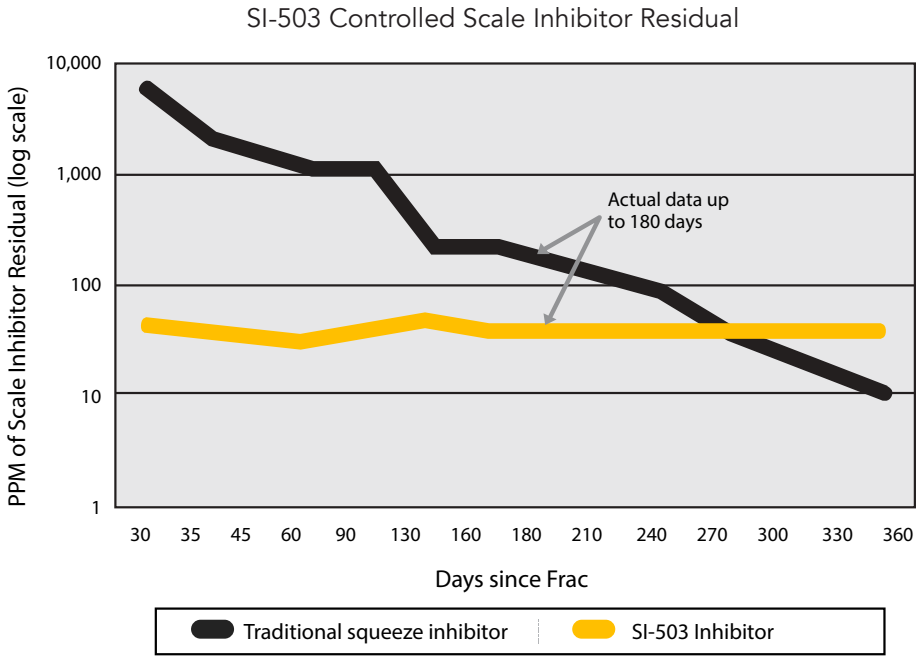
inhibitor is measured by looking at the residual of inhibitor in the produced water.

If scale inhibitor residual appears 2 to 3 ppm or greater, then the program is considered to be successful. FlowSure™ controlled release scale inhibitors are specifically formulated for compatibility with most fracturing fluids. Fluid compatibility is critical from an operational standpoint, ensuring that the essential nature of the scale inhibitor is not compromised by the addition of the fracturing products.

Squeeze applications are calculated on the water production and the desired life of the squeeze. The product is applied and squeezed into the near-wellbore, typically calculated as 5 to 6 ft (1.5 to 1.8 m) into the formation. The chemical then enters the production as the well produces water. Because the product is liquid, its concentration varies over time. Initially, there is a higher than required dose of inhibitor, but over time, the product is depleted and the well requires a resqueeze. A squeeze can last for 6 to 12 months.

CASE HISTORY

An Appalachian-area operator produced gas from a CBM formation. The produced water had a positive scaling index and deposited carbonate scale on the perforations and on the production string. Continuous scale treatment was operationally out of the question.



A scale squeeze only offered protection for up to a year. The operator wanted multiyear protection from a scale inhibitor that could be added in the fracturing process. Fritz Industries arrived at a solution by which a robust scale inhibitor was fixed onto an inert solid matrix. This solid product, FlowSure™ SI-503 Controlled Release Scale Inhibitor, was found to be compatible with a host of fracturing fluids. This inhibitor protects against general oilfield scales such as carbonates and sulfates. The product was applied and compared in the field with a traditional squeeze application. Whereas the scale inhibitor used in the squeeze was a liquid, SI-503 inhibitor is a solid product. The results showed the difference in the applications.

The squeeze product produced a high residual rate before tapering off. The fracture-applied inhibitor showed a low initial residual and held that residual over time. The treatments are now more than 5 years old. The extrapolation indicates that the solid scale inhibitor showed residuals long after the liquid product fell below the desired treating level.

The operator applied SI-503 in the fracture and eliminated the need for continuous or batch treatment. Furthermore, the residual trend indicates that the FlowSure™ SI-503 Controlled Release Scale Inhibitor has a life exceeding 5 years. Production has been optimized for this operator because scale no longer deposits downhole to restrict flow in the perforations. The operator has realized reduced downtime and cost due to workovers.