

Squeeze Treatment Recovers Production from an Under-Producing Well

ACHIEVED A SQUEEZE TREATMENT LIFETIME 55% LONGER THAN TARGET

MIDDLE EAST

CHALLENGE

- » Scale formation downhole near wellbore and tubing
- » 10 out of 70 wells shut-in due to CaSO₄ scaling
- » High salinity brine with high scaling potential
- » Production loss—10,000 BOPD
- » Well declared workover due to low production from scale deposition inside ESP and in tubing

SOLUTION

- » Chemical inhibition of scale formation by effective squeeze application in the workover declared well
- » Performance screening and systematic scale inhibitor selection process
- » Monitor and measure results against defined Key Performance Indicators (KPI)

RESULT

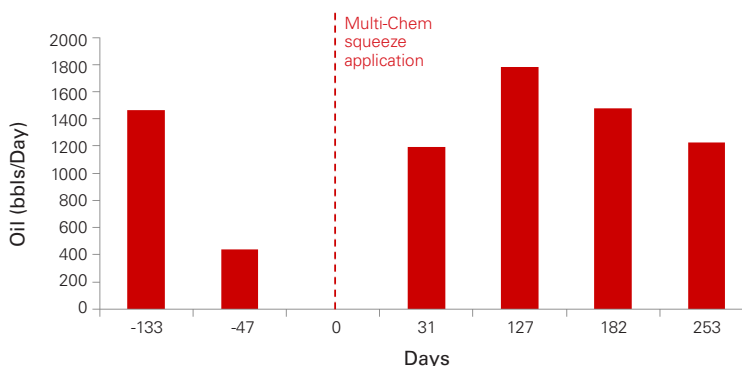
- » Effective chemical treatment design due to expertise and collaborative teamwork
- » Total production of well increased by an average of 1000 bbls/day
- » Production maintained at a high level with no decrease in scale ion concentrations
- » Squeeze lifetime of 280 days—longer than the original design lifetime of 180 days

OVERVIEW

A customer experienced considerable scale formation of CaSO₄ and CaCO₃ downhole in one of its assets. The challenge to control the high scaling potential produced brine contributed to a loss of 10,000 BOPD across the field and resulted in the shut-in of 10 of the 70 wells.

DESIGNING AN EFFECTIVE SQUEEZE TREATMENT

To mitigate the risk of the scale deposition during production, Multi-Chem's technology group designed and implemented a scale squeeze treatment. The design process started with a comprehensive field survey conducted by a field experienced technologist. Scale prediction modeling was used to identify scale composition and quantify scaling severity. The technology group conducted systematic performance, compatibility and stability testing to formulate a cost-effective, custom scale inhibitor that considered the water chemistry and conditions of the specific horizontal well. A collaborative effort between Multi-Chem and Halliburton's coiled tubing team engineered an effective application procedure to minimize loss of squeeze fluid due to refilling in the annulus and to deliver scale inhibitor to targeted zones. This application technique maximized the effectiveness and lifetime of the squeeze treatment.



Oil production rates before and after Multi-Chem squeeze treatment, demonstrating squeeze lifetime of >250 days.

The Multi-Chem approach to squeeze treatment design combines extensive field experience and application engineering with custom, cost-effective chemistry to meet well-defined Key Performance Indicators (KPI). In this case, a minimum effective concentration (MEC) of 5 ppm was determined by dynamic loop tests and static bottle tests. Continuous monitoring of the squeeze application demonstrated that the scale inhibitor concentration in the produced brine remained above MEC for more than 280 days, effectively inhibiting scale during that period. A 55% increase in treatment lifetime was achieved relative to the target of 180 days while recovering the oil production rate of the well—resulting in an increase of 1000 bbls/day (avg).

Predictive Model of Scale Inhibitor Concentration Over Time

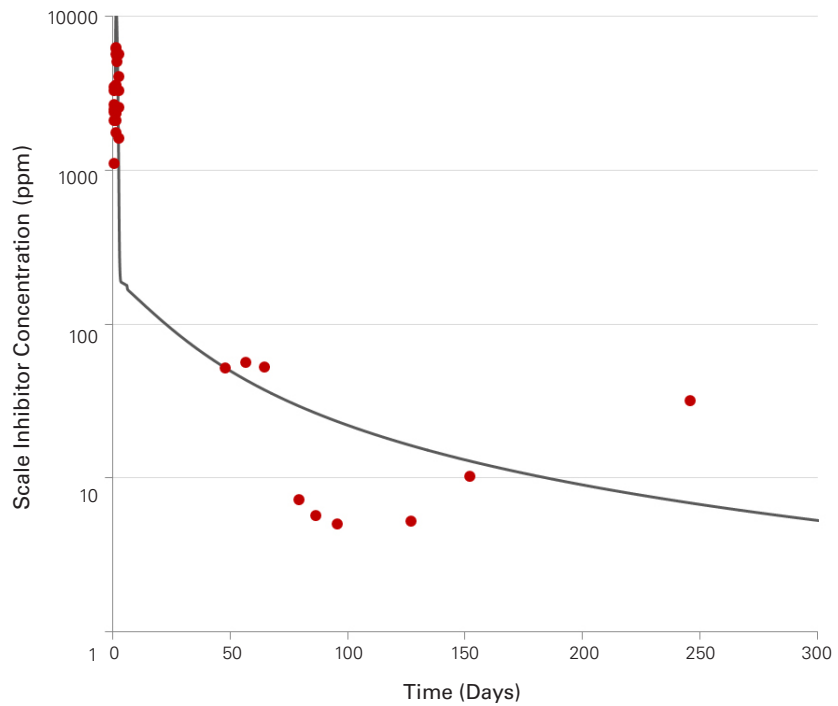


Chart shows estimate of treatment lifetime (line) and actual scale inhibitor concentration measured throughout squeeze treatment lifetime (circle).

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