CHEMISTRY: CASE STUDY

NEXTIER

Solid Scale Inhibitor Provides Long-Term Protection in the Permian Basin

CHALLENGE

Prevent scaling on five newly stimulated wells for three months with a scale inhibitor pumped during the frac job.

SOLUTION

NexTier chemistry experts recommended a tailored solid scale inhibitor program utilizing StimGuard Scale DPAT-S.

RESULT

StimGuard Scale DPAT-S successfully prevented post-job scaling for over two months while no well intervention could be performed.

Fig. 1 illustrates the difference between untreated water (left) and water treated with recommended scale inhibitor.

A major Permian Basin operator partnered with NexTier to design a long-term scale inhibition treatment for newly stimulated wells in an area with high scaling potential. The operator had a unique requirement: no well interventions could be performed for at least two months. Typically, scale inhibitor is continuously injected post-frac through a capillary-string or similar delivery method, but this was not an option for these wells. NexTier therefore developed a customized solution to meet the operator's constraints.

The minimum required inhibition period was two months, with three months or longer preferred. Based on early production forecasts, each well was expected to produce approximately 300,000 BBL of water during the first three months. Conventional liquid scale inhibitors pumped during frac operations lose effectiveness within days, increasing the risk of scale deposition, equipment damage, and higher treatment costs-making a long-acting solution essential for this application.

After collecting representative samples of recycled and formation waters, water testing was conducted at NexTier's Chemistry Innovation Center, verifying the potential for significant levels of

calcium carbonate scale to form. Kinetic turbidity testing (KTT) was utilized to demonstrate the formation of scale and determine effective chemistry and the minimum inhibitory concentration (MIC) for that chemistry. In these water samples, the effective MIC was 5 ppm.

Over the course of the 5 well pad containing 298 stages, 23,990 lbs of StimGuard Scale DPAT-S was pumped, placing approximately 4,800 lb of scale inhibitor per well.

Once production began, water samples were collected weekly and analyzed at the Chemistry Innovation Center to ensure residual scale inhibitor concentrations remained above the MIC. Over time, as stability was confirmed, sampling frequency decreased (Figure 2).

Simultaneously, produced water volume vs time data was collected to verify the volumes were in-line with expectations. Across the five wells, the average production over the first three months was within 2% of the 300,000 BBL estimated volume.

The StimGuard Scale DPAT-S program successfully delivered more than five months of continuous scale protection from treatments applied during the multi-stage frac job. This approach effectively protected electric submersible pumps (ESPs), delayed the need for capillary-string inhibitor injection, and provided a cost-effective, long-duration scale control solution. Based on these results, the operator has expanded use of StimGuard Scale DPAT-S to several additional pads across the field.

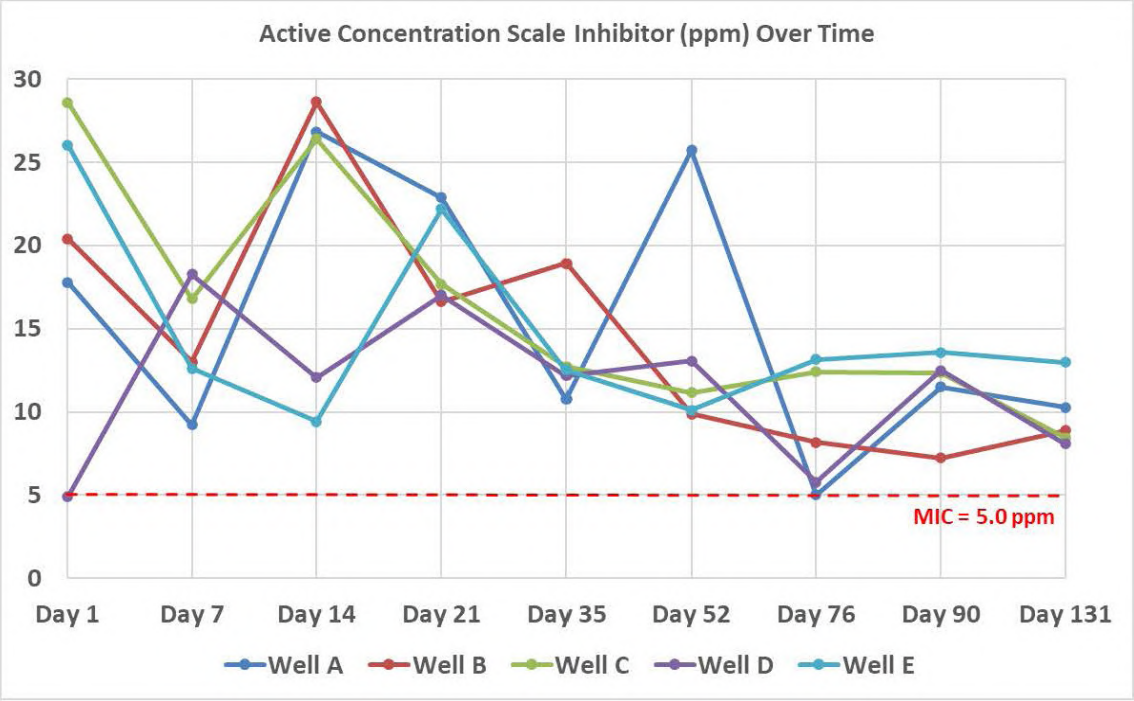

Fig. 2 shows that residual scale inhibition levels stayed above the 5 ppm threshold well beyond the initial three-month design period.