High-Performance Winterized Paraffin Inhibitor Helps to Reduce Thermal Remediation Frequency

Situation

The Denver-Julesburg Basin is located in the northeastern portion of the state of Colorado and is one of the fastest growing unconventional oil plays in the US. The basin stretches from the foothills of the Rocky Mountains all the way to the Kansas/Nebraska borders (East to West) direction and from the Denver Metro all the way to Wyoming (North to South). The production characteristics vary geographically with GOR ranging from 1,500 scf/BBL to 9,000 scf/BBL and the oil ranging from light condensate 55 API to light crude 40 API. The major production challenge for all cases is paraffin deposition. The most common artificial lift types used in the basin are Gas Lift, Rod Pump and Plunger Lift.

With the area experiencing harsh winter conditions with temperatures potentially staying below 0°F for weeks and dropping as low as -30°F at times, paraffin inhibition has historically been challenging, specifically when looking for chemistries that are stable at low temperatures and are economically advantageous compared to remediation treatments.

Challenge

The customer was addressing the paraffin deposition challenges by combining continuous inhibition of the wells with PARA10116A at 750ppm based on oil production and monthly thermal remediation treatments. The addition of PARA10116A has successfully pushed back the remediation frequency from bi-weekly to monthly; however the chemical-only solution was not able to prevent all deposition, requiring a monthly thermal remediation to keep the well in operation. The thermal remediation treatments carry a large cost to the customer in addition to the cost of the treatment – there are significant production losses associated with well shut-in and the use of oil for thermal remediation.

Insight

Nalco Champion's research center specifically formulated a new product suite for paraffin inhibition that would stand up to colder climates while achieving a high level of performance. The chemistries are not only stable to -40°F – they also show improved performance as compared to the current Nalco Champion winterized paraffin inhibitor offering.

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Solution

The Nalco Champion Denver-Julesburg Basin team tested the products on the customer's oil against the incumbent PARA10116A. The compilation of the laboratory testing results is shown in figure 1.

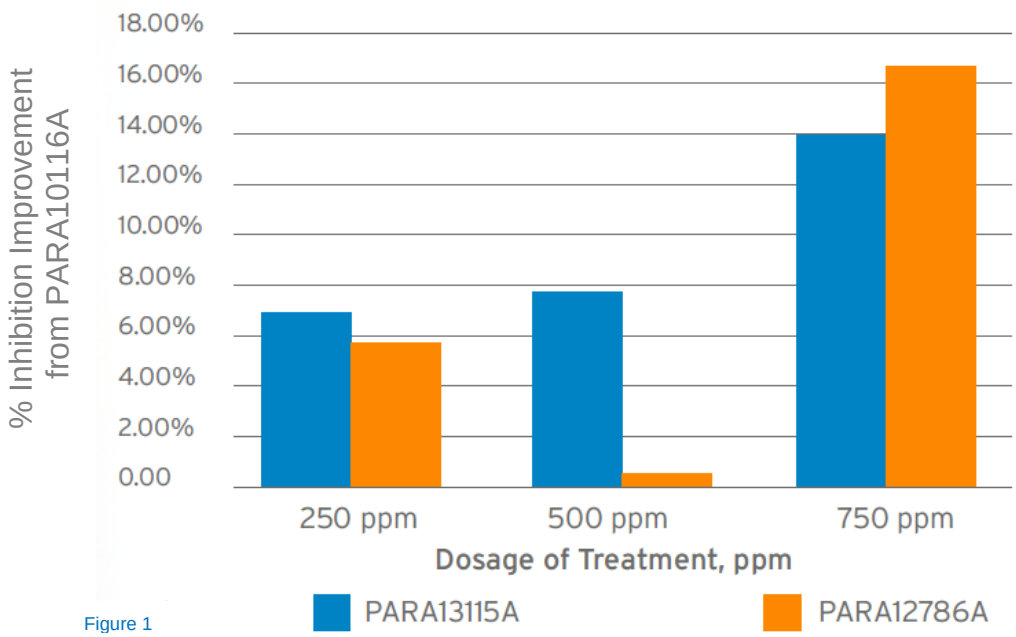

Figure 1

Based on the testing results, Nalco Champion recommended PARA13115A for a field trial, starting the trial at 750 ppm (the same injection rate as the incumbent chemistry), then further optimizing the rate down to 500 ppm. The well selected for the trial was a low GOR rod pump well located near Fort Lupton, CO and the chemistry was to be applied in the same fashion as the incumbent, via continuous injection down the backside of the well. The success of the treatments was to be measured by monitoring the differential pressures across the tubing string and the flowline leading to the separator. Both of these elements are part of Nalco Champion's comprehensive RenewIQ solution safety program.

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Results

The trial with PARA13115A at 750 ppm ran for 60 days between the months of February and April. During that time, the differential pressure between the wellhead and separator was measured and recorded daily, and correlated to the production by looking at the differential pressure increase per barrel of oil produced. The obtained values were then compared to historical data of no treatments and PARA10116A treatments in figure 2:

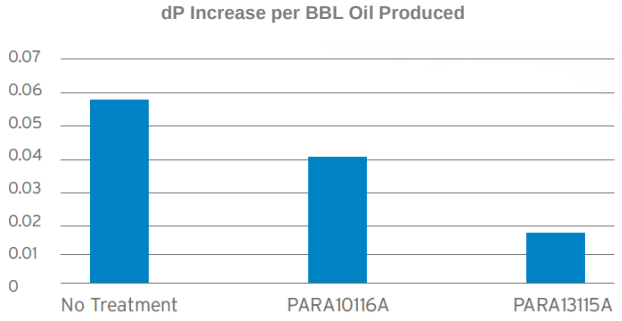

Figure 2

Based on the obtained results, PARA13115A has shown a great reduction in deposition, and for the duration of the trial the well did not require any remediation treatments to keep steady operation. Since the trial only lasted for 60 days, it will be difficult to estimate the full duration of the period between remediation treatments, however even extending the frequency from every 30 days to every 60 days shows significant value creation as captured in figure 3.

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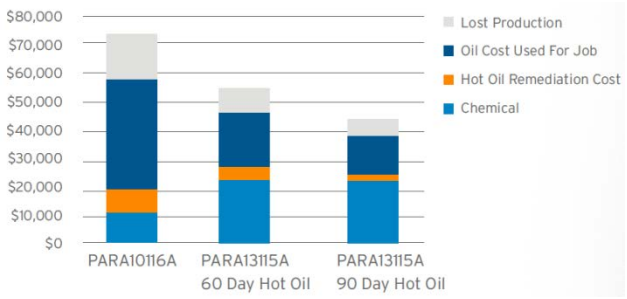

Figure 3

Based on the performed analysis, the use of PARA13115A has saved the customer 25 percent of the annual operation costs for the trialed well if the thermal remediation treatment frequency is extended to 60 days and up to 40 percent if the remediation frequency is extended to 90 days. The calculated numbers also do not capture the reduced exposure from minimizing the truck traffic in the field and reduced safety and environmental risk potential for reducing the thermal remediation frequency on a producing location.

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