Case History: OFC-CH-0096

# EC6734A IMPROVES OIL-WATER SEPARATION, BOOSTS OIL RECOVERY, CONDITIONS PRODUCED WATER FOR DISPOSAL IN SOUTH TEXAS

Case History: Oilfield Chemicals

## SITUATION

An operator recovering a multiphase production stream in South Texas was experiencing separation issues, even though Nalco Champion was continuously injecting a 50:50 blend of emulsion breaker-dispersant chemistry at a rate of 1,000 ppm. Separation-related problems were resulting in disposal of oil with waste water, increased labor costs, and high microbe-related fouling.

Production from wells in the field was gathered in pipeline headers and transported to a processing facility where liquids were separated and stored in tanks until the operator could sell the oil and dispose of produced water. An increase in production from previously shut-in wells brought a large influx of oil-wet iron sulfide solids into the processing facility, compounding the difficulty of separating fluids in the storage tanks.

The operator knew from past sampling that the field had a long history of microbe-related production problems.

Although a 5-ft thick emulsion pad persisted in the gun barrel tank, the incumbent combination emulsion breaker-dispersant chemistry had yielded satisfactory separation results until the concentration of iron sulfide solids had increased when the shut-in wells began producing into the system. Since the new wells were added, results of millipore sampling also indicated oil carryover in separated produced water of about 200 ppm, well beyond the 50-ppm maximum allowed by regulators for hydrocarbons in disposal water.

## CHALLENGE

The processing facility had been in place for many years, and over time a large amount of oil-wet solids had settled in the storage tanks. When contamination with iron sulfide solids increased, more man-hours were required to batch-treat the thick emulsion pad in the gun barrel tank. Heightened solids contamination also reduced the efficiency of oil-water separation, making it more difficult for the operator to achieve oil specifications required by purchasers and to reduce oil contamination in produced water enough to meet wastewater disposal standards.

## INSIGHT

Nalco Champion realized the operator needed a more effective treatment program to address the more challenging operating conditions. Specialty chemistry was needed to improve the efficiency of oil-water separation, keep microbial contamination in check, and improve precipitation of solids from fluids in storage tanks. A treatment program incorporating chemistry with those attributes would reduce the size of the emulsion pad in the gun barrel tank, while helping oil quality achieve sales specifications and waste water comply with disposal standards.

To determine which oilfield specialty chemistries would best help solve the operator's problems, Nalco Champion evaluated the performances of several candidate chemistries in fluid samples gathered from the processing facility. Empirical results showed that applying EC 6734A would improve fall-out of solids in the storage tanks. Tests also revealed that paracetic acid (PAA), a biocide that yields rapid kills of both planktonic and sessile bacteria, would reduce plugging by oxidizing iron and organics and would improve the precipitation of suspended inorganic solids.

## SOLUTION

An injection point was installed through the use of an injection quill to introduced EC6734A into the water phase of the gun barrel. Nalco Champion set the initial dosage rate at 250 ppm to shock the system and remove a large amount of the solids. After two days the treatment rate was reduced to 125 ppm to maintain the iron sulfide pad in the gun barrel.

Initial demand for PAA was very high and a large amount of solids fell out of the emulsion pad upon initial implementation. Subsequently, Nalco Champion optimized the PAA treatment rate to a dosage of 100 ppm.

Through optimization of the treatment program, Nalco Champion realized an emulsion breaker was needed to help polish off oil prior to selling. An emulsion breaker package consisting of a 50:50 blend of Emulsotron XF-421 and Flotron M-152 was introduced at a dosage rate of 250 ppm.

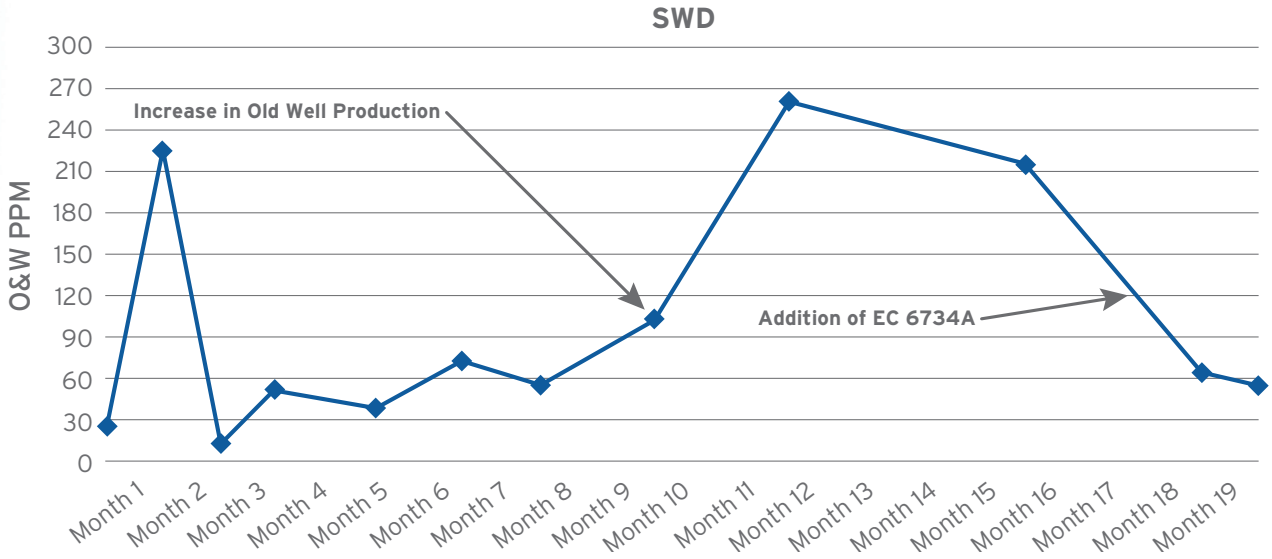


*Table 1 – Oil Carry Over Response*

## RESULTS

Since implementation of the treatment program recommended by Nalco Champion, the thickness of the emulsion pad in the gun barrel tank was reduced to less than 1 in. from about 5 ft and oil carryover in waste water decreased to about 50 ppm from more than 200 ppm, as shown in Table 1.

Before implementation of Nalco Champion's program, daily oil production was erratic, averaging about 97 b/d. One month after treating began, daily oil recovery was averaging 100 b/d and daily production had become much more consistent. The improvement of steady-state production can be attributed to enhanced separation in the gathering tanks.

The operator's return on investment is shown in Table 2.

| Location | Producted Water Injection | Oil Recovered | Daily Increased Oil Sales ($50/bbl) | Annual Increased Oil Sales ($50/bbl) | ROI |
|---|---|---|---|---|---|
| SWD Pre Treatment (Incumbent) | 1000 | 97 | – | – | – |
| SWD Post Treatment | 1000 | 100 | $150.00 | $54,750.00 | 3550% |

| | | | |
|---|---|---|---|
| Direct Chemical Savings | N/A | Type of Investment | N/A |
| Indirect Chemical Savings | N/A | Total Investment $ | $1,500.00 |
| Production Enhancement | $54,750.00 | Return on Investment | 3550% |
| Cost Avoidance | N/A | Total Value Recognized | $53,250.00 |

*Table 2 – Investment Summary*

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