Case Study: CH-1621

THE RenewIQ™ BIOCIDE SOLUTION PROVIDES IRON SULFIDE EMULSION AND BACTERIA CONTROL

PROBLEM
An operator producing oil from the Red River formation was experiencing costly production issues related to hydrogen sulfide (H₂S) and iron sulfide (FeS). Oil quality was being significantly degraded by H₂S in the production stream and a thick FeS emulsion pad had formed in project storage tanks, reducing the value of the oil. The contaminants also reduced production system throughput and diminished the quality of produced water, making disposal more difficult and costly. Better microbial control would reduce system H₂S levels and better management of FeS would reduce the thickness of the emulsion pad in the storage tanks.

SOLUTION
The local Nalco Champion team and research staff conducted a multi-parameter, multi-location site survey. The testing indicated that injecting a Renewiq solution, BIOC16734A biocide into the production stream would solve the site H₂S and FeS issues, while providing financial benefit to the operation. BIOC16734A biocide is a rapidly reacting, broad-spectrum biocide that oxidizes proteins in microbial cells as its biocidal kill mechanism. The product is also a weak oxidizer, effective at selectively oxidizing FeS and H₂S.

From a sustainability perspective, the post-oxidation byproducts are water and acetic acid.

The producer requested a product trial.
Nalco Champion ran three separate trials. The trials were conducted at different locations for different durations. It was determined that the optimal RenewIQ solution injection point for continuous dosing was at the free water knockout tank. Batch treatments were also conducted at the gas treater to determine the product’s effectiveness on H₂S. Prior to commencing the trials, Nalco Champion conducted extensive application safety and training sessions. The training was designed to ensure safe and efficient chemical application. The sessions targeted the producer’s site and roustabout crews, as well as the Nalco Champion sales and operations teams.

**RESULTS**

The BIOC16734A biocide injection brought bacteria levels back under control in the system (see Figure 2), drastically reduced the emulsion pad thickness by oxidizing the FeS (see Figure 3), reduced the water content in the oil to bring it back to saleable quality, improved water quality, and reduced the H₂S levels in the gas significantly (see Figure 4). In addition, it could be demonstrated that when residual levels of BIOC16734A biocide dropped, the bacteria levels correspondingly spiked (see Figure 5).
Figure 4 - Shows the reduction in H2S in the gas phase of the produced fluids by addition of BIOCI6734A biocide.

Figure 5 - Demonstrates the relationship between residual BIOCI6734A biocide and bacteria. When the residual levels are low, bacteria growth spikes; but when there is a consistent level of residual, bacteria is kept in control under the target of 250,000 colonies/mL.
CONCLUSION
The Nalco Champion implementation of a RenewIQ solution solved many operating problems for this producer and subsequently made their operation more profitable. Full implementation of a RenewIQ solution replaced four other chemicals and saved the customer an estimated $95,000 per year.

Oil and water separation was greatly improved in the customer’s separations tank through the elimination of FeS. Bacterial and H₂S levels were also improved. The customer has plans to implement the RenewIQ programs at other sites.