

THE RENEW^{IQ}™ BIOCIDAL 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 (H_2S) and iron sulfide (FeS). Oil quality was being significantly degraded by H_2S 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 H_2S 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 H_2S 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 H_2S .

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

The producer requested a product trial.

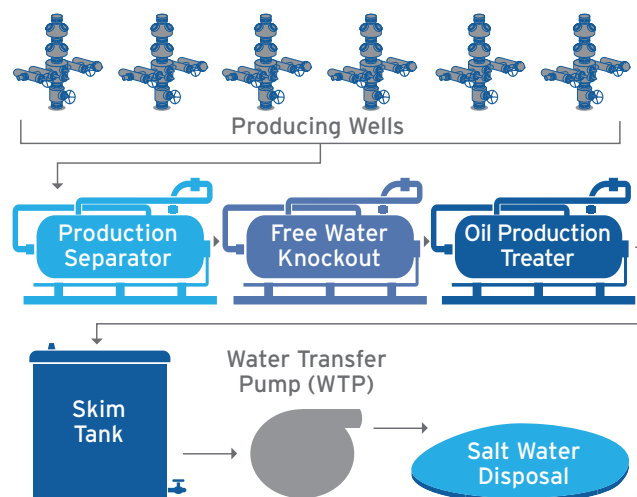


Figure 1 - Shows the producer's typical battery layout.

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 H_2S . 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 H_2S 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).

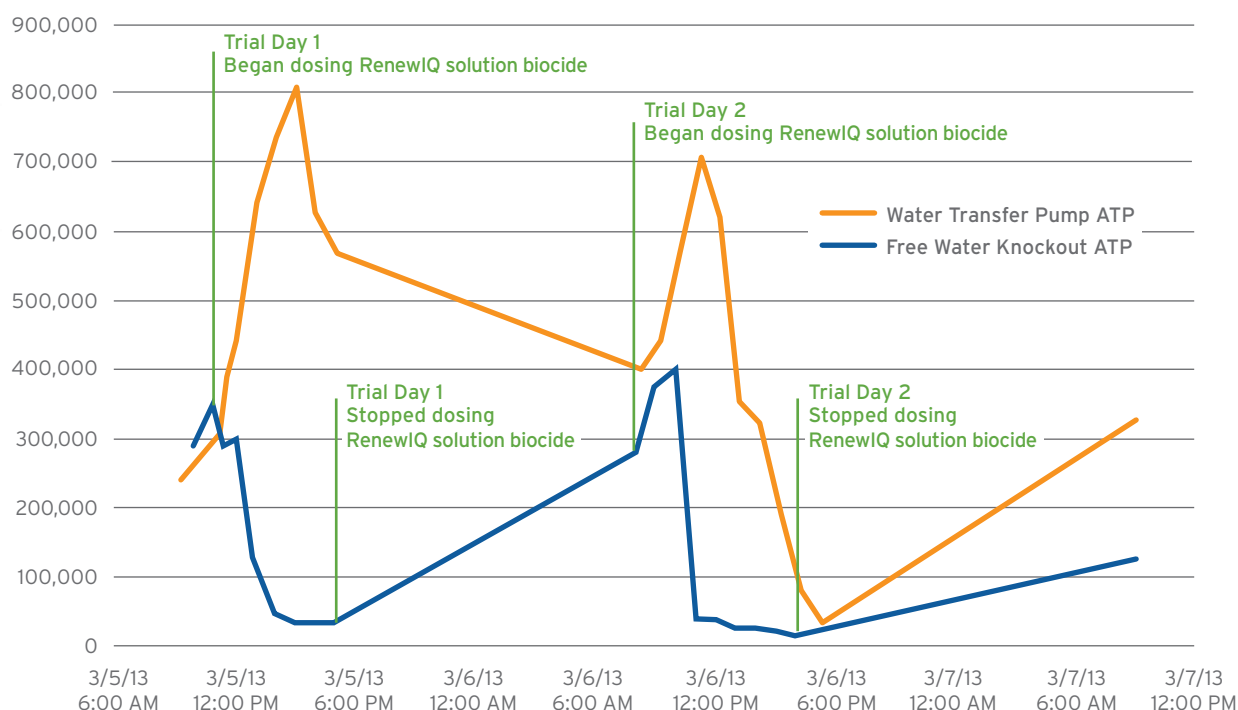


Figure 2 - Shows the ATP results in colonies/mL. The blue line is at the free water knockout tank and the red line is downstream at the water transfer pump. The effect of BIOC16734A biocide can be seen immediately with an initial spike due to the release of sessile bacteria colonies followed by a steep drop off.

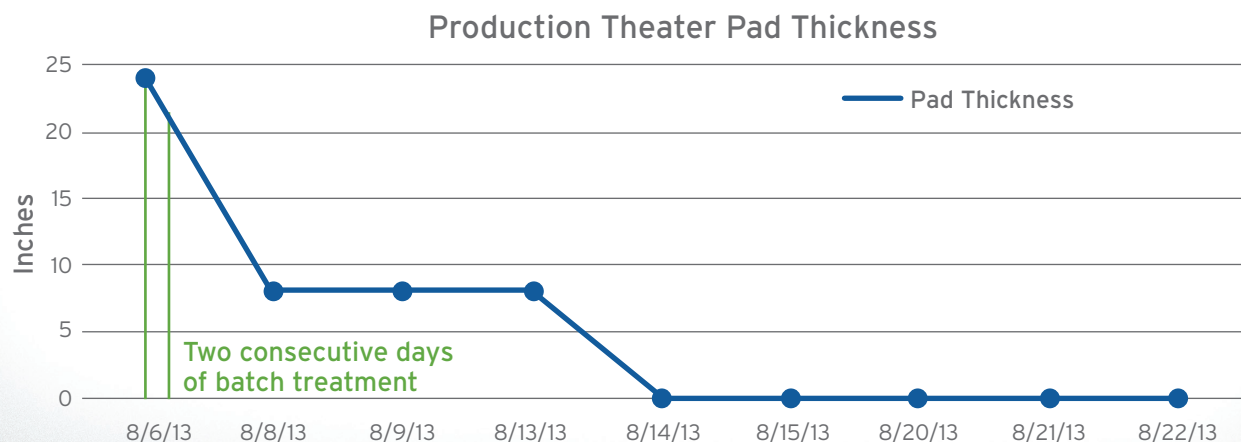


Figure 3 - Shows the reduction in thickness of the emulsion pad. There were two (2) consecutive days of batch treatment, which immediately reduced the pad thickness and the continuous treatment upstream of the production treater kept the pad from reforming.

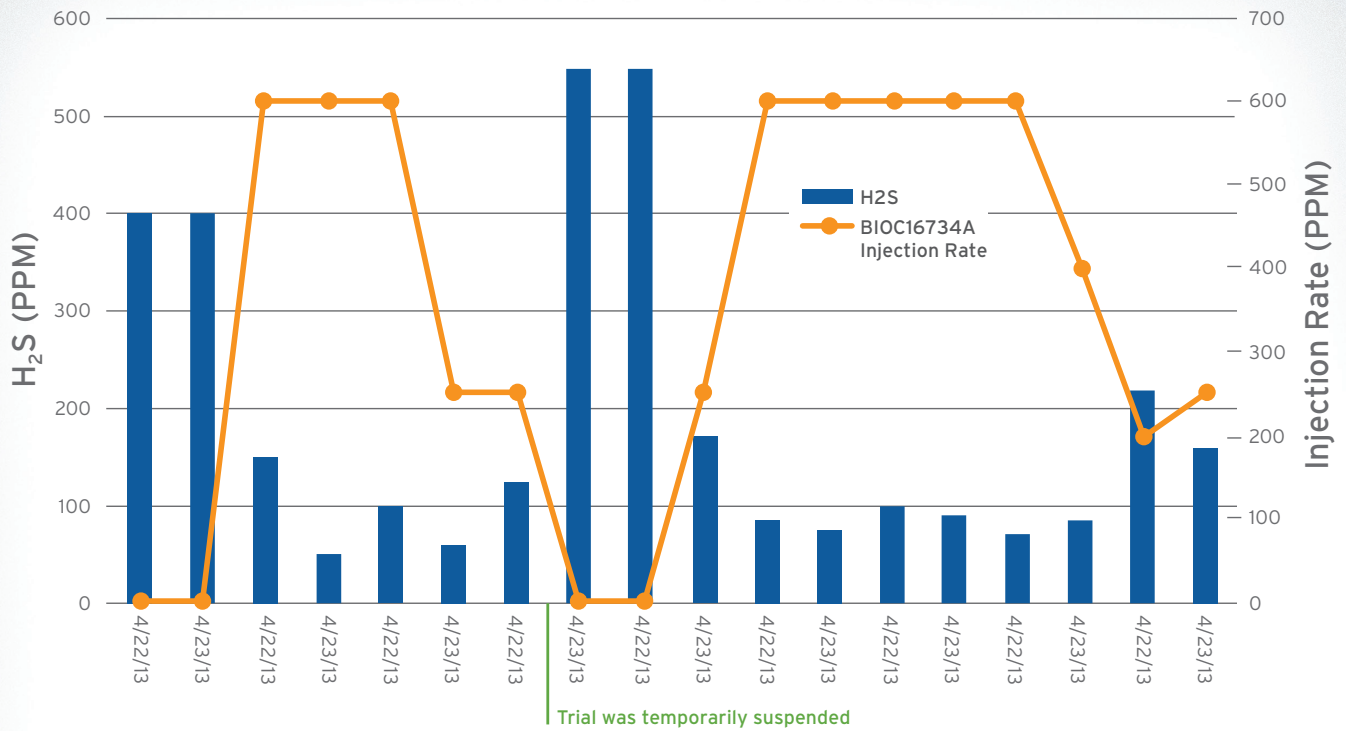


Figure 4 - Shows the reduction in H₂S in the gas phase of the produced fluids by addition of BIOIC16734A biocide.

Water Transfer Pump Bacteria versus Residual

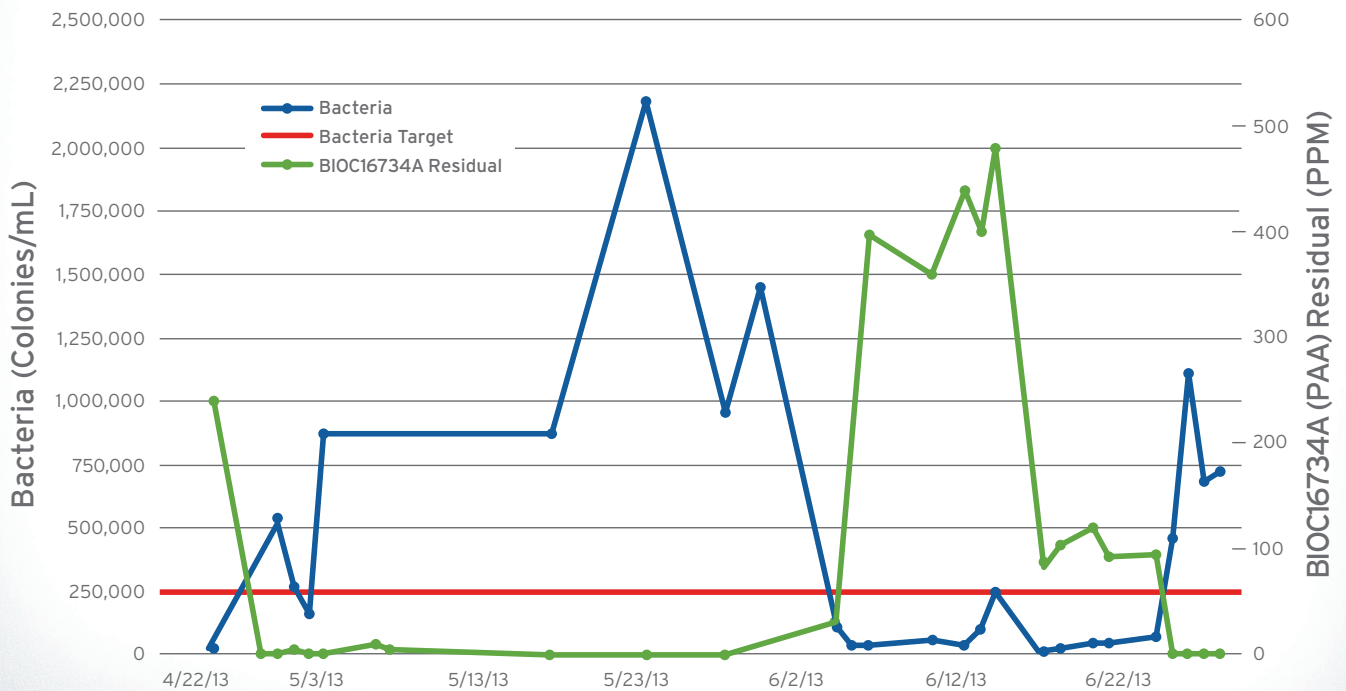


Figure 5 - Demonstrates the relationship between residual BIOIC16734A biocide and bacteria. When the residual levels are low, bacteria growth spikes; but when there is a consistent level of residual, bacteria is kept in control under the target of 250,000 colonies/mL.

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.

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