

Case Study: CH-1946

3D TRASAR™ TECHNOLOGY FOR BOILERS WITH NEW HARDNESS RESPONSE PROGRAM HELPS U.S. REFINERY ENSURE MAXIMUM BOILER RELIABILITY



INTRODUCTION

Scale on boiler surfaces can lead to serious problems. Even an extremely thin layer of scale is sufficient to impede heat transfer and reduce boiler efficiency and reliability. More importantly, scale can cause the boiler heat transfer surfaces to overheat, leading to tube failures. Tube failures are very dangerous and costly for Refiners as they pose safety, environmental and production risks to the facility.

Boiler waterside scale is minimized through the careful control and maintenance of all makeup and feed water pretreatment systems to limit the amount of impurities entering the boiler. Proper chemical treatment also plays a critical role in scale control and is used to inhibit the deposition of minerals that do make their way into the boiler.

Hardness can get into the boiler feed water through various ways such as a condenser leak or when the plant experiences an operating or maintenance issue on the sodium zeolite softeners making up the boiler feed water. If the hardness excursion is not detected and treated appropriately in an expeditious manner, the hardness can result in scale and reduced boiler reliability.

BACKGROUND

A long standing Nalco Champion customer was looking to invest in new technology to help the Refinery further minimize downtime and maximize reliability. As a trusted partner, the customer looked to Nalco Champion for new innovations that would extend asset preservation, specifically in the utilities area.

SOLUTION

The Refiner had already been realizing the benefits of the 3D TRASAR Technology for Boilers for several years with great success. Now it was time to further improve the system by adding on the newest innovation, the patented Nalco Hardness Analyzer with the Hardness Response Program.

The new program is a fully automated hardness monitoring system that includes low level hardness measurement, upset detection, corrective action and communication of results. With this new, integrated control capability, boiler system performance can be elevated to a new best practice standard.

RESULTS

The utilities area supplies boiler feed water to five 600 pound boilers. The boiler feed water is made up via sodium zeolite softeners and reverse osmosis pretreatment system. Typically, operations are smooth and the total hardness levels are below the ASME guidelines (0.2 ppm CaCO_3 for 600 pound boilers).

However, the Nalco Hardness Analyzer has picked up several excursions since its implementation. One example is shown in Figure 1 where there was a major excursion observed on the afternoon of April 14th, with the hardness level hitting approximately 10 times the ASME limit.

The excursion was later found to be attributed to a problem experienced on the regeneration of one of the sodium zeolite softeners.

The 3D TRASAR Technology for Boilers System not only detected the hardness excursion, but also took immediate action. The NexGuard™ internal treatment product pump

speed was increased, and correspondingly the NexGuard all polymer program dosage was increased to the new set point (1.5 times the normal set point) as shown in Figure 2.

CONCLUSION

The refinery's utility area produces sodium zeolite softened makeup water to its 600 pound boilers. Although the operation of the pre-treatment system is typically good, upsets can and will happen. Such was the case when the hardness level reached 10X the ASME recommended level. Significant hardness excursions increase the potential for scaling, which over time can lead to the boiler heat transfer surfaces overheating, resulting in tube failures.

In an effort to maximize reliability, the Refinery upgraded their existing 3D TRASAR Technology for Boilers System with the new Hardness Response Program. The 3D TRASAR Boiler Automation with the Nalco Hardness Response Program detected and immediately responded to the hardness excursion. After the incident, the internal treatment dosage was returned to its normal set point. The Hardness Response Program provides proactive control for maximum boiler system reliability.

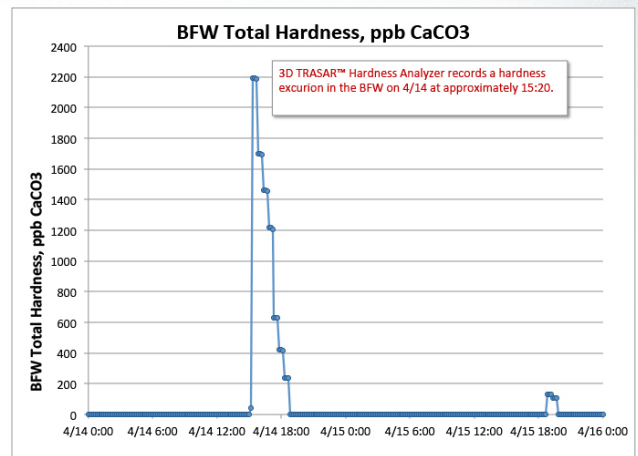


Figure 1 - 3D TRASAR Technology for Boilers System detects hardness excursion.

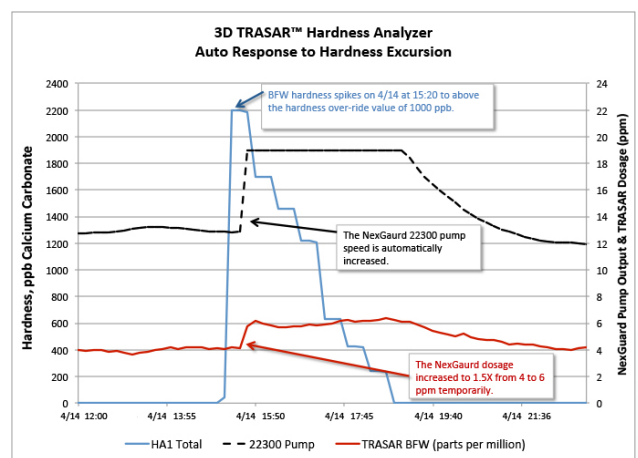


Figure 2 - 3D TRASAR Technology for Boilers System automatically responds to the upset condition.

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