

Case Study: CH-1976

NALCO CHAMPION TECHNOLOGY FOR YELLOW METAL PROTECTION CONTROLS MIDWEST REFINERY CORROSION UNDER HEAVY CHLORINATION



INTRODUCTION

Due to stricter regulations on biocontrol compliance in cooling tower water systems, a Midwest refinery experienced increased copper and mild steel corrosion rates. While biocontrol practices mitigate potential hazards and risks, the asset integrity goals were compromised. The refinery actively strives to protect the public, minimize potential risks to the environment, and safeguard the health and wellbeing of employees and contractors while sheltering assets from damage or loss. The management turned to Nalco Champion to help mitigate any potential damage.

BACKGROUND

With increased chlorination in the cooling systems, the impact on admiralty brass and associated mild steel corrosion was recognized by the refinery. The treatment used was not designed to cope with the new target of 0.7ppm FRC, and was particularly challenged by the routine spikes exceeding 2ppm FRC. Bleach interactions resulted in high chemical consumption for both the inhibitor and the bleach, leading the refiner to look for a more sustainable and robust treatment.

SOLUTION

Having recognized the challenges brought by increased chlorination, Nalco Champion developed a safer chemistry to deliver asset integrity under harsh oxidizing conditions.

This Nalco Champion technology has been specifically designed as an environmentally friendly method to control yellow metal corrosion in highly oxidizing environments. This patent pending chemistry is coupled with a rapid test method. Swift & accurate adjustments of the treatment can be made, mitigating potential damage from periodic excursions.

This innovative technology replaced the yellow metal inhibition treatment in one of the cooling towers. Over a period of 3 months the performance was evaluated while the dose rates were optimized. Recirculation cooling water data is shown for both the baseline and trial period in Table 1.

Recirculation Water	Baseline	Trial Average
Chloride mg/l	214	214
Sulfate mg/l	754	792
pH	7.8	7.9
Conductivity mS/cm	2257	2557
FRC mg/l Cl ₂	0.74	0.83

Table 1: Operating Conditions

	Baseline	Nalco Champion Treatment
Brass Corrosion	0.46 mpy	0.1 mpy
Mild Steel Corrosion	0.7 mpy	0.2 mpy
Inhibitor Residual	7%	74%
Cu ppm	0.031 ppm	0.018 ppm
Fe ppm	0.98 ppm	0.69 ppm

Table 2: New Treatment Results

RESULTS

The inclusion of the Nalco Champion technology immediately showed improved corrosion protection as shown in Figure 1. There was lower interaction with bleach, as the consumption went from 93% to 26%. The technology performance not only improved yellow metal corrosion, but soluble copper levels and mild corrosion as well, shown in Table 2.

CONCLUSION

Nalco Champion technology for yellow metal protection

succeeded in controlling admiralty brass heat exchanger corrosion and limiting any subsequent galvanic corrosion potential on critical mild steel heat exchangers. The benefits were realized while meeting the strictest safety standards. The new robust treatment, together with the rapid test method, delivered on the requirement to cost-effectively improve asset integrity and safety on-site. These benefits will help ensure the refinery can meet their business targets into the future.

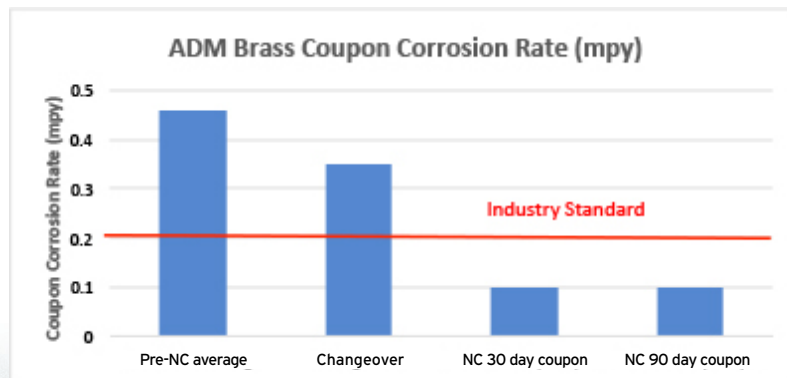


Figure 1: Coupon Corrosion Data

NALCO CHAMPION Locations

Headquarters

11177 S. Stadium Drive
Sugar Land, TX 77478 USA

Asia Pacific:

52 Jurong Gateway Road
#16-01 Jem Office Tower
Singapore 608550

Europe:

Ir.G.Tjalmaweg 1
2342 BV Oegstgeest
The Netherlands

Latin America:

Av. das Nações Unidas 17.891
6º Andar 04795-100
São Paulo SP Brazil

Ecolab, Nalco, Nalco Champion, the tagline and the logos are trademarks of Ecolab USA Inc. All other trademarks are the property of their respective owners.
©2018 Ecolab USA Inc., All Rights Reserved.

NALCO Champion

An Ecolab Company

nalcochampion.com