CASE STUDY
CH-1968

New 3D TRASAR™ Technology for Desalter Brine Improves System Assurance and Helps Optimize Tramp Amine Removal

eROI℠ by Ecolab

INTRODUCTION

A Gulf Coast refinery processing a highly variable crude slate, with long-term plans for running as much light-tight oil (LTO) as possible, was continually looking for ways to implement best practices for overall risk mitigation. As part of this strategy, the site had already employed automation to address concerns about potential downstream impacts from known tramp amine contamination (MEA). The refinery was one of the early adopters of the Nalco Water 3D TRASAR™ Technology for Crude Overhead Systems (3DTCOS) on their crude tower overhead, capturing an estimated $15M in salting potential avoidance and increased jet production.

The second phase of this crude unit management project involved amine removal through acidification and trials were run to select the most appropriate acid for the job. Control was done on a manual basis, relying on spot checks of desalter brine pH to adjust acid injection rates, trying to meet a target of 90% amine removal. The refinery needed a better way to manage their acidification program to ensure reliability and performance in meeting their amine removal targets.

BACKGROUND

To improve uptime and manage the potential maintenance requirements, the refinery asked Nalco Water what other technologies could be utilized.

The current situation was unreliable and unsustainable. It involved a recently installed, quite costly "off-the-shelf" pH control system that was difficult to keep running properly. A very high maintenance schedule was apparent due to poor pH performance (stream quality negatively impacting calibration) that the site had not anticipated. It simply was not performing as needed.

This crude unit used 2-stage desalting on a wide variety of crude blends, and a large component of cost-advantaged LTO crude. Minimum expectation was an amine removal rate of at least 90% whilst meeting all typical desalter key performance indicators (KPIs). Caustic is not used for additional corrosion control so having the lowest chloride content in the desalted crude was still important, along with achieving a minimal amine residual to minimize the potential risk of salt formation in the crude tower and overheads.

VALUE DELIVERED

PRODUCTIVITY

ELIMINATE VARIABILITY

Optimize Performance

PROFITABILITY

Increased crude flexibility by

$3-7 MILLION

SOLUTION

Based on experience with these types of systems, their impact to acidification programs, and knowledge of the overall performance of the crude unit, the new 3D TRASAR™ Technology for Desalter Brine (3DT-Brine) system was recommended. This automation platform was installed at a fraction of the cost of the old, defunct pH control system. It is a cost effective and reliable means to monitor and control the acid usage. In addition to providing dual-pH probe reliability, the unit outputs data on desalter effluent corrosion rates, as well as brine turbidity, which is a direct measure of effluent quality.

Figure 1 outlines the installation of the 3DT-Brine on the desalter and how it used the pH of the brine to provide feedback control for the acid injection to maintain the KPI of pH 5.5-6.0. The NCM (Nalco Corrosion Monitor, MPY) was connected

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to the wash water corrosion inhibitor to effectively protect the wash water and brine lines to < 5 MPY.

Apart from addressing poor reliability of the failed pH system, the secondary use for the 3DT-Brine was to gain an understanding of the variability and effectiveness of the desalter mud wash system.

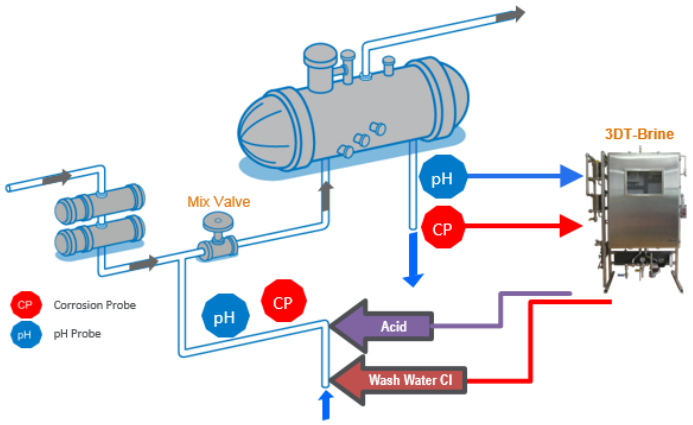

FIGURE 1: 3DT-BRINE FOR ACIDICICATION CONTROL (AMINE REMOVAL)

RESULTS

The graph in Figure 2 shows the 3DT-Brine unit output while in monitor mode only, with stable operation. The Y-axis shows turbidity (NTU) and temperature (oF), while the secondary Y-axis has the pH and NCM (MPY).

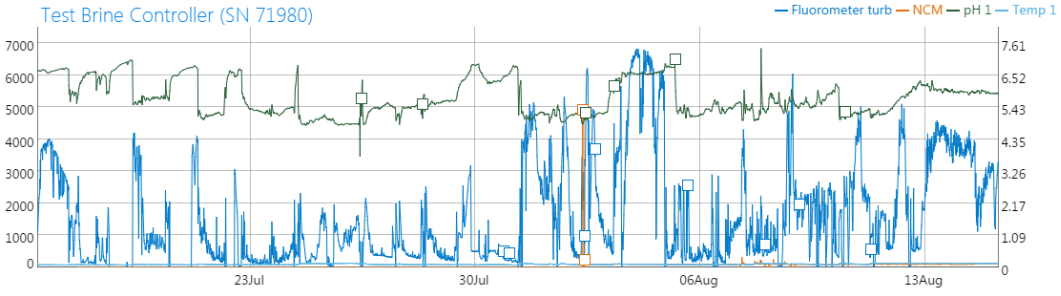

FIGURE 2: 3DT-BRINE PROVIDING STABLE OUTPUTS

Even in manual control of the acid injection pumps, having the online data available and working has produced better pH levels in the brine (one of the main KPI's for any acidification program). The pH is now more often hovering around 5.5-6.0. More uptime meant more alarm set points alerting Nalco Water and Process Engineers as to when operator involvement might be required.

The turbidity output was responding to mud washing events, and the corrosion rate stayed "flat" registering < 0.5 MPY with a set dosage of 40-50 ppm of the corrosion inhibitor in the system. As a side note the 3DT-Brine also provided stream temperatures, which is an extra piece of valuable information for the wastewater treatment plant operators.

Now with reliable online data, primarily for acid control, the acid consumption can be optimized while maintaining target amine removal rates. The site has also improved system assurance on unit corrosion around the desalter, and temperature in the brine heading to the waste plant.

CONCLUSION

All facets of the 3DT-Brine – dual pH, online turbidity (with automatic cleaning), conductivity and corrosion measurement – have shown reliable operation and trustworthy results. The system "up-time" improved from only one day between maintenance activities for the old pH control unit, to now 3-4 weeks with the new preventative maintenance schedule (i.e. filter cleanings and unit re-calibrations).

The refinery effectively improved its position of reliability in desalter acidification for amine removal leading to a higher level of system assurance for the crude unit overall, while at the same time allowing for a wider range of cost-advantaged crudes to be processed safely. Estimates on the value that 3DT-Brine brought to this site are between $3-7Million in crude flexibility.

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