CASE STUDY
CH-1970

New Online Salt Analyzer Captures Process Upset Allowing Quick Mitigation of Threats

eROI℠ by Ecolab

ANNUAL SAVINGS

ASSETS

IMPROVED RELIABILITY

COSTS

IMPROVED MONITORING
AND UPSET MITIGATION

INTRODUCTION

There are many potentially corrosive contaminants within feeds to crude units that can enter overhead systems. A major concern is salt-in-crude, making good desalting and caustic injection practices critical. Residual salts, especially in magnesium chloride left in the crude oil after desalting, can hydrolyze to form HCl, a prevalent and corrosive contaminant found in crude unit overhead systems.

Maintaining and protecting the operational integrity of crude unit overhead systems is key, as a failure to do so can impact unit reliability and availability. This can compromise the profitability of a refinery and increase the risk to personnel and public safety.

BACKGROUND

Effectively managing desalters and overhead corrosion control programs can be a challenge, especially when processing discounted feedstocks. The combination of frequent crude changes coupled with significant batch-to-batch variation, results in highly variable contaminant levels in the feed to many crude units, making control difficult.

Complicating things further, the operation of desalters is subject to enhanced variability, with even small upsets resulting in rapid increases in the levels of residual salt leaving the desalter. Due to the service infrequency of the desalting process, which only occurs two or three times per week as a health check on key process variables like salt-in-crude, trying to control the process with such measures is impossible.

Technology now exists to provide salt data hundreds of times per day, allowing process optimization to the desalter during the same crude run and through crude switches. This will vastly improve contaminant removal and reduce corrosion potential downstream of the desalter, which should also lead to economical use of caustic, providing downstream benefits in terms of lowering Na residuals. Overall system reliability will increase, and more cost advantaged crudes can be considered in the refinery crude diet.

FIGURE 1: ONLINE SALT ANALYZER (OSA)

NALCO Water
An Ecolab Company

SOLUTION

A Gulf Coast refiner installed the Nalco Water 3D CrudeFlex Online Salt Analyzer (OSA) at the desalted crude outlet of one of the crude units, complimenting the 3D TRASAR™ Technology for Crude Overhead Systems (COS) which was already installed. With the addition of the online analyzer, both inorganic and organic chlorine were detected, providing real time chlorine measurements. This ensured upsets could be detected quickly with mitigating actions taken, ensuring ongoing desalter performance met critical KPI's.

By having online analyzers on both the desalted crude outlet and the overhead sour water, the increased volume of data provided a much clearer picture of how operational variability impacted desalting and overhead corrosion control. The ability to analyze in near real time provided little time-lag in the results, allowing the refiner to potentially catch unit variations that would otherwise go unseen. This permitted the refiner to act upon them, ensuring that good desalter performance was maintained and overhead corrosion kept under control.

RESULTS

As previously discussed, existing procedures to monitor desalter performance and the overhead corrosion control program relied on spot samples or snapshots of a particular moment in time. In truth the refiner operated in total ignorance between measurements and was often unaware of the impact that even a small upset could cause.

Shortly after commissioning the OSA, the refiner experienced an operational issue and consequently, had to reduce feed rates. After which, the OSA showed a sharp increase in salt exiting the desalter, with the 3D TRASAR system revealing an increase in overhead chlorides that quickly exceeded the control value of 25ppm (see Figure 1).

The online analyzers, linked to the refinery control system, alerted operations of these increases and quickly determined that the reduction in feed rate resulted in a lower mix valve dP. Reduced mixing efficiency and poor contact between wash water and crude oil, resulted in desalting efficiency being compromised.

The increase in chlorides required increased neutralizer dose rates, to ensure that the overhead sour water pH remained within the desired control band.

Additionally, higher chlorides increased the risk of salt formation, potentially pushing salting into the top sections of the crude tower.

Once recognized, the mix valve dP was increased back to typical operating levels and the salt-in-crude and overhead chlorides began to reduce almost immediately, returning to typical levels.

CONCLUSION

The installation of Nalco Water's online salt analyzer, in addition to 3D TRASAR Technology for COS already installed, fills monitoring gaps of the desalter and the crude unit overheads. By providing real time analysis, compliance situations that may have otherwise gone unseen, are communicated immediately.

Since 90% of overhead corrosion can happen as little as 10% of the time, identifying these events allows the refiner to take corrective actions immediately. This helps the refiner to maintain operational integrity of the crude unit overhead system, improving reliability and availability.

The next step includes closing the loop in a semi-automatic function so that adjustments can be made to mix valves and desalter levels in an even more timely manner, further reducing risk and improving reliability.

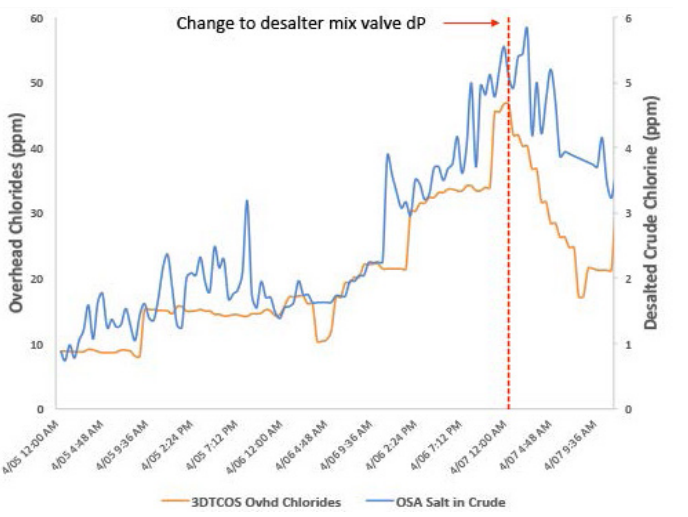

FIGURE 2: CHLORIDE DATA FROM OSA + 3D TRASAR COS

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