

New Nalco Water Chemical Mitigates Quench Water System Fouling in Ethylene Plant

BACKGROUND

Tar had been fouling the heat exchangers in the quench water circuit of an ethylene plant located in the Eastern Province of Saudi Arabia. Heat exchangers are used as the primary heating medium for the plant's light ends separation unit. Continued fouling of these exchangers, which are not accessible for cleaning online, had been causing reduction in throughput and unplanned shutdowns.

SOLUTION

The only solution to the problem being faced at the plant was to reduce throughput to enable the heat exchangers to be taken off line, one at a time, for manual cleaning. After reviewing the issue, Nalco experts

suggested the use of a new Nalco product, AQUAMAX™ EC 3368A.

This product has certain characteristics, which, it was felt, could help where traditional dispersants and solvents would not. The characteristics of the abovementioned Nalco product are as follows:

- 1) It is heavier than water hydrocarbon
- 2) Changes the flow characteristics of tar
- 3) Improves the dewatering of tar
- 4) Lowers the melting point of tar

The Nalco product uses these characteristics to penetrate the tar and remove it from the system.

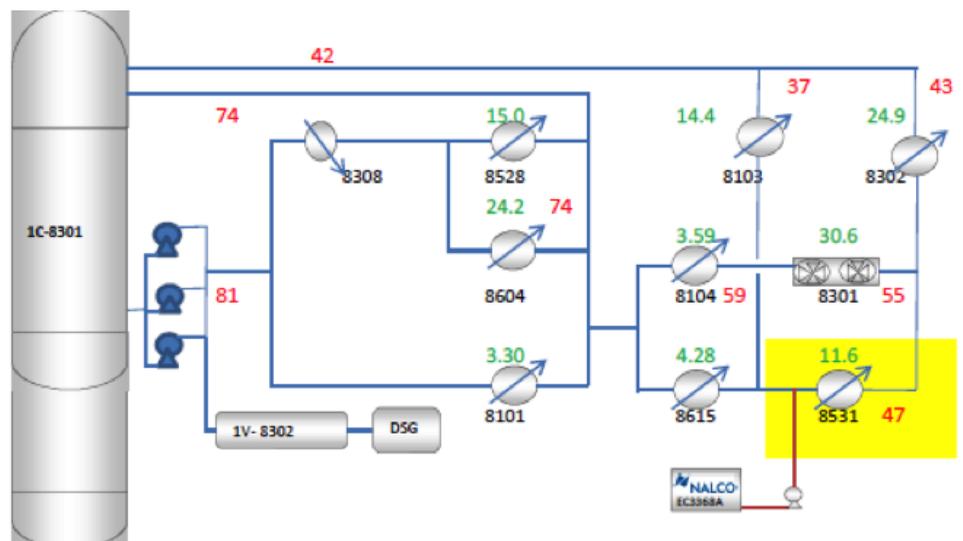


Figure 1 - The QW circuit highlighting the problem exchanger

(Continued on Reverse Side)

PROCESS

The suggested solution involved injecting the EC 3368A tar plasticizer ahead of the problem heat exchanger 8531. Very little modifications at the plant were required. Air-driven pump skids could be brought in quickly and installed in the plug-and-play mode.

After injection of the Nalco product, a number of parameters were monitored, including:

- 1) The Q value of the exchangers
- 2) Throughput of the plant
- 3) dt across the HXs

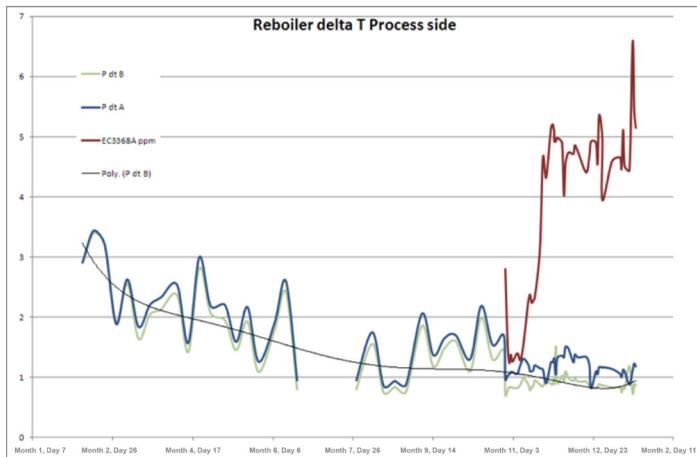


Figure 2 - EC3368A reduced the reboiler rate of decrease in the dt by up to eight times

RESULTS

The chemical is very unique in the way it works. Being heavier than water hydrocarbon, it could get to the areas of fouling, which regular solvents could not, thereby cleaning the system, a process that started almost immediately, bringing production back to the required levels.

The plant superintendent was quoted as saying: "Your new chemical is like magic. When we opened the exchanger, it was almost clean, and whatever cleaning was required, didn't take more than one day". The Normalised

Q value was very stable from the start and improved, subsequently, once the 5 ppm dosage was started in the third week. For the reboiler, the dt decline was reduced by up to eight times.

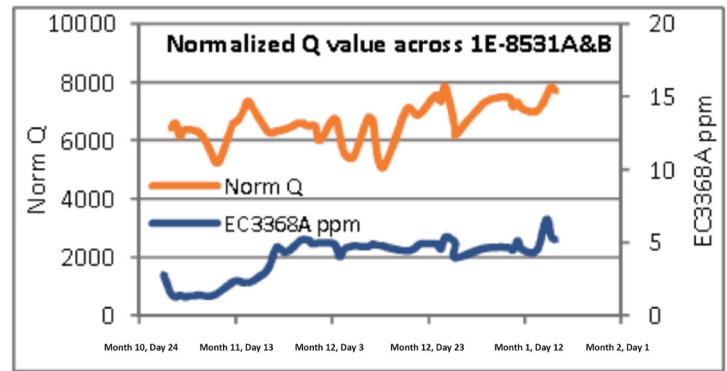


Figure 3 - Normalised Q value became very stable, and then improved, particularly from the 5 ppm dosage time in the third week

CONCLUSION

Major benefits were seen in all areas providing many physical and commercial improvements. Plant operation improved, throughput was increased, and even when there was a higher proportion of Propane cracking, the plant continued to run normally

Commercial Benefits

The net savings per year, assuming the reduction of squats from 2 to 1 were as follows:

- 2 Squats = US\$ 5,319,670 net lost + maintenance cost + disposal cost
- 1 Squat = US\$ 2,659,835 net lost + maintenance cost + disposal cost with Nalco help US\$ 230,857 Nalco cost

In the ultimate analysis, the plant ended up saving **US\$ 2,428,978** as a result of only one squat per year.

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