

# Nalco Water Aquamax™ Inhibitor Technology Quadruples Dilution Steam Generation Run Length

## SITUATION

Nalco Water stewards the quench water and dilution steam treatment process for a major Indian ethylene producer. This is done by utilizing industry leading corrosion control and fouling inhibition technologies to safeguard key equipment within the Dilution Steam Generation (DSG) system. While corrosion control is the cornerstone of any DSG treatment program, this case study focuses on how AQUAMAX's superior polymer inhibitor technology successfully overcame a perennial fouling problem that is unique to dilution steam systems.

As a result of unmitigated fouling at this particular site, overtime DSG run-lengths were limited to an average of 45 days or less, resulting in unstable operations and constant reliability issues.

## SOLUTION

To properly diagnose the root cause, Nalco Water, led by experienced industry technical consultants, performed a detailed plant survey using the Mechanical, Operational, and Chemical (MOC) approach. Based on the audit findings, the team concluded that polymerization of reactive species in the process water stream was the root cause of the fouling problem observed at the DSG. A proprietary polymer inhibition technology was proposed to address the issue at its source. This approach targets the fouling mechanism itself by addressing the root cause. To ensure success, the efficacy of this approach was thoroughly studied in Nalco Water's research laboratories both in India and the U.S. prior

### ENVIRONMENTAL INDICATORS



### ECONOMIC RESULTS

Avoided four DSG system shutdowns annually



Savings of \$24,000 from shutdown avoidance

Condensate gain of 4,751 tons or 0.98 TPH for 202 days



Savings of \$4,400 from condensate gain

Reduced fuel consumption for heating DM water by 6,234.47 MMBTU



Savings of \$99,000 from reduced fuel consumption



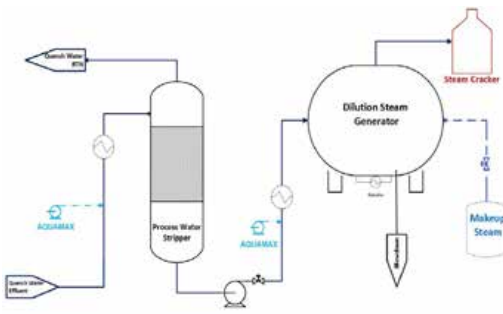


Figure 1: Process Flow diagram of the PWS and DSG showing injection locations of Nalco Water Products

to its implementation. The plant leadership team quickly approved a proposal generated from these studies after clarifying the planned proposal would address the issues supported by evidence garnered from the research.

As shown in Figure 1, the program implementation involves the injection of Nalco Water’s polymer inhibitor into the feed line to process water stripper preheater, along with the existing dispersant injection. During the trial, a starting dosage was subsequently optimized in a stepwise manner to ensure optimal balance between program performance and total program cost. (See Figure 2 for details). Throughout the trial, Nalco Water closely monitored the unit performance and provided continuous support throughout the DSG trial.

## RESULTS

Non-Volatile Residual (NVR) analysis was performed weekly by Nalco Water for the process water stripper bottom samples (as seen in Figure 2). It is clear that the polymer inhibition program produced a significant reduction in NVR levels in the process stream. As a result, the run length of the DSG was dramatically improved from an average of less than 45 days prior to the polymer inhibition program to 202 days with the program (See Figure 3). The run length improvement was accomplished without compromising any of the plant’s key performance indicators including plant load and excess makeup steam. As an added benefit, the DSG blowdown cooler never required cleaning throughout the entire 202 days run with the polymer inhibition program (previous runs were averaging 20-25 days prior to the trial). Reduced fouling and improved DSG run length resulted in significant savings. By allowing the DSG to run for 202 days instead of the typical 40-45 days, the plant saved an estimated \$132,000 per 202 day cycle.

This includes costs associated with system cleaning and maintenance as well as lost steam production due to impaired heat transfer of the DSG reboilers and DSG shutdowns. Taking into account the cost of the chemical program, the ROI is estimated to be greater than ~354%.

## CONCLUSION

Implementation of Nalco Water AQUAMAX polymer inhibition technology allowed the customer to achieve a record DSG run length, reduce the number of shutdowns and cleanings while significantly reducing the customer’s total cost of operation. Deemed a major success by the customer, this program is considered a significant improvement to overall plant reliability and is now integrated into the existing DSG management program.

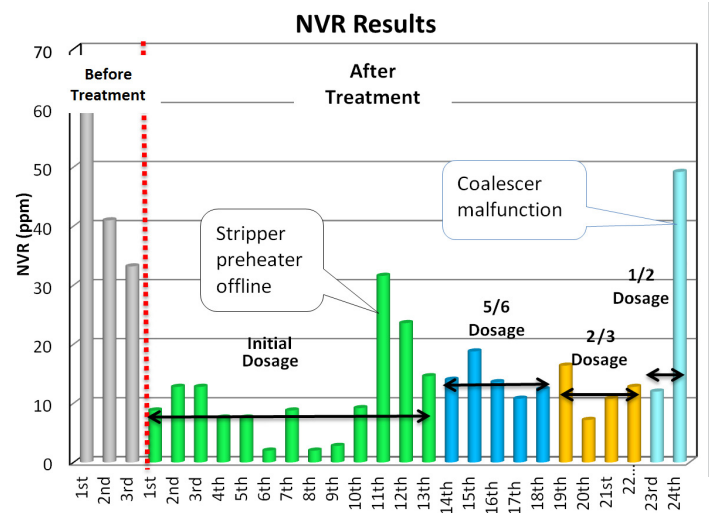


Figure 2: NVR (ppm) comparison before and after Nalco Water’s polymer inhibition program

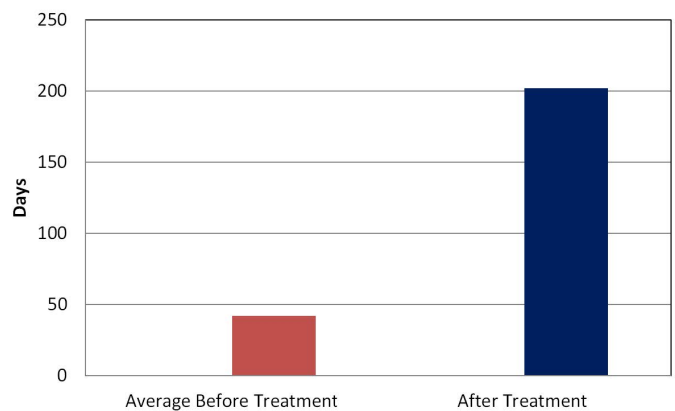


Figure 3: DSG Run Length Comparison before and after Nalco Water’s Polymer Inhibition Program

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