3D TRASAR™ Cooling Water Technology and Nalco Water expertise help a global air separation plant reduce US$ 34,500 in Total Cost of Operation

NALCO Water
An Ecolab Company

CASE STUDY - CHEMICAL

CH-1545AP

SITUATION

A plant for a major, global air separation company sought a sustainable solution to achieve a key initiative to minimize its Total Cost of Operation (TCO).

Nalco Water has been managing its cooling water system since its commissioning stage with a good track record of system performance. This plant has been operating reliably and efficiently without any unscheduled downtime.

In order to continue creating and maintaining our service value to this customer, Nalco Water and the plant personnel worked together to look at different TCO reduction options. After evaluation, it was decided to reduce fresh, makeup water usage and optimize the cooling tower water usage by further improving the cycles of concentration (COC) without compromising cooling system performance.

The key challenge to increasing COC was the increased scaling potential that would especially impact the Direct Cooling After Cooler (DCAC) system and intercoolers. System efficiency would be greatly reduced if the heat exchanger became scaled. Furthermore, higher COC would also lead to higher minerals content in the water, which required close monitoring of water quality and precise chemical treatment control and management to ensure the system would perform in optimum condition.

SOLUTIONS

With the higher COC, the chemical consumption would have to be increased to adjust for the higher stress of the cooling system. 3D TRASAR optimizer software was applied to simulate system performance with the expected water quality at higher COC to ensure the existing chemical treatment program would still maintain the system performance without any negative impact.

The existing 3D TRASAR Cooling Water control and monitoring system is the

Environmental Indicators	eROI™	Economic Results
Reduced 10,200 m^3 fresh water intake due to the increased concentration cycles	WATER	Saving US$ 34,500 in total cost of operation from the reduced water consumption

eROI is our exponential value: the combined outcomes of improved performance, operational efficiency and sustainable impact delivered through our services and programs.

perfect solution to effectively deliver the new chemical treatment regime by close monitoring, real-time detection, and provide on time response to the system stress management.

Along with the physical monitoring, the water chemistry, corrosion rate, and cooler approach temperature were closely monitored during implementation to minimize potential risk and ensure system performance was not compromised.

RESULTS

After the COC was increased, the following results were achieved to keep the cooling system performance:

- Corrosion rate was well maintained within the specification.

Table 1: *The corrosion rate after COC increase*

Material	Rate of Corrosion	Specification
Mild Steel	1.74mpy	<3mpy
Copper	0.094mpy	<0.2mpy
Stainless Steel	0.102mpy	<0.2mpy

- Approach temperatures of main heat exchanger were stable to maintain its efficiency.

Table 2: *The comparison of main heat exchange approach temperatures between before and after COC increase*

Date	Approach Temperature Point 1	Approach Temperature Point 2	Approach Temperature Point 3	Approach Temperature Point 4
Before COC Increase	10.3°C	3.3°C	2.1°C	1.1°C
After COC Increase	6.9°C	2.9°C	1.8°C	1.2°C

Economic and Environmental Benefits:

- **Water saving**
  Fresh makeup water consumption was reduced by 102,000 m^3 per year, equivalent to the total water consumption of 1,300 people in China for one year.

  The reduced TCO for the air separation plant contributed from Nalco Water treatment is US$ 34,500.

CONCLUSION

The Nalco Water 3D TRASAR Cooling Water Technology and expertise helped this air separation plant achieved significant TOC reduction by water saving without compromising the cooling system performance, while kept the plant operation reliability.

Nalco Water, an Ecolab Company
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