

Data Center Reduces Annual Water Use by 2.9 million Gallons



CASE STUDY - INSTITUTIONAL

CH-1297



BACKGROUND

A research and management company located in Irvine, CA has a central water treatment plant that provides cooling for more than one million square feet of office space as well the on-site data center that hosts the company's critical files. The central plant generates 3,000 tons of cooling and operates 24/7/365.

A third party engineering staff manages the site and runs the central plant. As the managing company, their services are contracted at a standard rate. Any efficiency improvements that reduce costs directly impact profitability. Any reduction in environmental footprint is considered opportunistic.

Using recycled wastewater to lower tower water usage, operating costs and complement environmentally focused branding initiatives was the challenge.

SITUATION

This facility was originally built to access recycled wastewater since the city of Irvine required all new construction projects to use recycled water for cooling towers. There was no allowance for blending, and 100% of the water was required to be a municipal recycled water source.

From the beginning, the data center engineers struggled with the water source given the high level of impurities (i.e. phosphate, silica, copper, calcium and magnesium). Faced with a challenging water source, the engineers were forced to lower tower cycles to minimize specific precipitation of these minerals that were in high quantity in the recycled waste water. Also, the constantly changing level of these contaminants made it difficult to eliminate deposition.

ENVIRONMENTAL INDICATORS

eROI

ECONOMIC RESULTS

Annual water savings of 2.9 MM gallons



\$15,532 saved annually

Annual electrical savings of 564,677 kWh/yrs



\$73,408 saved annually

Nalco reports eROI values to customers to account for contributions in delivering both environmental performance and financial payback.

Phosphate levels varied from 1 ppm to 25 ppm at times. These drastic changes in the water supply were tough to anticipate and respond to in real-time using traditional analytical testing techniques followed by manual adjustments to the water treatment program. As a result, the engineers experienced scaling in the chiller tubes and increased energy costs due to reduced heat transfer. In 2009-2010, the facility used 5.56 million kW/hr which amounted to ~\$723,000 in energy costs alone to run the chiller plant. Once the chiller was fouled, the facility spent another \$3,000 to clean the chillers.

SOLUTION

The data center engineers presented these water characteristics to Nalco and asked for help. The first step was to analyze and model the water source using the 3D TRASAR Optimizer (Figure 1) to determine the treatment scheme for the operating conditions. Because 3D TRASAR Cooling Water controllers monitor/control nearly 26 different water characteristics, the sales engineer can model various solutions. No other tower controller has the ability to monitor that many points.

The onsite engineers were also concerned about monitoring and managing the system 24/7/365 due to the water variability. Since reliability and system assurance were key business drivers for the data center, additional monitoring and a communication platform to respond real-time to upsets was needed. Nalco 360™ Service was proposed to meet these needs. This service features a staff of Nalco experts who remotely monitor all aspects of the 3D TRASAR Controller real-time. Once an alarm or issue is generated, it is reviewed, assessed and responded to via a pager, phone text or a direct phone call to the on-site engineer with the corrective action guidance. This real-time monitoring provides quick response with an actionable recommendation.

The engineers also wanted a more eco-friendly approach to the treatment program. While saving water would meet that need, a request was also made to move to a hands-free chemical delivery and feed system to eliminate drums (Figure 2).



Figure 2 - PORTA-FEED® Delivery System

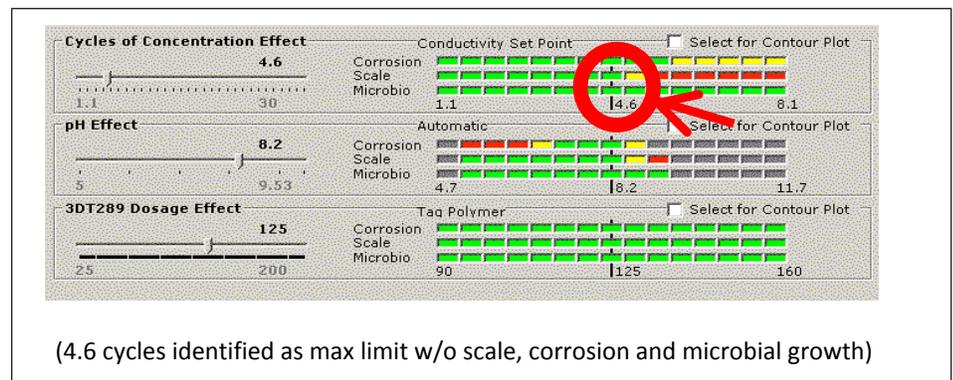


Figure 1 - 3D TRASAR Optimizer Model Tool

DELIVERING THE WATER TREATMENT PROGRAM

Based on the modeling tools available to the Nalco Sales Engineer, it was determined that 3D TRASAR tower control technology combined with a unique scale/corrosion inhibitor (3DT289), Nalco 360 Service (24/7/365), and an acid feed system and delivery of chemicals using the Nalco PORTA-FEED delivery system would be capable of meeting the desired goals. In this situation, an acid program was required because the modeling showed that higher tower cycles could be achieved saving additional water and energy costs.

With any acid proposed solution, a facility must weigh the benefits and risks associated with this type of program. In this case, the overwhelming water savings resulting from the acid program ensured that the facility would meet their water reduction goals. The Nalco Sales Engineer worked with the onsite engineers to implement an acid dilution trough, reducing onsite exposure due to the potential of an exothermic reaction. Safe handling

instructions, program administration manuals and ongoing training were provided to reinforce the safety requirements for the engineers. Combining this feed approach with the additional hands-free PORTA-FEED Delivery System for the inhibitor and biocide treatment, the onsite engineers achieved the high level of comfort and safety needed to implement the entire Nalco water treatment program.

RESULTS

The Nalco program allowed the plant to increase tower operating cycles from an average of 1.8 to 3.3 cycles saving 2.9 million gallons of water each year. This 2.9 million gallons equates to \$15,532 of annual savings.

The chiller tubes have remained scale-free due to the management of fluctuating impurity levels plus the real-time control using 3D TRASAR technology with Nalco 360 Service. The energy savings achieved due to the elimination of scale and deposition in the chillers was \$73,408 in annual electrical costs (~564,677 kWh/yr saved).

Implementation of the PORTA-FEED program has resulted in the elimination of 26, fifty-five gallon drums (192 cubic feet of waste) annually, helping the facility with their environmental brand image.

The facility now combines state of the art control technology to ensure reliable cooling, reduce water and energy use, and eliminate plastic drums.

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