

3D TRASAR™ Technology Helps Dairy Processor Exceed Five Year Sustainability Goal

SITUATION

A Northwest U.S. cheese and whey powder producer had a 5-year sustainability goal to reduce their facility's city water use by 33%.

The plant has eight separate Evapco condenser systems with a total cooling capacity of 1600 tons. Cycles of concentration in each of the systems is controlled by Walchem conductivity controllers. Scale and corrosion inhibitor was controlled by a percentage of bleed along with plant operator testing. Being familiar with the constituents in the local well water, the Nalco Water Engineer knew silica concentration was likely the limiting factor for the cooling water program. Without pretreatment, cycles of concentration were going to be 2.0 or lower.

The evaporative condenser systems were, in fact, operating at 2 cycles of concentration, causing this system to use 105 million gallons of makeup water per year. The Nalco Water Sales Engineer knew that improvement in cycles of concentration on the evaporative condenser system would help the plant meet its sustainability goal. This action, however, would require

a drastic improvement in makeup water quality entering the system. Better control through conductivity measurement, corrosion monitoring, and real-time control of scale and corrosion inhibitor feed was also identified as a need to ensure asset protection.

SOLUTION

Incoming city water samples were collected and analyzed by the Nalco Water laboratory. Water samples confirmed 81 ppm silica in the makeup stream. This analysis was entered into Nalco Water's 3D TRASAR Optimizer program to benchmark current system performance and limitations using 100% well water.

The 3D TRASAR Optimizer is a software program that supports the evaluation of a cooling water system by calculating scale/deposit potential, system parameters and estimated corrosion rates. This software determines the optimum cooling water program by defining system control ranges. It can also be used to troubleshoot system variability.

CUSTOMER IMPACT

Predicted annual water savings 85.8 MM gallons

eROI™

ECONOMIC RESULTS



\$94,450 cost savings

Next steps included review of reverse osmosis as a possible pretreatment step to help remove many of the troublesome ions present in city water. The 3D TRASAR Optimizer was used by Nalco Water to model cooling water system performance and limitations at different blends of RO Water and Well Water. The most effective blend was modeled at a 70/30 blend of RO Permeate to Well Water, respectively. This blend reduced the silica in the makeup from 81ppm to 25ppm allowing for 7.0 cycles of concentration and a 36% reduction in blowdown.

With increased cycles of concentration and the accompanying increase in stress on the evaporative condenser system, there was a need for updated control and monitoring equipment. Nalco Water recommended its 3D TRASAR Cooling Water Technology to control scale and corrosion inhibitor at recommended ranges, monitor corrosion rates, pH, ORP, and control conductivity.

The 3D TRASAR Cooling Water Program has the ability to react to system stresses and changing water conditions making it a valuable tool when increasing cycles of concentration. The technology can determine the appropriate action needed to bring the system back into control, while providing communication to system users.

Tower Make Up Water Blend Calculator

70% Reverse Osmosis Water in the make up

Analysis for Make Up Options

Constituent	Well	RO	Result of Blend
Calcium	5.7	0	1.7
Magnesium	1.4	0	0.4
Sodium	90	0	27.0
Potassium	15	0	4.5
Iron	0.02	0	0.01
Conductivity	380	2.7	115.9
pH	8.6	6.34	7.0
M alkalinity	160	0	48.0
P alkalinity	0	0	0.0
SO ₄	1.4	0.1	0.5
Cl	20	0.1	6.1
SiO ₂	81	0.4	24.6

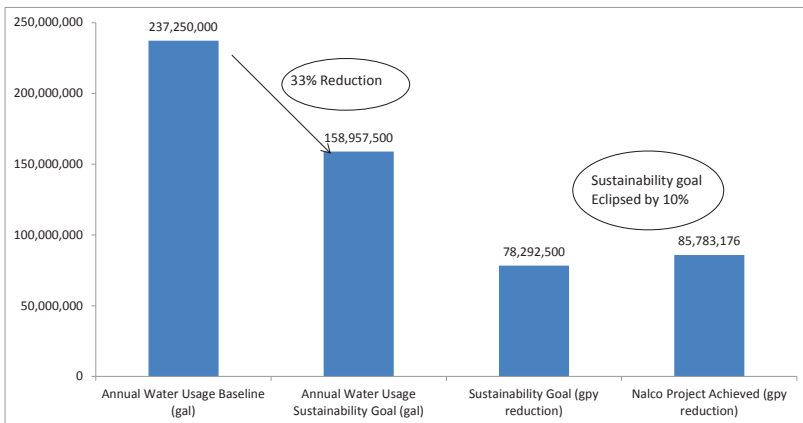
RO/Well Water Ion Blend Results

Since the implementation of 3D TRASAR Technology, this plant has been able to maintain optimum 7 cycles as identified by 3D TRASAR Optimizer. This increase in cycles has reduced the amount of system makeup water resulting in an annual water savings of 85.8 MM gallons.

RESULTS

The plant's water sustainability goal was a 33% reduction in annual water usage over a 5 year period. In order to meet this 5 year goal, total water used in the facility needed to be reduced by 79.2 MM gallons per year. This project is predicted to reduce the annual water usage by 85.8 MM gallons per year (\$94,450), eclipsing the 5 year goal by 8%.

A secondary benefit realized by using the RO permeate/city water blend for all potable water was a dramatic decrease in deposition on equipment, floors, and walls in the facility. This reduced deposition is valued by the customer as a food safety enhancement.



5 year Water Reduction Sustainability Goal Realized



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