WATER TREATMENT TECHNOLOGY FOR INDUSTRIAL, COMMERCIAL & ENVIRONMENTAL APPLICATIONS

APRIL 2017 - WATER TREATMENT NEWSLETTER

Optimizing Biocide Usage for Controlling Biofouling of Reverse Osmosis and Nanofilter Membranes

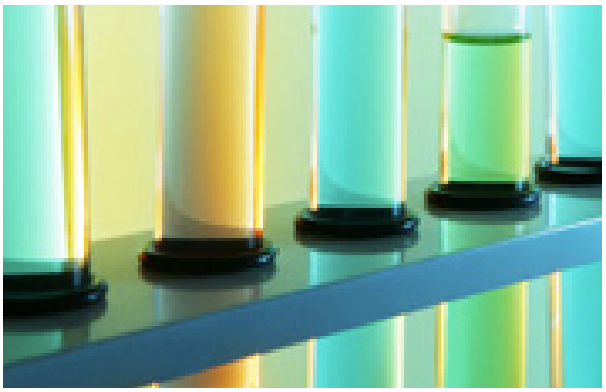
KWT uses ATP analyses to optimize biocide usage in industrial Reverse Osmosis and Nanofilter Systems . ATP (adenosine triphosphate) is the chemical energy exchange found in all living cells. ATP analysis is a convenient, quick and accurate method to determine microbiological activity in membrane systems.

A midwestern 100,000 barrel per day refinery recently built a large water treatment plant to reduce the usage of limited groundwater resources. The water plant has a total capacity of 4.2 MGD of nanofilter permeate and 2.7 MGD of RO permeate. The plant was designed to use recycled municipal waste water, groundwater from recovery wells and well water from the local aquifer. The plant was designed to have microfiltration followed by high recovery nanofilters (87%) and reverse osmosis (80%) to provide high quality makeup to the refinery's cooling towers and boiler systems.

Microbiological control has been critical to the success of this water plant operation. Using a nonoxidizing biocide (dibromo nitrile propionamide "DBNPA") has provided effective biocontrol in these membrane filtration systems.

The dynamic conditions of the operation affect the complexity of the microbiological control in these systems. Because of the variations in the feedwater sources the bacteria levels and bio nutrients concentrations vary from day to day. Also the plant ques the operation of the RO and Nanofilter skids, and some skids are in standby. Depending on the out of service time there is potential for bioactivity to begin in the idle skids. KWT's ATP analysis is being used to help identify the most effective biocide(s), optimal dosage(s) and the optimal biocide use frequency. ►

HIGH QUALITY
ENVIROMENTALY SAFE
CHEMICAL PRODUCTS



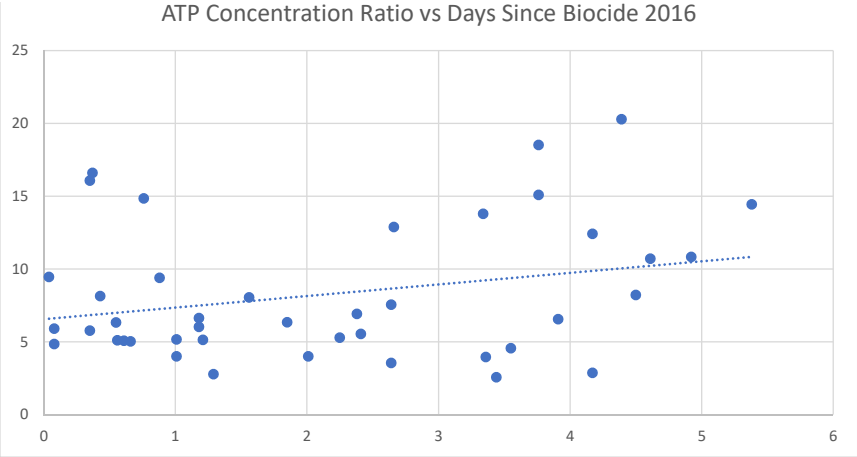
CUSTOMIZED
TREATMENT SOLUTIONS
FOR KANSAS INDUSTRY

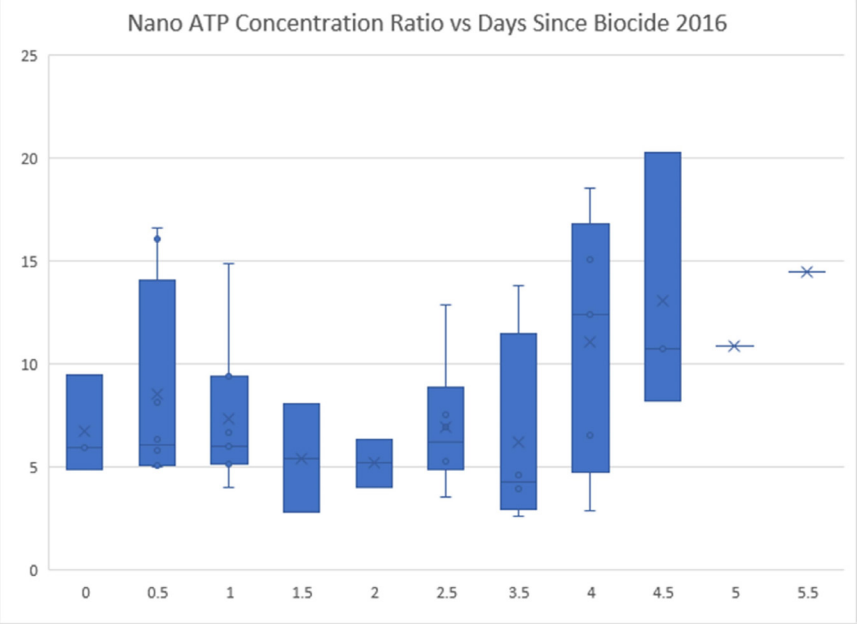
Because of the complexity of the operation statistical analysis of KWT's ATP data has been necessary . A couple of examples include:

1. KWT now uses Concentration Ratio ATP analysis to identify when bioaccumulation in the membranes may be occurring. This identifies when the concentrate ATP level exceeds the feedwater ATP level in a significant predefined amount.

2. KWT also compares normalized operating data to ATP results. We watch historical membrane differential and driving pressures and normalized flowrates that might be correlated to biological activity. The plant also has real time data from which they evaluate system performance.

Graphs Of The Analyses Of Concentration Ratio ATP





KWT & RSC Are Going Green AND Saving Your Green

KWT AND RSC HAVE MADE MULTIPLE CHANGES TO BE ECO-FRIENDLIER. We have also been able to pass savings onto our customers. Most of our boiler and closed loop systems have moved to our SteamTrol and LoopTrol chemicals. These film-forming amines are rated "readily biodegradable" and we use less of the chemical due to how they work. Our newly formulated CoolTrol product has also been upgraded to be more green than its predecessors.

Second is using KWT's McPherson Kansas warehouse for chemical delivery, formulating and storage. We now have many of our chemicals and raw materials shipped in totes to our warehouse for our chemical formulations. In addition to savings on freight charges and raw materials we maintain local inventory for our customers. We deliver our product in bulk tank trucks, totes, and/or in 55 gallon drums.

Last is our drum and tote recycling. We are purchasing fewer new 55-gallon drums and we reuse as many as possible. This saves on freight and packaging. We have also found a market for our cleaned 275 gallon caged totes. We have provided our empty totes to local buyers and even sent a couple of loads of totes to Arizona to the Navajo Reservation where they are being used for hauling potable water, animal watering and gardening.

Advances in Avista's RO Antiscalants for High Silica–High Sulfate Feedwaters

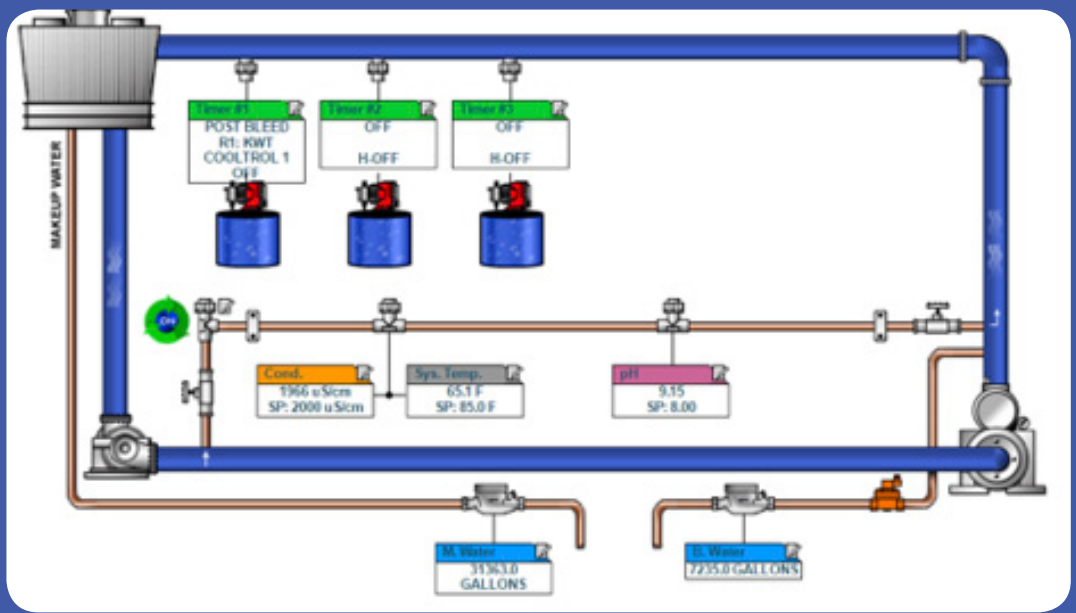
Antiscalants for RO systems have been designed for a variety of feedwaters. RO systems operating on well water need to be carefully evaluated for potential foulants due to the variations in the geochemistry of the groundwater. Preventing silica fouling and sulfate fouling on the membrane surfaces are two common conditions which require special antiscalants. In the past when high silica–high sulfate feedwaters were encountered a common practice has been to use an antiscalant that was specific for silica combined with a separate antiscalant which was specific for sulfate scales.

Avista is now marketing their Avista 158 product which is designed to prevent both silica and sulfate scales in RO systems with these high silica-high sulfate waters.

KWT has applied Avista 158 successfully in a western Kansas power plant which has sulfate levels in their wells of 800 to 1000 ppm and silica levels as high as 60 ppm. Being able to use a Avista 158 in this system has greatly simplified the plant antiscalant feed. Feeding a single product has eliminated inventorying two antiscalants, and reduced the chemical feed pump maintenance and dosage monitoring of two separate feed systems.

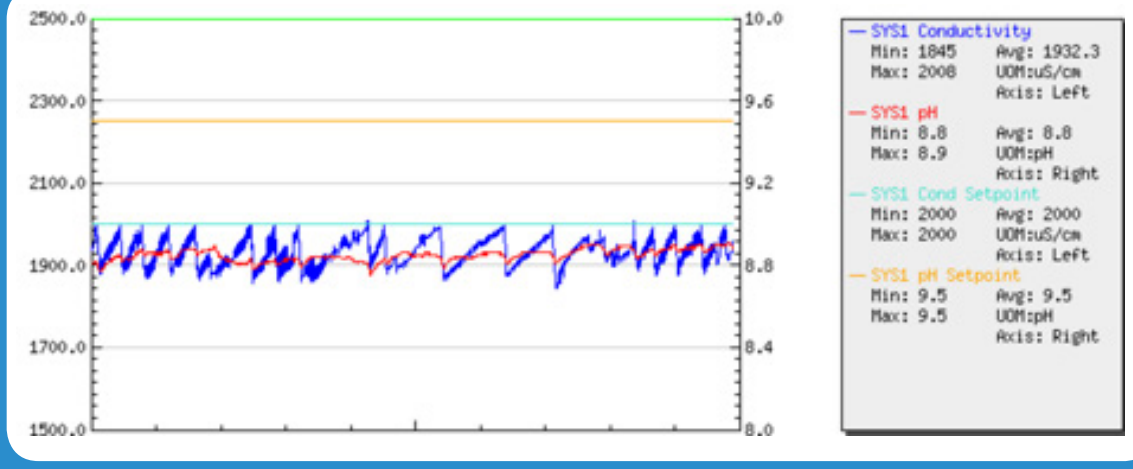
The Advantages of WebAdvantage

Newer controllers from Advantage Controls come with powerful online capabilities. It is easy to monitor and adjust controller settings, get live updates on controller readings, get email alerts when control ranges are left, or get email reports on any schedule you need. One of our customers has two new MegaTron Controllers on their water towers and, with permission, here are some examples of WebAdvantage's interface and reports.

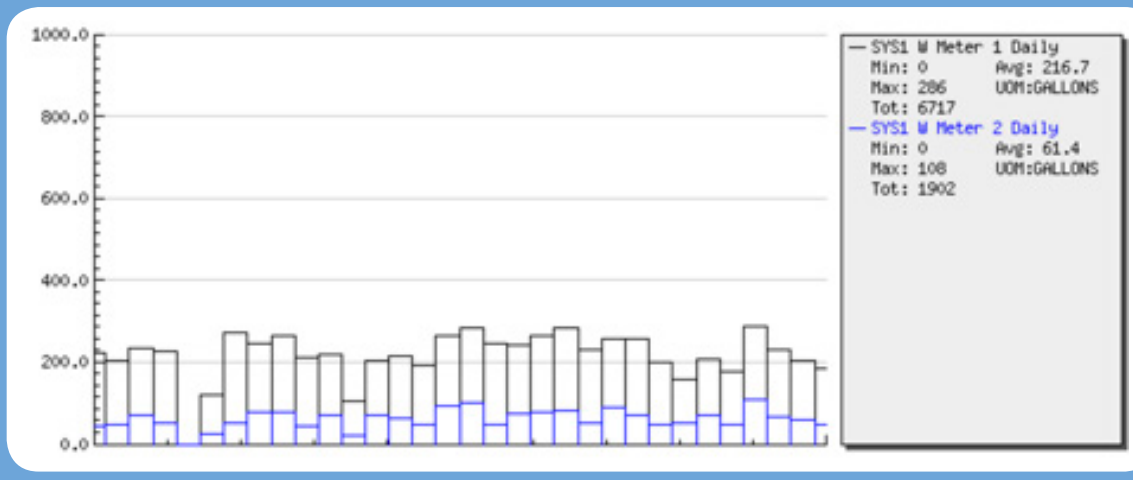


WebAdvantage interface showing current pH, temperature, conductivity, water meter readings, chemical feed on/off, and if there is flow in the system

The Advantages of WebAdvantage Cont.



Weekly conductivity and pH report. You can see the slowdown during the weekend where it takes longer to reach set point and bleed.



Monthly water meter report showing total make up and bleed for the month, the customer uses these numbers to get an evaporation credit from their water supplier.

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