

ZETA WATER MANAGEMENT SYSTEMS
City of Tucson Police Department Crime Lab

*Enhanced Water Conservation, Chemistry Reduction and Water
Re-use Opportunities for Open Loop HVAC Water Treatment*



Zeta Corporation
2045 N. Forbes Blvd.
Suite 102
Tucson, AZ 85745

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Zeta Corporation 888.785.9660

Background:

Zeta Rod[®] Water Management Systems combine a patented electronic water treatment technology with water management protocols developed to offer continuous remote monitoring of open loop evaporative cooling systems for optimizing water conservation and reduction of chemistry, while protecting equipment from corrosion, scale, bio-fouling, and bio-corrosion. Zeta Corporation developed and demonstrated the water management program under a Cooperative Research and Development Agreement with the U.S. Army Corps of Engineers Research Lab. The two-year study, published in 2009, monitored side-by-side installations of the technology, operating without any chemicals, against the results of a standard chemical water treatment program on sites chosen at Federal facilities in the desert Southwest. A two-year continuation study added additional cooling towers at Military bases with water qualities extending to the extremely hard and extremely soft ranges. Results showed an average of 20% reduction in make-up water usage and 50% reduction in blow-down, while meeting and exceeding criteria for protection of equipment from scale, corrosion and bio-fouling.

Opportunities for water conservation and chemistry reduction:

Evaporative cooling systems represent one of the largest water using components of any facility and have traditionally been operated under chemical water treatment programs. As a result, wastewater is subject to disposal by sewer, rather than storm drain, and is unavailable for irrigation or other gray water re-use.

When operated without chemistry (normal condition) the Zeta Water Management System is designed to meet the primary objective of equipment protection, while offering opportunities for increased water conservation beyond what is capable of being delivered by chemical treatment alone. This is accomplished because the technology allows systems to safely run at increased cycles of concentration under conditions that would normally be indicative of scaling potential. Additionally, operation at elevated pH sets conditions for low corrosion potential, and the unique ability of the technology to prevent formation of biofilms inhibits bio-fouling and associated microbial induced corrosion.

The Zeta Rod is extremely energy efficient (about \$15/year in electricity to operate) and is designed for long life, with no consumables required for operation, thereby reducing costs over time.

LEED and Federal Leadership in High Performance and Sustainable Buildings:

The application of a Zeta Rod Water Management program has the opportunity to contribute to LEED strategies for earning points under Water Efficiency and Innovation in Design. In particular, a measurable non-regulated water use savings that is at least 10% of

the total calculated baseline design for regulated (fixtures) water use is eligible for an exemplary performance ID point under WE Credit 3.

Under Federal Leadership goals, reducing total ownership cost of facilities; improving water and energy conservation; providing safe, healthy and productive built environments; and, promoting sustainable environmental leadership are all goals that are consistent with adoption of a green technology solution such as the Zeta Rod system. These same goals shape the design and management of many State and Municipal facilities as well.

Continuous monitoring:

The primary objective of any water treatment program is to protect expensive condensers and cooling towers while operating in an efficient manner. Variances in make-up water quality and lack of access or expertise can contribute to inefficiencies and risk to equipment and operators. Monitoring services and remote operational protocols allow for continuous 24/7 monitoring and control of systems for key metrics. This assures owners that adverse condition alarms are identified and addressed before they become critical issues. Documentation of actual water usage, based on remote metering of make-up and blow-down ratios, combined with analysis and reporting of data log readings and water sample testing comprise the basis for the monitoring program.

Calculated water savings for the Crime Lab:

The baseline case (under LEED) annual water consumption for regulated fixtures at the Crime lab is 166,950 gallons/year. The process water use reduction available by operating the cooling tower at higher cycles (than would be available with this makeup water quality through chemistry) is calculated at approximately 1,125,333 gallons/year. This is calculated on a conservative increase in cycles from 2.5 to 3.5. This savings represents 674% of the total baseline case; far exceeding the 10% requirement for process water savings versus the baseline case under the WE3 exemplary performance category. Wastewater now available for irrigation is estimated at 1,687,999 gallons/year, which represents reduction of water that would otherwise have been diverted to the sewer.

In the first cooling season for this project, the actual cycles of concentration have averaged above 5 cycles, exceeding the conservative calculation at 3.5 cycles. To date, the metered savings, against the 2.5 cycle baseline, have been 630,600 gallons:

Jun 2011	97,500
Jul 2011	59,533
Aug 2011	129,167
Sep 2011	87,333
Oct 2011	91,900
Nov 2011	43,667
Dec 2011	1,833
Jan 2012	75,567
Feb 2012	44,100

