

Water Efficient Technology Avoiding the Pitfalls

WHAT WORKS

August 5, 2008



Executive Order 13423:

“Strengthening Federal Environmental, Energy, and Transportation Management”

- **“Beginning in FY 2008, reduce water consumption intensity, relative to the baseline of FY2007 through life cycle cost-effective measure by 2 percent annually through the end of fiscal year 2015 or by 16 percent by the end of fiscal year 2015...”**
- **DOE Supplemental Guidance – Jan 08**



What Works & What Doesn't?

What will be covered?

Zeta Rod
Non Water Using Urinals
Sensor Devices
Irrigation



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Water Conservation – The Zeta Rod

*August 5, 2008
Session 4*

Presenter: Sol Williams



NON-CHEMICAL DEVICES

THE ZETA ROD



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Non-Chemical Devices

- Non-chemical water treatment technology has been used since the 1930's. Lack of reproducible results and performance characteristics kept as company secrets have prevented specifying non-chemical technology in standard government contract documents.



Non-chemical Devices

- Government-wide downsizing and changing expertise at installations have made program managers seek new methods and technologies to ensure mission success.



Non-chemical Device

- The Air Force (HQ AFCESA) & Army (ERDC-CERL) are conducting a 14 month test with a non-chemical device (Zeta Rod) at Davis Monthan AFB, Tucson and Ft Huachuca, Sierra Vista, Arizona.

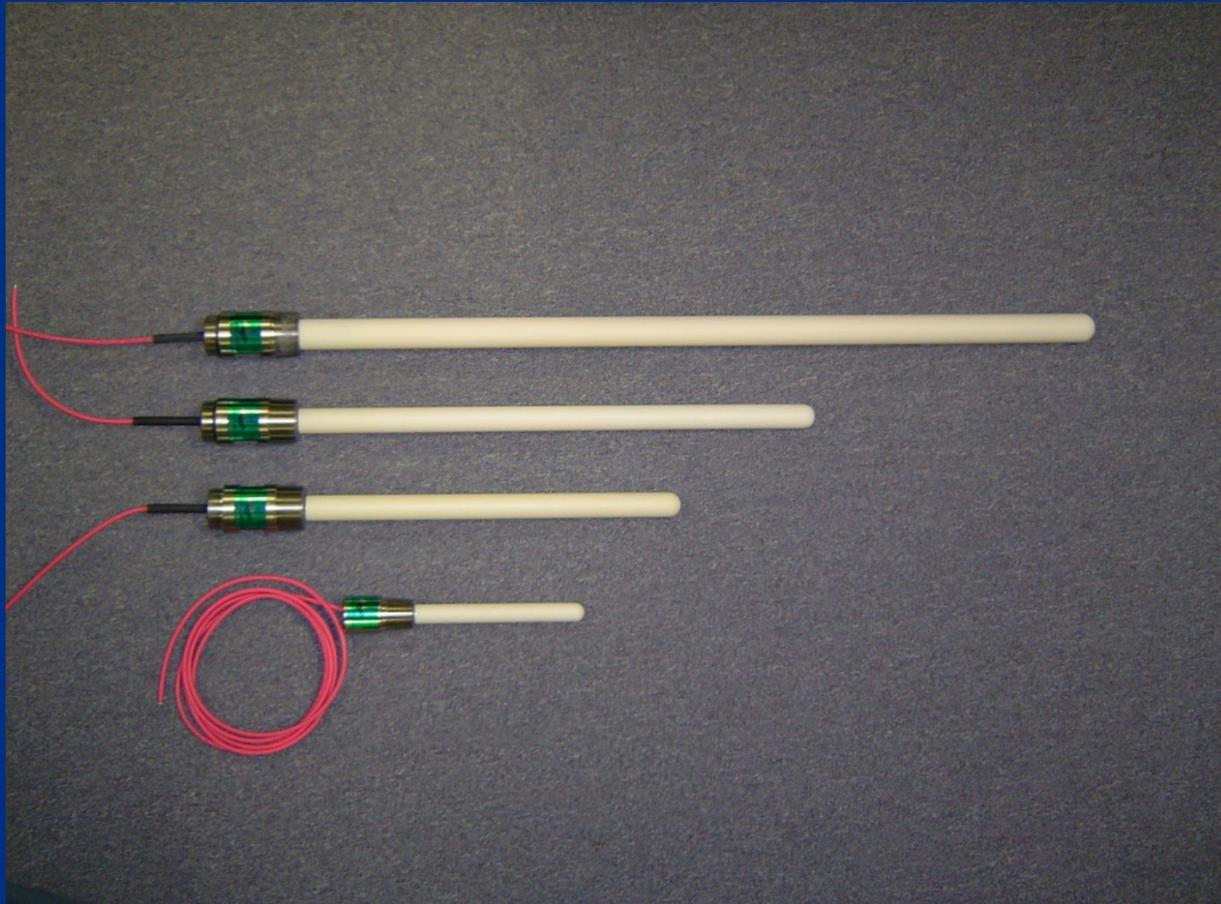


ZETA ROD

- HIGH VOLTAGE
- CAPACITANCE BASED
- DEPOSIT CONTROL FOR INDUSTRIAL FLUID APPLICATION



ZETA RODS





Zeta Rod Installation





Zeta Rod

- By creating a high voltage *potential* (35kV DC) between the two plates of a capacitor, the Zeta Rod creates a migration of counterions towards net-negative charged particles.
- Most colloidal particles in aqueous solutions (mineral and organic), as well as pipe surfaces have a net negative surface charge.
- As the counterions migrate towards net negative charged particles and surfaces, they experience an increase in surface charge density (an increase in Zeta Potential).



Zeta Rod

- Another effect created by the Zeta Rod is the reduction in surface tension of the fluid. This effect is crucial in biofilm control.
- In summary, the Zeta Rod can be considered a very strong *electro-dispersant*.



Zeta Rod Systems Control:

- Mineral Deposits (Scale)
- Biological Deposits (Biofouling)
- Corrosion



Scale Control

- Scale forms when minerals in the water exceed their solubility levels and precipitate out of the solution. When salts go from being in solution to being in suspension they do so by forming small colloidal particles which then given the right conditions can grow to form larger crystals and/or form deposits upon wetted surfaces.



Scale Control

- It is when these minerals first precipitate that the Zeta Rod becomes involved in the scale prevention process. By increasing the surface charge of the precipitated crystals, the Zeta Rod prevents them from growing into larger size crystals and from forming deposits on wetted surfaces such as heat exchangers, nozzles, pipes, cooling tower fill material, membranes, etc.



Biofouling Control

- Bacteria begin forming a biofilm within minutes of being introduced into an aqueous system. Once they are established onto a surface they will produce an *exo-polymeric substance (eps)* which will provide protection to the colony as well as a distribution matrix for nutrients to travel within the biofilm.



Biofouling Control

- Although not a biocide, the Zeta Rod has a three prong approach in the control of biofilm:
- The reduction of surface tension of the aqueous medium causes biofilm to take in more water than it can actually hold (superhydration) causing it to swell and be sloughed off by the shear forces of the turbulent flow in the pipes,



Biofouling Control

- The electro-dispersant effect of the Zeta Rod prevents viable organisms to form large clumps and to establish deposits on wetted surfaces, and
- It is believed that the Zeta Rod emits a signal that bacteria through their sensing quorum capabilities detect as an inhospitable environment causing them to go into a dormant stage.



Corrosion Control

- Cooling systems treated with Zeta Rod technology can operate at relatively high cycles of concentration. At these concentrations, the pH in the cooling water buffers out at 8.9 to 9.0. At this pH the water presents no corrosion potential (positive LSI), and because of the strong electro dispersion effect on precipitated minerals, the Zeta Rod allows cooling systems to operate at conditions under which no corrosion takes place.



Corrosion Control

- In situations where unusual water conditions exist, such as reclaimed water with high organic content, or water with corrosive properties, the Zeta Rod will allow corrosion and biofouling problems to be controlled with better results with a minimal amount of inhibitors or biocides, than with the chemicals alone.



Summary

- In conclusion:
 - The test results to date have been very positive.
 - No notable scale has formed
 - Acceptable corrosion rates
 - Water savings



For More Information

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Don't forget to fill out and drop off your session evaluations.



How Much Can YOU Save?

- Based on a PNNL 2005 study, 35 to 50 billion gallons per year savings potential

	People	Homes
Day	769,230,769	187,500,000
Month	25,641,026	6,250,000
Year	2,136,752	520,833

Note: 65 GPCPD or 8,000 per home/month

NO Water Urinals



Waterless Urinals



Sensors



this is the first sensor faucet to use a power source that is completely self-sufficient--a hydro-powered turbine that charges the power supply during usage, eliminating the need to replace batteries or use external electricity

Don't





Don't



Don't

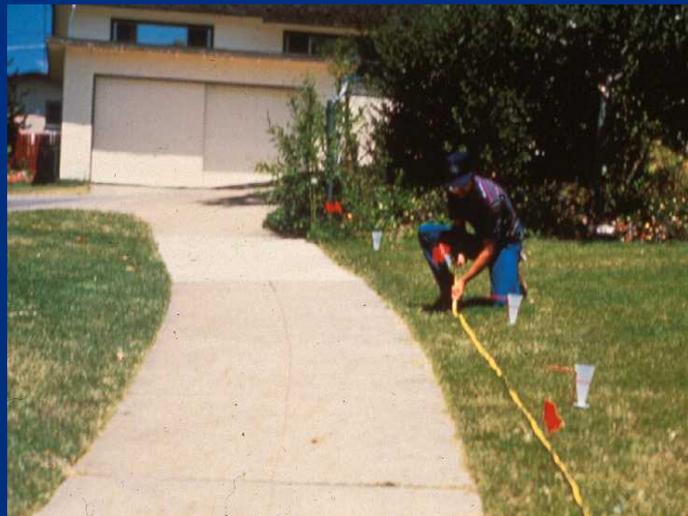




DON'T

- DON'T - Assume where your water is used
- Don't - Ever think you done all you can do
- Don't – Stop questioning whether water is actually required in that process
- Don't – Be shy
- Don't – Forget that water authorities give away millions per year to conserve

Don't



Don't



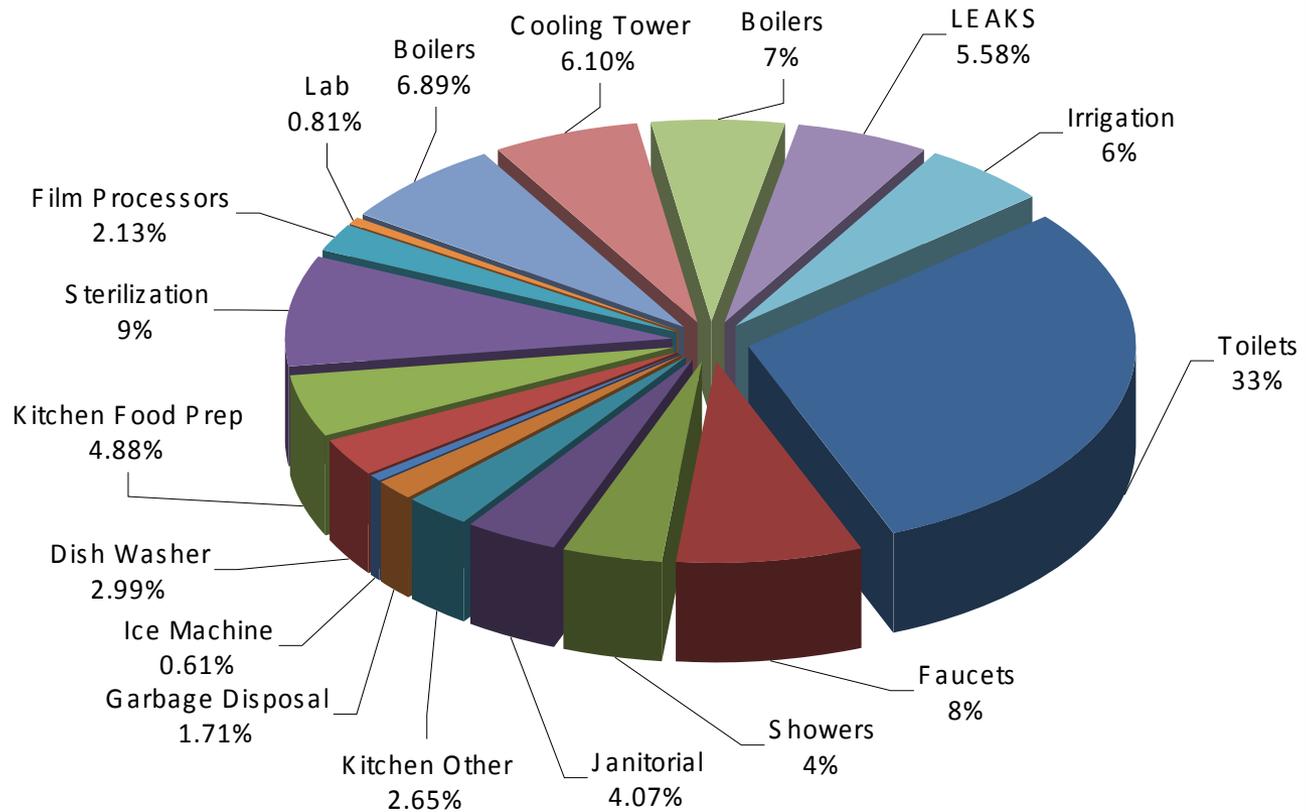
Don't





ONLY IN TEXAS!

DO!





Would you like to know more about this session?

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Don't forget to fill out and drop off your session evaluations.