

**INTRODUCTION**

The Los Angeles Convention Center installed their Zeta Rod™ system in early February 1998. The system is comprised of eleven Zeta Rod electrodes energized by four power supplies. This system protects large cooling towers, a 500-ton chiller and two 1250-ton chiller systems in the West Plant of the Convention Center.

A third-party consulting firm was contracted to monitor the performance of the Zeta Rod system, and compare the results obtained with a similar cooling system operating under a chemical water treatment regimen in the South Plant of the Convention Center.

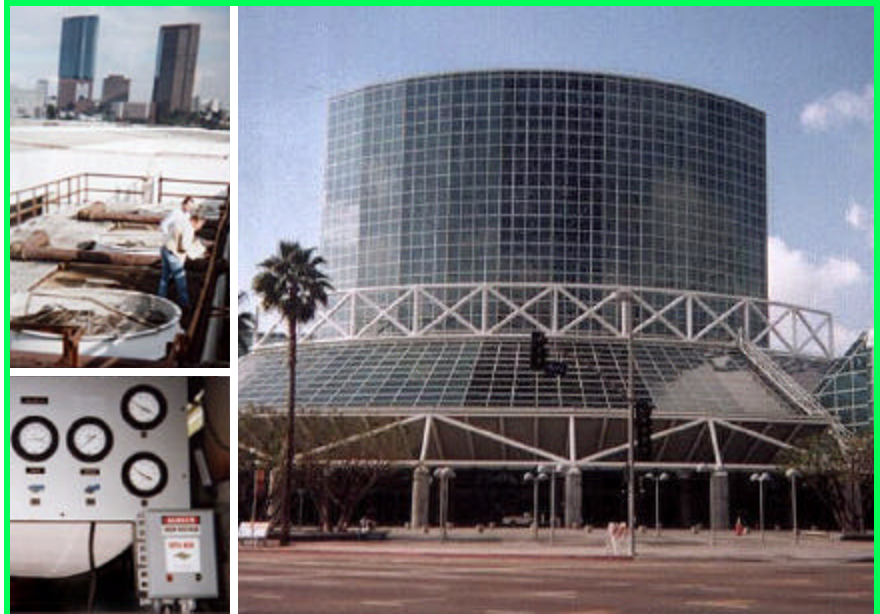
Parameters measured included:

- Water quality: pH, alkalinity, hardness (total and Ca), chlorides, silica, and total iron.
- Corrosion rates: mild carbon steel (C1010) and copper (CDA110).
- Total aerobic bacteria.

**INSTALLATION & OPERATION**

The Zeta Rod system was installed during the first week of February 1998, during a season when the plant was not in full operation. Because there was no flow in the systems, the consultant reported on April 20th that “biological control in both [chemical and Zeta Rod] condensing water systems was not acceptable...The elevated biological activity is most likely from the extended stagnant conditions...” A twice daily or low-flow continuous recirculation of the condensing water was

recommended. Convention Center personnel implemented a program in which the condenser water was circulated for continuously between 0730 and 0830 hr and 1930 and 2130 hr each day.



The Los Angeles Convention Center has Zeta Rod electrodes installed to protect the cooling towers (top left) and chillers (lower left) that provide comfort cooling to the Center.

On May 26, the consultant reported that “all data trends appear to be showing program improvements across the board.” Specifically, it was reported that “biological control in both condensing water systems has improved,” and that “all [corrosion] coupons analyzed show corrosion rates below industry standards<sup>1</sup>.”

1. “Corrosion Standards for Cooling System Water Treatment” from Blake, R.T., *Water Treatment for HVAC and Potable Water Systems*, McGraw Hill, N.Y., 1983, pp126-127 were used as targets against which the data in this study were measured. The rates given in this reference are (1) mild steel: 0-2 mils/year = excellent, 2-5 mils/year=good, and (2) copper: 0-1 mils/year = excellent, 1-2 mils/year = good.

# An Evaluation of the Zeta Rod™ System at the Los Angeles Convention Center

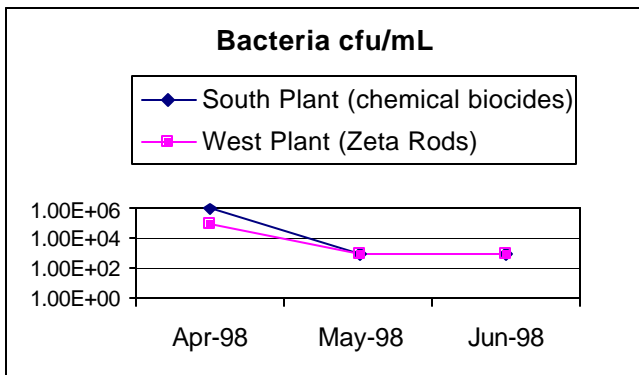
This report concludes that chiller operating data showed “proper efficiencies,” indicating that the overall health of the system was good.

In the final report of June 23, the consultant stated that, “our findings showed evidence of on-line cleaning in the West [Zeta Rod-equipped] Plant chillers that had been operating.” The evidence included softening of old deposits, freshly-cleaned areas on the insides of the condenser tubes, loosened scale chips and calcium carbonate mud in low flow areas such as tower sumps.

The report also indicated that, “biological control in both condensing water systems has stayed consistent,” and that all of the corrosion coupons analyzed still showed corrosion rates below industry standards.

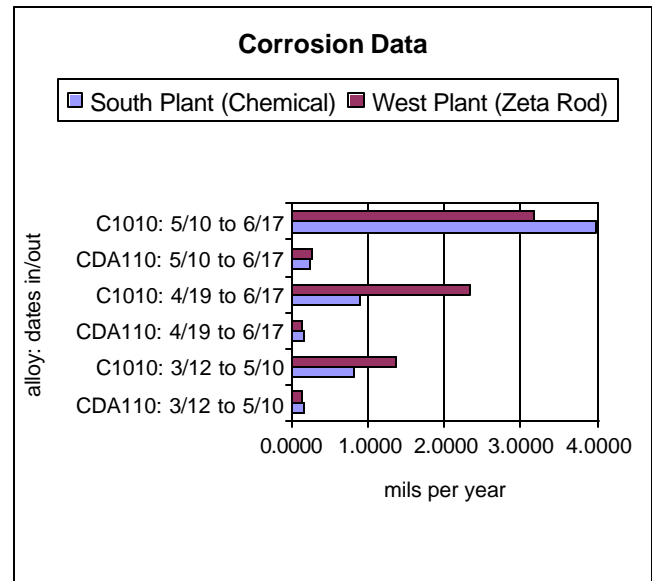
## DATA

**Biological** samples were gathered from the cooling tower sumps after recirculating each system for at least 30 minutes. Populations of aerobic bacteria in colony-forming units per milliliter of water are shown in the chart below.



**Corrosion** coupons of mild carbon steel (alloy C1010) and copper (CDA 110) were exposed

between the dates indicated on the chart above right.



## CONCLUSIONS

The final report from the consulting firm concluded that:

1. “On-line removal of existing deposits can be more rapid with an acid assisted chemical program than with the Zeta Rods, but proper protection of critical system metals may be compromised in the process”...“the on-line cleaning properties exhibited by the Zeta Rod resembled those of a strong, non-acid chemical program.”
2. “Biological control in all condensing water systems was virtually identical despite the treatment approach utilized.” [Zeta Rod vs. chemical biocides]
3. “Chemical feed excursions and chemical leaks did occur with the South [chemically-treated] Plant system. This would be impossible with the Zeta Rod technology.”



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