

INTRODUCTION

Water naturally contains a variety of inorganic and organic substances that can be deposited upon evaporative cooling media as water trickles over it. The result is that the media quickly become contaminated with inorganic scale and with growing bacteria, algae, and other biological organisms. This contamination can impede the proper distribution of water over the media, block the passage of air through the system, and produce foul “swampy” odors.

BIOSPHERE 2 CENTER CLIMATE WALL

At Biosphere 2 Center near Oracle, Arizona, a climate wall in the greenhouse (see photo below right) maintains a suitable environment for raising a variety of plants and animals during Arizona’s extremely hot and dry summers. The climate wall is approximately four feet high and extends the full 40-foot width of the building.

The media consists of forty multi-layer pads that measure 48 inches in height and 6 inches in depth (front to back). The pads are composed of paper impregnated with a waterproof coating. Water from a distribution pan at the top of the unit trickles down over the media and collects in a sump, where it is recirculated back to the distribution pan.

Replacement pads cost from \$22 to \$40 each, and represent a significant ongoing operating cost of between \$880 and \$1600 to replace all of the media in the climate wall.

After several months of operation, the climate wall at Biosphere 2 Center had accumulated a significant layer of scale and crust and slime (see

close-up photo on next page, left side). This accumulation reduced the efficiency of the unit by blocking the proper distribution of water and the free flow of air. The reduced efficiency leads to lower performance and greater consumption of water and power.

The water in the sump was foul-smelling and opaque, with visible masses of algae. Personnel at the Biosphere attempted to clean the media with a high-pressure water jet; however, the paper media was damaged without significant removal of the contaminants

ZETA ROD™ BENEFITS

Because the Zeta Rod prevents suspended materials in water from agglomerating or attaching to wetted surfaces, it is an ideal addition to evaporative cooling systems. Zeta Rod-equipped systems eliminate odors, permit operation with very low bleed - conserving water, and prevent the fouling of media with crust and scale.



Figure 1: The greenhouse climate wall at Biosphere 2 Center humidifies and cools interior spaces during Arizona’s hot, dry climate.

Commercial and Industrial Heating & Cooling
Prevention of Biofouling and Scale in Evaporative Cooling Systems

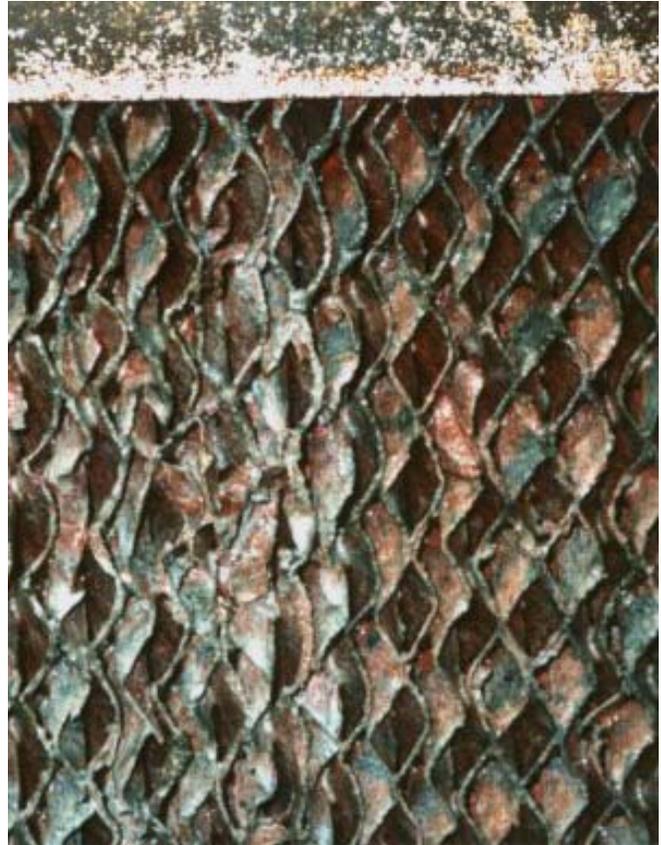


Figure 2: Photos of evaporative cooling media. LEFT (BEFORE Zeta Rod installation) - Significant build-up of slime and scale interferes with wetting of media and impedes air flow. RIGHT - 6 weeks after installation of the Zeta Rod system, layers of fouling and scale swelled and loosened, and the media was restored to clean condition by washing with a low-pressure garden hose.

A Zeta Rod system was installed at the Biosphere in late May 1997 with the expectation that once the contaminated media were replaced, further accumulations of scale and biofouling would be prevented. Within a few weeks it was observed that the layer of scale and slime was swelling and softening, and by the 10th of July, it was possible to gently wash the media with low-pressure water from a garden hose, removing the loosened contaminants and revealing the media underneath (see photo above right).

In addition to the removal of contaminants on the media, the water in the sump became clear and no foul odors remained.

The dramatic improvement in the cleanliness of the media due to the treatment of the water by the Zeta Rod means that media replacement is unnecessary and the climate wall can operate at peak efficiency.



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