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Orp control helps medical center de-bug cooling towers

Control of oxidizing biocides in the face of changing system demands is a challenge for most coolingtower operations. For TECO, a thermal-energy cooperative, this challenge is met through ORP (oxidation reduction potential) measurement for on-line halogen control. TECO supplies institutions in Houston's Texas Medical Center. It operates three large cooling towers for air conditioning more than 8,000,000 sq ft of floor space.

Precise levels of an oxidizing biocide must be maintained for effective microbiological control. "Microorganisms are scrubbed from the air into the recirculating water at the cooling tower," explained Wayne Scolton, operations supervisor. "Improperly controlled, they can severely foul the cooling system within a short time."

Orp (also known as redox) technology is designed to measure the electromotive force (emf) generated when an oxidant is present in aqueous solution. The strength of the force, measurable in millivoltage, is directly proportional to the oxidative strength of the treated system. The higher the concentration of oxidant, the higher the voltage. The higher the concentration of reductants, the lower the voltage. Therefore, the orp of TECO's cooling-tower system at any given time is a measurement of the system's current oxidant demand.

Working with Stranco, Inc., Bradley, IL, TECO installed a "High Resolution Redox" control system at the medical center's West Tower to control feed of gaseous chlorine and sodium bromide. The tower, a 33,000-ton cross-flow system with a design flow of 96,000 gpm and an evaporation rate of up to 1,000,000 gpd, is operated at six cycles of concentration.

Biological control is carried out using a bromine program which involves mixing gaseous chlorine and sodium bromide during injection. The chemicals are fed to maintain upper and lower control limits of 0.6 ppm and 0.3 ppm total halogen.

Using orp measurement, the precise amount of oxidant is continuously fed to meet the real-time demand in TECO's cooling tower. "We noticed im-



The adoption of ORP control has helped TECO optimize heat-transfer rates and lower workpower requirements for this 33,000 ton cooling tower at the Texas Medical Center, Houston.

proved performance almost immediately," said Scolton. "More accurate control of the oxidant level is maintained, and this has brought about improved overall biological control and has greatly reduced the potential for fouling and corrosion problems," he noted.

In addition to gaining more accurate control of oxidizing biocides, another benefit of on-line halogen control is reduced work-hour requirements for TECO. "In the past, we conducted wet tests every two hours, which would consume approximately 15 minutes of an operator's time, 12 times a day. We now conduct wet tests only once daily simply to cross check the oxidant level in the system," he concluded.

Using orp measurement and control for monitoring the oxidant demand and automatically treating the system with the oxidant dose required to achieve and maintain system cleanliness has proved effective in optimizing TECO's microbiological control programs.

Based upon the improved performance at the West Tower, TECO installed HRR controllers at the two remaining cooling towers at Texas Medical Center.