Pre-Outage Water System Audit Can Prevent Headaches

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An uninterrupted supply of high-quality water is vital to power plant operations. When making outage plans that include preventative maintenance on key plant systems, plant personnel should address the plant's water treatment equipment, ensuring it receives the same high level of attention as its boiler, condensers, turbines and process equipment.

So, how does a maintenance planner know whether the water treatment system is operating at its best and that it can meet the power plant's current and future demands? One way is to plan an audit of the water treatment equipment before a planned outage. The audit should start with a system check-up to assess system conditions, performance and efficiencies and to pinpoint areas that need improvement. The check-up also can determine if a full system audit is required to provide a more in-depth investigation of a single or multiple water unit operation. The system audit should address the individual challenges of specific situations and include an in-plant survey and a summary of findings and recommendations for improvement.

Audit recommendations can be implemented at any time, including during the next scheduled outage. The audit can be conducted by plant personnel or by an outside water treatment vendor. With today's power plants running increasingly lean operations, resources are at a premium, particularly during an outage. This is driving a trend toward outside-vendor services, including equipment audits. An outside vendor can design a program to coincide with a plant's major outages.

mens Water Technologies' service technicians monitor a customer's RO system water. Photo courtesy of Siemens.

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Product and service solutions that can be implemented during the outage include system maintenance, repair or overhaul. For example, for the pretreatment portion of the water system, components or media may be replaced, instruments and controls may be upgraded and temporary water treatment in the form of mobile clarification or filtration may be brought in. For the make-up water portion of the system, a resin analysis or membrane autopsy may be done, the resin and/or membranes may be replaced or temporary water treatment or service deionization equipment may be brought in. In cases where condensate polishing is included as part of the water treatment system, the resin may be regenerated offsite, cartridge filters may be replaced or mobile condensate polishing may be brought in.

Follow-up service after the outage is often needed to ensure the improvements to the water system meet the outlined objectives and specifications. Ongoing support also ensures that the system's performance stays on track and it operates at its highest efficiency.

Power Plant Case Study

A particular power plant using an older reverse osmosis (RO) system for treating reclaimed wastewater to within high-pressure boiler feedwater specifications needed to be reconfigured so the system could accommodate a change to well water feed. The RO membranes from the current system had not been cleaned in a year, and the membrane salt rejection had decreased to about 90 percent. This resulted in an increase in ion exchange mixed-bed regenerations.

Although the RO system was not a Siemens Water Technologies' system, power plant personnel contacted Siemens for a solution. Siemens ultimately recommended a full water system audit, part of an outage service package called OSCAR-Outage Service: Check-up, Audit and Review- that includes a water analysis profile of the system between each major treatment process.

The OSCAR service typically begins when a Siemens water treatment specialist interviews the client's water treatment system operator or plant manager and his or her staff to evaluate system conditions, performance and efficiency. A system check-up then pinpoints areas of improvement that can be achieved quickly with specific products and services. The check-up also determines if a system audit is required, and if so, an audit team is assembled and sent to the customer's site. Follow-up visits and ongoing service are also included in the program.

TABLE 1 THE OSCAR PROGRAM'S FIVE STEPS

	Step 1 Check-up	Step 2 Audit	Step 3 Outage	Step 4 Start-up and Validation	Step 5 Ongoing Service
ocess Steps	Interview Questionnaire Water Analysis Review Logs Computer Analyses	On-site Team Inspection Review Report Results	Provide Solutions Perform Work Mobile Services	Check Performance Verify Sensors Calibration Water Analysis	Monitoring Preventative Maintenance Emergency Service
iverables	Check-up Scorecard	Audit Report	Solutions: Products and Services	Performance Improvement Report	Service Reports Account Management Reviews
ical Timing	Six Months Pre-Outage	Four Months Pre-Outage	Outage	One Month Post-Outage	Ongoing

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Table 1 summarizes the OSCAR program's five steps and what is included in each.

Audit Recommendations

In this plant's case, because the feed water was to be changed from reclaim water to well water, Siemens recommended that the customer eliminate its weak-acid cation (WAC), acid feed and de-carbonator process, as these were no longer needed. By doing so, the company saved power, chemical and WAC regeneration labor costs.

The Siemens audit also showed that by switching to newer membranes, the customer could run its RO units at 73 percent recovery, allowing for a more continuous run time and reducing bio-fouling in the third stage of the RO units. Siemens recommended an off-site membrane cleaning program every six months to maintain optimum membrane performance and life, thus reducing ion exchange polishing costs.

By removing the WAC and de-carbonator process units and replacing the RO membranes, Siemens estimated that the plant could save $82,000 a year, based on reduced electricity, chemical and labor costs. Furthermore, by cleaning the RO membranes twice a year the audit predicted a reduction in the plant's ion exchange polishing costs by an additional 25 to 40 percent.

Power plant personnel agreed with Siemens' recommendations, and most of the system changes were made during the next scheduled outage.

This example illustrates how customers can reap the benefits of a pre-outage audit to optimize plant performance and reduce costs.

"The trend of auditing a plant's water treatment system before an annual outage, an unplanned outage or seasonal maintenance, is growing," says Chuck McCloskey, Siemens Water Technologies' market development manager. "Having water treatment specialists go to their site and offer solutions tailored to their needs allow customers to focus their time and resources on running their power plants instead of worrying about their water treatment systems."