

Sodium Analysis with Better Benefits

Problem

As a power plant, Platte River Power Authority's (PRPA) Rawhide Energy Station needed accurate sodium monitoring of potential breaches between their cooling reservoir and boiler-cycle water.

Solution

The Rawhide Energy Station beta tested Hach's new NA5600sc Sodium Analyser with positive results.

Benefits

The NA5600sc Sodium Analyser allowed plant staff to use a milder, less hazardous solution to reactivate their instruments' electrodes, and found the interface familiar and easy to use.

Background

Staff at PRPA's Rawhide Energy Station beta tested Hach's soon-to-be released NA5600sc Low Range Sodium Analyser. Activities include installation, commissioning, and comparisons with Polymetron 9240/9245 analysers, Hach's previous comparable product.

Energy Station Operations

Commissioned in 1984, Rawhide Energy Station is a single unit coal fired steam generation plant that produces 278 MW for PRPA's four owner cities. The unit is generally base loaded, and additional energy requirements are met with on-site gas combustion turbines as well as a portfolio of solar, hydro, and wind. An on-site potable water treatment plant provides source water for a demineralisation system that provides boiler makeup water. All-volatile chemistry treatment is used for the all-stainless-steel boiler, and no condenser polishers are required.

Cooling Reservoir System

Rather than cooling towers, the unit utilises a cooling reservoir which is fed from tertiary treated municipal wastewater effluent. The reservoir water is pumped into 10,000 tubes in an all-stainless-steel condenser. Steam exiting the last set of turbine blades enters the condenser, liquifies, and is pumped back into the boiler at the rate of ~3,800 gpm.

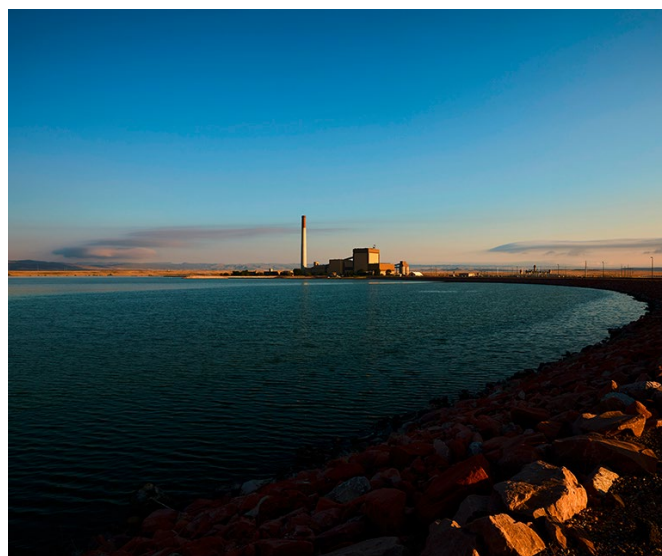


Fig 1: Platte River Power Authority's Rawhide Energy Station

Solutions & Improvements

Sodium Monitoring

Any breach between cooling reservoir water and the ultra-pure boiler cycle water could be damaging to the metallurgy of the system. Sodium can be one of the early indicators of a condenser tube leak, since typical reservoir sodium levels are several orders of magnitude higher than cycle chemistry levels. One could expect reservoir sodium of ~200 mg/L, whereas steam and condensate pump discharge sodium levels at Rawhide tend to be less than 0.1 ug/L.

Online Analysers

At Rawhide, online analysers are used for both steam and condensate pump discharge, and signals from these instruments feed into their Plant Information (PI) system. The alarm limit of 10 ug/L notifies laboratory staff as well as the power plant control room so that immediate action can be taken in the event of a tube leak. This information is also used in trending software so that staff can easily detect sample or instrument drift.



Fig 2: The Hach NA5600sc Sodium Analyser

Conclusion

Safety Gains

Staff found several advantages to the beta instrument they tested. They previously used other brands and models of sodium analysers. The DIIP method is well established and works well; however, most instruments require occasional electrode etching with hydrofluorosilicic acid, which is extremely dangerous to work with. This instrument uses a much milder solution to reactivate the electrode.

User-Friendly Interface

Another advantage of this instrument is that it uses the same user interface platform as the other Hach Series 5500 (Silica & Phosphate) analysers, including the industry standard Hach 5500sc Silica Analyser. Rawhide staff use Hach 5500sc silica and phosphate analysers and are well familiar with the user interface. This made it very quick and easy to become accustomed to the beta instrument.



Fig 3: The Hach NA5600sc Sodium Analyser, door open

Summary

The beta test of the new NA5600sc Low Range Sodium Analyser by PRPA's Rawhide Energy Station benefited the plant in these ways:

- The milder, less hazardous solution used to reactivate their instruments' electrodes meant the facility could avoid working with the more dangerous hydrofluorosilicic acid.
- The staff found it easy to use the NA5600sc interface as it was similar to the previously purchased 5500sc (Silica & Phosphate) model they use today to monitor for Silica.