

# 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 Analyzer with positive results.

## Benefits

The NA5600sc Sodium Analyzer 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 Analyzer. Activities include installation, commissioning, and comparisons with Polymetron 9240/9245 analyzers, 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 demineralization 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 utilizes 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 ~3800 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 Analyzers

At Rawhide, online analyzers 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 Analyzer

### Conclusion

#### Safety Gains

Staff found several advantages to the beta instrument they tested. They previously used other brands and models of sodium analyzers. 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) analyzers, including the industry standard 5500sc Silica Analyzer. Rawhide staff use 5500sc silica and phosphate analyzers 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 Analyzer, door open

### Summary

The beta test of the new NA5600sc Low Range Sodium Analyzer 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.

#### HACH World Headquarters: Loveland, Colorado USA

United States: 800-227-4224 tel 970-669-2932 fax orders@hach.com

Outside United States: 970-669-3050 tel 970-461-3939 fax int@hach.com

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