PowerPlant Chemistry® The Journal of All Power Plant Chemistry Areas

International Edition ISSN 1438-5325 June Volume 7 (2005), No. 6

Abstracts

Fact and Fiction in ECP Measurement and Control in Boiling Water Reactor Primary Coolant Circuits

Digby D. Macdonald

A review is presented of various electrochemical potentials, including the electrochemical corrosion potential (ECP), that are used in the mitigation of stress corrosion cracking in the primary coolant circuits of boiling water reactors (BWRs). Attention is paid to carefully defining each potential in terms of fundamental electrochemical concepts, so as to counter the confusion that has arisen due to the misuse of previously accepted terminology. A brief discussion is also included of reference electrodes and it is shown on the basis of experimental data that the use of a platinum redox sensor as a reference electrode in the monitoring of ECP in BWR primary coolant circuits is inappropriate and should be discouraged. If platinum is used as a reference electrode, because of extenuating circumstances (e.g., potential measurements in high dose regions in a reactor core), the onus must be placed on the user to demonstrate quantitatively that the electrode behaves as an equilibrium electrode under the specified conditions and/or that its potential is invariant with changes in the independent variables of the system. Preferably, a means should also be demonstrated of transferring the measured potential to the standard hydrogen electrode (SHE) scale.

PowerPlant Chemistry 2005, 7 (6)

Fear and Loathing at a Combined Cycle Power Plant – Ion Chromatography in a Box
Beverly Newton, Mike Doyle, Luis Carvalho, Ian Scarth, and Peet Lindau

The use of ion chromatography for monitoring corrosive ions in water has been implemented at several new combined cycle gas-fired power plants. Due to stringent requirements for clean water to prevent corrosion and plugging of turbine components, this methodology is predicted to have a significant impact in extending useful operating lifetimes and to measurably increase the availability of components in contact with water. Ion chromatography, due to its ability to identify individual anion and cation species, to achieve parts-per-trillion detection limits, and to operate on-line, has played a central role in the effectiveness of these water chemistry monitoring programs.

Combined cycle power plants are faced with tough choices for water monitoring. The lack of trained chemists to run low level analyses results in uncertainty as to the quality of the water used for steam going to the turbine and in some cases to the generator. This paper presents a report on a recent study of a low cost, hands-off ion chromatography solution to provide on-line monitoring at the water panel for chloride and sulfate ions at 1 part per billion or below.

PowerPlant Chemistry 2005, 7 (6)

Oxygen Injection into Reheating Steam of Moisture Separator Reheaters
Wilfried Rühle, Harry Neder, Günter Holz, and Volker Schneider

The steam/water cycles of the nuclear power plants Philippsburg 2 (KKP-2), Isar 2 (KKI-2) and Biblis A/B (KWB-A/B) operate under high-AVT-chemistry conditions (pH at 25 °C ≥ 9.8 in final feedwater). After many years of excellent operating performance, flow-accelerated corrosion (FAC) in the carbon steel heater tubes of the moisture separator reheaters (MSRs) was observed. In order to counteract the flow-accelerated corrosion it was decided to inject oxygen into the reheating steam line upstream moisture separators. As is known, more stable protective oxide layers are formed in oxygen-containing steam condensate. However, reducing conditions in the recirculating water of the steam generators also had to be ensured after the implementation of oxygen injection at the plants to definitely exclude conditions under which localized corrosion could occur. Visual and eddy current inspections performed after four cycles of operation confirmed that FAC in the MSRs in KKP-2 and KWB-A/B could be stopped without negative side effects on the steam generators.

This paper describes the influence of the oxygen injection on the water chemistry parameters and system performance at KKP-2, KKI-2 and KWB-A/B.

PowerPlant Chemistry 2005, 7 (6)

Hypochlorite and the pH in Cooling Water
Geoff Spowart

This paper looks at the issues surrounding the relationship between pH and chlorine effectiveness in power station cooling water. In particular, the impact of changes to cooling water chemistry on Legionella counts is highlighted along with some strategies for optimizing biocide dosing and the pH set point.

PowerPlant Chemistry 2005, 7 (6)

The 25th Annual University of Illinois Electric Utility Chemistry Workshop – Extending the Life and Reliability of Power Plant Equipment through Improved Chemical Control
K. Anthony Selby

In May this year, the 25th Annual University of Illinois Electric Utility Chemistry Workshop took place in Champaign, IL, U.S.A. The abstracts of the papers presented at this event are compiled in this paper.

PowerPlant Chemistry 2005, 7 (6)

On-Line Calibrator for Verifying Sodium Ion Transmitters
Eric V. Maughan

The question of calibration and verification of on-line instrumentation at the concentration of interest is often raised. This paper describes a method using a conductivity measurement to calibrate and verify sodium ion analyzers, as well as pH and conductivity sensors.

PowerPlant Chemistry 2005, 7 (6)

DISCUSSION
Re:
Brad Buecker: Condenser Performance – A Critical Issue for Plant Chemists
PowerPlant Chemistry 2005, 7(1), 40–43.

PowerPlant Chemistry 2005, 7 (6)