

**Abstracts****Troubleshooting Reverse Osmosis**

Jane Kucera

The use of reverse osmosis (RO) has grown tremendously over the last 10 years, as advancements in technology continue to lead to economic justification of RO, and as more operators and plant managers gain familiarity with RO. To keep RO systems operating optimally, operators need to understand how an RO system works, including how to inspect or "troubleshoot" a system. The ability to troubleshoot and correctly diagnose a problem with an RO system is critical to keeping the system on line. This paper describes RO troubleshooting techniques to prevent system problems and to identify mechanisms of system failures that, when managed, ultimately lead to improved RO performance.

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**Evaluation Method of Corrosive Conditions in Cooling Systems of Nuclear Power Plants by Combined Analyses of Flow Dynamics and Corrosion**

Shunsuke Uchida, Masanori Naitoh, Yasushi Uehara, Hidetoshi Okada, Koji Hotta, Ryoko Ichikawa, and Seiichi Koshizuka

Problems in major components and structural materials in nuclear power plants have often been caused by flow induced vibration, corrosion and their overlapping effects. In order to establish safe and reliable plant operation, it is necessary to predict future problems for structural materials based on combined analyses of flow dynamics and corrosion and to mitigate them before they become serious issues for plant operation.

The analysis models are divided into two types.

1. Prediction models for future problems with structural materials  
Distributions of oxidant concentrations along flow paths are obtained by solving water radiolysis reactions in the boiling water reactor (BWR) primary cooling water and hydrazine–oxygen reactions in the pressurized water reactor (PWR) secondary cooling water. Then, the electrochemical corrosion potential (ECP) at the point of interest is also obtained by the mixed potential model using oxidant concentration. Higher ECP enhances the possibility of intergranular stress corrosion cracking (IGSCC) in the BWR primary system, while lower ECP enhances flow accelerated corrosion (FAC) in the PWR secondary system.

2. Evaluation models of wall thinning caused by flow accelerated corrosion  
The degree of wall thinning is evaluated at a location with a higher possibility of FAC occurrence, and lifetime is estimated for preventive maintenance.

General features of models are reviewed in this paper and the prediction models for oxidant concentrations are briefly introduced.

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### **Determination of Low-Molecular-Weight Organic Acids and Inorganic Anions by Gradient Elution Chromatography**

Shun'an Cao, Jing Hu, and Qing Zhu

Conditions of the separation and detection of organic and inorganic anions by gradient ion chromatography and suppressed conductivity detection were studied, and the procedure of gradient elution was optimized. A detection limit of  $1 \cdot 10^{-3} \mu\text{g} \cdot \text{L}^{-1}$  was obtained using the pre-concentrated column and most relative standard deviations obtained in the determination of seven organic and inorganic anions were below 5 %. This method was proved to be simple, rapid and accurate for the separation and determination of low-molecular-weight organic acids and inorganic anions and could be applied in the analysis of the samples from water and steam systems of thermal power plants with satisfactory results.

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### **Oil Removal from a Closed Secondary Cooling System during Operation**

Martin Herberg and Heinz-Peter Borchardt

This paper describes a novel cleaning technique for removal of oil contamination in a closed cooling system during operation. This technique includes among other things the application of ceramic ultrafiltration membranes during the cleaning process. Information is given about the successful removal of oil from a cooling system in a cogeneration combined cycle unit.

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**Experience and Use of Oxidation Reduction Potential Measurements in Power Plant Applications**

Stephen J. Shulder

Oxidation reduction potential (ORP) measurements may be used in a variety of power plant processes including boiler cycle feedwater treatment, cooling water treatment, make-up water treatment, and wastewater treatment. These measurements are typically performed using a platinum measuring electrode and a silver/silver chloride reference electrode containing a potassium chloride solution. ORP is influenced by the amount of dissolved oxygen, and oxidizing and reducing agents in a water sample. In addition, pH, partial pressure of hydrogen and oxygen, and the materials also influence ORP in the system where the measurement is made. ORP measurements can be an effective control method for maintaining an oxidizing, neutral, or reducing environment. This presentation provides some examples of how ORP is used to control plant processes and some of the pitfalls to avoid.

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**Oxygenated Treatment for Units with Once-through Steam Generators – Some Questions and Answers**

Albert Bursik

PowerPlant Chemistry has received a multitude of questions regarding currently used feedwater and boiler water treatments in fossil-fired plants. This contribution addresses many of the inquiries regarding oxygenated treatment applied in units with once-through steam generators, giving general information on the subject and providing references where the questioners and readers of this paper can find more detailed information on the topics discussed.

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