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Abstracts

Chemistry in Steam Turbines

Robert Svoboda

The local chemical environment in steam turbines is governed by the solubility and the volatility of substances in the steam. Both are influenced by steam expansion and condensation. Nowadays there is sufficient knowledge to predict, quantify and experimentally verify these effects. Basic data and experimental results as well as their practical application are discussed.

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Latest Experience with Water Chemistry in Nuclear Power Plants in Japan

Shunsuke Uchida

Water chemistry control in nuclear power plants (NPPs) is principally based on experience with such control in fossil power plants (FPPs). However, the much more severe targets for integrities of fuel assemblies and structural materials, accumulation of radioactive species involved in the primary cooling water and irradiation-induced degradation of component materials cause major differences in the control of the two plant types.

In this article, major cooling systems of NPPs are compared with those of FPPs and then the latest experiences with water chemistry in NPPs, especially evaluation and control of radiolytic species for mitigating corrosion damage of structural materials in primary cooling water of boiling water reactors, are summarized. Procedures of radioactive corrosion product control for moderating shutdown radiation levels and radwaste source reduction are also introduced.

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A New Generation of Automated Water and Steam Sampling

David J. Cahalane und Danial Quigley

Flow control of water and steam samples is important to help assure the quality of the samples and repeatability of the analytical results. Constant velocity in the sample line maintains the integrity of the sample even with the entrapment and/or release of both soluble and insoluble species deposited within the system piping.

Sample inlet temperature and flow are easily controlled under constant conditions. Since sample pressures typically fluctuate, specifically at the time of startup and shutdown or at peaking power plants, maintaining a representative sample can be difficult and labor intensive. The traditional manual sample conditioning system requires constant adjustment during startup or as plant conditions change. With plants continually operating with limited maintenance and operational resources, an automated sample conditioning system is essential. Previously available flow sensing and automated sample conditioning technologies required maintenance on sample lines with high levels of crud. A new automated sample conditioning system continually adjusts a pressure-reducing valve in order to maintain a constant sample flow rate. By automatically maintaining the sample flow rate, unattended representative sampling is achieved. Automatic startup including a controlled blowdown sequence can be initiated from sample conditions or remote commands. Additional features and benefits of an automated sample conditioning system are discussed. System operation, instrument diagrams and results from field trials are presented.

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Stator Cooling Water Deoxygenation Control at Tarong Power Station

Des McInnes

Large electrical generators are normally cooled by circulating deionised water through hollow strands in the stator bars. Corrosion of the copper strands can lead to restriction of the cooling water flow through the strands, resulting in reduced cooling and consequently reduced output, or in the worst case catastrophic failure due to local overheating. Two key chemical parameters which can be managed to minimise the risk of flow restriction due to deposition of corrosion products are the dissolved oxygen concentration and the pH of the cooling water.

Tarong Power Station has four 350 MW Hitachi generators and is currently completing generator stator rewinds on all units. In conjunction with the rewind, Tarong has installed a deoxygenation system to provide low oxygen make-up water to the stator cooling systems. The stator cooling water systems have operated for twenty years under low oxygen neutral pH conditions, however the make-up water has always had up to 8 $mg \cdot kg^{-1}$ of dissolved oxygen.

This paper briefly discusses the corrosion issues and provides an overview of the modified make-up system at Tarong.

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Experience with Organic Treatment at American Israeli Paper Mills (AIPM)

Massalha Loay and Aharon Grabli

The nature of a paper mill, generally, creates a challenge for the water cycle treatment, which must be based on different considerations. An illustration of these considerations is provided and discussed briefly throughout the presentation of American Israeli Paper Mills' experience with amine treatment. Encouraging as well discouraging results of such a treatment are described. Moreover, it is shown that the VGB range values for the water cycle parameters are achievable even in a paper mill.

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The On-Line Measurement of Silica in the Power Plant (Part One)

Eric V. Maughan and David Dalgetty

The measurement of silica has always been a core measurement in the plant cycle. However, owing to the perceived complexity of the measurement and the maintenance requirements, many of these on-line analysers have fallen into disuse. The purpose of this paper (in two parts) is an attempt to dispell these notions. A review of the principles of measurement, calibration and troubleshooting is presented in this two-part paper.

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