

**Abstracts****Improving Chemical Planning Aspects of New Generation Plant – Huntly e3p Project Experience**

David Addison

Modern Engineer, Procure and Construct (EPC) contracts can, at times, lack suitable thermal power station chemistry expertise, resulting in less than best practice design choices being made. It is the responsibility of thermal power station chemists within organisations that are the clients of EPC contracts to ensure that thermal power station chemistry knowledge and good practice is utilised for new projects. This approach has been followed with Genesis Energy's new "Energy, Efficiency, Enhancement" 385 MW combined cycle gas turbine (CCGT) plant (e3p), located at its Huntly Power Station site in New Zealand. This project has also shown that the inclusion of condensate polishing for CCGT units is economically viable with significant long term benefits in terms of lower plant operating costs and improved plant reliability.

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**The Removal of Magnetite to Protect On-Line Analysis Equipment**

Wolfgang Leye and Eric Maughan

The transport of corrosion products through the steam-water circuit is of major importance to the power plant chemist. Several devices are commercially available to perform on-line sampling of corrosion products with subsequent analysis in the laboratory. However, the bulk of the corrosion product (mainly iron oxides) found in the sampling lines for on-line analysis is transported to the chemical analysers, resulting in deposition and blinding of the sensors. This results in additional maintenance.

This paper describes a device for the removal of iron oxide (magnetite) in the sample lines prior to on-line analysis.

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**Water for Power Generation in Australia – Now & into the Future**

David J. Knights

Australia is the driest inhabited continent on earth. This paper summarises the current water usage for electricity generation in Australia and explores the future alternatives for water resources. Many power stations use large volumes of good quality water for cooling, most of which is simply evaporated into the atmosphere. The author examines the community's awareness of the volume of water used for electricity generation and attempts to determine the value of this lost water.

As water resources in Australia are stretched to their limit and the urban and rural users compete for the resource, power generators will need to look for water savings, alternative water supplies, improvements in generating efficiency and other forms of cooling in an attempt to save water. Whilst generators have made water savings, many of the alternative cooling processes and water saving alternatives result in a net increase in carbon emissions, or have other environmental impacts.

The author highlights the issues associated with making water savings, and discusses the water options available in the future for electricity generators.

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**Behaviour of Steam Generator Tubing in the Presence of Silicon Compounds****Dumitra Lucan**

The chemical reactions that take place between the components of concentrated solutions generate an aggressive environment. The presence of this environment and of the tubesheet crevices lead to localized corrosion and the affected tubes cannot ensure effective heat transfer between the fluids of the primary and secondary circuits. Thus, it becomes necessary to understand the corrosion process that occurs on the CANDU steam generator secondary side. The purpose of this paper is the assessment of the corrosion behaviour of the tube material Incoloy 800 at the normal secondary circuit parameters (temperature = 260 °C, pressure = 5.1 MPa). The testing environment was demineralized water containing silicon compounds, at a pH = 9.5 regulated with morpholine and cyclohexylamine. The paper presents the results of metallographic, electronic microscopy and X-ray diffraction examinations, as well as the results of electrochemical measurements.

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

Eric V. Maughan and David Dalgetty

In Part 1 of this paper, the rationale for the measurement of silica, on-line methods and troubleshooting were presented. In this second part more detail is given on the theory of measurement, the chemistry of the reaction and the calibration of on-line analysers.

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**A Thermodynamic Study on the Effects of Individual Flue Gas Components on Mercury Speciation**

Carolina Acuña-Caro, Harald Thorwarth, and Günter Scheffknecht

Thermodynamic equilibrium calculations have been carried out to investigate the effect of common flue gas components on mercury behaviour under oxidising conditions in coal-fired power plants. The calculations were implemented based on the free Gibbs energy minimisation method. Considering homogeneous and heterogeneous reactions the shares of the different elements/compounds were varied over a wide range. The coal mercury content does not show any impact on its own speciation along the temperatures under study. The weak influence of O<sub>2</sub> (g) on the oxidation of elemental mercury, the importance of the coal chlorine content as well as the inhibiting effect of H<sub>2</sub>O (g) in the conversion of Hg<sup>0</sup> (g) to HgCl<sub>2</sub> (g) have been found to be the major flue gas influencing factors.

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