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Abstracts

Nozzles under Power Plant Conditions

Piti Srisukvatananan, Derek H. Lister, Robert Svoboda, and Karol Daucik

Representative sampling of water and steam cycles in power plants is crucial since its impact on operating decisions can be significant. Although industry guidelines for sampling are available, it is recognized that errors may still occur, so efforts to improve sample system design continue in attempts to achieve optimum techniques. This paper investigates the concepts of isokinetic sampling applied to sampling nozzles operating under power plant conditions using CFD (computational fluid dynamics) software. Two different designs of sampling nozzle are assessed for their effectiveness in capturing particles at the nozzle tip – deposition and release along the sample line are neglected. It is shown that the lower the sampling velocity, the higher the apparent concentration, and the effect of sampling velocity is more pronounced in the condition where the Stokes number is greater. The nozzle acts as an obstacle that disturbs the flow field and does not allow true isokinetic conditions to be established. The suggested design nozzle, "the inclined nozzle", is less sensitive to sampling velocity than the commercial nozzle.

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PPChem 101 – Boiler and HRSG Tube Failures
Lesson 2: Corrosion Fatigue

R. Barry Dooley and Albert Bursik

University 101 courses are typically designed to help incoming first-year undergraduate students to adjust to the university, develop a better understanding of the college environment, and acquire essential academic success skills. Why are we offering a special *Boiler and HRSG Tube Failures PPChem 101*? The answer is simple, yet very conclusive:

- There is a lack of knowledge on the identification of tube failure mechanisms and for the implementation of adequate counteractions in many power plants, particularly at industrial power and steam generators.
- There is a lack of knowledge to prevent repeat tube failures.

The vast majority of BTF/HTF have been, and continue to be, repeat failures. It is hoped that the information about the failure mechanisms of BTF supplied in this course will help to put plant engineers and chemists on the right track. The major goal of this course is the avoidance of repeat BTF. This second lesson is focused on corrosion fatigue boiler and HRSG failures.

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Air-Cooled Condensers – Chemistry Implications at Kogan Creek Power Station

Ian Richardson

Corrosion within air-cooled condensers (ACC) is a well-documented phenomenon, however the problems caused by this corrosion and the solutions to these problems can vary from plant to plant. Kogan Creek Power Plant is a supercritical 750 MW coal-fired power plant in Australia that has previously reported severe ACC corrosion and proposed several management strategies. In this follow-up report the implementation and results of these strategies, including increasing the feedwater pH, increasing condensate polisher operating temperature and replacing condensate filters, are discussed. An update on the current situation at Kogan Creek Power Station and future options to further reduce corrosion are also discussed.

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Instrumentation for Monitoring and Control of Cycle Chemistry for the Steam-Water Circuits of Fossil-Fired and Combined-Cycle Power Plants

A guidance document on the instrumentation for monitoring and control of cycle chemistry for the steam-water circuits of fossil-fired and combined-cycle power plants was developed within the IAPWS Power Cycle Chemistry Working Group. This technical guidance document has been authorized by the International Association for the Properties of Water and Steam (IAPWS) at its meeting in Doorwerth, The Netherlands, 6–11 October, 2009, for issue by its Secretariat. The members of the IAPWS are: Britain and Ireland, Canada, the Czech Republic, Denmark, France, Germany, Greece, Japan, Russia, and the United States of America, and the associate members Argentina and Brazil, Italy, and Switzerland.

In order to achieve suitable chemical conditions in steam-water circuits it is essential to establish reliable monitoring of key parameters on every plant. This enables the demonstration of operation within cycle chemistry targets, and alerts the operators to the need to take corrective action when the target conditions are compromised. This technical guidance document considers conventional fossil and combined-cycle/HRSG plants and identifies the key instrumentation and monitoring techniques required for each plant type and cycle chemistry treatment. It is emphasized that this is an IAPWS guidance document and that, depending on local requirements, the use of simpler instrumentation may be adequate, whereas more complex techniques and instrumentation may be necessary when specific issues arise.

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Organic Plant Cycle Treatment Chemicals – A PowerPlant Chemistry Interview

The editor interviews Pierre Bezzoli and Karsten Cramer

In the last twelven months, nine papers have been published in this journal dealing either exclusively or largely with the behavior of organics in the fossil plant cycle. Surprisingly, the major focus of these papers is not on natural organics, extractables, or leachables from ion exchange resins; organic plant cycle treatment chemicals are the main theme. As you might expect, these papers are not able to address all aspects of this very complex topic. The fact that such papers are written, read, and discussed substantiates the need for more information relating to this subject. For this reason, PowerPlant Chemistry has decided to contact major suppliers of organic plant cycle treatment chemicals and ask them the questions that we have received from our readers. This time, our interviewees are Pierre Bezzoli and Karsten Cramer, jointly representing the producer of FINEAMIN.

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Eskom's New Generation Coal-Fired Power Stations: Reliability Starts at the Water Plant
Kenneth J. Galt, Manas M. Masenya, Frikkie Fourie, and Sheila Ecksteen

As Eskom embarks on a new build programme to secure adequate power supplies for South Africa through to 2025 and beyond, its chemists and chemical engineers responsible for the provision of water treatment plant face a new set of challenges – deteriorating raw water qualities in a water-stressed country – whilst at the same time needing to ensure the highest quality demineralised water for power plant use and to adhere to Eskom's zero liquid effluent discharge policy. Selection of the right water treatment processes is critical to success and the reliability of the entire power plant. This paper describes the process selection for the first of these new plants, Medupi Power Station.

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