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ABSTRACTS

The Design of Sampling Devices for the Water/Steam Cycle

Karol Daucik

Today, the importance of representative sampling from the water/steam cycle is widely recognized. However, there is still disagreement on the question of how to get a representative sample, particularly when the sample contains two phases. Sampling of corrosion products in particulate form often involves the risk of systematic error. Parameters affecting the representative sampling of particulates in steam are discussed in this paper. The application of these considerations to the appropriate design of sampling devices is the main objective of the study. Necessary compromises and some remaining questions are pointed out in the conclusion.

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DOE/NETL's Mercury Control Technology R&D Program – Taking Technology from Concept to Commercial Reality

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The U.S. Department of Energy, National Energy Technology Laboratory (DOE/NETL) has worked with industry, research organizations, and academia to develop advanced mercury control technology for coal-based power systems. Over the past seven years, this research has focused on the full-scale and slip-stream field testing of activated carbon injection (ACI) and flue gas desulfurization enhancements at nearly 50 U.S. coal-fired power plants. The goal of the field testing was to demonstrate high levels (50 % to 90 %) of mercury capture over an extended period of operation, while also reducing the cost of mercury removal. The field testing program has successfully met this goal. Due in large part to this success, coal-fired power plant operators have initiated commercial deployment of mercury control technology. As of April 2008, nearly 90 full-scale ACI systems have been ordered by U.S. coal-fired power generators, accounting for over 44 GW of coal-fired electric generating capacity. This paper will provide an update on DOE/NETL's mercury control technology research and development program, including an assessment of the cost of capture.

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The Use of Separate Bed Condensate Polishing on Fossil Power Stations

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The use of condensate polishing on fossil power stations is recommended by EPRI. The majority of stations that have followed this advice have adopted polishing systems based on the use of deep beds of ion exchange resin. Mixed bed polishers have been shown over the last 50 years to be very effective and capable, in the proper hands, of yielding polished water containing less than 0.1 $\mu g \cdot kg^{-1}$ of the common ionic impurities. This is admirable and mixed beds are always used when condensate of the highest possible quality is required. Fossil power stations do not require such a high quality as they have been shown to operate satisfactorily with impurity levels of about 1 $\mu g \cdot kg^{-1}$ with EPRI "First Action Limits" being set at 3 $\mu g \cdot kg^{-1}$. Mixed bed polishers are widely and successfully used on fossil stations but some, particularly those with low manning levels, find that they are very demanding. Interest is now being shown in alternative, less demanding techniques that promise to yield a polished condensate of suitable quality for fossil power stations although not capable of meeting the requirements of nuclear power stations.

Deionization of water by the use of separate beds of cation and anion exchange resins predates the use of mixed beds. The very early condensate polishing plants, however, adopted mixed beds and their use has continued to the present time. It is of interest that as early as the 1960s separate bed polishers were employed in a few European countries. The designs used were based on conventional deep-bed service vessels and in-situ regeneration was favored, often together with counter-current regeneration. It is reported that perfectly acceptable polished water qualities are obtained and that improved designs of in-situ regenerated separate bed polishers have recently been installed on ultra-supercritical units in Denmark.

In the early 1980s an innovative separate bed system was devised in the UK in which layers of cation–anion–cation resin were contained in one service vessel, thus saving cost and space. This proprietary design of layered separate beds found favor in Australia, where its additional advantage of simplifying operation in the economical ammonium form was clearly shown. This paper reviews these developments and the various trials of separate bed polishing systems that have taken place. It considers the regeneration procedures for resins from such plants and particularly the problem of ensuring resins are thoroughly cleansed of any traces of the regenerants used. Also considered are the results and experience derived from separate bed polishers currently in use on power plants, differences in anion resin fouling in mixed bed condensate polishers versus separate bed and cation/mixed bed polishers, and the possibility of further improvements to the technique.

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The 29th 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 June this year, the 29th Annual University of Illinois Electric Utility Chemistry Workshop took place in Champaign, IL, U.S.A. The content of the workshop and abstracts of the papers presented at this event are compiled in this paper.

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A HRSG Supplier's Water Chemistry Program Recommendations

Joseph E. Schroeder

Various international standards as well as EPRI recommend starting with good feedwater. Nooter Eriksen has adopted the EPRI philosophy for their heat recovery steam generator (HRSG) water chemistry program recommendations. The EPRI guidelines provide a simple means for treating and monitoring HRSG water chemistry. All-volatile treatment and phosphate treatment programs are discussed. Some differences from the EPRI guidelines are suggested depending upon the HRSG configuration.

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