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Abstracts

Bruce A. Larkin and Frances M. Cutler
Off-Site Regeneration of Condensate Polishing Resins

In the past, the traditional U.S. utility preferred owning and operating all equipment that was an integral part of generating unit operation. The same was true for equipment that was peripheral, but essential, to unit operation (such as the condensate polisher regeneration system). In the current market, outsourcing of services is being considered more frequently. Examination of the feasibility, goals, benefits, drawbacks, plant design, and operating guidelines for use of off-site regeneration suggests that off-site regeneration of condensate polisher resin is a viable alternative, both technically and economically.

David C. Shallcross and Phil Renouf
Modeling Radial Flow Ion Exchange Performance for Condensate Polisher Conditions

A theoretical model is developed which simulates ion exchange performance within an annular resin bed. Flow within the mixed ion exchange bed is diverging, with the solution flowing outwards away from the bed's axis. The model is used to simulate performance of a mixed annular bed operating under condensate polisher conditions. The simulation predictions are used to develop design envelope curves for practical radial flow beds and to estimate potential cost savings flowing from less expensive polisher vessels.

Irma Dedekind, Denis Aspden, Ken J. Galt, and Dave Dalgetty
Oxygenated Feedwater Treatment at the World's Largest Fossil Fired Power Plant – Beware of Pitfalls –

Kendal, a drum boiler station, was commissioned using hydrazine as a reducing agent. Failures on various parts of the feedwater system and distillate drains were ascribed to flow-accelerated corrosion. The decision was taken to convert to oxygenated treatment after terminating hydrazine dosing.

Although significant improvements were obtained (reduction in iron transport, cleaner boiler mud-drums and more complete passivation of the boiler feed pump balancing lines), the distillate drains did not benefit by the levels of oxygen introduced, and the feedwater tank did not passivate as extensively as expected. Other operational problems also detracted from the success of conversion.

The oxygen level was increased. The first inspection after the change indicates improvement. However, complete system passivation has not yet been achieved, especially in the heater distillate area.

Des McInnes, Javier Cabrera, and David Ryan
Tarong Energy's Experience with Unit Cycle Copper Transport and Deposition

As a result of numerous failures caused by flow-accelerated corrosion, the four 350 MW drum units at Tarong have been converted from low oxygen all-volatile treatment to oxygen treatment. This necessitated retubing the low pressure heaters with 304 stainless steel. On conversion to oxygen treatment all units suffered varying degrees of HP turbine capacity and efficiency losses.

This paper describes Tarong Energy's activities leading to full implementation of oxygen treatment on the four units. Efforts to minimize loss of HP turbine capacity and efficiency due to copper deposition were not successful. Observation and monitoring has provided some useful data on copper deposition and remobilization from within the boiler water and steam systems. This paper summarizes the copper transport data and the impact on turbine performance.

Peter A. Zhdan and James E. Castle
Copper Pick-up from Admiralty Brass in Ultra Pure Water

This work has been undertaken in the context of the entry of copper compounds in soluble form into the steam/water cycle of a power plant. Measurements of the pick-up of copper from admiralty brass at temperatures up to 95 °C were made using coupons exposed to ultra pure water at various controlled oxidation-reduction potentials (ORP). The ORP is a measure of the quantity of dissolved oxygen and/or reducing agent and is a measurement by which it is possible to characterize the circulating water in the plant cycle.

This work has shown that copper pick-up increases in correlation with ORP over the range: -350 mV (reducing) to +100 mV (oxidizing). The oxidizing potentials at which copper pick-up is a problem are recognizable by the appearance of Cu(II), a cupric phase, on the surface. Copper pick-up is not greatly influenced by the prior history of the surface but is very responsive to the current ORP value.

The ORP determines the rank order of the release rate (-350 mV, low, to +100 mV, high) but the absolute magnitude increases strongly with pH value and possibly with NH_3 concentration.

Miroslav Šťastný
Effect of Copper Deposition on the Steam Turbine Efficiency and Capacity

Attention is paid to the change in blade shapes due to copper deposition, and an estimate of the effect of these changes on the efficiency of the HP turbine and on the turbine capacity is performed. The method for calculating the losses that are connected with the deposit roughness is analyzed and a calculation of the efficiency reduction in individual blade cascades and turbine stages due to the roughness is performed. A way of estimating the change in steam turbine capacity due to the copper deposits on the HP turbine blades is suggested.

Albert Bursik
PowerPlant Chemistry's Survey on Layup Practices in Fossil-Fired Power Plants

The editorial staff received survey forms from 147 units in all. Almost all of them were completely filled in, while some of them (a small minority) were incomplete. Some of the utilities sent summaries covering all utility units. This survey revealed marked deficiencies, particularly in the long-term layup of both the cycles with drum and those with once-through boilers. Many operators reported that they do not use any layup method at all.

Considering the costs of both outages due to failures of major cycle components whose primary cause is corrosion during unit idle periods and of startup holds due to high level of corrosion products in the feedwater, the improvement of unit layup procedures seems to be more than justified.

International Conference on "Boiler Tube Failures, HRSG Tube Failures, and Inspections" – Abstracts

The International Conference "Boiler Tube Failures, HRSG Tube Failures, and Inspections" organized by EPRI (Electric Power Research Institute, 3412 Hillview Avenue, Palo Alto, California, USA), took place in Phoenix, Arizona, on November 6–8, 2001.

This conference was focused exclusively on a very important topic – boiler tube failures in fossil power generation – and, for this reason, was very interesting for all those active in power plant chemistry. Unfortunately, not every interested person is able to attend international conferences. For this reason, PowerPlant Chemistry is presenting in this issue the abstracts of all the papers presented at the conference.

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David C. Shallcross and Phil Renouf: Modeling Radial Flow Ion Exchange Performance for Condensate Polisher Conditions	☐
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