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## Abstracts

### Seventh International Conference on Cycle Chemistry in Fossil Plants
### June 3–5, 2003
### Houston, TX, U.S.A.

This contribution contains the abstracts of all papers presented at this important conference. The conference was organized by the Electric Power Research Institute (EPRI), Palo Alto, CA. 151 attendees from twenty countries participated in this conference.

### Phillip Smurthwaite
### Optimizing Condenser Ball-Cleaning Performance by $\mu g \cdot kg^{-1}$ Transition-Metal Analysis

The ball cleaning of condensers has proved to be an effective method of maintaining the heat transfer characteristics of tube surfaces by minimizing deposition and removing scale. In the case of cupro-nickel tubes, ferrous sulphate dosing is then required to protect the tubes against seawater corrosion following ball cleaning. There is therefore a balance to be struck between condenser protection and heat transfer efficiency.

By monitoring the pick-up of dissolved copper in the cooling water across the condenser and maintaining levels between 0 and 10 $\mu g \cdot kg^{-1}$, condenser performance may be optimized. It can be shown that chelation ion chromatography of cooling water samples taken at the inlet and outlet of cupro-nickel condensers can accurately determine the concentrations of copper necessary to ensure optimization.

Of the three condensers controlled using $\mu g \cdot kg^{-1}$ transition metal analysis, all surpassed three years base load operation without on-load failures and net efficiencies rose by 0.9 % following introduction of ball cleaning and monitoring.

### Nicolas Dobrowitch
### The Use Of Titanium for Condenser Tube Bundles

In a power plant, the condenser is a strategic heat exchanger with regards to the efficiency of the steam turbine and its reliability guarantees the performance and continuous operation of the plant.

Until the early 1980s, copper alloys were routinely used in condenser tubes, thanks to their high heat transfer rates. Yet, numerous problems arose from the use of this material, such as stress corrosion cracking, ammoniacal corrosion, fouling, erosion, dezincification, abrasion, erosion-corrosion, etc. and lately the problem of the inadequacy of copper with nuclear steam generators.

The trend was then to consider new tube materials, such as stainless steel and titanium, at first for particular operating conditions and now for most of the projects, with several objectives, such as:

– improving reliability (titanium in particular can bring major improvements including higher water velocities promoting better heat transfer coefficients, and excellent resistance to abrasion, erosion and corrosion thereby improving resistance to fouling);
– finding more cost-effective solutions. The first investment is higher but money is saved on maintenance costs and on time reliability of the material.

**Søren Birk Rasmussen, Stefan U. Hagen, Stephen G. Masters, Anke Hagen, Kenny Ståhl, K. Michael Eriksen, Peter Simonsen, Jørgen Nørklit Jensen, Mogens Berg, Rasmus Fehrmann, Ib Chorkendorff**
**Catalytic and Chemical Properties of Boiler Deposits from Orimulsion™ Fuel**

Bulk and surface analyses have been conducted for selected deposit samples from an Orimulsion™ fired boiler unit at the Asnaes power plant in Kalundborg, Denmark. Analyses of the composition show that the deposits on the boiler tubes contain significant quantities of vanadium, calcium, nickel and sulfur. Furthermore the $SO_2$ oxidation activity of the collected samples has been measured as a function of oxygen and $SO_2$ content in the flue gas and of the gas temperature. The results show a significant $SO_2$ oxidation capability in the temperature range 530–670 °C. The catalytic oxidation reaction on the deposits is found to be a gas-solid, heterogeneously catalyzed reaction. The catalytically active species have been determined as surface oxo vanadium compounds with vanadium in a formal oxidation state between +IV and +V.

**Albert Bursik, Pierre Bezzoli, and Anton Graf**
**Cycle Chemistry in Cycles with Drum Boilers: Is There a Niche for the Use of Alternative Organic Chemicals in the Continuum of Treatments?**

Organic cycle additives, particularly amines, have been used for many years in both industrial steam and power generation. The extent of the application of amine treatments in classic fossil utility power plants is steadily increasing. The use of amines is reported even from relatively new combined cycles, too. So far, none of the acknowledged plant cycle chemistry guidelines have included or discussed this type of cycle treatment. This means that neither the current nor the potential users have adequate guidance on hand. For this reason, in addition to good and approved organic cycle additives, some inadequate products are still on the market.

This paper discusses the behavior of organics in the plant cycle in general and focuses on the possible application of amines for the cycle treatment. The pros and cons of their application are considered. The possibility of including the amine treatment in the continuum of treatment is discussed.

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