

Abstracts**International Conference on "The Interaction of Organics and Organic Cycle Treatment Chemicals with Water, Steam, and Materials" – Conference Discussion Groups and Summary**

R. Barry Dooley and Albert Bursik

At the beginning of the conference, Dooley and Bursik had presented five key topics in the world of organics in power generation cycle chemistry for which they thought knowledge was deficient. Following the working group summaries, the conference chairmen came back to the same points and provided the following summary.

The conference provided a great cross-section of the science, applications and results in all aspects of organics in the energy cycle chemistry cycle. The science appears to be improving. The number of applications is also increasing. But quantitative assessments remain weak and thus raise more questions than they provide answers. Particularly, answers will be needed in the first five areas before any quantitative guidelines can be derived:

- Effect on cycle materials
- Properties of organics in the cycle
- Organics as treatment chemicals
- Shutdown/layup protection
- Role of organics in efficiency/performance improvement
- Economics

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Organics: A Retrospective Look at Fossil Plant Cycle Chemistry and the Possible Requirements for the Future

Albert Bursik and R. Barry Dooley

The current suite of EPRI fossil plant cycle chemistry guidelines for all-volatile treatment (AVT), oxygenated treatment (OT), phosphate continuum (PC), and caustic treatment (CT) have established themselves as the treatments of choice around the world. These guidelines contain little information on the presence of organics in the cycle nor do they advocate the use of organic additives during either operation or shutdown. This paper, and indeed the conference *Interaction of Organics and Organic Cycle Treatment Chemicals with Water, Steam, and Materials*, has been assembled to review the status of all aspects of organics in a fossil plant cycle. The two main thrusts are to thoroughly review the science and application and to recognize the main areas of deficiency in that knowledge so that a structured research program can be developed. Interest is focused not only on the adventitious ingress of organics through the makeup and cooling water systems, but also on the purposeful addition of organics to the cycle as treatment chemicals or preservatives.

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Status of Application of Amines in US PWRs

Peter J. Millett and Keith Fruzzetti

Prior to 1990, the majority of US units with pressurized water reactors (PWRs) were using ammonia as the primary pH control agent in secondary systems. Morpholine was used in one plant that did not employ condensate polishers. With the introduction of ethanolamine and other advanced amines in 1992, US PWRs could now get the benefit of improved pH control and still operate condensate polishers in the H-OH form. In this paper, the current practice with amines in US PWRs is reviewed with consideration for the optimization of pH control in secondary systems.

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Corrosion Behavior of Magnetite Grown from Amine-Carboxylate and Amine Aqueous Solutions

Kazuo Marugame, Li-Bin Niu, and Hiroshi Takaku

A unique boiler water treatment using amine-carboxylate and amine for the application in the temperature range of 150–364 °C and at pressures from 0.5–20 MPa has been developed. The size of the magnetite formed by this method is very fine 0.3–1.5 μm , while that of magnetite formed by the conventional boiler feedwater treatment is 20–40 μm . Laboratory test results have shown that the specimens treated with this magnetite have good corrosion resistance in both severe acidic and caustic environments, while those formed by the conventional boiler feedwater treatment experience severe general and pitting corrosion. Results from an actual power plant test show the same corrosion behavior as in the laboratory tests. The formation of this fine and tight magnetite on the boiler tube inner surface is very effective for corrosion suppression.

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Field Investigation of Various Weld Overlays in a Waste Incineration Plant

Melanie Montgomery and Ole Hede Larsen

A test waterwall was fabricated so that alternatives to alloy 625 could be exposed in the first pass of the waste incineration plant Haderslev. The difference between application method was also a parameter, such that manual welding, machine welding and arc spray coating of alloy 625 were compared. In addition to the test waterwall exposure, the chemical environment from the waste incineration was also monitored by analyzing deposits and corrosion products from various locations in the boiler. These were analyzed with respect to morphology and composition using electron microscopy with energy dispersive spectrometry. Based on these results it was detected that the aggressive environment had changed during the exposure period, which made direct comparison difficult between alloys that had been exposed the first year and those exposed for the second year. However, all candidate alloys could be compared with alloy 625, which was present in every test panel. It was observed that all the weld overlay test sections behaved similarly to machined alloy 625 in that there was general corrosion and pitting corrosion. In addition, alloy 622 also exhibited preferential corrosion with respect to its dendrite structure.

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Environmentally Assisted Cracking of Commercial Ni-Cr-Mo Alloys – A Review

Raúl B. Rebak

Nickel-Chromium-Molybdenum alloys (Ni-Cr-Mo) are highly resistant to general corrosion, localized corrosion and environmentally assisted cracking (EAC). Chromium acts as a beneficial element under oxidizing acidic conditions and molybdenum under reducing conditions. All three elements (Ni, Cr and Mo) act synergistically to provide resistance to EAC in environments such as hot concentrated chloride solutions. Ni-Cr-Mo alloys may suffer EAC in environments such as hot caustic solutions, hot wet hydrofluoric acid solutions and in supercritical water oxidation applications. Not all the Ni-Cr-Mo alloys have the same susceptibility to cracking in the mentioned environments. Most of the available data regarding EAC is for the oldest Ni-Cr-Mo alloys such as N10276 and N06625.

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