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Abstracts

The Behavior of Organics in a Makeup Water Plant

Rob Heijboer, Marga H. van Deelen-Bremer, Leo M. Butter, and André G. L. Zeijseink

It is well known that organic compounds are decomposed in the water/steam cycle and affect the cation conductivity of the steam. KEMA and others have demonstrated that acid decomposition products like acetate and formate are enriched in the early condensate. KEMA has found strong indications that these organics played a role in a low pressure turbine blade failure. As a measure to prevent future damage, the Dutch power industry asked KEMA to carry out research to assess the behavior of organics in makeup water plants based on ion exchange resins. A survey has been conducted of the raw water sources used by the Dutch power industry. It appears that not only the concentration of the organics (total organic carbon, TOC) is different but also the composition. Because most of the TOC could be classified as natural organic material (NOM) the seasonal influence on the TOC composition has also been addressed.

The performance of a demineralization plant is influenced by the quality of the raw water, the composition of the TOC playing a very important role. The research revealed a seasonal influence on the TOC concentration and composition in the makeup water after mixed bed. With the results it is now much easier to predict the possibility of operational disturbances and/or decreased makeup water quality and to implement the technical alternatives to prevent these.

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The Results of Chemical Cleaning by Organic Chemicals of Boiler Tubes of a Plant Operated on OT

Masato Matsubara, Satoshi Itaba, and Masamichi Miyajima

In December 2003, Unit 1 of the Chita Second Thermal Power Plant underwent chemical cleaning; the first time our company has chemically cleaned a plant operated on oxygenated treatment (OT). The cleaning resulted in the complete removal of scale using the procedure typically applied in units operated on all-volatile treatment (AVT), and there was no corrosion caused by excessive cleaning. However, we discovered that the acid cleaning process requires more time than in plants operated on AVT, and consequently this must be reflected in future chemical cleaning processes of units operated on OT.

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Aspects of the Distribution of Volatile Amines in LP Turbines

Hans-Günter Seipp, Frank-Udo Leidich, and Christoph Liehr

Minor amounts of acids have frequently been identified in various areas of LP turbines that are exposed to initial condensation processes. To avoid the general use of highly corrosion-resistant materials in such areas, an optimal precautionary measure is to provide for sufficient alkalization of the initial condensates. The effectiveness of the alkalization in preventing corrosive attack by contaminants is dependent on a number of factors. Several related problems are discussed.

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TOC: The Contaminant Seldom Looked for in Feedwater Makeup and Other Sources of Organic Contamination in the Power Plant

Eric V. Maughan and Ulrich Staudt

All life, their wastes and decomposition products fall into the category of natural occurring organic matter (NOM). Furthermore man also contributes to the overall load with synthetic organic compounds such as plastics, organic solvents, pesticides, organic coatings and polymers, which do not occur in nature.

Although at face value the majority of organic compounds appear to be insoluble due to their non-polar nature and therefore are considered to be immiscible in water. Nevertheless water as the universal solvent will retain certain fractions, whether as trace soluble compounds or due to electrostatic forces, e.g., van der Waals.

NOM and man-made organics are difficult to detect by conventional means e.g. by conductivity, or pH measurements and specialised equipment is required. Once identified as a contaminant, steps must be taken for effective removal before entering the power plant cycle. However subsequent contamination within the plant cycle should not be overlooked.

This presentation explores:

- The nature of organic matter found in water supplies
- The identification that contamination by organic matter is taking place in the pre-treatment plant as well as power plant cycle
- Measurement of organic matter i.e. different methods
- Removal of organic matter in makeup supply to the power plant cycle
- Effects of organic matter on the plant cycle chemistry
- Effective measures to attempt to counteract any detrimental effects
- Case studies
- Organic contaminants which might be introduced into the plant cycle

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Concentrations of Total Organic Carbon and Trihalomethanes in Feedwater of a Nuclear Power Plant

Guy W. Hutchinson, Keith Garbett, and Nigel J. Drew

A UK Magnox coastal power station was found to experience organic fouling of the condensate polishing plant resins, leading to impaired anion resin kinetics. After 25 years of operation it also began to experience some on-load corrosion boiler tube leaks from a source of halide. Dry primary coolant of carbon dioxide has to be maintained, and each boiler tube leak requires that power must be reduced to plug the leaking tube. Sources of the organic materials were investigated and trihalomethanes (THMs) were identified in the station 'Town's Main' water supply. Seasonal variations and the change in concentration through the make-up water treatment plant and in the steam/water circuit were investigated. Approximately 4 % of the total organic carbon (TOC) and 80 % of the THMs passed through the water treatment plant (WTP) with some of the remaining THMs breaking down in the once-through boiler, in this case releasing halide into the boiler. This required palliative measures for boiler alkalisation and an upgrade to the WTP.

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Down Under – The ESAA's Conference "Power Station Chemistry 2006"

Robert Svoboda

This paper reports about the last Power Station Chemistry Conference organized bi-annually by the Energy Supply Association of Australia. This year, thirty technical papers were presented to 121 participants from 9 countries. In addition, two interesting training courses were offered to the conference participants. The topics of the conference, especially the advanced considerations on water resource management, are of worldwide relevance.

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