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Abstracts

Flow Restrictions in Water-Cooled Generator Stator Coils – Prevention, Diagnosis and Removal

Robert Svoboda, Christoph Liehr, and Hans-Günter Seipp
Part 3: Removal of Flow Restrictions in Water-Cooled Generator Stator Coils

The removal of flow restrictions in generator stator bars can be achieved either by mechanical or by chemical cleaning, or by a combination of both. Experience has shown that mechanical cleaning on its own is not thorough, and chemical cleaning is not capable of removing very severe plugging, as found in completely plugged conductors. The choice of method or combination of methods thus will depend on the specific case, as well as on its impact on generator availability. Mechanical cleaning can be done by backflushing or by localized manual cleaning. The latter is very effective but possible only within a limited range of accessibility. Chemical cleaning can be done by acids or by complexants. It is important that chemical cleaning be done in at least some stages under oxidizing conditions. A post-cleaning surface treatment may be required under certain circumstances. Managing flow restrictions at an early stage is recommended in order to reduce the risk of severe plugging of conductors that may be very difficult to remove later on.

Daniel Zinemanas
A Simple Model for Studying the Effect of Condenser Cooling Water Leakage on Cycle Water Chemistry

In this paper, a dynamic simulation of the main cycle chemical variables in a generation unit under condenser leakage conditions is performed by means of a simple numerical model of the main water/steam cycle. The results of this simulation are compared to the values measured online in an operating unit under similar conditions, and a close correspondence between them is found. This close agreement between the model predictions and the real data indicates that the model, although simple, is robust enough to provide good insight into and understanding of the water/steam cycle behavior under the conditions studied. However, in spite of the good predictions achieved, further improvement and validation of the model are desirable and will follow in future work.

Barry Dooley and Kevin Shields
Cycle Chemistry for Conventional Fossil Plants and Combined Cycle/HRSGs

To become or to remain World Class in cycle chemistry, an organization must be continually assessing its total treatment philosophy. Not least here is that the guidelines to which it operates its units must be on the cutting edge of science and technology. In this regard, EPRI's research over the last 10 years into steam, the phase transition zone, partitioning/volatility, copper corrosion and transport, and boiler water corrosion/deposition has provided the ability to make the previous guidelines and understanding obsolescent.

Over the last two years, most of the suite of EPRI treatment guidelines have been revised. In addition to all-volatile treatment (AVT) and caustic treatment (CT), the new phosphate continuum (PC) has been introduced. This supplements the recently introduced concepts of oxidizing AVT (AVT(O)) and reducing AVT (AVT(R)). More importantly, these guidelines now contain a new methodology, which decouples the derivation of the boiler water guidelines from the steam guidelines, and provides unique limits to protect the boiler and turbine individually. The discussion in the paper focuses on the application of these guidelines to conventional and combined cycle plants, illustrating how they have been designed to address the major chemically influenced problems in both types of plant.

Syuichi Gotou, Yuichi Abe, Takashi Morimoto, Kenji Mawatari, and Senichi Tsubakizaki
Experience of Phosphate Treatment by Disodium Phosphate Application in Sakata Kyodo Power Station

Most commercial drum boiler units with an operation pressure higher than 10 MPa in Japan generally use sodium phosphate at a Na-to-PO_4 molar ratio of 2.5–2.8, although there are some cases of industrial boiler units that must be controlled at Na-to-PO_4 molar ratios of 3.0 or greater because of the occurrence of the sodium phosphate hideout phenomenon, or in order to deal with the lowering of pH by organic components in the makeup water (these are decomposed within the boiler and generate organic acids). This paper reports on the experiences at Unit 1 of the Sakata Kyodo Thermal Power Station under conditions of application of disodium phosphate in the phosphate treatment.

Degassed Conductivity – Comments on an Interesting and Reasonable Plant Cycle Chemistry Monitoring Technique

Miroslaw Gruszkiewicz and Albert Bursik
Part 1: Degassing of Low-Molecular-Weight Organic Acids in Technical Degassed Cation Conductivity Monitors

Degassed cation conductivity monitoring is not as common as specific and cation conductivity monitoring even though this technique offers some very interesting features. This technique can help to distinguish between plant cycle contamination with inorganic and/or organic acids and/or their salts and that caused by carbon dioxide. This may be important, e.g., during startup of a unit. Two issues are often discussed in connection with degassed conductivity monitoring: the behavior of formic and acetic acid during degassing and the correct conversion of values measured at nearly 100 °C to standard temperature (25 °C). This first part of a two-part publication focuses on the first issue. A rigorous thermodynamic approach was chosen for the evaluation of conditions in the degassing part of the monitoring system. The results of calculations clearly show that the actual loss of formic and acetic acid in a technical atmospheric degassing system via system vents is so low that it can be disregarded. In contrast, the concentration of formic and acetic acid in the sample exiting the technical atmospheric degassing system is somewhat higher than that in the original sample. The actual increase in concentration is based on the volatility behavior of both acids and depends additionally on the evaporation rate of the system.

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