3469. Conference on Interaction of Non-Iron-Based Materials with Water and Steam

Continued protection of non-iron-based materials is vital to the reliable operation of power-generating and other energy-related equipment. This conference was dedicated to the fundamental aspects of oxidation, corrosion, dissolution, and transport of non-iron-based materials and their oxides in high-purity and contaminated water and steam.

The conference included sessions on the following themes:

- Copper-based alloys in condensate and feedwater
- Volatility and transport of copper and its oxides
- Electrochemistry and monitoring of copper alloys in high-purity feedwater systems
- Chemical cleaning
- Titanium in power plants
- Materials in light water reactor (LWR) nuclear plants
- Generator water cooling systems

Some of the key points follow:

- Cycle chemistry in fossil cycles with copper or copper alloys is a compromise, which means that the optimum can never be achieved for both iron-based or copper-based materials. Despite conference papers on the use of oxidizing feedwater chemistries, the consensus was that reducing conditions in cycles with copper alloys remains the only reasonable alternative.

- Titanium and stainless steel are a reasonable alternative for condenser and feedwater heater tubing. Elimination of all copper or copper alloys in a fossil plant cycle makes the application of oxygenated treatment possible.

- The papers confirmed the incomplete understanding of the actual copper corrosion process, copper oxide transport around the cycle, and particularly deposition of copper oxides onto high-pressure turbine surfaces.

- The deposition in, and the cleaning of, water-cooled generator windings is a very important issue for utilities operating large generators. Conference papers document the necessity of further investigations that should result in optimum generator cooling system chemistry.

- Non-iron-based materials are applied in nuclear power plants on a large scale. Conference presentations covered the state of the art for interactions of pressurized water reactor (PWR) steam generator tubing materials (Alloys 600, 690, and 800) and of fuel cladding tubing materials (zirconium alloys) with the operational environment. Further investigations in this area are clearly needed and are important for the availability and the reliability of nuclear plant cycles.

- A compilation of all plant cycle-related thermodynamic and physical chemistry data into one volume is urgently needed.

For more information see: EPRI TR-108236, Proceedings, July 1997, 624 pages.

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