

N198. New PWR Guidelines Target Intergranular Attack and Stress Corrosion Cracking in Steam Generators

New chemistry guidelines for PWRs represent the first step along a new path for plant chemistry, aimed at proactive management of steam generator (SG) degradation.

Despite the quality performance in chemistry programs, there has nevertheless been a rapid growth in intergranular attack and stress corrosion cracking (IGA/SCC) at tube-to-tube support intersections in recirculating steam generators.

Recent research has been focused on understanding the causes and growth patterns of IGA/SCC. As the total concentrations of impurities has decreased, the ability of a small imbalance of, for example, sodium, to affect crevice pH increases. This is believed to be one of the reasons for the increasing incidence of IGA/SCC. There has also been a continuing improvement in eddy current inspection techniques, providing more sensitive detection of this type of failure. Furthermore, the increased operating temperatures in newer plants can result in shorter times to failure and increased sensitivity to the crevice environment.

Laboratory studies and field experience suggest that the resistance of IGA/SCC depends on the tubing material and the tube support design. Several other factors influence susceptibility to IGA/SCC, most notably the balance-of-plant design. For example, the presence of copper increases susceptibility by raising the electro-chemical corrosion potential of the crevice. There have been some isolated instances of IGA/SCC in once-through steam generators, but the most significant concern is IGA/SCC occurring at tube-to-tube support locations in recirculating steam generators.

The growth in steam generator tube degradation and a desire to improve secondary water chemistry programs have prompted a revision to the guidelines, scheduled for publication in 1993. The main technical recommendations in the forthcoming EPRI interim report are:

- Increase the minimum hydrazine concentration.
- Reduce permissible feedwater iron and copper limits.
- Use boric acid for plants with IGA/SCC problems.
- Monitor cation/anion ratio.
- Perform hideout/hideout return evaluations.
- Use phosphate chemistry on secondary side.

The interim recommendations provide an initial comprehensive program for immediate implementation to control IGA/SCC.

Taken from, "New PWR Guidelines Target IGA/SCC in SGs," by Christopher J. Wood, Nuclear Engineering International, October 1992, p. 40.