

3479. Steam Generator Tube Fatigue Evaluation

The steam generator tube fatigue analysis and predictive methodology described in this document will provide estimates of fatigue usage factors and remaining life needed for defining preventative maintenance, in-service inspection requirements, and the evaluation of design fixes. Fatigue life of PWR steam generator tube bundles due to flow induced vibrations can now be examined quantitatively using analytical models. This fatigue prediction methodology has certain critical parameters. Those with the most influence are flow induced turbulence and fluid-elastic forces, water chemistry, tube-to-support clearances, and mean stresses produced by tube denting. The fatigue prediction model incorporates these parameters using available experimental and theoretical correlations. The fatigue life methodology has been validated by comparison of predicted results with the field experience in three steam generators.

This methodology provides an effective tool for utility engineers to identify possible trouble spots in a steam generator tube bundle, susceptible to high cycle fatigue damage. The methodology's usefulness can be significantly enhanced by its implementation on a user friendly workstation where most of the complex data transfer and processing are automated and instructions for analysis are provided via pull-down menus. Implementation of the available databases for the tube support clearances and denting measurements into the fatigue evaluation procedures would improve prediction accuracy.

For more information see: EPRI TR-107263, Final Report, December 1996, 125 pages.

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