

Steam Generator Snubber Elimination

Background

Hydraulic snubbers are used in the steam generator (SG) upper support system to accommodate the large thermal movement of the SG during plant heat-up and cool down. SG snubbers also provide restraint to the SG during such dynamic events as postulated pipe rupture and earthquakes. Because of their complexity, hydraulic snubbers are extremely sensitive to abnormalities or changes in the hydraulic fluid. Additionally, snubber service life and operation are directly influenced by the durability of the snubber seal materials.

These factors can significantly affect the performance of the hydraulic snubber and contribute to the continuing need to monitor and periodically test the performance of the snubbers. Testing is costly and can lead to the need for repair or replacement of the snubber.

Description

It is technically and economically feasible to perform the engineering analyses necessary to eliminate all of the SG snubbers in many nuclear units. Westinghouse began offering the current SG snubber elimination program in 1994. Similar to the SG snubber reduction programs of the 1980s and early 1990s, this program implements the accepted analysis load reduction techniques of leak-before-break (LBB) and elimination of arbitrary intermediate stress break (EAIB), and also takes advantage of component reserve margins.

The SG snubber elimination program also includes nonlinear time history seismic, and pipe-break analyses to more accurately predict the addition of loads on the reactor coolant system components. These analyses allow for the elimination of all SG snubbers by reduction of calculated loads on the plant structures.

Benefits

- Eliminates visual inspection and functional testing
- Reduces the risk of outage extension and/or unplanned outages
- Reduces maintenance and refurbishment costs
- Reduces outage activities
- Achieves as-low-as-is-reasonably-achievable (ALARA) status
- Improves plant reliability by reducing congestion and snubber failures
- Increases plant availability

The payback period for implementation of a SG snubber elimination program can be less than two to three refueling outages.

Experience

Westinghouse has developed the complete technology to perform total SG snubber elimination.

- Westinghouse has successfully implemented the SG snubber elimination program for more than 10 units to date.
- The implementation has been done under 10CFR50.59.

