

5.5 Programs and Manuals

5.5.9 Steam Generator (SG) Tube Surveillance Program (continued)

- f) Plugging or Repair Limit means the imperfection depth at or beyond which the tube shall be removed from service by plugging or (for Unit 1 only) repaired by sleeving and is equal to 40% of the wall thickness. The plugging limit for laser welded sleeves is equal to 43% of the nominal wall thickness. The plugging limit for Leak Tight sleeves is equal to 20% of the nominal wall thickness. This definition does not apply to that portion of the Unit 1 tubing that meets the definition of an F* tube. This definition does not apply to tube support plate intersections for which the voltage-based plugging criteria are being applied. Refer to 5.5.9e.1m) for the repair limit applicable to these intersections. All tubes repaired with Leak Limiting sleeves shall be plugged upon detection of degradation in the sleeve and/or pressure boundary portion of the original tube wall in the sleeve/tube assembly (i.e., the sleeve-to-tube joint) regardless of depth. The F* criteria is not applicable to the parent tube located behind the Leak Limiting sleeves installed in the tubesheet transition zone;
- g) Unserviceable describes the condition of a tube if it leaks or contains a defect large enough to affect its structural integrity in the event of an Operating Basis Earthquake, a loss-of-coolant accident, or a steam line or feedwater line break as specified in Specification 5.5.9d.3, above;
- h) Tube Inspection means an inspection of the steam generator tube from the tube end (hot leg side) completely around the U-bend to the top support of the cold leg. For a tube repaired by sleeving (for Unit 1 only) the tube inspection shall include the sleeved portion of the tube;
- i) Preservice Inspection means an inspection of the full length of each tube in each steam generator performed by eddy current techniques prior to service to establish a baseline condition of the tubing. This inspection shall be performed prior to initial POWER OPERATION using the equipment and techniques expected to be used during subsequent inservice inspections;
- j) F* Distance (Unit 1 only) is the distance of the hardroll expanded portion of a tube which provides a sufficient length of non-degraded tube expansion to resist pullout of the tube from the tubesheet. The F* distance is equal to 1.13 inches, plus an allowance for eddy current measurement uncertainty, and is measured down from the top of the tubesheet, or the bottom of the roll transition, whichever is lower in elevation. The F* criteria is not applicable to the parent tube located behind the Leak Limiting sleeves installed in the tubesheet transition zone;
- k) F* Tube (Unit 1 only) is that portion of the tubing in the area of the tubesheet region below the F* distance with a) degradation below the F* distance equal to or greater than 40%, b) which has no indication of degradation within the F* distance, and c) that remains inservice;

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4. Certain intersections as identified in WPT-15949 will be excluded from application of the voltage-based repair criteria as it is determined that these intersections may collapse or deform following a postulated LOCA + SSE event.
5. If an unscheduled mid-cycle inspection is performed, the following mid-cycle repair limits apply instead of the limits identified in 5.5.9e.1.m)1., 5.5.9e.1.m)2., and 5.5.9e.1.m)3. The midcycle repair limits are determined from the following equations:

$$V_{MURL} = \frac{V_{SL}}{1.0 + NDE + Gr \left(\frac{CL - \Delta t}{CL} \right)}$$

$$V_{MLRL} = V_{MURL} - (V_{URL} - V_{LRL}) \left[\frac{CL - \Delta t}{CL} \right]$$

where:

- V_{URL} = upper voltage repair limit
- V_{LRL} = lower voltage repair limit
- V_{MURL} = mid-cycle upper voltage limit based on time into cycle
- V_{MLRL} = mid-cycle lower voltage repair limit based on V_{MLRL} and time into cycle
- Δt = length of time since last scheduled inspection during which V_{URL} and V_{LRL} were implemented
- CL = cycle length (the time between two scheduled steam generator inspections)
- V_{SL} = structural limit voltage
- Gr = average growth per cycle
- NDE = 95-percent cumulative probability allowance for nondestructive examination uncertainty (i.e., a value of 20-percent has been approved by the NRC)

Implementation of these mid-cycle repair limits should follow the same approach as in TS 5.5.9e.1.m)1., 5.5.9e.1.m)2., and 5.5.9e.1.m)3.

- n. Tube Repair (for Unit 1 only) refers to the process that establishes tube serviceability. Acceptable tube repairs will be performed in accordance with the process described in Westinghouse WCAP-13698, Rev. 3 and Westinghouse Letter WPT-16094 dated March 20, 2000, WCAP-15090, Rev. 1, CEN-630-P, Rev. 2 dated June 1997, and WCAP-15918, Rev. 1, dated January, 2004.

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