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

3. The tubes selected as the second and third samples (if required by Table 5.5.9-2) during each inservice inspection may be subjected to a partial tube inspection provided:
  - a) The tubes selected for these samples include the tubes from those areas of the tube sheet array where tubes with imperfections were previously found, and
  - b) The inspections include those portions of the tubes where imperfections were previously found.
4. Implementation of the steam generator tube/tube support plate repair criteria requires a 100% bobbin coil inspection for hot-leg and cold-leg support plate intersections down to the lowest cold-leg tube support plate with known outside diameter stress corrosion cracking (ODSCC) indications. The determination of the lowest cold-leg tube support plate intersection having ODSCC indications shall be based on the performance of at least a 20% random sampling of tubes inspected over their full length.
5. Inspection of dented tube support plate intersections will be performed in accordance with WCAP-15573, Revision 1, to implement axial primary water stress corrosion cracking (PWSCC) depth-based repair criteria. The extent of required inspection is:
  - a) 100 percent bobbin coil inspection of all tube support plate (TSP) intersections.
  - b) Plus Point coil inspection of all bobbin coil indications at dented TSP intersections.
  - c) Plus Point coil inspection of all prior PWSCC indications left in service.
  - d) If bobbin coil is relied upon for detection of axial PWSCC in less than or equal to 2 volt dents, then on a SG basis perform Plus Point coil inspection of all TSP intersections having greater than 2 volt dents up to the highest TSP for which PWSCC has been detected in the prior two inspections or current inspection and 20% of greater than 2 volt dents at the next higher TSP. If a circumferential indication is detected in a dent of "x" volts in the prior two inspections or current inspection, Plus Point inspections will be conducted on 100% of dents greater than "x - 0.3" volts up to the affected TSP elevation in the affected SG, plus 20% of dents greater than "x - 0.3" volts at the next higher TSP. "x" is defined as the lowest dent voltage where a circumferential crack was detected.

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

- e) If bobbin coil is not relied upon for detection of axial PWSCC in less than or equal to 2 volt dents, then on a SG basis perform Plus Point coil inspection of all dented TSP intersections (no lower dent voltage threshold) up to the highest TSP for which PWSCC has been detected in the prior two inspections or current inspection and 20% of all dents at the next higher TSP.
- f) For any 20% dent sample, a minimum of 50 dents at the TSP elevation shall be inspected. If the population of dents is less than 50 at the TSP elevation, then 100% of the dents at the TSP elevation shall be inspected.

The results of each sample inspection shall be classified into one of the following three categories:

<u>Category</u>	<u>Inspection Results</u>
C-1	Less than 5% of the total tubes inspected are degraded tubes and none of the inspected tubes are defective.
C-2	One or more tubes, but not more than 1% of the total tubes inspected are defective, or between 5% and 10% of the total tubes inspected are degraded tubes.
C-3	More than 10% of the total tubes inspected are degraded tubes or more than 1% of the inspected tubes are defective.

Note: In all inspections, previously degraded tubes must exhibit significant (greater than 10%) further wall penetrations to be included in the above percentage calculations.

- c. Inspection Frequencies - The above required inservice inspections of SG tubes shall be performed at the following frequencies:
  - 1. The first inservice inspection shall be performed after 6 Effective Full Power Months but within 24 calendar months of initial criticality. Subsequent inservice inspections shall be performed at intervals of not less than 12 nor more than 24 calendar months after the previous inspection. If two consecutive inspections not including the preservice inspection, result in all inspection results falling into the C-1 category or if two consecutive inspections demonstrate that previously observed degradation has not continued and no additional degradation has occurred, the inspection interval may be extended to a maximum of once per 40 months;

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

- 2) This definition does not apply to the portion of the tube within the tubesheet below the W\* length. Acceptable tube wall degradation within the W\* length shall be defined as in 5.5.9.d.1.k. \*
  - 3) This definition does not apply to axial PWSCC indications, or portions thereof, which are located within the thickness of dented tube support plates which exhibit a maximum depth greater than or equal to 40 percent of the initial tube wall thickness. WCAP-15573, Revision 1, provides repair limits applicable to these intersections.
  - 4) A tube which contains a tube support plate intersection with both an axial ODSCC indication and an axial PWSCC indication will be removed from service.
- 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 a Double Design Earthquake, a loss-of-coolant accident, or a steam line or feedwater line break as specified in 5.5.9.c.3, above;
- h) Tube Inspection means an inspection of the SG tube from the tube end (hot leg side) completely around the U-bend to the top support of the cold leg;
- i) Preservice Inspection means an inspection of the full length of each tube in each SG performed by eddy current techniques prior to service to establish a baseline condition of the tubing. This inspection shall be performed after the field hydrostatic test and prior to initial Power Operation using the equipment and techniques expected to be used during subsequent inservice inspections;
- j) Tube Support Plate Plugging Limit is used for the disposition of an alloy 600 steam generator tube for continued service that is experiencing predominantly axially oriented outside diameter stress corrosion cracking confined within the thickness of the tube support plates. At tube support plate intersections, the plugging limit is based on maintaining steam generator tube serviceability as described below:
- (i) Steam generator tubes, whose degradation is attributed to outside diameter stress corrosion cracking within the bounds of the tube support plate with bobbin voltages less than or equal to the lower voltage repair limit (NOTE 1), will be allowed to remain in service.
  - (ii) Steam generator tubes, whose degradation is attributed to outside diameter stress corrosion cracking within the bounds of the tube support plate with a bobbin voltage greater than the lower voltage repair limit (NOTE 1), will be repaired or plugged, except as noted in 5.5.9.d.1.j (iii) below.

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\* Applicable for Units 1 and 2, Cycles 10, 11, 12, and 13 only.

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

- (iii) Steam generator tubes, with indication of potential degradation attributed to outside diameter stress corrosion cracking within the bounds of the tube support plate with a bobbin voltage greater than the lower voltage repair limit (NOTE 1) but less than or equal to the upper voltage repair limit (NOTE 2), may remain in service if a rotating pancake coil inspection does not detect degradation. Steam generator tubes, with indications of outside diameter stress corrosion cracking degradation with a bobbin voltage greater than the upper voltage repair limit (NOTE 2) will be plugged or repaired.

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5.6 Reporting Requirements (continued)

5.6.10 Steam Generator (SG) Tube Inspection Report

- e. (\*) The results of the inspection of W\* tubes shall be reported to the Commission pursuant to 10 CFR 50.4 within 90 days following return to service of the steam generators. This report shall include:
- 1) Identification of W\* tubes.
  - 2) W\* inspection distance measured with respect to the BWT or the top of the tubesheet, whichever is lower.
  - 3) Elevation and length of axial indications within the flexible W\* distance and the angle of inclination of clearly skewed axial cracks (if applicable).
  - 4) The total steam line break leakage for the limiting steam generator per WCAP-14797.
- f. (\*) The aggregate calculated steam line break leakage from application of all alternate repair criteria shall be reported to the Commission pursuant to 10 CFR 50.4 within 90 days following return to service of the steam generators.
- g. For implementation of the repair criteria for axial PWSCC at dented TSPs, the NRC shall be notified prior to startup, pursuant to 10CFR50.72, of the following conditions that indicate a failure of performance criteria:
- 1) The calculated SG probability of burst for condition monitoring exceeds  $1 \times 10^{-2}$ .
  - 2) The calculated SG leakage for condition monitoring from all sources (all alternate repair criteria and non-alternate repair criteria indications) exceeds the leakage limit determined from the licensing basis steam line break dose calculation.
- h. For implementation of the repair criteria for axial PWSCC at dented TSPs, the results of the condition monitoring and operational assessments will be reported to the NRC within 120 days following completion of the inspection. The report will include:
- 1) Tabulations of indications found in the inspection, tubes repaired, and tubes left in service under the ARC.
  - 2) Growth rate distributions for indications found in the inspection and growth rate distributions used to establish the tube repair limits.
  - 3) Plus Point confirmation rates for bobbin detected indications when bobbin is relied upon for detection of axial PWSCC in less than or equal to 2 volt dents.
  - 4) For condition monitoring, an evaluation of any indications that satisfy burst margin requirements based on the Westinghouse burst pressure model, but do not satisfy burst margin requirements based on the combined ANL ligament tearing and throughwall burst pressure model.

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\* Applicable for Units 1 and 2, Cycles 10, 11, 12, and 13 only.

5.6 Reporting Requirements (continued)

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5.6.10 Steam Generator (SG) Tube Inspection Report

- 5) Performance evaluation of the operational assessment methodology for prediction flaw distributions as a function of flaw size.
  - 6) Evaluation results of number and size of previously reported versus new PWSCC indications found in the inspection, and the potential need to account for new indications in the operational assessment burst evaluation.
  - 7) Identification of mixed mode (axial PWSCC and circumferential) indications found in the inspection and an evaluation of the mixed mode indications for potential impact on the axial indication burst pressures or leakage.
  - 8) Any corrective actions found necessary in the event that condition monitoring requirements are not met.
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\* Applicable for Units 1 and 2, Cycles 10, 11, 12, and 13 only.