

## 5.5 Programs and Manuals

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

2. The first sample of tubes selected for each inservice inspection (subsequent to the preservice inspection) of each SG shall include:
  - i. All tubes that previously had detectable tube wall penetrations > 20% that have not been plugged or sleeved in the affected area, and all tubes that previously had detectable sleeve wall penetrations that have not been plugged,
  - ii. Tubes in those areas where experience has indicated potential problems,
  - iii. A tube inspection (pursuant to Specification 5.5.9.e.8) shall be performed on each selected tube. If any selected tube does not permit the passage of the eddy current probe for a tube inspection, this shall be recorded and an adjacent tube shall be selected and subjected to a tube inspection;
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:
  - i. 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
  - ii. The inspections include those portions of the tubes where imperfections were previously found; and

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4. A random sample of  $\geq 20\%$  of the total number of laser welded sleeves and  $\geq 20\%$  of the total number of Tungsten Inert Gas (TIG) welded sleeves installed shall be inspected for axial and circumferential indications at the end of each cycle. In the event that an imperfection exceeding the repair limit is detected, an additional 20% of the unsampled sleeves shall be inspected and if an imperfection exceeding the repair limit is detected in the second sample, all remaining sleeves shall be inspected. These inservice inspections will include the entire sleeve, the tube at the heat treated area, and the tube-to-sleeve joints. The inservice inspection for the sleeves is required on all types of sleeves installed in the SGs to demonstrate acceptable structural integrity.

c. Inspection Results Classification

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

-----NOTE-----  
Previously degraded tubes or sleeves must exhibit significant ( $> 10\%$  of wall thickness) further wall penetrations to be included in the percentage calculations.  
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<u>Category</u>	<u>Inspection Results</u>
C-1	$< 5\%$ of the total tubes inspected are degraded tubes and none of the inspected tubes are defective.
C-2	One or more tubes, but $\leq 1\%$ of the total tubes inspected are defective, or $\geq 5\%$ and $\leq 10\%$ of the total tubes inspected are degraded tubes.
C-3	$> 10\%$ of the total tubes inspected are degraded tubes or $> 1\%$ of the inspected tubes are defective.

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#### e. Acceptance Criteria

1. Imperfection means an exception to the dimensions, finish or contour of a tube or sleeve from that required by fabrication drawings or specifications. Eddy current testing indications  $< 20\%$  of the nominal tube or sleeve wall thickness, if detectable, may be considered as imperfections;
2. Degradation means a service induced cracking, wastage, wear or general corrosion occurring on either inside or outside of a tube or sleeve;
3. Degraded Tube means a tube or sleeve containing unrepaired imperfections  $\geq 20\%$  of the nominal tube or sleeve wall thickness caused by degradation;
4. % Degradation means the percentage of the tube or sleeve wall thickness affected or removed by degradation;
5. Defect means an imperfection of such severity that it exceeds the plugging or repair limit. A tube or sleeve containing an unrepaired defect is defective;
6. Plugging or Repair Limit means the imperfection depth at or beyond which the tube shall be removed from service by plugging or repaired by sleeving in the affected area. The plugging or repair limit imperfection depth for the tubing is equal to 40% of the nominal wall thickness. The plugging limit imperfection depth for laser welded sleeves is equal to 38.7% of the nominal wall thickness. The plugging limit imperfection depth for TIG welded sleeves is equal to 32% of the nominal wall thickness.

For Unit 2 during Refueling Outage 12 and the subsequent operating cycle, this definition does not apply to degradation identified in the portion of the tube below 17 inches from the top of the hot leg tubesheet. Degradation found in the portion of the tube below 17 inches from the top of the hot leg tubesheet does not require plugging or repair.

For Unit 2 during Refueling Outage 12 and the subsequent operating cycle, degradation identified in the portion of the tube from the top of the hot leg tubesheet to 17 inches below the top of the tubesheet shall be plugged or repaired upon detection;

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7. 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 OBE, LOCA, or a steam line or feedwater line break as specified in Specification 5.5.9.d.4;
8. Tube Inspection means an inspection of the SG tube from the point of entry (hot leg side) completely around the U-bend to the top support of the cold leg. For a tube that has been repaired by sleeving, the tube inspection shall include the sleeved portion of the tube.

For Unit 2 during Refueling Outage 12 and the subsequent operating cycle, the portion of the tube below 17 inches from the top of the hot leg tubesheet is excluded;

9. 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 prior to initial MODE 1 operation using the equipment and techniques expected to be used during subsequent inservice inspections;
10. Tube Repair refers to a process that reestablishes tube serviceability. Acceptable tube repairs will be performed by the following processes:
  - i. Laser welded sleeving as described in a Westinghouse Technical Report and subject to the limitations and restrictions as approved by the NRC, or
  - ii. TIG welded sleeving as described in ABB Combustion Engineering Inc., Technical Reports: Licensing Report CEN-621-P, Revision 00, "Commonwealth Edison Byron and Braidwood Unit 1 and 2 Steam Generators Tube Repair Using Leak Tight Sleeves, FINAL REPORT," April 1995; and Licensing Report CEN-627-P, Operating Performance of the ABB CENO Steam Generator Tube Sleeve for Use at Commonwealth Edison Byron and Braidwood Units 1 and 2," January 1996; subject to the limitations and restrictions as noted by the NRC Staff.

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Tube repair includes the removal of plugs that were previously installed as a corrective or preventative measure. A tube inspection per Specification 5.5.9.e.8 is required prior to returning previously plugged tubes to service; and

11. The SG shall be determined OPERABLE after completing the corresponding actions (plug or repair in the affected area all tubes exceeding the plugging or repair limit) required by Table 5.5.9-2.
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### 5.5.10 Secondary Water Chemistry Program

This program provides controls for monitoring secondary water chemistry to inhibit SG tube degradation. The program shall include:

- a. Identification of a sampling schedule for the critical variables and control points for these variables;
- b. Identification of the procedures used to measure the values of the critical variables;
- c. Identification of process sampling points, which shall include monitoring the discharge of the condensate pumps for evidence of condenser inleakage;
- d. Procedures for the recording and management of data;
- e. Procedures defining corrective actions for all off control point chemistry conditions; and
- f. A procedure identifying the authority responsible for the interpretation of the data and the sequence and timing of administrative events, which is required to initiate corrective action.