

ATTACHMENT 2

PROPOSED TECHNICAL SPECIFICATIONS CHANGES  
NORTH ANNA UNIT 2

VIRGINIA ELECTRIC AND POWER COMPANY

## REACTOR COOLANT SYSTEM

### STEAM GENERATORS

#### LIMITING CONDITION FOR OPERATION

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3.4.5 Each steam generator in a non-isolated reactor coolant loop shall be OPERABLE.

APPLICABILITY: MODES 1, 2, 3 and 4.

ACTION:

With one or more steam generators in non-isolated reactor coolant loops inoperable, restore the inoperable generator(s) to OPERABLE status prior to increasing  $T_{avg}$  above 200°F.

#### SURVEILLANCE REQUIREMENTS

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4.4.5.0 Each steam generator shall be demonstrated OPERABLE by performance of the following augmented inservice inspection program and the requirements of Specification 4.0.5.

4.4.5.1 Steam Generator Sample Selection and Inspection - Each steam generator shall be determined OPERABLE during shutdown by selecting and inspecting at least the minimum number of steam generators specified in Table 4.4-1.

4.4.5.2 Steam Generator Tube\* Sample Selection and Inspection - The steam generator tube minimum sample size, inspection result classification, and the corresponding action required shall be as specified in Table 4.4-2. The inservice inspection of steam generator tubes shall be performed at the frequencies specified in Specification 4.4.5.3 and the inspected tubes shall be verified acceptable per the acceptance criteria of Specification 4.4.5.4. When applying the exceptions of Specification 4.4.5.2.a through 4.4.5.2.c, previous defects or imperfections in the area repaired by sleeving are not considered an area requiring reinspection. The tubes selected for each inservice inspection shall include at least 3% of the total number of tubes in all steam generators; the tubes selected for these inspections shall be selected on a random basis except:

- a. Where experience in similar plants with similar water chemistry indicates critical areas to be inspected, then at least 50% of the tubes inspected shall be from these critical areas.

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\* When referring to a steam generator tube, the sleeve shall be considered a part of the tube if the tube has been repaired per Specification 4.4.5.4.a.9.

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### SURVEILLANCE REQUIREMENTS (Continued)

- b. The first sample of tubes selected for each inservice inspection (subsequent to the preservice inspection) of each steam generator shall include:
1. All tubes that previously had detectable wall penetrations greater than 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.
  2. Tubes in those areas where experience has indicated potential problems.
  3. At least 3% of the total number of sleeved tubes in all three steam generators. A sample size less than 3% is acceptable provided all the sleeved tubes in the steam generator(s) examined during the refueling outage are inspected. These inspections will include both the tube and the sleeve.
  4. A tube inspection (pursuant to Specification 4.4.5.4.a.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.
- c. The tubes selected as the second and third samples (if required by Table 4.4-2) during each inservice inspection may be subjected to a partial tube inspection provided:
1. The tubes selected for these samples include the tubes from those areas of the tubesheet array where tubes or sleeves with imperfections were previously found.
  2. The inspections include those portions of the tubes or sleeves where imperfections were previously found.

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 or sleeves must exhibit significant (greater than 10%) further wall penetrations to be included in the above percentage calculations.

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### SURVEILLANCE REQUIREMENTS (Continued)

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#### 4.4.5.4 Acceptance Criteria

a. As used in this Specification:

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 below 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 either inside or outside of a tube or sleeve.
3. Degraded Tube means a tube (including the sleeve if the tube has been repaired) containing unrepaired imperfections greater than 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 defective tube is a tube containing a defect that has not been repaired by sleeving or a sleeved tube that has a defect in the sleeve.
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 depths are specified in percentage of nominal wall thickness as follows:

a. Original tube wall	40%
b. Westinghouse laser welded sleeve wall	27%
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 Operating Basis Earthquake, a loss-of-coolant accident, or a steam line or feedwater line break as specified in 4.4.5.3.c, above.
8. Tube Inspection means an inspection of the steam generator tube from the point of entry on the hot leg side, completely around the U-bend to the top support of the cold leg side. For a tube that has been repaired by sleeving, the tube inspection shall include the sleeved portion of the tube.
9. Tube Repair refers to laser welded sleeving, as described by Westinghouse reports WCAP-13088, Rev. 2, and WCAP-13619, Rev. 1, which is used to maintain a tube in-service or return a tube to service. This includes the removal of plugs that were installed as a corrective or preventive measure. A tube inspection per Specification 4.4.5.4.a.8 is required prior to returning previously plugged tubes to service.

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### SURVEILLANCE REQUIREMENTS (Continued)

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10. 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 using the equipment and techniques expected to be used during subsequent inservice inspection.

- b. The steam generator shall be determined OPERABLE after completing the corresponding actions (plug or repair all tubes exceeding the plugging or repair limit) required by Table 4.4-2.

#### 4.4.5.5 Reports

- a. Following each inservice inspection of steam generator tubes, the number of tubes plugged or sleeved in each steam generator shall be reported to the Commission within 15 days.
- b. The complete results of the steam generator tube inservice inspection shall be reported on an annual basis for the period in which this inspection was completed. This report shall include:
1. Number and extent of tubes inspected.
  2. Location and percent of wall-thickness penetration for each indication of an imperfection.
  3. Identification of tubes plugged or sleeved.
- c. Results of steam generator tube inspections which fall into Category C-3 require prompt notification of the Commission pursuant to Section 50.72 to 10 CFR Part 50. A Licensee Event Report shall be submitted pursuant to Section 50.73 to 10 CFR Part 50 and shall provide a description of investigations conducted to determine cause of the tube degradation and corrective measures taken to prevent recurrence.

TABLE 4.4-2  
STEAM GENERATOR TUBE INSPECTION

1ST SAMPLE INSPECTION			2ND SAMPLE INSPECTION		3RD SAMPLE INSPECTION	
Sample Size	Result	Action Required	Result	Action Required	Result	Action Required
A minimum of S tubes per S.G.	C-1	None	N/A	N/A	N/A	N/A
	C-2	Plug or repair defective tubes and inspect additional 2S tubes in this S.G.	C-1	None	N/A	N/A
			C-2	Plug or repair defective tubes and inspect additional 4S tubes in this S.G.	C-1	None
					C-2	Plug or repair defective tubes
					C-3	Perform action for C-3 result of first sample
			C-3	Perform action for C-3 result of first sample	N/A	N/A
	C-3	Inspect all tubes in this S.G., plug or repair defective tubes, and inspect 2S tubes in each other S.G.  Prompt notification to NRC pursuant to Specification 6.9.1	All other S.G.s are C-1	None	N/A	N/A
			Some S.G.s C-2 but no additional S.G. is C-3	Perform action for C-2 result of second sample	N/A	N/A
			Additional S.G. is C-3	Inspect all tubes in each S.G. and plug or repair defective tubes. Prompt notification to NRC pursuant to Specification 6.9.1	N/A	N/A

$S = 3 \frac{N}{n} \%$  Where N is the number of steam generators in the unit, and n is the number of steam generators inspected during an inspection.

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- c. the maximum stress amplitude is anticipated to lie in the 5 ksi range which would allow for much earlier leak before break warning than would occur in the assumed 7 ksi case.

These assumption also include an appropriate allowance for measurement uncertainty. (References: Virginia Electric and Power Co., "North Anna Unit 1 July 15, 1987 Steam Generator Tube Rupture Event Report, Revision 1, September 15, 1987, and Westinghouse WCAP-11601, "North Anna Unit 1 Steam Generator Tube Rupture and Remedial Actions Technical Evaluation, September 1987").

This limit, along with the enhanced monitoring system, should provide sufficient notification to permit orderly shutdown prior to a potential tube rupture event. Leakage in excess of any of these limits will require plant shutdown and an unscheduled inspection, during which the leaking tubes will be located and plugged or sleeved.

Wastage-type defects are unlikely with all volatile treatment (AVT) of secondary coolant. However, even if a defect of similar type should develop in service, it will be found during scheduled inservice steam generator tube examinations. Plugging or sleeving will be required of all tubes with imperfections exceeding the plugging or repair limit which, by the definition of Specification 4.4.5.4.a is 40% of the tube nominal wall thickness. If a laser welded sleeved tube is found to have through wall penetration in the sleeve of greater than or equal to 27% of the nominal sleeve wall thickness, the tube must be plugged. The 27% plugging limit for the sleeve is derived from a Regulatory Guide 1.121 analysis which utilizes a 20% allowance for eddy current uncertainty in determining depth of tube wall penetration and additional degradation growth. The portion of the sleeve for which indications of wall degradation must be evaluated are summarized as follows:

1. Indication of degradation in the length of the sleeve between the weld joints of the tube support plate sleeve must be evaluated against the sleeve plugging limit of 27%.
2. Indications of degradation in the length of the sleeve below the upper weld joint extending down to the end of the tubesheet sleeve must be evaluated against the sleeve plugging limit of 27%.

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3. Indications of tube degradation of any type including a complete break in the tube between the upper joint and the lower joint of the tube support plate sleeve, and between the upper joint and the length of the tube adjacent to the sleeve hardroll in the tubesheet sleeve does not require that the tube be removed from service.
4. In a free span weld joint with more than one weld, the weld closest to the end of the sleeve represents the governing joint, and the extent of sleeve inspection.
5. The tube plugging limit of 40% through wall continues to apply to the portion of the tube above the upper weld joint and below the lower weld joint of the tube support plate sleeve. In the tubesheet area, the tube plugging limit applies to the portion of the tube above the upper weld joint and the portion of the tube adjacent to the hardrolled section of the sleeve in the lower joint.

Steam generator tube inspections of operating plants have demonstrated the capability to reliably detect degradation that has penetrated 20% of the original tube wall thickness.

Whenever the results of any steam generator tubing inservice inspection fall into Category C-3, these results will be promptly reported to the Commission pursuant to Section 50.72 to 10 CFR Part 50 with a follow up report pursuant to Section 50.73 to 10 CFR Part 50. Such cases will be considered by the Commission on a case-by-case basis and may result in a requirement for analysis, laboratory examinations, tests, additional eddy-current inspection, and revision of the Technical Specifications, if necessary.

**ATTACHMENT 3**

**WESTINGHOUSE LETTER, APPLICATION FOR WITHHOLDING  
PROPRIETARY INFORMATION FROM PUBLIC DISCLOSURE  
CAW-91-091**

**VIRGINIA ELECTRIC AND POWER COMPANY**