

Attachment C

Proposed Technical Specification Changes

Pages: 4.10-1
4.10-2
4.10-3
4.10-4a
4.10-5
4.10-6

Note: Proposed changes to the Technical Specifications are indicated by change bars in the left hand margin.

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4.10 Steam Generator Tube Surveillance

Applicability: Applies to all steam generators.

Objective: To define the surveillance requirements necessary to demonstrate the steam generators operable.

Specification:

- A. 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 4.10-1.
- B. 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 4.10-2. The inservice inspection of steam generator tubes shall be performed at the frequencies specified in Specification C and the inspected tube shall be verified acceptable per the acceptance criteria of Specification D. The tubes selected for each inservice inspection shall include at least 3 percent of the total number of tubes in all steam generators; the tubes selected for these inspections shall be selected on a random basis except:
1. 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.
 2. The first sample inspection during each inservice inspection (subsequent to the pre-service inspection) of each steam generator shall include:
 - (a) All non-plugged and non-sleeved tubes and sleeved tubes that previously had detectable wall penetrations (> 20%), and
 - (b) Tubes in those areas where experience has indicated potential problems.
 - (c) A tube inspection [pursuant to Specification 4.10.D.(h)] 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 ("Adjacent" is interpreted to mean the nearest tube capable of being inspected.)
 3. The second and third sample inspections during each inservice inspection may be less than a full tube inspection by concentrating (selecting at least 50% of the tubes to be inspected) the inspection on those areas of the tube sheet array and on those portions of the tubes where tubes with imperfections were previously found.

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

Category

C-1

Inspection Results

Less than 5% of the total tubes inspected are degraded tubes and none of the inspected tubes are defective.

4.10-1

Category

Inspection Results

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 (> 10%) further wall penetrations to be included in the above percentage calculations.

C. Inspection Frequencies - The above required inservice inspections of steam generator tubes shall be performed at the following frequencies:

1. 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 following service under AVT conditions, 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.
2. If the results of the inservice inspection of a steam generator conducted in accordance with Table 4.10-2 at 40 month intervals fall in Category C-3, the inspection frequency shall be increased to at least once per 20 months. The increase in inspection frequency shall apply until the subsequent inspections meet the conditions specified in C.1 and the interval can be extended to a 40 month period.
3. Additional, unscheduled inservice inspections shall be performed on each steam generator in accordance with the first sample inspection specified in Table 4.10-2 during the shutdown subsequent to any of the following conditions:
 - (a) Primary-to-secondary tube leaks (not including leaks originating from tube-to-tube sheet welds) in excess of the limits of Specification 4.14.C.5,
 - (b) A main steam line break or feedwater line break,
 - (c) A seismic occurrence greater than the Operating Basis Earthquake, or
 - (d) A loss-of-coolant accident requiring actuation of the engineered safeguards.

D. Acceptance Criteria

1. As used in this Specification.

- (a) Imperfection means an exception to the dimensions, finish or contour of a tube or tube sleeve from that required by fabrication drawings or specifications. Eddy-current testing indications below 20% of the nominal tube or tube sleeve wall thickness may be considered as imperfections.
- (b) Degradation means a service-induced cracking, wastage, wear or general corrosion occurring on either inside or outside of a tube or tube sleeve.
- (c) Degraded Tube means a tube or tube sleeve containing imperfections greater than or equal to 20% of the nominal tube or tube sleeve wall thickness caused by degradation.
- (d) % Degradation means the percentage of the tube or tube sleeve wall thickness affected or removed by degradation.
- (e) Defect means an imperfection of such severity that it exceeds the 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.
- (f) 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 because it may become unserviceable prior to the next inspection and is equal to 40% of the nominal tube wall thickness. For a tube that has been previously sleeved, through wall penetrations or imperfection depths of equal to 40% of sleeve nominal wall thickness shall be defined as the repair limit.
- (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 steam line break, feedwater line break, Operating Basis Earthquake, or a loss-of-coolant accident as specified in 4.10.C.3 above.
- (h) Tube Inspection means an inspection of the steam generator 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.
- (i) Critical Area means an area of the steam generator where degraded and/or defective tubes exist due to a steam generator physical and/or operating characteristic which would promote tube degradation in that identified area.
- (j) Tube Repair means plugging or sleeving by mechanical or welding methods which will maintain a tube in service or return a tube to service.

- [2. The steam generator shall be determined OPERABLE after completing the
[corresponding actions (plug or sleeve all tubes exceeding the repair limit in a
qualified manner required by Table 4.10-2).

EXCEPTION:

The steam generator shall be determined OPERABLE without performing 100% tube inspection required by Table 4.10-2 when first or subsequent sample inspection results are at the C-3 level due to defects in a critical area, provided:

- (a) The critical area(s) are identified and bounded.
- (b) A 100% inspection of the critical area is conducted.
- (c) A steam generator tube inspection is conducted for the sample size required by Specification 4.10.B excluding those tubes and results from the inspection of the critical area(s).

E. Reports

- [1. 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.
2. The complete results of the steam generator tube inservice inspection shall be
included in the "NIS-1 Owners Data Report for Inservice Inspections" for the
period in which this inspection was completed. This report shall include:
- (a) Number and extent of tubes inspected.
 - (b) Location and percent of wall-thickness penetration for each indication of
an imperfection.
 - [(c) Identification of tubes plugged or sleeved.

TABLE 4.10-2
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 sleeve ⁽¹⁾ defective tubes and inspect additional 2S% tubes in this S.G.	C-1	None	N/A	N/A
			C-2	Plug or sleeve ⁽¹⁾ defective tubes and inspect additional 4S% tubes in this S.G.	C-1	None
					C-2	Plug or sleeve ⁽¹⁾ defective tubes
					C-3	Perform action for C-3 result of first sample
	C-3	Inspect all tubes in this S.G., plug or sleeve ⁽¹⁾ defective tubes and inspect 2S% tubes each S.G. Report to NRC pursuant to 10 CFR 50.72(b)(2)	C-3	Perform action for C-3 result of first sample	N/A	N/A
			All other S.G.s are C-1	None	N/A	N/A
			Some S.G.s C-2 but no additional S.G. are C-3	Perform action for C-2 result of second sample	N/A	N/A
			Additional	Inspect all tubes in each S.G. and plug or sleeve ⁽¹⁾ defective tubes. Report to NRC pursuant to 10 CFR 50.72(b)(2)	N/A	N/A

S = 3 N/n Percent where N is the number of steam generators in the unit, and n is the number of steam generators inspected during an inspection

Note: For the inspection of steam generator #1 performed in December 1990, a 100% inspection of steam generator #2 rows 3 through 10 shall be conducted instead of the additional inspections of S/G #1 indicated by this specification. If the inspection of #2 steam generator indicates any u-bend defects, then a 100% inspection of #3 steam generator rows 3 through 10 shall be conducted.

- (1) Sleeving repair of tubes shall be in accordance with the sleeve design, installation techniques, and inspection program identified in the proprietary Combustion Engineering Report CEN-618-P, "Maine Yankee Nuclear Power Plant Steam Generator Tube Repair Using Leak Tight Sleeves", Revision 0, dated October 1994.

Basis: The Surveillance Requirements for inspection of the steam generator tubes ensure that the structural integrity of this portion of the RCS will be maintained. The program for inservice inspection of steam generator tubes is based on a modification of Regulatory Guide 1.83, Revision 1. Inservice inspection of steam generator tubing is essential in order to maintain surveillance of the conditions of the tubes in the event that there is evidence of mechanical damage or progressive degradation due to design, manufacturing errors, or inservice conditions that lead to corrosion. Inservice inspection of steam generator tubing also provides a means of characterizing the nature and cause of any tube or tube sleeve degradation so that corrective measures can be taken.

The plant is expected to be operated in a manner such that the secondary coolant will be maintained within those chemistry limits found to result in negligible corrosion of the steam generator tubes. If the secondary coolant chemistry is not maintained within these limits, localized corrosion may likely result in stress corrosion cracking.

Degraded steam generator tubes may be repaired by the installation of sleeves which span the region of degraded steam generator tubes. A steam generator tube sleeve is designed to meet the structural requirements of tubes which are not degraded. Maine Yankee has been analyzed for the use of the Combustion Engineering sleeves as specified in the report CEN-618-P, "Maine Yankee Nuclear Power Plant Steam Generator Tube Repair Using Leak Tight Sleeves", Revision 0, dated October 1994.

Wastage-type defects are unlikely with proper chemistry treatment of the secondary coolant. However, even if a defect should develop in service, it will be found during scheduled inservice steam generator tube examinations. Plugging or sleeving repair will be required for all tubes or sleeves with imperfections exceeding 40% of the tube nominal wall thickness.

In the past, Maine Yankee as well as other licensees has experienced steam generator tube degradation in specific localized areas. The exception permits inspecting 100% of the localized area and a representative sample of remaining tubes, when degradation of tubes in the localized area would otherwise cause the inspection results to be classified C-3.

Attachment E

"Steam Generator Tube Repair Using Leak Tight Sleeves, Final Report"

CEN-618-P

Proprietary Report