

ATTACHMENT I

REACTOR COOLANT SYSTEM

SURVEILLANCE REQUIREMENTS (Continued)

1. All nonplugged tubes that previously had detectable wall penetrations greater than 20% that were not repaired. #
2. Tubes in those areas where experience has indicated potential problems.
3. 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. In addition to the sample required in 4.4.5.2 b.1 through 3, all
or L* tubes which have had the F* criteria applied will be inspected in the tubesheet region. These F* tubes may be excluded from 4.4.5.2 b.1 provided the only previous wall penetration of >20% was located below the F* distance.
- d. 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 tube sheet array where tubes with imperfections were previously found.
 2. The inspections include those portions of the tubes 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 must exhibit significant (greater than 10%) further wall penetrations to be included in the above percentage calculations.

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SURVEILLANCE REQUIREMENTS (Continued)

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 from that required by fabrication drawings or specifications. Eddy-current testing indications below 20% of the nominal tube 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.
3. Degraded Tube means a tube containing imperfections greater than or equal to 20% of the nominal wall thickness caused by degradation.
4. % Degradation means the percentage of the tube 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 containing a defect is defective.
6. Plugging or Repair Limit means the imperfection depth at or beyond which the tube shall be repaired (i.e. sleeving) or removed from service by plugging and is equal to 40% of the nominal tube wall thickness.

This definition does not apply to the portion of the tube in the tubesheet below the F* or L* distance provided the tube is not degraded within the F* distance for F* tubes and within the L* distance for L* tubes.

- a. For the area in the upper weld joint, any degradation shall be plugged unless it can be clearly demonstrated by a qualified NDE technique that the degradation is less than 40% of the nominal wall thickness of the sleeve for ID imperfections or less than 40% nominal wall thickness of the tube for O.D. imperfections.
- b. For the area of the tube behind the sleeve and above the upper weld joint, tubes with any degradation shall be plugged unless it can be clearly demonstrated by a qualified NDE technique, that the degradation is less than 40% of the nominal wall thickness.
- c. For the area below the upper weld joint, any defect greater than 40% of the nominal sleeve wall thickness shall be plugged.

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SURVEILLANCE REQUIREMENTS (Continued)

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 (hot leg side) completely around the U-bend to the top support of the cold leg.

A tube inspection to implement the L* criterion will consist of a minimum of 3.0 inches of the tube into the tubesheet from the top of the tubesheet using rotating pancake coil eddy current technique or an inspection method shown to give equivalent or better information on the orientation and length of axial cracks. A minimum of 1.3 inches (plus eddy current uncertainty) of sound expanded tube separated by no more than 2 areas of tube degradation in the form of axial cracking must be found in the inspected portion of the tube.

9. Sleeve Inspection means an inspection of the sleeved portion of the tube. This inspection will include 3 inches of the parent tube directly above the upper weld, the upper weld which forms the new pressure boundary, and the sleeve material below the upper weld.
10. Repaired tube means a tube that has undergone a process that re-establishes its serviceability.
The Combustion Engineering Inc. weld sleeve process will be used per report CEN-337-P.
11. L* Distance is the distance into the tubesheet from the bottom of the transition between the expanded and unexpanded portion ^{of the tube} or the top of the tubesheet whichever is lower (further into the tubesheet) that has been determined to be 0.56 inches including eddy current elevation measurement uncertainty. (0.06 inch eddy current uncertainty assumed)
12. L* Tube is a tube with equal or greater than 40% degradation below the L* distance and not degraded within the L* distance. The eddy current indication of degradation below the L* distance must be determined to be the result of cracks with an orientation no greater than 30 degrees from axial not including eddy current test measurement uncertainty. The L* criteria shall be limited to a maximum of 1648 tube ends per steam generator. Tubes qualifying as F* tubes are not classified as L* tubes.

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SURVEILLANCE REQUIREMENTS (Continued)

9.13. 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 after the field hydrostatic test and prior to initial POWER OPERATION using the equipment and techniques expected to be used during subsequent inservice inspections.

10.14. F* Distance is the distance into the tubesheet from the face of the tubesheet or the top of the last hardroll, whichever is lower (further into the tubesheet) that has been conservatively chosen to be 1.6 inches.

11.15. F* TUBE is the tube with degradation equal to or greater than 40%, below the F* distance and not degraded (i.e., no indications of cracking) within the F* distance. The application of F* expires at the end of the fifth fuel cycle.

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

4.4.5.5 Reports

a. Within 15 days following the completion of each inservice inspection of steam generator tubes, the number of tubes plugged or repaired in each steam generator shall be reported to the Commission in a Special Report pursuant to Specification 6.9.2.

b. The complete results of the steam generator tube inservice inspection shall be submitted to the Commission in a Special Report pursuant to Specification 6.9.2 within 12 months following the completion of the inspection. This Special 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 repaired.

c. Results of steam generator tube inspections which fall into Category C-3 and require prompt notification of the Commission shall be reported pursuant to 10 CFR 50.72(b)2(i) prior to resumption of plant operation. A report pursuant to 10 CFR 50.73(a)2(ii) shall be submitted to provide a description of investigations conducted to determine cause of the tube degradation and corrective measures taken to prevent recurrence.

d. The results of inspections of F*^{and L*} tubes shall be reported to the Commission in a report to the Director, ONRR, prior to the restart of the unit following the inspection. This report shall include:

1. Identification of F*^{and L*} tubes, and
2. Location and size of the degradation

NRC approval of this report is not required prior to restart.

REACTOR COOLANT SYSTEM

BASES

3/4.4.5 STEAM GENERATORS

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 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. The extent of cracking during plant operation would be limited by the limitation of steam generator tube leakage between the primary coolant system and the secondary coolant system (primary-to-secondary leakage = 500 gallons per day per steam generator). Cracks having a primary-to-secondary leakage less than this limit during operation will have an adequate margin of safety to withstand the loads imposed during normal operation and by postulated accidents. Operating plants have demonstrated that primary-to-secondary leakage of 500 gallons per day per steam generator can readily be detected by radiation monitors of steam generator blowdown. Leakage in excess of this limit will require plant shutdown and an unscheduled inspection, during which the leaking tubes will be located and plugged or repaired.

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 repairing will be required for all tubes with imperfections exceeding 40% of the tube nominal wall thickness. Steam generator tube inspections of operating plants have demonstrated the capability to reliably detect wastage-type degradation that has penetrated 20% of the original tube wall thickness.

replace with → ~~For the tubes with degradation below the F* distance, but not degraded within the F* distance, plugging is not required.~~

Plugging is not required for F* or L* tubes where the degradation is below the F* distance or the L* distance.

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 10 CFR 50.72(b)2(i) prior to resumption of plant operation. 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 II

No Significant Hazards Determination

In accordance with the provisions of 10CFR50.92, SCE&G has determined that a finding of no significant hazards is appropriate because the proposed amendment:

- 1) Does not involve a significant increase in the probability or consequences of an accident previously evaluated.

The presence of the tubesheet will enhance steam generator tube integrity in the region of the hardroll by precluding tube deformation beyond its initial expanded outside diameter. The resistance to both tube rupture and tube collapse is strengthened by the presence of the tubesheet in that region. The result of the hardroll of the tube into the tubesheet is an interference fit between the tube and the tubesheet. Tube rupture can not occur because the contact between the tube and tubesheet does not permit sufficient movement of tube material. In a similar manner, the tubesheet does not permit sufficient movement of tube material to permit buckling collapse of the tube during postulated LOCA loadings.

The type of degradation for which the L^* criteria has been developed (cracking with an axial or near axial orientation) has been found not to significantly reduce the axial strength of a tube. An evaluation including analysis and testing has been done to determine the strength reduction for axial loads with simulated axial and near axial cracks. This evaluation provided the basis for the acceptance criteria for tube degradation subject to the L^* criteria.

The length of roll expansion above L^* is sufficient to preclude significant leakage from tube degradation located below the L^* distance. The existing Technical Specification leakage rate requirements and accident analysis assumptions remain unchanged in the unlikely event that significant leakage from this region does occur. As noted above, tube rupture and pullout is not expected for tubes using the alternate plugging criteria. Any leakage out of the tube from within the tubesheet at any elevation in the tubesheet is fully bounded by the existing steam generator tube rupture analysis included in the V. C. Summer Final Safety Analysis Report. The proposed alternate plugging criteria do not adversely impact any other previously evaluated design basis accident.

- 2) The proposed license amendment does not create the possibility of a new or different kind of accident from any accident previously evaluated.

Implementation of the proposed alternate tubesheet tube plugging criteria does not introduce any significant changes to the plant design basis. Use of the criteria does not provide a mechanism to result in an accident outside of the region of the tubesheet expansion. Any hypothetical accident as a result of any tube degradation in the expanded portion of the tube would be bounded by the existing tube rupture accident analysis.

- 3) The proposed license amendment does not involve a significant reduction in a margin of safety.

The use of the alternate tubesheet plugging criteria has been demonstrated to maintain the integrity of the tube bundle commensurate with the requirements of Reg. Guide 1.121 for indications in the free span of tubes and the primary to secondary pressure boundary under normal and postulated accident conditions. Acceptable tube degradation for the L* criteria is any degradation indication with axial or nearly axial cracking in the tubesheet region, more than the L* distance below the bottom of the transition between the roll expansion and the unexpanded tube. For tubes with axial or nearly axial cracks the strength of the tube relative to an axial load would not be reduced below the strength required to resist potential axial loads. The safety factors used in the verification of the strength of the degraded tube are consistent with the safety factors in the ASME Boiler and Pressure Vessel Code used in steam generator design. The L* distance has been verified by testing to be greater than the length of roll expansion required to preclude significant leakage during normal and postulated accident conditions. The leak testing acceptance criteria are based on the primary to secondary leakage limit in the Technical Specifications and the leakage assumptions used in the FSAR accident analyses.

Implementation of the alternate tubesheet plugging criterion will decrease the number of tubes which must be taken out of service with tube plugs or repaired with sleeves. Both plugs and sleeves reduce the RCS flow margin, thus implementation of the alternate plugging criteria will maintain the margin of flow that would otherwise be reduced in the event of increased plugging or sleeving. Based on the above, it is concluded that the proposed change does not result in a significant reduction in a loss of margin with respect to plant safety as defined in the Final Safety Analysis Report or the bases of the Technical Specifications.