

3.4 REACTOR COOLANT SYSTEM

3.4.5 STEAM GENERATORS

LIMITING CONDITIONS FOR OPERATION

LCO 3.4.5

Each steam generator shall be OPERABLE.

APPLICABILITY: MODES 1, 2, 3, and 4.

ACTION:

With one or more steam generators inoperable, restore the inoperable generator(s) to OPERABLE status prior to increasing Tavg above 93°C.

SURVEILLANCE REQUIREMENTS

SR 3.4.5.0

Each steam generator shall be demonstrated OPERABLE by performance of the following augmented inservice inspection program.

SR 3.4.5.1

Steam Generator Sample Selection and Inspection - Each steam generator shall be determined OPERABLE during shutdown.

SR 3.4.5.2

Steam Generator Tube Sample Selection and Inspection - The steam generator tube minimum sample size, inspection result classification, and the corresponding action required shall be performed at the frequencies specified in SR 3.4.5.3 and the inspected tubes shall be verified acceptable per the acceptance criteria of SR 3.4.5.4. The tubes selected for each inservice inspection shall include at least 20% (S) of the total number of tubes in all steam generators. The tubes selected for these inspections shall be selected as defined per ADP-1.4.322 Inservice Inspection of Steam Generator Tubes (subject to URSJV approval) 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;
- b. The first sample of tubes selected for each inservice inspection (subsequent to the preservice inspection) of each steam generator shall include:

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SURVEILLANCE REQUIREMENTS (Continued)

- 1) All nonplugged tubes that previously had detectable wall penetrations (greater than 20%),
 - 2) Tubes in those areas where experience has indicated potential problems, and
 - 3) A tube inspection (pursuant to SR 3.4.5.4.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 3.4-1) 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, and
 - 2) The inspections include those portions of the tubes where imperfections were previously found.

The result 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)

SR 3.4.5.3

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

- a. The first inservice inspection shall be performed after 6 Effective Full Power Months but within 24 calendar months of SG service. Subsequent inservice inspections shall be performed at intervals as defined per ADP-1.4.322 Inservice Inspection of Steam Generator Tubes (subject to URSJV approval) of not less than 12 no 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;
- b. If the result of the inservice inspection of steam generators conducted in accordance with Table 3.4-1 at 40-month intervals fall in category C-3, the inspection frequency shall apply once per 20 months. The increase in inspection frequency shall apply until the subsequent inspections satisfy the criteria of SR 3.4.5.3.a; the interval may then be extended to a maximum of once per 40 months; and
- c. Additional, unscheduled inservice inspections shall be performed on each steam generator in accordance with the first sample inspection specified in Table 3.4-1 during the shutdown subsequent to any of the following conditions:
 - 1) Reactor-to-secondary tubes leak (not including leaks originating from tube-to-tube sheet welds) in excess of the limits of LCO 3.4.6.2, or
 - 2) A seismic occurrence greater than the Operating basis Earthquake, or
 - 3) A loss-of-coolant accident requiring actuation of the Engineered Safety Features, or
 - 4) A main steam line or feedwater line break.

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SURVEILLANCE REQUIREMENTS (Continued)

SR 3.4.5.4

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 limit. A tube containing a defect is defective;
- 6) Plugging Limit means the imperfection depth at or beyond which the tube shall be removed from service; The limit shall be determined by standards for examination category B-Q, "Steam Generator Tubes" of Section XI of the ASME Boiler and Pressure Vessel Code version applicable to the current ISI inspection program;
- 7) Unservicable 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 SR 3.4.5.3.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 point of exit (cold leg side);
- 9) 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 prior to initial POWER OPERATION using the equipment and techniques expected to be used during subsequent inservice inspections.

- b. The steam generator shall be determined OPERABLE after completing the corresponding actions (plug all tubes exceeding the plugging or repair limit) required by Table 3.4-1.

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SURVEILLANCE REQUIREMENTS (Continued)

SR 3.4.5.5

Reports

- a. Within 15 days following the completion each inservice inspection of steam generator tubes, the number of tubes plugged in each steam generator shall be reported to the URSJV in a Special Report (plugging list).
- b. The complete result of the steam generator tube inservice inspection shall be submitted to the URSJV in a Special Final Report within 12 months following the completion of the inspection. The Special Final Report shall include:
 - 1) Number and extent of tubes inspected,
 - 2) Location and percent of wall-thickness penetration for each indication of an imperfection, and
 - 3) Identification of tubes plugged.
- c. Results of steam generator tube inspections which fall into Category C-3 shall be reported in a Special Preliminary Report to the URSJV within 30 days and prior to resumption of plant operation. This report shall provide a description of all type of defects and their causes not previously experienced in the NEK replacement steam generator tubes.

STEAM GENERATOR TUBE INSPECTION

TABLE 3.4-1

1ST SAMPLE INSPECTION			2ND SAMPLE INSPECTION		3RD SAMPLE INSPECTION	
Sample(s) Size	Result	Action Required	Result	Action Required	Result	Action Required
A minimum of S	C-1	None	N.A	N.A.	N.A.	N.A.
Tubes per S.G.	C-2	Plug defective tubes and inspect additional 2S tubes in this S.G	C-1	None	N.A.	N.A.
			C-2	Plug defective tubes and inspect additional 2S tubes in this S.G.	C-1	None
					C-2	Plug 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.
			All S.Gs are C-1	None	N.A.	N.A.
	C-3	Inspect all tubes in this S.G., plug defective tubes and inspect 2S tubes in each other S.G.	Some S.Gs are C-2 but no add. S.G. are C-3	Perform action for C-2 result of second sample	N.A.	N.A.
		Notification to URSJV	Add. S.G. is C-3	Inspect all tubes in each S.G. and plug defective tubes. Notification to URSJV	N.A	N.A.