

ATTACHMENT I TO IPN-87-006
PROPOSED TECHNICAL SPECIFICATIONS

NEW YORK POWER AUTHORITY
INDIAN POINT 3 NUCLEAR POWER PLANT
DOCKET NO. 50-286

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4.9 STEAM GENERATOR TUBE INSERVICE SURVEILLANCE

Applicability

Applies to inservice surveillance of the steam generator tubes.

Objective

To assure the continued integrity of the steam generator tubes that are a part of the primary coolant pressure boundary.

Specification

Steam generator tubes shall be determined operable by the following inspection program and corrective measures:

A. Inspection Requirements

1. Definitions

- a. Imperfection is an exception to the dimension, finish, or contour required by drawing or specification.
- b. Degradation means a service-induced cracking, wastage, wear or corrosion.
- c. Degraded Tube is a tube that contains imperfections caused by degradation large enough to be reliably detected by eddy current inspection. This is considered to be 20% degradation.
- d. % Degradation is an estimate % of the tube wall thickness affected or removed by degradation.
- e. Defect is an imperfection of such severity that it exceeds the plugging limit. A tube containing a defect is defective.
- f. Tube Plugging Limit is the tube imperfection depth at or beyond which the tube must either be removed from service or repaired. This is considered to be an imperfection depth of 40%.
- g. Sleeve Plugging Limit is the sleeve imperfection depth at or beyond which the sleeved tube must be removed from service or repaired. This is considered to be an imperfection depth of 40% for tube sleeves.

- h. Tube Inspection is a full length inspection for the initial 3% sample specified in Table 4.9-1. Supplemental sample inspections (after the initial 3% sample) may be limited to a partial length inspection concentrating on those locations where degradation has been found.

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Text previously on this page has been relocated to page 4.9-5.

3. Results of steam generator tube inspections which fall into Category C-3 of Table 4.9-1 and require prompt notification of the Commission shall be reported prior to resumption of plant operation. The written followup of this report shall provide a description of investigations conducted to determine cause of the tube degradation and corrective measures taken to prevent recurrence.

Basis

Inservice surveillance of steam generator tubes is essential in order to ensure that the structural integrity of this portion of the RCS is maintained. This inservice surveillance consists of an inspection program which provides a means of identifying and characterizing the nature of any mechanical damage or tube degradation so that corrective measures can be taken. Degradation could be caused by design or fabrication deviations or inservice conditions that lead to corrosion.

An essentially 100% tube inspection was performed on each tube in every steam generator by eddy current techniques prior to service in order to establish a baseline condition for the tubing. This inspection was conducted under conditions and with equipment and techniques equivalent to those expected to be employed in the subsequent inservice inspections.

The program for inservice inspection of steam generator tubes including equipment, procedures, and sample selection is based upon the guidance and recommendations in Regulatory Guide 1.83 and NRC Generic Letter 85-02. The program includes a full length inspection for the initial 3% sample recommended in the regulatory guide followed by supplementary tube sampling and inspection if necessary based upon the results of the initial sample. The initial sample inspection may include separate entries from the hot and cold leg sides and the selection of different tubes on the hot and cold leg sides to satisfy the minimum sampling requirements. Supplementary inspections need not be full length and should concentrate on areas of known degradation. The detailed sampling process based upon the regulatory guide is defined in section 4.9.A.2, 4.9.A.3, and Table 4.9-1 of this section, and the frequency of inspection in 4.9.A.4.

Following the pre-service inspection, the plant is expected to be operated in a manner such that the secondary coolant will be maintained within those 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 result in stress corrosion cracking. If stress corrosion cracking occurs during plant operation, its extent would be limited by the limitation of steam generator tube leakage between the primary coolant system and the secondary coolant system which is 500 gallons per day per steam generator. Cracks having a primary to secondary leakage less than this limit during operation have an adequate margin of safety against failure due to loads imposed by design basis accidents. Operating plants have demonstrated that primary to secondary leakage as low as 0.1 gpm can be detected. Leakage in excess of the 500 gallon per day per steam generator limit requires plant shutdown and an unscheduled inspection, during which the leaking tubes will be located and plugged or repaired. This limit is also consistent with the assumptions used to develop the Technical Specification limit for secondary coolant activity. For Indian Point 3, for conservatism, the plant will be shutdown if leakage exceeds 432 gallons per day per steam generator or 1 gpm total through all four steam generators and an unscheduled eddy current inspection will be conducted. Leaking and defective tubes will be located and either; (1) plugged or (2) repaired.

If the results of an inservice inspection conducted as described previously show any tube with an imperfection exceeding 40% of the tube nominal wall thickness, the tube is unacceptable for continued operation and must be plugged or repaired as required by the ASME Code. Steam generator tube inspections of operating plants have demonstrated the capability to reliably detect degradation that has penetrated 20% of the original 0.050 inch nominal wall thickness. In accordance with Regulatory Guide 1.121, a plugging margin evaluation has demonstrated that the actual remaining wall thickness for flaws with axial extent not exceeding 0.9 inches and circumferential extent not exceeding 135° to withstand the max DP expected during faulted conditions is 28%. This is also supported by burst test data of representative tubing. Leak before break has also been verified for this extent of degradation. Since this provides for 72% wall loss, a 40% plugging limit incorporates a 32% margin. A 10% margin is applied to measurement inaccuracies leaving 22% safety margin for corrosion allowance during a given operating period prior to the next inspection.

TABLE 4.9-1

STEAM GENERATOR TUBE INSPECTION

First Sample Inspection			Second Sample Inspection		Third Sample Inspection			
Minimum Size	Result	Action	Result	Action	Result	Action		
S* Tubes per steam generator	C-1					▷		
	C-2	Plug or repair defective tubes. Inspect additional 2S tubes in this SG.	C-1			▷	Go to power.	
			C-2	Plug or repair defective tubes. Inspect additional 4 S tubes in this SG.	C-1	▷	Plug or repair defective tubes. Go to power.	
			C-3	Go to first sample. C-3 action	C-2	▷		
	C-3	Inspect all tubes in this SG. Plug or repair defective tubes. Inspect 2 S tubes in each other SC	All other SGs C-1				▷	Go to power
			Some SGs C-2 But no add'l C-3	Go to second sample. C-2 action				
			Add'l SG C-3	Inspect all tubes in all SGs. Plug or repair defective tubes.			▷	Prompt Report to NRC per 4.9.C.3

* $S = 3 \frac{N}{n} \%$ where N is the number of steam generators in the plant, and n is the number of steam generators inspected to satisfy the full length inspection criteria of 4.9.A.1.

Category C-1: Less than 5% of the total tubes inspected are degraded tubes and none of them is defective.

Category C-2: One or more of the total tubes inspected is defective but not more than 1% of the tubes inspected or between 5 and 10% of the tubes inspected are degraded tubes.

Category C-3: More than 10% of the total tubes inspected are degraded or more than 1% of the tubes inspected are defective.

ATTACHMENT II TO IPN-87-006
SAFETY EVALUATION

NEW YORK POWER AUTHORITY
INDIAN POINT 3 NUCLEAR POWER PLANT
DOCKET NO. 50-286

I. Description of Change

This revision to the Indian Point 3 Technical Specifications seeks to permit the resumption of power operations without prior NRC approval subsequent to a steam generator inspection requiring the inspection of all tubes per the provisions of Table 4.9-1 of the Technical Specifications. In addition, the definition of Tube Inspection is being modified and historical references to the tube plugging limit of 63% degradation, which was valid for Cycle 4 only, are being deleted. The proposed change will also revise Section 4.9 to reflect new information concerning wastage-type defects. Table 4.9-1 is also being revised to reflect that a defective tube may be repaired by plugging or sleeving.

II. Evaluation of Change

- a) The proposed Technical Specifications will delete the provision for NRC approval prior to resuming power operation subsequent to a steam generator inspection whose results have been classified as Category C-3 requiring the inspection of all tubes. Technical Specification 4.9.C.3 will be revised to require notification of the NRC prior to resumption of power operation from a steam generator inspection requiring the inspection of all tubes. The proposed Technical Specifications are consistent with the Westinghouse Standard Technical Specifications which require the prompt notification of Category C-3 results but do not include a requirement for NRC approval prior to resumption of power operation.

This change does not impact the extent of the steam generator tube inspections nor does it impact the corrective measures to be taken upon the identification of a defective tube. The Authority will plug or sleeve the identified defective tubes prior to commencement of power operation, regardless of the requirements for prior NRC approval. Hence, the level of safety will not be degraded by deleting the requirement of NRC approval prior to the resumption of power operation.

- b) The Indian Point 3 Technical Specifications currently require sample inspections from the hot leg tubesheet to the top support on the cold leg side. In light of the degradation on the cold leg side, full length tube inspections will be performed for the initial 3% sample defined in Table 4.9-1. Additional sample inspections may be limited to a partial length inspection concentrating on those locations where degradation has been found. This

definition of tube inspection is that recommended by Generic Letter 85-02, "Staff Recommended Actions Stemming from NRC Integrated Program for the Resolution of Unresolved Safety Issues Regarding Steam Generator Tube Integrity."

- c) For Cycle 4 only, the plugging limit was increased to 63% degradation from 40% degradation. Upon completion of Cycle 4 operations the tube plugging limit reverted to 40%. The historical references to the 63% tube plugging limit in Section 4.9 are being deleted for the sake of clarity.
- d) Wastage type defects were identified during the Cycle 4/5 refueling outage steam generator inspection. Based on an evaluation of two tubes pulled from a steam generator during the Cycle 4/5 refueling outage, the maximum area of localized wastage had an axial extent of .85 inches and a circumferential extent of .5 inches. Assuming this maximum area of localized wastage, a Regulatory Guide 1.121 plugging margin analysis determined the maximum allowable tube wall loss to be 72% (28% remaining wall). Hence, the 40% plugging limit results in a 32% safety margin. This 32% safety margin consists of a 10% margin for measurement uncertainty and a 22% margin for corrosion allowance.
- e) The Basis for Section 4.9 has been revised and updated to provide a current rationale for Technical Specification 4.9. Historical information was either deleted or updated. The Basis provisions addressing wastage-type defects have been revised to reflect information acquired during the steam generator inspection performed during the Cycle 4/5 refueling outage and subsequent analyses.

III. No Significant Hazards Evaluation

In accordance with requirements of 10 CFR 50.92, the application has been determined to involve no significant hazards based upon the following:

- (1) Does the proposed license amendment involve a significant increase in the probability or consequences of an accident previously evaluated?

Response

The proposed Technical Specification change is an administrative change. Since the proposed changes will not impact plant power operation,

the changes do not involve a significant increase in the probability or consequences of an accident previously evaluated.

- (2) Does the proposed license amendment create the possibility of a new or different kind of accident from any accident previously evaluated?

Response

This proposed amendment will not vary or affect any plant operating condition or parameter. Hence, the possibility of a new or different kind of accident from any accident previously evaluated is not created.

- (3) Does the proposed amendment involve a significant reduction in a margin of safety?

Response

The proposed change seeks, in part, to delete the requirement for NRC approval prior to resumption of power operation from an outage which included Category C-3 steam generator inspection results requiring the inspection of all tubes. The Authority will still be required to plug or sleeve identified defective tubes prior to resumption of power operation. As such, the margin of safety will not be reduced.

The proposed change also seeks to revise the definition of Tube Inspection. In light of the degradation on the cold leg side, the scope of the tube inspection will be expanded to a full length inspection for the initial 3% sample. Additional sample inspections may be limited to a partial length inspection concentrating on those locations where degradation has been identified. This revised definition of tube inspection will ensure the continued inspection of the cold leg side, where degradation has been previously identified. As such, the margin of safety will not be reduced.

The proposed change also seeks to revise the Technical Specifications to reflect the applicable plugging limit of 40% and to reflect the presence of wastage-type defects. Assuming the identified maximum area of localized wastage, a Regulatory Guide 1.121 plugging margin analysis determined the maximum

allowable tube wall loss to be 72% (28% remaining wall). Therefore, the 40% plugging limit results in a 32% safety margin. This 32% safety margin consists of a 10% margin for measurement uncertainty and a 22% margin for corrosion allowance. During Cycle 4 operation the applicable plugging limit of 63% resulted in a total safety margin of 12%. Hence the combined effect of reverting to the 40% tube plugging limit and presence of wastage type defects does not involve a reduction in a margin of safety but rather it results in an increase in a margin of safety.

The Authority considers that the proposed changes can be classified as not likely to involve significant hazards considerations since the proposed changes constitute "a purely administrative change to Technical Specifications." (Example (i), Federal Register, Vol. 48, No. 67, dated April 6, 1983, page 14870).

IV. Impact of Change

This change will not adversely impact the following:

- ALARA Program
- Security and Fire Protection Programs
- Emergency Plan
- FSAR or SER Conclusions
- Overall Plant Operations and the Environment

V. Conclusion

The incorporation of these changes: a) will not increase the probability nor the consequences of an accident or malfunction of equipment important to safety as previously evaluated in the Safety Analysis Report; b) will not increase the possibility for an accident or malfunction of a different type than any evaluated previously in the Safety Analysis Report; c) will not reduce the margin of safety as defined in the basis for any Technical Specifications; d) does not constitute an unreviewed safety question; and e) involves no significant hazards considerations as defined in 10 CFR 50.92.

VI. References

- a) IP-3 FSAR
- b) IP-3 SER
- c) Regulatory Guide 1.121, "Bases For Plugging Degraded PWR Steam Generator Tubes"
- d) Safety Evaluation for Indian Point Unit 3 Plugging criteria, dated September 4, 1985