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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 estimated% of the tube wall thickness affected or removed by degradation.
- e. Defect is a degradation of such severity that it exceeds the plugging limit. A tube containing a defect is defective.
- f. Plugging Limit is the degradation depth at or beyond which the tube must be removed from service. This is considered to be a degradation depth of 40%.

g. Tube Inspection is an inspection of the hot leg side tube length. To the extent practical, this shall include the length from the point of entry around the U-bend to the top support of the cold leg.

2. Sample Size and the Number of Steam Generators to be Inspected.

- a. At the first inservice inspection subsequent to the pre-service inspection, six percent of the tubes in each of two steam generators shall be inspected as a minimum.
- b. At the second inservice inspection subsequent to the pre-service inspection, twelve percent of the tubes in one of the two steam generators not inspected during the first inservice inspection shall be inspected as a minimum.
- c. At the third inservice inspection subsequent to the pre-service inspection, twelve percent of the tubes in the steam generator not inspected during the first two inservice inspections shall be inspected as a minimum.
- d. Fourth and subsequent inservice inspections may be limited to one steam generator on a rotating schedule encompassing 3 N% of the tubes (where N is the number of steam generators in the plant) if the results of the first or previous inspections indicate that all steam generators are performing in a like manner.
- e. Under some circumstances, the operating conditions in one or more steam generators may be found to be more severe than those in other steam generators. Under such circumstances, the sample sequences shall be modified to inspect the steam generator with the most severe conditions.
- f. Unscheduled inspections shall be conducted on the affected steam generator(s) in accordance with the first sample inspection specified in Table 4.13-1 in the event of primary-to-

secondary tube leaks (not including leaks originated from tube-to-tube sheet welds) exceeding technical specifications, a seismic occurrence greater than an operating basis earthquake, a loss-of-coolant accident requiring actuation of engineered safeguards, or a major steam line or feedwater line break.

3. Extent and Result of Steam Generator Tube Inspection

- a. The minimum sample size, inspection result classification, and the corresponding action required are specified in Table 4.13-1.
- b. Tubes for the inspection should be selected on a random basis except where experience in similar plants with similar water chemistry indicates critical areas to be inspected.
- c. The first sample inspection subsequent to the preservice inspection shall include all nonplugged tubes that previously had detectable wall penetration ( $> 20\%$ ) and shall also include tubes in those areas where experience has indicated potential problems.
- d. The second and third sample inspections in Table 4.13-1 may be limited to the partial tube inspection only, concentrating on tubes in the areas of the tube sheet array and on the portion of the tube where tubes with imperfections were found.
- e. In all inspections, previously degraded tubes must exhibit significant ( $> 10\%$ ) further wall penetration to be included in the percentage calculation for the result categories in Table 4.13-1.

#### 4. Interval of Inspection

- a. Subsequent to the first inservice inspection of steam generators, completed during the first refueling outage, inservice inspections shall be performed not less than 12 or more than 24 calendar months after the previous inspection.
- b. If the results of two consecutive inspections, not including the preservice inspection, all fall in the C-1 category specified in Table 4.13-1, the frequency of inspection may be extended to 40-month intervals. Also, if it can be demonstrated through two consecutive inspections that previously observed degradation has not continued and no additional degradation has occurred, a 40-month inspection interval may be initiated.

#### B. Corrective Measures

All leaking tubes and defective tubes shall be plugged.

#### C. Reports

The results of these steam generator tube inservice inspections shall be included in the Annual Operating Report for the period in which the inspections were completed.

#### Basis

Inservice inspection of steam generators is essential in order to monitor the integrity of the tubing and to maintain surveillance in the event that there is evidence of mechanical damage or progressive

deterioration due to design, manufacturing errors, or chemical imbalance. 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.

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. Following changeover to all volatile treatment (AVT) in March, 1975, a baseline inspection was conducted prior to resumption of power operation.

Wastage-type defects are unlikely with the all volatile treatment (AVT) of secondary coolant. However, even if this type of defect occurs, the steam generator tube surveillance specification will identify steam generator tubes with degradation having a depth greater than 40% of the 0.050 inch tube wall thickness as being unacceptable for continued service. The results of steam generator tube burst and collapse tests have demonstrated that tubes having wall thickness not less than 0.025 inch have adequate margins of safety against failure due to loads imposed by normal plant operation and design basis accidents.

A 10% allowance for tube degradation that may occur between inservice tube examinations added to the 40% tube plugging limit provides an adequate margin to assure that SG tubes acceptable for operation will not have a minimum tube wall thickness less than the acceptable 50% or normal tube wall thickness (i.e., 0.025 in) during the service lifetime of the tubes.

Steam generator tube inspections of operating plants have demonstrated the capability to reliably detect wastage type defects that have penetrated 20% of the original 0.050 inch wall thickness.

This program for inservice inspection of steam generator tubes is based on Regulatory Guide 1.83, Revision 1, dated July 1975.

TABLE 4.13-1  
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 defective tubes.  Inspect additional 1 S tubes in this SG.	C-1			▷	Go to power.
			C-2	Plug defective tubes. Inspect additional 2 S tubes in this SG.	C-1	▷	
			C-2		C-2		Plug defective tubes. Go to power
			C-3		C-3		Go to first sample. C-3 action
	C-3	Inspect all tubes in this SG. Plug defective tubes.  Inspect 2 S tubes in each other SG.	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 defective tubes.			▷

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

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 B

APPLICATION FOR AMENDMENT TO  
OPERATING LICENSE

SAFETY EVALUATION

Consolidated Edison Company of New York, Inc.

Indian Point Unit No. 2

Docket No. 50-247

December 3, 1976

## SAFETY EVALUATION

This Application is submitted in accordance with the letter dated September 21, 1976 from Mr. Robert W. Reid to Mr. William J. Cahill, Jr. The proposed changes to the Indian Point Unit No. 2 Technical Specifications, contained in Attachment A to this Application, would add specific surveillance requirements for the steam generator tube inservice inspection program based on Regulatory Guide 1.83, Revision 1, dated July 1975. The addition of the proposed section 4.13 would further assure the continued integrity of the steam generator tubes.

The proposed changes do not in any way alter the safety analyses performed for Indian Point Unit No. 2. The proposed changes have been reviewed by the Station Nuclear Safety Committee and the Con Edison Nuclear Facilities Safety Committee. Both committees concur that these changes do not represent a significant hazards consideration and will not cause any change in the types or increase in the amounts of effluents or any change in the authorized power level of the facility.

BEFORE THE UNITED STATES  
NUCLEAR REGULATORY COMMISSION



In the Matter of )  
 )  
CONSOLIDATED EDISON COMPANY ) Docket No. 50-247  
OF NEW YORK, INC. )  
(Indian Point Station )  
Unit No. 2) )

CERTIFICATE OF SERVICE

I hereby certify that I have, this 9th day of December, 1976 served the foregoing document entitled "Application for Amendment to Operating License" dated December 3, 1976 by mailing copies thereof, first class postage prepaid and properly addressed to the following persons:

Hon. George V. Begany  
Mayor, Village of Buchanan  
Municipal Building  
Buchanan, New York 10511

Hendrick Hudson Free Library  
31 Albany Post Road  
Montrose, New York 10548

*M. Reamy Ancarrow*  
M. Reamy Ancarrow