November 9, 1984

Docket No. 50-286

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President - Nuclear Generation Power Authority of the State of New York 123 Main Street White Plains, New York 10601

Mr. J. P. Bayne, Executive Vice

Dear Mr. Bayne:

The Commission has issued the enclosed Amendment No. 50 to Facility Operating License No. DPR-64 for the Indian Point Nuclear Generating Unit No. 3. The amendment consists of changes to the Technical Specifications in response to your application transmitted by letter dated November 1, 1984, as supplemented November 6, 1984.

The amendment revises the Technical Specifications, Section 4.9.A.1.f, to change the tube plugging limit for pitting from an imperfection depth of 50% to 63%.

A copy of the related Safety Evaluation is enclosed. A Notice of Issuance will be included in the Commission's next regular monthly Federal Register notice.

Sincerely,

/s/JDNeighbors

Joseph D. Neighbors, Project Manager Operating Reactors Branch #1 Division of Licensing

Enclosures:

- 1. Amendment No. 50 to DPR-64
- 2. Safety Evaluation

cc: w/enclosures
See next page



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cc: Mr. John C. Brons Indian Point 3 Nuclear Power Plant Post Office Box 215 Buchanan, New York 10511

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Indian Point Nuclear Generating 3

- 2 -

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## UNITED STATES NUCLEAR REGULATORY COMMISSION WASHINGTON, D. C. 20555

POWER AUTHORITY OF THE STATE OF NEW YORK

# DOCKET NO. 50-286

# INDIAN POINT NUCLEAR GENERATING UNIT NO. 3

# AMENDMENT TO FACILITY OPERATING LICENSE

Amendment No. 50 License No. DPR-64

- 1. The Nuclear Regulatory Commission (the Commission) has found that:
  - A. The application for amendment by Power Authority of the State of New York (the licensee) dated November 1, 1984, as supplemented November 6, 1984 complies with the standards and requirements of the Atomic Energy Act of 1954, as amended (the Act) and the Commission's rules and regulations set forth in 10 CFR Chapter I;
  - B. The facility will operate in conformity with the application, the provisions of the Act, and the rules and regulations of the Commission;
  - C. There is reasonable assurance (i) that the activities authorized by this amendment can be conducted without endangering the health and safety of the public, and (ii) that such activities will be conducted in compliance with the Commission's regulations;
  - D. The issuance of this amendment will not be inimical to the common defense and security or to the health and safety of the public; and
  - E. The issuance of this amendment is in accordance with 10 CFR Part 51 of the Commission's regulations and all applicable requirements have been satisfied.
- Accordingly, the license is amended by changes to the Technical Specifications as indicated in the attachment to this license amendment, and paragraph 2.C.(2) of Facility Operating License No. DPR-64 is hereby amended to read as follows:

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# (2) Technical Specifications

The Technical Specifications contained in Appendices A and B, as revised through Amendment No.50 , are hereby incorporated in the license. The licensee shall operate the facility in accordance with the Technical Specifications.

3. This license amendment is effective as of the date of its issuance.

FOR THE NUCLEAR REGULATORY COMMISSION 2010 0110

Steven A. Varga, Chief Operating Reactors Branch #1 Division of Licensing

Attachment: Changes to the Technical Specifications

Date of Issuance: November 9, 1984

- 2 -

# ATTACHMENT TO LICENSE AMENDMENT NO. 50

# FACILITY OPERATING LICENSE NO. DPR-64

# DOCKET NO. 50-286

Revise Appendix A as follows:

Remove Pages	Insert Pages
4,9-1	4.9-1
4.9-6	4.9-6

# 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. <u>Imperfection</u> is an exception to the dimension, finish, or contour required by drawing or specification.
  - b. <u>Degradation</u> means a service-induced cracking, wastage, wear or corrosion.
  - c. <u>Degraded Tube</u> is a tube that contains imperfections caused by <u>degradation</u> large enough to be reliably detected by eddy current inspection. This is considered to be 20% degradation.
  - d. <u>\* Degradation</u> is an estimate \* of the tube wall thickness affected or removed by <u>degradation</u>.
  - e. <u>Defect</u> is an imperfection of such severity that it exceeds the <u>plugging limt</u>. A tube containing a <u>defect</u> is defective.
  - f. <u>Tube Plugging Limit</u> 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%. However, for the purposes of identifying defective tubes due to pitting between the tubesheet and first support plate of the cold leg side of all four steam generators, the tube plugging limit shall be an imperfection depth of 63%.
  - g. <u>Sleeve Plugging Limit</u> 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.

4.9-1

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% of normal tube wall thickness (i.e., 0.025 in) during the service lifetime of the tubes. This minimum wall thickness is not applicable to pitted tubes in the cold leg region for Cycle 4.

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.

The definition of tube plugging limit also provides that an interim tube imperfection depth of 63% shall be applied for the remainder of Cycle 4, to tubes which have experienced pitting on the cold leg side of a steam generator between the tube sheet and first support plate.

This 13% increase in allowable tube degradation from the 50% allowed for pitted tubes in Amendment 47 is acceptable since burst tests, corrected to 600°F, of representative tubing with various flaw types, lengths and wall thicknesses, have demonstrated that 25% remaining wall thickness for all flaw lengths is adequate to withstand the max  $\Delta P$  (2650 psi) calculated to occur during faulted conditions. The 63% plugging limit incorporates a 12% margin, which includes a 10% margin for measurement inaccuracies and a 2% safety margin for corrosion allowance.

The definition of sleeve plugging limit provides that a sleeve imperfection depth of 40% (.0156 inch) or greater shall be applied to tube sleeves.

The definition of tube inspection also provides that the steam generator inspection conducted as a result of the March 24, 1982 tube leak may be performed on the cold leg sides up to the second support plate on that side except that in at least one steam generator the inspection shall extend up the sixth tube support plate on the cold leg side. This is acceptable since the leakage which initiated this inspection occurred on the cold leg side and since a 100% inspection of the cold leg side of one steam generator up to the sixth tube support plate on that side revealed negligible defects. In addition, a 100% inspection of the hot leg sides of two steam generators up to the sixth tube support plate revealed negligible defects.

4.9-6

Amendment No. 50



## UNITED STATES NUCLEAR REGULATORY COMMISSION WASHINGTON, D. C. 20555

# SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION RELATED TO AMENDMENT NO. 50 TO FACILITY OPERATING LICENSE NO. DPR-64 POWER AUTHORITY OF THE STATE OF NEW YORK INDIAN POINT NUCLEAR GENERATING UNIT NO. 3

# DOCKET NO. 50-286

# INTRODUCTION

By letters dated November 1 and November 6, 1984, Power Authority of the State of New York (licensee) submitted an application for a license amendment consisting of a proposed change to the Technical Specifications for Indian Point Nuclear Plant Unit 3. This proposed Technical Specification change would allow operation of Unit 3 until the next refueling outage (about five months) with steam generator tubes having degradation up to 63% of the nominal wall thickness. The present Technical Specification plugging limit for pitted tubes is 50%.

## BACKGROUND

The licensee has completed a required mid-cycle eddy-current inspection which encompassed all tubes in the four steam generators, both inlet and outlet legs up to the second tube support plate and found tubes in the outlet legs which exceeded the 50% plugging limit for pitted tubes. The licensee provided technical justifications for a 63% plugging limit and for continued safe operation of Indian Point 3 until the scheduled refueling outage with tubes having pitting degradation which exceed the present 50% plugging limit.

# DISCUSSION

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In 1982/1983 Indian Point 3 plugged 376 steam generator tubes and sleeved approximately 2000 tubes which were affected by a newly discovered corrosion mechanism (pitting) on the outlet legs. The plugging and sleeving limit was established at 50% for the outlet leg pitted tubes. A licensing condition for a mid-cycle eddy-current inspection was imposed because of the 1.7% per month degradation that had been experienced prior to the sleeving and plugging in 1982/1983. The mid-cycle inspection was conducted in October 1984 and included a 200 tube sample each in the hot leg of steam generators #31 and #34 and 300 tubes each in the cold leg of steam generators #31 and #34. The inspection was expanded to 100% of the tubes in all four steam generators based on the results of the initial sample. The final results of the eddy-current inspections showing the number of tubes with varying degrees of degradation are as follows:

<u>S.G.</u>	<u>&lt; 50%</u> <u>&lt; 63%</u>		> 50%	<u>&gt; 63%</u>	TOTAL	
31 outlet 32 outlet 33 outlet 34 outlet	186 198 173 232	226 221 188 246	48 27 19 20	8 4 4 6	234 225 192 252	
	:	< 40%	<u>&gt;</u>	40%	TOTAL	
31 inlet 32 inlet		48 -		11	59 -	
33 inlet		5		2	7	
34 inlet		9		11	20	

Comparing eddy-current results from 511 cold leg tubes inspected in 1982 with those inspected in 1984; the licensee calculates an average flaw growth rate of 1.5% for nine months.

In justifying the past 50% plugging limit for defective pitted tubes the licensee submitted test data (October 18, 1982) that 25% remaining wall thickness for all tested flaw lengths (up to 2") is adequate to withstand the maximum  $\Delta$  P (2650 psi) calculated to occur during faulted conditions. By adding 10% eddy-current uncertainty and a 15% corrosion allowance (based on observed growth rates) to this minimum wall thickness of 25%, a plugging limit of 50% was appropriate.

In their 1982 submittal the licensee also indicated that a pitted tube (R22C46) removed from Indian Point 3 steam generator #31 during the Fall 1981 inspection, having a measured depth of approximately 65% and a pit diameter of, approximately .1 inch, was pressurized to 10,000 psi with slight bulging but no rupture and no leakage. This strength is comparable to a virgin (non-pitted) tube.

Conservatism in the field eddy-current data is suggested by the licensee in that during Indian Point 3's 1982 outage three pitted tubes were removed from the steam generators following eddy-current testing for nondestructive and destructive failure analysis. A comparison of the field eddy-current test and the actual lab measurement of the maximum pit depth is presented below:

	Field ECT	Lab Measurement		
R19C47	100%	100%		
R2C72	78%	70%		
R12C46	73%	60%		

- 3 -

Thus, available evidence indicated that the eddy-current tests of tubes R28C46 and R10C73 may also have over predicted the defect size and the licensee contends that the 10% eddy-current uncertainty is also conservative when establishing a plugging limit for pitted tubes.

The licensee therefore proposes that an interim tube imperfection depth of 63% be applied for the remainder of Cycle 4, to tubes which have experienced pitting on the cold leg side of a steam generator between the tubesheet and first support plate.

The 63% plugging limit incorporates a 12% margin from the 75% maximum allowable degradation. This margin includes a 10% margin for measurement inaccuracies and a 2% margin for corrosion allowance.

The licensee attributes the decrease in pitting degradation during the past nine months to continuing improvements in secondary plant water chemistry.

This trend is illustrated by comparing the following data from 1978 -82 with the data thus far in 1984. Steam generator blowdown chlorides and condensate pump discharge oxygen have been used for this comparison although other parameters show similar trends.

	78	79	80	<sup>·</sup> 81	82	83*	84
SG Blowdown 01 (ppb)	70	150	220	240	70	NĀ	51
CPD Oxygen (ppb)	23	10	22	13	13	NA	11

\*Indian Point 3 operated for only 10 days in 1983.

Plant improvements including make-up deaeration, feedwater filtration on plant startup, replacement of moisture separator reheater tube bundles as well as aggressive condenser leak detection and air inleakage reduction by the plant staff have been instrumental in achieving this improved chemistry.

At the 50% plugging limit it would be necessary to plug 114 tubes but at the 63% plugging limit only 22 tubes would be required to be plugged. The licensee estimates that 60 man rem exposure could be saved by using the 63% plugging limit.

A total of 24 tubes which exceed the 40% limit for hot leg defects will also be plugged.

### SUMMARY

Based upon our evaluation, we find that an interim 63% plugging limit for cold leg pitted tubes is acceptable until the upcoming refueling outage inspection when all tubes exceeding the present 50% plugging limit must be sleeved or plugged. The factors supporting this conclusion are based on the knowledge of the type, size and location of the tube defects, acceptable burst test results for pitted tubes, conservatism in field eddy-current data, improvements in plant chemistry and an apparent decrease in degradation rate. The technical specification limits of 0.3 gpm for primary-to-secondary leakage will ensure that prompt action be taken in the unlikely occurrence of through-wall penetration in any tube.

### EMERGENCY CIRCUMSTANCES

The NRC Project Manager was informed on October 30, 1984, of the need for the amendment and the application was submitted by letter dated November 1, 1984. We have reviewed the facts concerning this request and conclude that the licensee has made a timely submittal, that reactor startup would be delayed without NRC action, and that action by the licensee could not preclude this situation without delay of startup.

## NO SIGNIFICANT HAZARDS CONSIDERATION DETERMINATION

The Commission's regulations in 10 CFR 50.92 state that the Commission may make a final determination that a license amendment involves no significant hazards considerations if operation of the facility in accordance with the amendment would not:

- (1) Involve a significant increase in the probability or consequences of an accident previously evaluated; or
- (2) Create the possibility of a new or different kind of accident from any accident previously evaluated; or
- (3) Involve a significant reduction in a margin of safety.

The previous tube plugging limits (now being replaced by this amendment) for pitted tubes was determined by the previous corrosion rate so as to maintain the requisite minimum wall thickness. Likewise, while the lower corrosion rate now being experienced allows a higher plugging limit, the requisite minimum wall thickness during the next cycle of operation is maintained. This lower corrosion is a result of significant plant improvements in secondary water chemistry including make-up deareation, feedwater filtration, replacement of reheater tube bundles and significant improvements in condenser control.

Consequently, with no change in minimum tube wall thickness, there is no increase in the probability or consequences of an accident previously evaluated nor the possibility of a new or different kind of accident from any accident previously evaluated. In addition, the plugging limit for hot-side corrosion remains unchanged as well as the allowable leak rate. As a result there will be no significant reduction in safety margin and the steam generator integrity will be maintained.

### STATE CONSULTATION

In accordance with the Commission's regulation, consultation was held with the State of New York by telephone on November 7, 1984. The State had no comments on this action.

# ENVIRONMENTAL CONSIDERATION

This amendment involves a change in the installation or use of a facility component located within the restricted area as defined in 10 CFR Part 20. The staff has determined that the amendment involves no significant increase in the amounts, and no significant change in the types, of any effluents that may be released offsite, and that there is no significant increase in individual or cumulative occupational radiation exposure. The Commission has made a final no significant hazards considertion finding with respect to this amendment. Accordingly, this amendment meets the eligibility criteria for categorical exclusion set forth in 10 CFR Sec 51.22(c)(9). Pursuant to 10 CFR 51.22(b) no environmental impact statement or environmental assessment need be prepared in connection with the issuance of this amendment.

## CONCLUSION

We have concluded, based on the considerations discussed above, that: (1) there is reasonable assurance that the health and safety of the public will not be endangered by operation in the proposed manner, and (2) such activities will be conducted in compliance with the Commission's regulations and the issuance of this amendment will not be inimical to the common defense and security or to the health and safety of the public.

Dated: November 9, 1984

## PRINCIPAL CONTRIBUTORS:

L. Frank