SEP 19 1984

MEMORANDUM FOR: Gus C. Lainas, Assistant Director
for Operating Reactors
Division of Licensing

FROM: William V. Johnston, Assistant Director
for Materials & Qualifications Engineering
Division of Engineering

SUBJECT: INDIAN POINT 3 - STEAM GENERATOR TUBE PLUGGING TECHNICAL SPECIFICATION CHANGE (TAC #55812)

The Inservice Inspection Section of the Materials Engineering Branch has reviewed Power Authority of the State of New York's letter of September 18, 1984 regarding their proposed Technical Specifications change revising the steam generator "tube plugging limit" to allow two tubes to exhibit an imperfection depth of 55% which exceeds the present limit of 50% for pitted tubes.

Based upon our evaluation, we find that the 55% plugging limit for the two pitted tubes is acceptable until the mid-cycle outage scheduled for October 13, 1984 at which time the steam generator tubes will undergo eddy-current inspections. 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 and improvements in plant chemistry. We recommend, however, that each operator be refreshed with the procedure for shutting down the plant in the event of large primary-to-secondary leakage. Our Safety Evaluation Report is attached.

/s/

William V. Johnston, Assistant Director
Material & Qualifications Engineering
Division of Engineering

Enclosure:
As stated

cc w/enclosure:
See next page

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ENCLOSURE

REVIEW OF PROPOSED TECHNICAL SPECIFICATION CHANGES FOR INDIAN POINT UNIT 3 STEAM GENERATOR TUBE PLUGGING

INSERVICE INSPECTION SECTION

MATERIALS ENGINEERING BRANCH

Ref: Power Authority of the State of New York letter dated September 14, 1984.

1.0 Introduction

By letter dated September 18, 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 changes would allow operation of Unit 3 with 2 steam generator tubes having degradation up to 55% of the nominal wall thickness. The present Technical Specification plugging limit for pitted tubes is 50%.

2.0 Background

During the preparation of the tube inspection plan for the upcoming mid-cycle outage, it was discovered that two tubes in Steam Generator 31 had defects greater than the plugging limit of 50% as determined by the last eddy-current examination which was conducted mid-1982, and were identified as neither plugged nor sleeved. The two tubes are R28C46 and R10C73. Reanalysis of the last eddy-current inspection tubes revealed that the maximum defect depth for each tube was 54% and located above the tube sheet. Review of the records also revealed that these tubes had not been plugged or sleeved as required by the Technical Specification.

The licensee provided a technical basis for allowing continued safe operation of Indian Point 3 until the scheduled inspection outage of October 13, 1984 although the two tubes in question have degradation which exceed the 50% plugging limit.

3.0 Discussion

In justifying the past 50% plugging limit for defective 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 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.

Using the same test data the licensee indicated that the tubes in question have multiple pits with a maximum depth of 54% along lengths of .9" and accordingly, a minimum remaining wall thickness of only 13% is adequate for these two tubes to meet the same criteria by which the 50%

plugging criteria was established, i.e., that the remaining wall thickness can withstand a ΔP of 2650 psi. Therefore, by adding 10% eddy-current uncertainty and 15% corrosion allowance to the minimum wall thickness of 13%, a plugging limit of 62% (100-(10+15-13)) for these two tubes with these flaw lengths offers the same margin of safety as the tubes with plugging limits of 50% which was established without regard to flaw length.

In their 1982 submittal the licensee indicated that a pitted tube (R22C46) removed from Indian Point 3 steam generator No. 31 during the Fall 1981 inspection, having a measured pit 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 non-destructive 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%

Thus, available evidence indicated that the eddy-current tests of tubes R28C46 and R10C73 may also have over predicted the defect size.

The licensee offers the following further justification for continued safe operation of Indian Point 3.

During late 82 - early 83 the licensee conducted an extensive tube inspection and resultant tube plugging and sleeving. Approximately 400 tubes were plugged and nearly 3000 tubes were sleeved. To date, this repair program is judged as highly successful since IP-3 has operated at approximately 90% capacity for the past 8 months and has not experienced any instances of primary to secondary leakage.

Part of the explanation for the demonstrated success of the repair program may be in the continued improvement 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	81	82	83*	84
SG Blowdown Cl^-(ppb)	70	150	220	240	70	NA	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.

Finally the licensee has assessed the environmental impact of the proposed revision. The licensee concludes, based on the foregoing technical evaluations, that continued operation poses no significant hazard and no impact on the environment. If the plant was required at this time to repair the two tubes which are not leaking there is significant environmental impact. Based upon an assessment of a similar task undertaken in 1978, the estimated exposure to plug the tubes is 16.7 manrem. In addition, it is estimated that 177 cubic feet of low level rad waste will be generated by the demineralization process to clean up liquid waste generated in drain down and that 120 cubic feet of solid waste will be generated in the course of job performance. If, however, the work is performed during the scheduled mid-cycle outage it will be performed with negligible impact owing to the nature of the outage.

4.0 Conclusion

Based upon our evaluation we find that the 55% plugging limit for the two pitted tubes is acceptable until the midcycle outage scheduled for October 13, 1984 at which time the steam generator tubes will undergo eddy-current inspections. The factors supporting this conclusion is based on the knowledge of the tube, size and location of the tube defects, acceptable burst test results for pitted tubes, conservatism in field eddy-current data and improvements in plant chemistry. We recommend, however, that each operator be refreshed with the procedure for shutting down the plant in the event of large primary-to-secondary leakage.