Stephen B. Bram
Vice President

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April 20, 1989

Re: Indian Point Unit No. 2
Docket No. 50-247

Document Control Desk
US Nuclear Regulatory Commission
Mail Station P1-137
Washington, DC 20555

SUBJECT: NRC Bulletin No. 88-09, "Thimble Tube Thinning in Westinghouse Reactors"

Attachment A to this letter contains our response to the subject Bulletin in accordance to the reporting requirements laid out therein.

Our response is provided pursuant to the provisions of Section 182a, Atomic Energy Act of 1954, as amended. Should you or your staff have any questions regarding this matter, please contact Mr. Jude G. Del Percio, Manager, Regulatory Affairs.

Very truly yours,

Subscribed and sworn to
before me this 20 day
of April, 1989.

Anthony R. Arnone
Notary Public

ANTHONY R. ARNONE
Notary Public, State of New York
No. 4883047
Qualified in Westchester County
Commission Expires January 26, 1991

Attachment

cc: Mr. William Russell
Regional Administrator - Region I
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Attachment A

Response to NRC Bulletin No. 88-09
"Thimble Tube Thinning in Westinghouse Reactors"

Consolidated Edison Company of New York, Inc.
Indian Point Unit No. 2
Docket No. 50-247
April, 1989

## 1.0 History

The Indian Point 2 (IP2) plant began operation in 1973. Since then there have been approximately 93,500 hours (128 months) of operation.

The incore instrumentation system at IP2 contains 58 incore thimble tubes, 50 for moveable detectors and 8 containing fixed detectors. Due to non-operability of the eight fixed detectors, four were replaced in 1976 and four were replaced in 1978. The replacement fixed incore detectors were not connected to any plant instrumentation nor were these required by the plant operators. The replacement fixed incore detectors also became non-operational and have since been capped at the seal table. (The non-operability of the fixed detectors was due to the detectors, not the surrounding thimble tube material.) All the 50 moveable detector thimble tubes are the original tubes; none have been replaced. There has never been a leak in a thimble tube at IP2.

The 50 moveable detector thimble tubes are made of 316 stainless steel with a .386" outer diameter and a .059" wall thickness. These tubes are larger in diameter and have a greater wall thickness than most other thimble tubes in Westinghouse plants. IP2 has continued to provide maintenance throughout plant operation on the seal table and associated thimble tubes. This maintenance has included thimble tube cleaning and high pressure seal refurbishment. In 1986 the first thimble tube (the only one to date) became blocked and was unable to be used. This blockage was cleared during the 1987 refueling outage.

## 2.0 Thimble Tube Inspection Program

In 1986, due to the occurrence of thimble tube wear at other plants, Con Edison evaluated the need for an inspection of thimble tubes at IP2. In 1987, eddy current was chosen as the inspection methodology and a decision was made to inspect the thimble tubes during the 1989 refueling outage. In the meantime, NRC issued Bulletin 88-09 on July 26, 1988, which requested (Actions Requested 2.d) inspection of thimble tubes prior to restart from the next cold shutdown that is of sufficient duration. The 1989 refueling outage, which commenced on March 18, 1989, was the first outage of sufficient duration to perform the thimble tube inspection. This inspection was performed on March 22, 1989.

### 2.1 Wear Acceptance Criterion

The thimble tube wear acceptance criterion is based on percent through-wall loss. Westinghouse performed an analytical assessment for allowable wall loss using a finite element analysis to evaluate the effects of mechanical wear (wall loss) on the IP2 thimble tubes. The analysis model used the thimble tube material and dimensions, appropriate wear scar configuration and system design pressure.

The results of the analytical modeling demonstrated an acceptable maximum wall loss of 65%. This allowable percent wall loss was reduced to 60% to account for uncertainties in the analysis and in the inspection technique. Eddy current inspection generally has an accuracy of between ±5% and ±10%. In order to further account for uncertainties, with regard to the data, the acceptable maximum wall loss was reduced to 50%. The 50% criterion was used for the determination of acceptability of a thimble tube for continued use during operation. Any thimble tube which showed a 50% wall loss or greater, based on the eddy current inspection, would require capping or replacement.

In addition to determining a maximum wall loss, criteria were established for other action levels, below the 50% criterion, for the 1989 inspection. Since there was no previous data on thimble tube wear rates at IP2, a conservative wear rate was assumed. The other action levels identified were repositioning of the thimble tubes (relocation of wear area) and no action required. The determination made is shown below:

Table 2.1

| Planned Inspection | 15 Months of Operation | 30 Months of Operation |
|---|---|---|
| Cap/Replace | WL $\geq$ 50% | WL $\geq$ 50% |
| Reposition | 50% $>$ WL $\geq$ 45% | 50% $>$ WL $\geq$ 40% |
| No Action Required | WL $<$ 45% | WL $<$ 40% |

The values given for the next planned inspections at 15 and 30 months can be used to linearly interpolate or extrapolate to obtain values for time intervals not listed.

The thimble tube inspection program will provide IP2 specific data for use in projecting wear rates. The Westinghouse Owners Group (WOG) has initiated a study to refine plant criteria for measuring, predicting and dealing with thimble tube wear. This WOG study is due to be completed by the end of 1989. This additional information will be factored into the IP2 thimble tube inspection program.

## 2.2 Inspection Results

On March 22, 1989, an eddy current inspection of the incore thimble tubes was conducted. The inspection was performed by Cramer and Lindell Engineers, an experienced eddy current inspector of incore thimbles. In addition to the quality assurance program of Cramer and Lindell, Con Edison quality assurance personnel monitored and reviewed the Cramer and Lindell procedures and inspection.

All 50 moveable incore thimble tubes were inspected using the eddy current technique, of these 43 indicated no wall loss, 7 indicated varying degrees of measurable wall loss. The results and the wear location are listed below:

Table 2.2

| Maximum Estimated Wall Loss-Percent | Wear Location |
|---|---|
| 10 | Lower Core Plate |
| 15 | Lower Core Plate and Core Support Forging |
| 16 | Lower Core Plant |
| 18 | Lower Core Plate |
| 19 | Lower Core Plate |
| 19 | Lower Core Plate |
| 35 | Near Core Support Forging |

2.3 Inspection Frequency

The inspection frequency was determined based upon extrapolation of the time intervals in Table 2.1 for the "No Action Required" limits and the maximum measured wall loss of 35% from Table 2.2. This results in an interval for the next required inspection of just under 45 months of additional operation.

This inspection frequency will be re-evaluated based on the WOG study results due at the end of 1989.