Con Edison
Consolidated Edison Company of New York, Inc.
Indian Point Station
Broadway & Bleakley Avenue
Buchanan, New York 10511-1099

January 22, 1988

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

Document Control Desk
U. S. Nuclear Regulatory Commission
Washington, DC 20555

SUBJECT: Steam Generator Tube Inservice Inspection Program
1987 Inspection Program Results

The results of steam generator tube inspections as conducted at Indian Point Unit No. 2 (IP-2) during the recently concluded refueling outage are reported in Attachment I to this letter pursuant to IP-2 Technical Specification 4.13. The inspection program was described in our July 20, 1987 letter and approved by NRC by letter dated October 6, 1987. Additional information on the program was transmitted via a letter dated October 30, 1987.

Based upon the results of the most recent inspections, we have concluded that the next steam generator tube examinations should be conducted at the time of the next refueling outage. We request that you review the enclosed report, and approve our proposed examination schedule in accordance with Technical Specification Section 4.13.C.5

Should you or your staff have any questions, please contact us.

Very truly yours,

Stephen Bram
Vice President
Nuclear Power

Attachment

8802030145 880122
PDR ADOCK 05000247
Q PDR

A047
1/1

cc: Mr. William Russell
Regional Administrator - Region I
U. S. Nuclear Regulatory Commission
631 Park Avenue
King of Prussia, PA 19406

Ms. Marylee M. Slosson, Project Manager
Project Directorate I-1
Division of Reactor Projects I/II
U. S. Nuclear Regulatory Commission
Washington, DC 20555

Senior Resident Inspector
U. S. Nuclear Regulatory Commission
P.O. Box 38
Buchanan, NY 10511

ATTACHMENT I

Steam Generator Examination Program and Results
1987 Refueling Outage

Consolidated Edison Company of New York, Inc.
Indian Point Unit No. 2
Docket No. 50-247
January 22, 1988

1. Examination Program Description

Details of the steam generator tube inservice examination program planned for IP-2's eighth refueling outage were submitted to the NRC by Con Edison letter dated July 20, 1987.

NRC approval of the program was received by letter dated October 6, 1987. This NRC letter requested additional information, which we transmitted in our October 30, 1987 letter.

The scope, results and conclusions of our steam generator tube inservice examination program, as conducted during the eighth refueling outage just completed are discussed below.

2. Scope of the Examination

a. Steam Generator Tube Eddy Current Examination

One hundred percent of the tubes in service in the four steam generators were eddy current examined from the tubesheet to the first tube support plate on both the hot-leg and cold-leg sides.

Selected tubes in the hot-legs and cold-legs of Steam Generators 21, 22, 23 and 24 were further eddy current examined for both dents and defects. The selection of these tubes was based primarily on the results obtained from inspections during earlier outages. The examinations were performed at 10, 200, 400 and 600 KHz.

Examination was conducted from the hot-leg side of the channel head. Tubes identified as "hot-legs" were examined from the tube sheet, around the U-bend, to the uppermost support plate on the cold-leg side. Tubes identified as "cold-legs" were examined full-length from tubesheet to tubesheet.

A standard 700 mil or 720 mil diameter eddy current probe was used to perform the eddy current testing. If any tube did not permit passage of this standard 700 mil probe, the tube was eddy current tested with a 610 mil probe. If any tube did not permit passage of the 610 mil probe, it was plugged. Furthermore, the tubes immediately adjacent to any tube that did not pass the 610 mil probe were subjected to eddy current examination.

Identification of the hot-leg and cold-leg tubes in Steam Generators 21, 22, 23 and 24 which were eddy current examined for dents and defects are given in Tables 1, 2, 3, and 4. In Steam Generator 21, 766 tubes, or 24.8 percent of the active (in service) tubes, were examined. In Steam Generator 22, 736 tubes, or 24.5 percent of the active tubes, were examined. In Steam Generator 23, 637 tubes, or 20.5 percent of the active tubes, were examined. In Steam Generator 24, 662 tubes, or 21.7 percent of the active tubes, were examined.

In each steam generator, the eddy current examination from the hot-leg included tubes in the patch plate and peripheral "hard spot" areas, a sample of tubes in the interior section of the bundle, and all active tubes in Rows 2 and 3. Tubes in Row 1 were not examined because these tubes in the four steam generators were plugged during construction.

b. Flow Slot and Lower Support Plate Inspections

Using the hand holes above the tubesheet on the four steam generators, visual and photographic examinations of the flow slots in the lower tube support plates were made. Where feasible, higher support plates were also photographed through the flow slots in the lower support plates.

Using the "hillside" inspection ports in Steam Generators 22 and 23, visual and photographic examinations were made of the flow slots in the uppermost support plates.

c. Secondary Side Examination

A video camera was passed around the annulus between the tube bundle and the shell, and down the tube lane between the hot-legs and cold-legs to search for foreign objects in the steam generators.

d. Steam Generator Sludge Analysis

The sludge removed from the steam generator tube sheets during lancing operations was sampled and chemically analyzed.

e. J-Tubes Examination

Ultrasonic examination of selected J-tubes from Steam Generator 22 was performed to determine whether any unusual wear patterns or metal loss has occurred.

3. Results of Examination

a. Results of the Tube Examination

A total of 146 tubes with eddy current indications were left in service in 1986. In 1987, the indications were not found in 28 of these. In 45 of these tubes the indications were reported to be larger than reported in 1986. In 62 of these tubes the indications were reported to be approximately the same size (±10%) and in 11 tubes, the indications were reported to be smaller. Of the 45 tubes in which the eddy current indications were reported to be larger in 1987 than in 1986, the maximum single increase was 37%, and the average increase was 15%. Of the 39 tubes in which the indications were reported to be smaller (or to have disappeared) in 1987, the maximum single decrease was 39%, and the average decrease was 24%. Hence it is not possible to derive a "growth rate" for these indications.

The number of tubes with eddy current indications during the 1987 inspection and the distribution of the indications are listed in Table 5. Tubes with indications evaluated at 40% of the wall thickness or greater were plugged. The locations of the indications and the eddy current probe voltage of each are listed in Tables 6A through 6D.

Average dent size in the tubes in each steam generator was not substantially different from that measured during previous steam generator examinations

The number of tubes that did not permit passage of a 610 mil diameter probe and their distribution are listed in Table 7.

The number of tubes plugged this outage, tubes previously plugged, tube plugging totals, and the current percentage plugged are listed in Table 8.

b. Results of Flow Slot and Lower Support Plate Examination

The photographs taken of the lower support plate flow slots indicated essentially no change in the "hour-glassing" in the flow slots in the lower support plates in all four steam generators from that found in previous outages.

During previous steam generator examinations, photographs revealed cracks in the tube support plates at some flow slots in the steam generators. The cracks are in the ligaments between the flow slot and the first row tube holes. Examination of these flow slots during the 1987 steam generator examination program showed essentially no change in the cracks.

c. Top Support Plate Examination of Steam Generators 22 and 23

The top support plates in Steam Generators 22 and 23 were visually examined as was done in previous examinations. Examination is accomplished by utilizing a borescope inserted through the one inch diameter (nominal) "hillside port" provided in the steam generator shells. No "hour-glassing" of the flow slots in the top support plates was observed.

d. Results of Secondary Side Examination

Two new small foreign objects were observed on the secondary side of the tubesheet in the steam generators in addition to the objects observed during the previous examination. The objects could not be moved. A safety analysis, performed for these remaining objects concluded that Indian Point Unit No. 2 can safely return to power and operate with the foreign objects remaining in the steam generators until at least the next refueling outage, at which time the integrity of the steam generator tubes in the vicinity of these objects will be reassessed.

e. Sludge Analysis

Sludge was removed from each of the steam generators by lancing. Quantities of sludge removed are listed in Table 9. The sludge consisted of approximately 57% iron, 33% copper, and 10% insolubles.

4. Conclusions

The 1987 steam generator tube inservice examination demonstrates that the Indian Point Unit No. 2 steam generators are acceptable for continued service at full power.

Based on the results of this examination, the next steam generator examination has been scheduled for the next refueling outage, which is currently planned for the spring of 1989.

This scheduling for the next examination is appropriate for the following reasons:

- Our experience with steam generator tubes has been good. Since the initial operation of Indian Point Unit No. 2, there have been only seven instances of primary-to-secondary leakage, which in all cases has been very small. One leak occurred in the first quarter of 1975. The leak was in one tube near the tubesheet in Steam Generator 22. The second leak occurred in the fourth quarter of 1976. The leak was in two tubes near the top tube support plate in Steam Generator 24. The third leak occurred in Steam Generator 22 during the second quarter of 1979. Due to its extremely small size (i.e., 0.06 gallons per day), testing did not identify the exact location of the leak, but the leaky tube was included in those preventively plugged. The fourth leak occurred in two tubes on the cold-leg in Steam Generator 23 during startup hydrostatic testing in April 1981, and the fifth leak occurred in another cold-leg tube in Steam Generator 23 after a turbine trip in August 1981. The sixth leak occurred in a tube on the hot-leg in Steam Generator 22 in February 1984. The seventh leak occurred in one tube on the hot-leg of Steam Generator 23 during startup hydrostatic testing in February 1986.

- In 1978 we plugged tubes which did not pass a 610 mil probe. Profilometry was used as an added examination technique during the 1980, 1982 and 1984 examinations. If the maximum strain was found to be acceptable in tubes which did not pass a 610 mil probe, they continued in service. Profilometry was not performed in 1986 and 1987; we plugged tubes which did not pass a 610 mil probe including those previously left in service based on profilometry. No onset of increased tube degradation accompanied by tube leaks occurred when the unit was returned to service following any of the refueling/maintenance period steam generator examinations.

- During the 1987 examination, tubes in which eddy current signals indicated wall loss equal to or greater than 40%, and tubes which did not pass a 610 mil probe were plugged. No onset of increased tube degradation accompanied by tube leaks is expected to occur during future operation of IP2.

- Should any tube leak occur, our Technical Specification 3.1.F requires a thorough assessment of its significance and specifies applicable limiting conditions of operation.

- As an additional conservatism we have voluntarily updated our tube leak assessment program to track detectable leaks at incipient stages to assure that any sudden increases will be properly analyzed and appropriate mitigative action taken.

TABLE 1-A

HOT-LEG TUBES EDDY CURRENT EXAMINED
STEAM GENERATOR NO. 21

ROW	COLUMN	NO. OF TUBES
2	2-7,9-46,48-77,79-84,87-90,92	85
3	1-76,79-92	90
4	1,2,23,27,28,45,50,77,78,91,92	11
5	1,2,22,24-26,29,44,46,49,51,91,92	13
6	1,2,24,26,28,45,50,51,63,64,67,91,92	13
7	1-5,24,25,28,30,34,44,46,56,62, 88,90,91,92	18
8	1-5,23,25-27,29,33,35,44,47,49-51,55 57,88-92	24
9	2-5,32,34,43,47,52,56,63,64,67,88, 90,91	16
10	2-5,29,33,39,41,44,46,49-51,56,87, 89,90,91	18
11	2-5,28,30,39,42,44,46,87,88,89,90,91	15
12	2-5,29,35,37,40-42,45,47,51,86,88, 90,91	17
13	3-5,34,36,38,41,43,45,47,87,89,90	13
14	3,5,6,35,37,38,42,46,87,90	10
15	6-8,37,39,46,51,88,89	9
16	6-8,36,39,45,47,88	8
17	4,5,24,39,41,43,46,88,89	9
18	5,6,23,25,31,40,42,44,51,87,88	11
19	5,6,87,88	4
20	5,6,39,87,88	5
21	6,7,15,18,21,24,27,30,33,42,45,48, 51,86,87	15
22	7,8,31,33,38,40,85,86	8
23	7,8,32,39,44,46,85,86	8
24	8,9,84,85	4
25	8,9,32,60,84,85	6
26	9,10,31,33,36,41,59,61,83,84	10
27	10,11,32,35,37,40,42,51,82,83	10
28	11-17,36,76-81	14
29	12-17,76-82	13
30	12-17,51,76-81	13
31	15-17,76-78	6
32	15-18,39-54,76-78	23
33	15-17,19,39,54,76-78	9
34	16,18,39,40,53,54,76,77	8
35	18,39,40,53,54,75,76	7

TABLE 1-A (continued)

36	19,20,24,25,27-54,73,74	34
37	20,21,23-54,72,73	36
38	21,22,24,26-54,71,72	34
39	23,24,39,40,53,54,69,70	8
40	25-28,39,40,53,67,68	9
41	27,28,39,40,53,54,62-66	11
42	29-50,53-64	34
43	32-37,39-42,53-61	19
44	35-40,42-58	23
45	40-54	15
	Total Number of Hot-Leg tubes	766

TABLE 1-B

COLD-LEG TUBES EDDY CURRENT EXAMINED
STEAM GENERATOR NO. 21

ROW	COLUMN	NO. OF TUBES
7	1-5,88,90,91,92	9
8	5,88,91,92	4
9	5,88	2
10	2,3,5,90,91	5
11	2,3,5,89,90,91	6
12	90,91	2
18	6	1
29	13	1
31	16	1
33	16,39	2
36	24,25,27,28,29,30,31,35,36,37,38,39, 42,43,44,45,48,49,50,51,52	21
37	24-27,30,32,34-44,46,48-52	23
38	24,26-30,36-46,49-52	21
39	23,40,53,54	4
40	27,39,40,53	4
41	27,40,53	3
42	32-35,39,40,53,54,57-61,64	14
43	32,34,36,37,39,40,56-60	11
44	35,36,54,57,58	5
45	50,54	2
	Total Number of Cold-Leg Tubes	141

TABLE 2-A

HOT-LEG TUBES EDDY CURRENT EXAMINED
STEAM GENERATOR NO. 22

ROW	COLUMN	NO. OF TUBES
2	4,6,8,11-13,18,21,22,24-28,34-41,48, 52-57,62-74,76,77,78,80-83,85,86,89-92	55
3	1,2,3,5,6,8,9,11-14,17-22,24-30,34-45, 48-52,54-57,59,60,62-92	78
4	1,2,7,9,10,15,16,23,24,31,32,33,46,47, 52-54,56,58-60,63,87,91,92	25
5	1,2,8,23,25,32,33,47,51,55,58,61,62,64, 67,86,88,91,92	19
6	1,2,24,31,34,39,46,48,51,52,60,62,63,66, 68,87,91,92	18
7	1,2,32,33,38,46,48,51,53,58,60,62,67,90, 91,92	16
8	1,2-5,30,31,33,37,39,44,45,47,52,59,61, 63,88,89,91,92	21
9	2,3-5,29,31,32,38,43,46,51,60,62,88,89,91	16
10	2-5,30,31,33,45,47,88,90,91	12
11	2-5,32,46,70,90,91	9
12	2,3-5,51,69,71,88-91	11
13	3,4-6,51,70,88-90	9
14	3,4-6,24,37,87,90	8
15	3,4,5,23,25,36,38,51,88,90	10
16	4,5,24,25,37,88,89	7
17	4,5,22,23,26,88,89	7
18	5,6,21,23,25,51,69,87	8
19	5,6,22,24,28,68,70,86,87,88	10
20	6,27,29,67,69,79,85,87,88	9
21	6,7,13,15,18,21,27,29,30,36,39,42,45,48, 51,65,68,78,80,86	20
22	8,28,62,64,66,67,79,85	8
23	8,49,50,61,63,65,66,68,85,86	10
24	8,9,41,48,51,53-55,61,63,67,84,85	13
25	8,9,40,42,49,51,52,59,62,84,85	11
26	9,10,41,50,57,58,60,83,84	9
27	10,11,50,53-56,58,60,81-83	12
28	11,12-18,77-81	13
29	11,12-17,77-82	13
30	12,13-17,51,78-81	11
31	15-20,74,75,77,78	10
32	16-18,20,39-54,73,76,77,78	24
33	15-17,19,39-54,74,76,77,78	24
34	18,19,39,40,49,53,54,75,77	9
35	17,18,39,40,48,53,54,74	8

TABLE 2-A (continued)

36	19,20,39,40,49,51,53,54,73,74	10
37	20,21,23-54,73	35
38	21-54,71,72	36
39	23,24,39,40,53,54,69,70	8
40	25,26,27,39,40,41,53,54,67,68	10
41	27,28-40,54-66	27
42	29,30,34-41,53-64	22
43	33-37,40,41,52-61	17
44	36-39,41-52	16
45	39-50	12
	Total Number of Hot-Leg Tubes	736

TABLE 2-B

COLD-LEG TUBES EDDY CURRENT EXAMINED
STEAM GENERATOR NO. 22

ROW	COLUMN	NO. OF TUBES
3	58,59,60,63	4
8	2-5,88,89	6
9	3,4,5,51,88,91	6
10	2-5,88,90,91	7
11	2-5,90,91	6
12	3,4,5,51,89,90,91	7
13	51	1
18	51	1
21	15,18	2
35	17	1
36	19	1
37	23-52	30
38	23-52	30
39	23,39,40,53	4
40	27,39,40,41,54	5
41	29,30,32-40,55,56,59-66	21
42	30-32,34-41,53,55-64	22
43	33-35,37,40,55-61	12
44	37-39,43,47-50	8
45	44,47,48,50	4
	Total Number of Cold-Leg tubes	178

TABLE 3-A

HOT-LEG TUBES EDDY CURRENT EXAMINED
STEAM GENERATOR NO. 23

ROW	COLUMN	NO. OF TUBES
2	14-17,19-30,33-43,45,48-52,55-60, 64-80,82,84,85,87-92	65
3	1-31,33-54,56-92	90
4	1-14,32,55,91,92	18
5	1,2,91,92	4
6	1,2,91,92	4
7	1,2,90-92	5
8	1-4,6,70,72,88,89,91,92	11
9	2-6,46,47,71,88,90,91	11
10	2-6,46,48,87,90,91	10
11	2-6,47,86,89-91	10
12	2-7,46,48,62,87,89,90,91	13
13	3-6,47,86-90	10
14	3-6,88-90	7
15	3-6,46,87,89,90	8
16	4,5,88,89	4
17	4-6,88,89	5
18	5,6,46,87,88	5
19	5,6,87,88	4
20	5,6,36,87,88	5
21	6,7,16,19,22,25,28,31,34,37,40, 43,46,86,87	15
22	7,8,36,85,86	5
23	7,8,47,85,86	5
24	8,9,46,48,84,85	6
25	8,9,47,84,85	5
26	9,10,83,84	4
27	10,11,46,82,83	5
28	11-16,77-82	12
29	11-13,15-17,77-82	12
30	12-17,46,77-81	12
31	15-17,77,78	5
32	15-17,39-54,77,78	21
33	15-17,34,39-54,77,78	22
34	16,17,39,40,53,54,76,77	8
35	18,19,39,40,53,54,75,76	8

TABLE 3-A (continued)

36	20,39,40,53,54,73,74	7
37	21,23-54,72,73	35
38	21,22,23-54,71,72	36
39	23,24,33,35,36,39,40,53,54,69,70	11
40	25,26,31-34,36,37,40,54,67,68	12
41	27-31,33-35,37-40,53,55-66	25
42	29-36,38-40,53,55-64	22
43	32-37,39,40,53-61	17
44	35-51,52,54-58	23
45	39-53	15
	Total Number of Hot-Leg Tubes	637

TABLE 3-B

COLD-LEG TUBES EDDY CURRENT EXAMINED
STEAM GENERATOR NO. 23

ROW	COLUMN	NO. OF TUBES
8	1,2,4,6,88,89	6
9	2,3,5,46,88,90,91	7
10	2-6,90,91	7
11	2-6,90,91	7
37	23-54	32
38	23-52	30
39	35,36,39,40,53,54	6
40	31,32,34,37	4
41	27-30,35,38,64,65,66	9
42	29,32,34,35,36,40,53,57,58,64	10
43	34-37,40,53,54,56-60	12
44	41,43,46,57,58	5
	Total Number of Cold-Leg Tubes	135

TABLE 4-A

HOT-LEG TUBES EDDY CURRENT EXAMINED
STEAM GENERATOR NO. 24

ROW	COLUMN	NO. OF TUBES
2	1,3-7,10-16,18-24,26-33,43,44,45, 47-52,58,60-67,69,71-77,80,81,85,87-92	63
3	1-38,41-52,57-92	86
4	4-9,15-18,25,37-41,47,48, 51,53,55,56,82,84,85	25
5	24,26,37-41,52-54,56,57,65,82,83,86	16
6	25,26,48,63,66,84,85	7
7	1-5,25,27,44,47,49,64,65	12
8	4,5,26,27,43,45,47,48,88,89,90,91,92	13
9	2,3,5,6,26,44,46,48,51,55,88,89,90,91	14
10	2,3,4,6,88,89,90,91	8
11	2-5,7,25,27,29,45,47,49,51,55,88-91	17
12	2-5,7,23,26,28,30,46,50,88-91	15
13	3,4,6,22,24,29,88-90	9
14	3,5,23,88-90	6
15	4,5,25,46,88-90	7
16	24,26,27,28	4
17	23,25,28,65	4
18	24,27,44,45,46,64	6
19	44,46,65	3
20	45	1
21	13,16,19,22,25,28,31,34,37,40,43-47	15
22	43,44,45,46,47	5
23	43,44,45,46,47	5
24	32,33,43,44,45,46,47	7
25	9,31,43,44,45,46,47	7
26	10,11,12,32,33	5
27	12-17,46	7
28	14-17,37,77-82	11
29	12-17,36,38,39,42,76-82	17
30	12,13,16,17,37,38,40,41,43,46	10
31	15-17,39,42,76-78	8
32	15-19,39-54,76-78	24
33	15-17,20,39-54,76-78	23
34	16,19,20,39,40,53,54,76,77	9
35	19,20,39,40,53,54,75,76	8

TABLE 4-A (continued)

36	20,23,24,27-34,39,40,52-54	16
37	23-54	32
38	23-54	32
39	39,40,52,53,54	5
40	39,40,52,54,60,65	6
41	27-40,52,53,54,56-59,61-64,66	26
42	29-40,53-60,62,63	22
43	32-37,39,40,52,53-61	18
44	35,39-46,48-52,57,58	16
45	41-46,48-53	12
	Total Number of Hot-Leg Tubes	662

TABLE 4-B

COLD-LEG TUBES EDDY CURRENT EXAMINED
STEAM GENERATOR NO. 24

ROW	COLUMN	NO. OF TUBES
7	3-5	3
8	4,5,88,89,91	5
9	2,3,88,90,91	5
10	2,3,4,88,90,91	6
11	2,3,4,89,90,91	6
12	2-5,46,88-91	9
36	24,27-34	9
37	26-30,33,34,37-51	22
38	25-28,30,31,38,40,42-51	18
39	39,40,52,53,54	5
40	39,54	2
41	35,40,52-54,56-58	8
42	29,30,34-36,39,40,53-58,60,62,63	16
43	32-37,39,53,54,56-60	14
44	35,40,42-46,48,57,58	10
45	46,48	2
	Total Number of Cold-Leg Tubes	140

TABLE 5

NUMBER OF TUBES WITH EDDY CURRENT INDICATIONS
(PERCENT WALL THINNING)

S/G NO.	LEG	20-29%	30-39%	40-49%	50-59%	60-69%	>70%
21	Hot	2	2	0	0	1	0
21	Cold	25	34	9	4	3	0
22	Hot	14	8	4	0	1	0
22	Cold	26	33	4	5	2	0
23	Hot	18	19	4	3	1	0
23	Cold	3	10	6	7	6	1
24	Hot	24	9	0	0	0	0
24	Cold	16	31	13	8	8	0

TABLE 6-A

LOCATION OF INDICATIONS $\geq$ 40%
STEAM GENERATOR NO. 21

ROW	COLUMN	INCHES ABOVE TUBESHEET	VOLTAGE
4	53	0.4	0.40
6	56	2.9	0.50
8	44	0.4	1.38
8	53	7.1	0.83
8	55	4.0	1.09
8	60	3.9	0.93
9	38	12.6	0.77
9	43	12.8	0.31
10	53	7.3	0.72
10	60	7.5	0.42
11	51	9.7	1.22
11	60	7.3	0.57
15	69	0.4	0.39
16	35	11.2	0.62
17	24	1.0	0.77
26	33	2.8	0.43
28	58	0.4	0.49

TABLE 6-B

LOCATION OF INDICATIONS $\geq$ 40%
STEAM GENERATOR NO. 22

ROW	COLUMN	INCHES ABOVE TUBESHEET	VOLTAGE
5	35	1.1	0.43
6	29	1.8	0.46
6	68	1.7	0.53
7	63	3.0	0.65
9	72	1.2	0.59
11	71	1.0	0.50
11	73	0.8	0.51
13	28	4.9	0.72
18	46	11.1	0.36
18	47	6.4	0.42
19	27	1.9	0.55
20	26	0.4	0.77
26	58	2.1	0.86
27	50	1.4	0.45
28	54	6.3	1.35
42	30	0.1	0.59

TABLE 6-C

LOCATION OF INDICATIONS $\geq$ 40%
STEAM GENERATOR NO. 23

ROW	COLUMN	INCHES ABOVE TUBESHEET	VOLTAGE
7	22	0.0	1.14
7	38	2.4	0.56
7	68	1.1	0.77
8	37	2.3	0.91
8	38	2.3	0.66
8	68	0.9	0.31
9	31	1.6	1.20
9	38	1.8	1.32
9	39	2.4	0.91
10	39	2.8	0.83
11	46	9.3	0.51
12	40	1.0	0.62
12	57	4.0	0.40
14	28	2.3	0.36
14	36	3.0	0.81
15	71	0.7	0.98
15	72	0.6	0.82
18	49	4.0	0.67
20	35	2.0	0.84
20	36	1.6	0.94
20	49	3.0	0.53
21	34	0.9	0.91
21	35	1.3	0.67
21	47	5.1	0.43
22	41	2.1	0.68
25	59	1.2	0.86
28	33	0.5	1.47
28	38	1.9	0.57

TABLE 6-D

LOCATION OF INDICATIONS ≥ 40%
STEAM GENERATOR NO. 24

ROW	COLUMN	INCHES ABOVE TUBESHEET	VOLTAGE
6	24	0.8	0.98
6	25	0.7	0.96
6	40	0.8	0.76
6	66	0.2	3.93
7	20	0.4	0.77
7	38	5.7	0.83
7	67	1.4	2.27
8	27	1.1	0.86
9	20	0.9	0.72
9	24	0.6	1.03
9	48	11.5	0.97
9	57	5.8	0.70
10	26	0.8	1.16
11	23	0.5	0.99
11	24	0.6	1.05
11	59	7.8	1.07
12	30	3.2	1.35
12	70	1.0	0.70
13	69	1.0	0.55
14	55	9.4	1.16
14	68	1.9	0.69
14	69	0.7	0.91
20	47	9.8	0.64
23	60	1.7	0.57
26	34	1.3	0.35
28	37	1.1	0.80
31	40	1.4	1.10
44	52	8.7	2.82
45	49	11.7	1.43

TABLE 7

NUMBER OF TUBES PLUGGED IN 1987
BECAUSE OF TUBE RESTRICTIONS

S/G 21	3
S/G 22	0
S/G 23	11
S/G 24	5

TABLE 8

SUMMARY OF PLUGGED TUBES

S/G NO.	Plugged in 1987	Previously Plugged	Total	Percent Now Plugged
21	22*	177	199	6.1
22	16	249	265	8.1
23	39	149	188	5.8
24	34	201	235	7.2
Total	111	776	887	6.8

* Includes 2 tubes plugged with sentinel plugs because of North Anna-related concerns.

TABLE 9

SLUDGE REMOVAL IN 1987

S/G NO.	AMOUNT OF SLUDGE
21	306 lbs
22	201 lbs
23	316 lbs
24	226 lbs
Total	1049 lbs