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August 13, 2018

NL-18-063

U.S. Nuclear Regulatory Commission  
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SUBJECT: **Submission of IP2 Steam Generator Examination Program Results for the 2018 (2R23) Refueling Outage in Accordance with Technical Specification 5.6.7**  
Indian Point Unit No. 2  
Docket No. 50-247  
License No. DPR-26

Dear Sir or Madam:

Entergy Nuclear Operations, Inc. (Entergy) is providing in the Enclosure, the Indian Point Unit 2 Steam Generator Examination Program Results 2018 Refueling Outage (2R23), as required by Indian Point Unit No. 2 Technical Specification 5.6.7. Technical Specification 5.6.7 requires that a report be submitted within 180 days after the initial entry into MODE 4 following completion of an inspection performed in accordance with the Technical Specification 5.5.7, Steam Generator (SG) Program. The subject inspection was performed in April 2018 during the Spring 2018 refueling outage (2R23). The unit initially entered MODE 4 following this inspection on April 16, 2018. This inspection was the 5th in-service inspection (ISI) following SG replacement in 2000 and the 2nd of three scheduled inspections in the 2nd inspection period.

The scope of the inspection included all four steam generators, which are Westinghouse Model 44F with thermally treated Alloy 600 tubes. At the time of the inspection, the steam generators had accumulated approximately 170 effective full power months (EFPM) of operation since the first in-service inspection performed in 2002. Based upon the inspection results, all four steam generators were found to be in compliance with Condition Monitoring requirements.

There are no commitments made or revised in this letter.

AD47  
NRR

Should you have any questions concerning this letter or require additional information, please contact Mr. Robert Walpole, Manager, Regulatory Assurance at (914) 254-6710.

Sincerely,

A handwritten signature in black ink, appearing to read "Amy J. Vetter". The signature is fluid and cursive, with the first name "Amy" being more prominent than the last name "Vetter".

AJV/gd

Enclosure: Indian Point Unit 2 Steam Generator Examination Program Results 2018  
Refueling Outage (2R23)

cc: Mr. David Lew, Regional Administrator, NRC Region 1  
Mr. Richard Guzman, Senior Project Manager, NRC NRR DORL  
NRC Resident Inspector's Office  
Ms. Alicia Barton, President and CEO, NYSERDA  
Ms. Bridget Frymire, New York State Dept. of Public Service

ENCLOSURE

to NL-18-063

Indian Point Unit 2 Steam Generator Examination Program Results  
2018 Refueling Outage (2R23)

ENTERGY NUCLEAR OPERATIONS, INC.  
INDIAN POINT NUCLEAR GENERATING UNIT NO. 2  
DOCKET NO. 50-247

Indian Point Unit 2  
Steam Generator Examination Program Results  
2018 Refueling Outage (2R23)

1.0 Introduction

Indian Point Unit 2 (IP2) Technical Specification 5.6.7 Steam Generator Tube Inspection Report, requires Entergy Nuclear Northeast to submit a report to the NRC within 180 days after initial entry into Mode 4 following a Steam Generator (SG) inspection performed in accordance with Technical Specification 5.5.7, Steam Generator Program. The report shall include:

- a. The scope of inspections performed on each SG,
- b. Degradation mechanisms found,
- c. Nondestructive examination techniques utilized for each degradation mechanism,
- d. Location, orientation (if linear), and measured sizes (if available) of service induced indications,
- e. Number of tubes plugged during the inspection outage for each degradation mechanism,
- f. The number and percentage of tubes plugged to date, and the effective plugging percentage in each SG, and
- g. The results of condition monitoring, including the results of tube pulls and in-situ testing.
- h. The primary to secondary leakage rate observed in each SG (if it is not practical to assign the leakage to an individual SG, the entire primary to secondary leakage should be conservatively assumed to be from one SG) during the cycle preceding the inspection which is the subject of the report
- i. The calculated accident leakage rate from the portion of the tubes below 18.9 inches from the top of the tubesheet for the most limiting accident in the most limiting SG. In addition, if the calculated accident leakage rate from the most limiting accident is less than 1.75 times the maximum primary to secondary leakage rate, the report should describe how it was determined, and
- j. The results of monitoring for tube displacement (slippage). If slippage is discovered, the implications of the discovery and corrective action shall be provided.

Entergy performed a SG inspection in April 2018 during refueling outage 2R23. This inspection was the 5<sup>th</sup> in-service inspection (ISI) following SG replacement in 2000 and the 2<sup>nd</sup> of 3 scheduled inspections in the 2<sup>nd</sup> inspection period. The unit initially entered MODE 4 following this inspection on April 16, 2018.

IP2 is currently scheduled to permanently shut down in 2020.

## 2.0 Steam Generator Background

The original Westinghouse Model 44 SG's at IP2 were replaced in 2000 with Westinghouse Model 44F SG's. Each SG has 3214 tubes made from thermally treated Alloy 600. The nominal OD of each tube is 0.875 inch and the nominal tube wall is 0.050 inch thick. At the time of the 2018 refueling outage (2R23) at IP2, the SG's had accumulated approximately 170 effective full power months (EFPM) of operation since the first in-service inspection performed in 2002. Refueling outage 2R23 was the third of five refueling outages in the second inspection period of 96 EFPM as defined in section 5.5.7.d.2 of Technical Specifications and the second of three scheduled SG inspections within the period. The SG inspections were performed in April 2018.

Indian Point 2 Steam Generator Primary Inspection Plan

Outage	Year	Current Cycle EFPM	SG Cumulative EFPM	Inspection Period EFPM	Sequential Inspection Period	Notes
2R15	2002	20.6	20.6	N/A	N/A	First ISI
2R17	2006	16.6	59.2	38.6	First	Skip 1 outage
2R19	2010	22.2	103.2	82.6		Skip 1 outage
2R21	2014	22.4	146.9	6.3	Second	Skip 1 outage
2R23	2018	20	190.2	49.6		Skip 1 outage
2R25	2022	22 (est)	234.2 (est)	93.6 (est)		Skip 1 outage

Note: IP2 is scheduled to shutdown in 2020. The information included for 2R25 in 2022 is for information only.

## 3.0 Required Report Content - The following information is provided as required in Section 5.6.7 of IP2 Technical Specifications

### a) Scope of Inspections Performed on each SG

The inspection program, as required by the EPRI Pressurized Water Reactor (PWR) SG Examination Guidelines, addressed the existing degradation mechanisms observed in Indian Point Unit 2 in prior inspections as well as those regarded as potential degradation mechanisms. The program also addressed inspection requirements related to the implementation of the H\* alternate repair criteria (ARC) license amendment. The defined base scope implemented during 2R23 included the following:

- 33% full length bobbin inspection in each SG including any previously identified degradation which may have been left in service from a previous examination (such as AVB or TSP wear).
- 50% +POINT probe inspection of the Row 1 and 2 U-bends in tubes that were not inspected during 2R21.

- Three tube deep +POINT probe inspection of Hot and Cold Leg Top of Tubesheet periphery plus Row 1 and Row 2 tubes from +6 inches to -3 inches about TTS (foreign objects concern); this equated to approximately 22% of the tubes.
- 100% +POINT probe inspection of bobbin special interest conditions:
  - Any freespan signal with a flaw-like response (DNI, NQI, FSI, etc.).
  - Any signal at a support structure with a flaw-like response (DSI, DNI, etc.).
  - +POINT probe "boxing" of previously and newly reported potential loose parts (PLPs).
  - +POINT probe "boxing" of tubes previously plugged for foreign objects.
- 50% +POINT probe inspection of historical dents >5V at TSPs and AVBs.
- 50% +POINT probe inspection of historical freespan dings >5V.
- +POINT probe inspection of historic BLG reports within -3 inches of the hot leg TTS located on the 33% bobbin program tubes; this ensured that 67% of the BLGs within -3 inches of TTS have been inspected through the combined 2014 and 2018 inspections.
- +POINT probe inspection of all BLGs greater than 18.0 Volts and OXPs greater than 0.790 inch between TSH-3/-18.9 inches which were included in the 33% base scope bobbin tubes. Inspections performed for this purpose encompassed the full TSH-3/-18.9 inches extent within the tubesheet.
- 100% tube plug visual inspection from the primary side.
- Remote visual inspection of the hot and cold leg divider plate-to-stub runner welds, cladding in the vicinity of drain tube welds, lowest points of the channel head bowl, tube-to-tubesheet welds, channel head-to-tubesheet Z-seam weld region and general bowl inspection.

The Indian Point 2R23 SG inspection plan met or exceeded the requirements of the EPRI SG Examination Guidelines, the EPRI SG Integrity Assessment Guidelines and was aligned with the Indian Point SG Program document.

No inspections or cleaning were performed on the secondary side of the SG's during 2R23.

#### b) Degradation Mechanisms Found

AVB wear and Tube Support Plate (TSP) wear were the only existing degradation mechanisms found during the SG inspection in 2R23. 3 tubes were plugged as a result of AVB wear. The largest AVB wear indication was measured at 41% through wall in Steam Generator 23 tube Row 35 Column 59. In 2R23, two TSP wear indications were identified with 7% and 9% TW depth which did not challenge any condition monitoring criteria. No tubes were plugged for TSP wear indications.

c) Nondestructive Examination Techniques Utilized for each Degradation Mechanism

NDE Techniques used for Existing and Potential Degradation Mechanisms

Technique	EPRI ETSS	Degradation Mechanism
Bobbin	I28413 (1)	Tube wear at non-dented AVB and TSP intersections, tube wear due to foreign objects, volumetric (not corrosion related). Diagnostic technique for freespan differential signals.
Bobbin	10013.1 (2)	Tube wear at <5V dented AVB and TSP intersections
+Pt	10908.1	Tube wear at non-dented AVB intersections, tube wear at <5V dented AVB
+Pt	96910.1	Tube wear at non-dented TSP intersections, tube wear at <5V dented TSP
+Pt	21998.1	Tube wear due to foreign objects, volumetric (not corrosion related). Diagnostic technique for potential manufacturing burnish marks and absolute drift indications.
Bobbin	96010.1	Diagnostic technique for potential manufacturing burnish marks and absolute drift indications.
+Pt	I28425	Diagnostic technique for freespan differential signals.

(1) Bobbin coil Appendix I techniques include "hotter" span settings than non-Appendix I techniques that address wear mechanisms. Application of this technique produces improved detection capabilities.

(2) NDE technique is qualified for detection of axial ODSCC at dented supports and is extended for wear mechanisms. Wear of equal depth as ODSCC will produce significantly larger signal amplitudes thus resulting in wear detection at shallower depths compared to ODSCC.

d) Service Induced Indications

The only service induced indications detected during 2R23 were wear indications. Tables A-1, A-2, A-3 and A-4 of Attachment A list all service induced wear indications detected during 2R23, by Steam Generator, including which tubes were repaired and which tubes were left in service as a result of eddy current inspections.

e) Number of Tubes Plugged by Degradation Mechanism for 2R23

For this inspection two existing degradation mechanisms were present, AVB wear and TSP wear. Three tubes were plugged due to AVB wear (two tubes in SG 23 and one tube in SG 24). No tubes were plugged due to TSP wear. Additionally, three tubes were preventatively plugged and stabilized due to a possible loose part which was detected by eddy current in SG 24. The possible loose part in SG 24 was dispositioned by preemptively plugging and stabilizing 3 tubes. No associated tube wear was identified with this possible loose part indication.

Degradation Mechanism	SG 21	SG 22	SG 23	SG 24	Total
AVB Wear	0	0	2	1	3
TSP Wear	0	0	0	0	0
Possible Loose Part	0	0	0	3	3
Totals	0	0	2	4	6

f) Tubes Plugged to Date and Effective Plugging Percentage

	SG 21	SG 22	SG 23	SG 24	Total
Total Number of Tubes	3214	3214	3214	3214	12856
Tubes Plugged Pre-Service	0	0	0	2	2
Tubes Plugged in Prior Outages	20	5	13	8	46
Tubes Plugged in 2R23	0	0	2	4	6
Total Tubes Plugged to Date	20	5	15	14	54
% of Tubes Plugged to Date	0.6%	0.2%	0.5%	0.4%	0.4%

Since there are no sleeves installed, the effective tube plugging is equivalent to the percentage of tubes plugged to date.

g) Condition Monitoring Results

Mechanical wear at tube AVB and TSP supports are the only two existing degradation mechanisms with AVB wear indications observed in all four SGs and TSP wear in two SGs. None of the indications exceeded condition monitoring limits. There were a total of six tubes plugged between the four SGs during 2R23. One of the tubes plugged was required in accordance with the plant technical specification while the other five were either precautionary to address a possible loose part or necessary in order to support the Operational Assessment projections. There was no detectable SG primary-to-secondary leakage during the previous operating period. Therefore, all of the SG performance criteria were met for the two previous operating cycles. Because the tube degradation found was sized less than the condition monitoring limit, in situ pressure testing was neither required nor performed. No tube pulls were performed.

The tube plug inspections had no findings. All tube plugs were present and in the correct positions with no evidence of leakage or degradation. All primary bowls were inspected to address Westinghouse NSAL12-1, Nuclear Regulatory Commission (NRC) License Renewal Interim Staff Guidance LR-ISG-2016-01, and industry OE. There were no anomalies or degradation detected on the divider plate or tube-to-tubesheet welds during the inspections. However, cladding anomalies were identified in 22 Hotleg, 23 Hotleg, 23 Coldleg, and 24 Coldleg in the primary bowl area. All other primary bowls had no anomalies. The cladding anomalies were characterized by discoloration. An inspection of all anomalies was performed,



measurements were taken, a probing device (dental pick-like tool) was used to determine if any undercutting of the cladding was present and to determine if the cladding in the vicinity of the anomalies was tightly adhered to the channel head. None of the anomalies exhibited undercutting and all cladding in the vicinity of the anomalies was tightly adhered to the channel head. Based on a detailed engineering assessment, which included similar operating experience at other plants, the SG cladding anomalies do not present a condition which could affect SG operation and therefore, the cladding anomalies were not required to be repaired prior to plant restart.

A Condition Monitoring assessment was performed, on a defect-specific basis, to demonstrate compliance with integrity criteria by the comparison of 2R23 NDE measurements with calculated burst and leakage integrity limits. Calculated integrity limits, including consideration for appropriate uncertainties, burst and leak analytical correlations, material properties, NDE technique, and analyst uncertainties were provided in the degradation assessment report. All indications in this inspection were below the calculated integrity limits and, therefore, met integrity performance criteria requirements without further testing. Based upon the inspection results, all four SG's were found to be in compliance with Condition Monitoring requirements.

h) Primary to Secondary Leakage Rate Observed in Each SG

No primary to secondary leakage was present during the steam generator inspection interval.

i) Calculated Accident Leakage Rate

No primary to secondary leakage was present during the SG inspection interval, and no leakage is projected by the operational assessment calculations. Therefore, no leakage comparison is to be made and no administrative leakage limit to be set beyond the present SG program and plant Technical Specification requirements.

j) Results of Monitoring for Tube Displacement (Slippage)

All bobbin coil data collected was monitored for tube slippage. No tube slippage was detected.

4.0 Attachments

- A) Indian Point 2 Service Induced Indication Tables by Steam Generator
- B) Indian Point 2 Listing of Individual Tubes Plugged This Inspection
- C) Indian Point 2 Steam Generator Tubesheet Map
- D) Indian Point 2 Steam Generator Landmark Information

ATTACHMENT A

Indian Point 2 Service Induced Indication Tables by Steam Generator

Table A-1  
SG 21 Service Induced Indications – Wear – 2R23

Count	SG	Row	Column	Volts	% TW	Locn	Inch	Repair or Leave in service
1	21	20	30	0.19	9	AV1	-0.14	Leave in Service
2	21	20	30	0.23	11	AV2	-0.26	Leave in Service
3	21	26	64	0.35	17	AV2	0.05	Leave in Service
4	21	26	64	0.7	24	AV3	0.2	Leave in Service
5	21	27	38	0.29	13	AV2	0.13	Leave in Service
6	21	27	38	0.23	11	AV3	-0.14	Leave in Service
7	21	27	63	0.2	10	AV1	-0.05	Leave in Service
8	21	27	63	0.29	13	AV2	-0.14	Leave in Service
9	21	27	63	0.25	12	AV4	-0.39	Leave in Service
10	21	29	19	0.18	9	AV3	-0.13	Leave in Service
11	21	29	64	0.28	15	AV2	0.05	Leave in Service
12	21	30	37	0.2	10	AV2	-0.16	Leave in Service
13	21	30	37	0.44	17	AV3	-0.15	Leave in Service
14	21	30	37	0.26	12	AV4	0.14	Leave in Service
15	21	30	38	0.22	9	AV3	-0.14	Leave in Service
16	21	30	47	0.8	24	AV1	-0.24	Leave in Service
17	21	30	47	1.05	27	AV2	0.16	Leave in Service
18	21	30	47	1.29	30	AV3	-0.21	Leave in Service
19	21	30	47	0.35	14	AV4	0.17	Leave in Service
20	21	30	50	0.24	14	AV3	-0.07	Leave in Service
21	21	31	26	0.17	11	AV1	-0.11	Leave in Service
22	21	31	57	0.25	11	AV1	-0.11	Leave in Service
23	21	31	57	0.34	14	AV2	0.12	Leave in Service
24	21	31	57	0.23	11	AV3	0.69	Leave in Service
25	21	32	39	0.32	11	AV1	-0.12	Leave in Service
26	21	32	39	0.19	10	AV2	0.07	Leave in Service
27	21	33	29	0.29	13	AV3	0.11	Leave in Service
28	21	33	29	0.22	11	AV4	-0.15	Leave in Service
29	21	33	37	0.21	10	AV2	0.07	Leave in Service
30	21	33	38	0.35	16	AV2	-0.15	Leave in Service
31	21	33	38	0.33	16	AV3	-0.14	Leave in Service
32	21	33	38	0.2	11	AV4	-0.21	Leave in Service
33	21	33	46	0.37	15	AV1	-0.19	Leave in Service
34	21	33	46	0.23	11	AV2	0.09	Leave in Service
35	21	34	47	0.24	11	AV1	-0.19	Leave in Service
36	21	34	47	0.41	16	AV2	0.16	Leave in Service
37	21	34	47	0.28	12	AV3	-0.14	Leave in Service
38	21	34	60	0.72	22	AV1	-0.25	Leave in Service
39	21	34	60	0.46	17	AV2	-0.46	Leave in Service
40	21	34	60	0.36	15	AV4	0.47	Leave in Service
41	21	35	70	0.25	12	AV2	-0.17	Leave in Service
Count	SG	Row	Column	Volts	% TW	Locn	Inch	Repair or Leave in service

Count	SG	Row	Column	Volts	% TW	Locn	Inch	Repair or Leave in service
42	21	35	70	0.23	11	AV3	-0.14	Leave in Service
43	21	37	36	0.29	15	AV1	-0.22	Leave in Service
44	21	37	36	0.23	12	AV2	-0.12	Leave in Service
45	21	37	47	0.29	13	AV1	-0.16	Leave in Service
46	21	37	47	0.31	13	AV3	-0.16	Leave in Service
47	21	37	47	0.21	10	AV4	0.11	Leave in Service
48	21	37	54	0.3	13	AV3	-0.23	Leave in Service
49	21	38	68	0.22	10	AV2	-0.1	Leave in Service
50	21	40	57	0.25	11	AV3	-0.24	Leave in Service
51	21	40	57	0.27	12	AV4	-0.18	Leave in Service
52	21	40	67	0.27	15	AV3	-0.16	Leave in Service
53	21	41	28	0.15	8	AV1	-0.15	Leave in Service
54	21	41	39	0.2	10	AV2	-0.17	Leave in Service
55	21	41	39	0.36	15	AV3	-0.2	Leave in Service
56	21	42	40	0.31	15	AV2	0.1	Leave in Service
57	21	44	37	0.17	9	AV2	-0.08	Leave in Service
58	21	45	43	0.24	11	AV2	-0.16	Leave in Service
59	21	45	52	0.26	12	AV3	-0.16	Leave in Service
60	21	45	52	0.29	13	AV4	-0.15	Leave in Service

Table A-2  
SG 22 Service Induced Indications – Wear – 2R23

Count	SG	Row	Column	Volts	% TW	Locn	Inch	Repair or Leave in service
<b>1</b>	<b>22</b>	<b>9</b>	<b>42</b>	<b>0.21</b>	<b>7</b>	<b>05H</b>	<b>-0.63</b>	<b>Leave in Service</b>
2	22	23	54	0.38	15	AV1	-0.24	Leave in Service
3	22	23	54	0.34	14	AV2	0.09	Leave in Service
4	22	23	54	0.37	15	AV3	-0.19	Leave in Service
5	22	23	54	0.68	22	AV4	0.25	Leave in Service
6	22	30	35	0.22	10	AV1	-0.18	Leave in Service
7	22	30	35	0.22	10	AV2	-0.25	Leave in Service
8	22	30	53	0.33	15	AV1	-0.27	Leave in Service
9	22	30	53	0.39	16	AV2	-0.15	Leave in Service
10	22	30	53	0.39	17	AV3	-0.22	Leave in Service
11	22	30	67	0.24	11	AV2	0.05	Leave in Service
12	22	31	26	0.36	16	AV3	-0.14	Leave in Service
13	22	36	41	0.28	12	AV1	0.17	Leave in Service
14	22	36	41	0.22	10	AV2	0.17	Leave in Service
15	22	36	44	0.59	20	AV1	-0.24	Leave in Service
16	22	36	44	0.48	18	AV2	0.19	Leave in Service
17	22	36	44	1.52	33	AV2	-0.28	Leave in Service
18	22	36	44	0.5	18	AV3	-0.33	Leave in Service
19	22	36	62	0.31	13	AV1	-0.19	Leave in Service
20	22	36	62	0.64	21	AV2	-0.17	Leave in Service
21	22	36	64	0.25	11	AV1	-0.2	Leave in Service
22	22	36	64	0.22	10	AV2	-0.1	Leave in Service
23	22	37	53	0.19	9	AV1	-0.2	Leave in Service
24	22	37	54	0.26	11	AV1	0.1	Leave in Service
25	22	37	54	0.27	12	AV2	-0.21	Leave in Service
26	22	37	73	0.37	14	AV1	0.15	Leave in Service
27	22	37	73	0.29	12	AV3	-0.15	Leave in Service
28	22	38	49	0.42	16	AV1	-0.16	Leave in Service
29	22	38	49	0.46	17	AV2	-0.24	Leave in Service
30	22	38	55	0.34	14	AV1	-0.27	Leave in Service
31	22	38	55	0.54	19	AV2	-0.19	Leave in Service
32	22	40	57	0.27	12	AV1	0.07	Leave in Service
33	22	40	57	0.84	24	AV2	0.16	Leave in Service
34	22	40	57	0.28	12	AV3	-0.28	Leave in Service
35	22	41	52	0.27	12	AV1	-0.03	Leave in Service
36	22	41	52	0.36	15	AV2	0.1	Leave in Service
37	22	42	62	0.34	14	AV4	-0.13	Leave in Service

Tube R9 C42 in **BOLD** is TSP wear, all other tubes are AVB wear

Table A-3  
SG 23 Service Induced Indications – Wear – 2R23

Count	SG	Row	Column	Volts	% TW	Locn	Inch	Repair or Leave in service
1	23	29	41	0.23	10	AV2	-0.27	Leave in Service
2	23	29	55	0.25	12	AV1	-0.24	Leave in Service
3	23	29	55	0.3	14	AV2	-0.17	Leave in Service
4	23	29	55	0.51	19	AV4	0.05	Leave in Service
5	23	30	22	0.27	13	AV1	0.16	Leave in Service
6	23	32	62	0.39	16	AV1	0	Leave in Service
7	23	32	62	0.3	13	AV2	0	Leave in Service
8	23	32	63	0.26	12	AV1	0.14	Leave in Service
9	23	33	31	0.49	18	AV2	0.21	Leave in Service
10	23	33	31	0.39	15	AV3	-0.21	Leave in Service
11	23	33	31	0.21	10	AV4	-0.21	Leave in Service
12	23	34	44	0.35	15	AV2	0.17	Leave in Service
13	23	34	62	0.37	15	AV1	0.2	Leave in Service
14	23	34	62	0.54	19	AV2	-0.14	Leave in Service
15	23	34	62	0.37	15	AV3	-0.29	Leave in Service
16	23	34	65	0.32	14	AV1	0.1	Leave in Service
17	23	34	65	0.42	17	AV2	-0.19	Leave in Service
18	23	34	65	0.38	16	AV3	-0.19	Leave in Service
19	23	34	65	0.29	13	AV4	-0.13	Leave in Service
20	23	34	70	0.28	13	AV2	-0.2	Leave in Service
21	23	35	38	0.31	14	AV2	0.12	Leave in Service
22	23	35	38	0.22	11	AV3	0	Leave in Service
23	23	35	41	0.28	12	AV2	0.07	Leave in Service
24	23	35	46	0.39	16	AV2	0.3	Leave in Service
25	23	35	46	0.44	17	AV3	0.22	Leave in Service
26	23	35	59	1.38	32	AV2	-0.22	Removed From Service
27	23	35	59	2.33	41	AV3	-0.26	Removed From Service
28	23	35	59	0.27	13	AV4	-0.2	Leave in Service
29	23	35	61	0.19	10	AV3	-0.14	Leave in Service
30	23	36	60	0.4	16	AV1	-0.11	Leave in Service
31	23	38	51	0.21	11	AV3	-0.14	Leave in Service
32	23	38	62	0.52	18	AV2	-0.25	Leave in Service
33	23	38	62	0.28	12	AV3	-0.19	Leave in Service
34	23	39	56	0.76	23	AV1	-0.22	Removed From Service
35	23	39	56	1.98	36	AV3	-0.21	Removed From Service
36	23	40	53	0.57	21	AV4	-0.18	Leave in Service
37	23	40	54	0.21	10	AV1	-0.22	Leave in Service
38	23	40	58	0.57	21	AV2	-0.21	Leave in Service
39	23	40	58	0.78	25	AV3	-0.31	Leave in Service
40	23	41	43	0.36	15	AV1	-0.22	Leave in Service
41	23	41	64	0.35	15	AV1	-0.19	Leave in Service
42	23	41	64	0.43	17	AV2	-0.02	Leave in Service

Table A-4  
SG 24 Service Induced Indications – Wear – 2R23

Count	SG	Row	Column	Volts	% TW	Locn	Inch	Repair or Leave in service
1	24	28	64	0.42	16	AV3	0.08	Leave in Service
2	24	28	64	0.36	15	AV4	-0.28	Leave in Service
3	24	32	45	0.43	17	AV1	-0.16	Leave in Service
4	24	32	45	0.35	15	AV2	0.02	Leave in Service
5	24	32	45	0.33	15	AV3	-0.21	Leave in Service
6	24	32	69	0.27	10	AV2	-0.47	Leave in Service
7	24	32	69	0.32	12	AV3	-0.14	Leave in Service
8	24	33	63	0.43	15	AV2	-0.15	Leave in Service
9	24	33	63	0.42	14	AV3	0.28	Leave in Service
10	24	33	63	0.7	20	AV4	-0.18	Leave in Service
11	24	33	64	0.26	12	AV1	-0.24	Leave in Service
12	24	33	64	0.41	16	AV2	0.19	Leave in Service
13	24	33	64	0.73	23	AV3	-0.14	Leave in Service
14	24	33	64	0.67	22	AV4	0.16	Leave in Service
15	24	33	69	0.22	9	AV1	0.13	Leave in Service
16	24	33	69	0.66	19	AV3	0.18	Leave in Service
17	24	33	71	0.32	12	AV1	0.15	Leave in Service
18	24	33	71	0.32	12	AV2	0.12	Leave in Service
19	24	33	71	0.35	12	AV3	0.13	Leave in Service
20	24	33	71	0.46	15	AV4	-0.2	Leave in Service
21	24	34	59	0.74	24	AV1	0.55	Leave in Service
22	24	34	59	0.61	21	AV2	0.12	Leave in Service
23	24	34	59	0.35	15	AV3	-0.14	Leave in Service
24	24	34	60	0.36	12	AV3	-0.16	Leave in Service
25	24	34	65	0.31	12	AV2	-0.1	Leave in Service
26	24	35	72	0.22	11	AV3	-0.34	Leave in Service
27	24	35	73	0.21	10	AV3	-0.24	Leave in Service
28	24	36	32	0.9	26	AV2	-0.24	Leave in Service
29	24	36	32	0.25	12	AV3	-0.19	Leave in Service
30	24	36	47	0.23	11	AV1	-0.11	Leave in Service
31	24	36	71	0.37	13	AV1	0.1	Leave in Service
32	24	36	71	0.92	24	AV2	-0.22	Leave in Service
33	24	36	71	0.22	9	AV3	-0.17	Leave in Service
34	24	37	25	0.43	15	AV1	-0.16	Leave in Service
35	24	37	33	0.29	11	AV1	-0.24	Leave in Service
36	24	37	70	0.55	19	AV2	0.14	Leave in Service
37	24	38	60	0.45	15	AV2	-0.17	Leave in Service
38	24	38	60	0.46	15	AV3	-0.21	Leave in Service
39	24	41	32	0.22	11	AV1	-0.16	Leave in Service
40	24	41	65	0.18	9	05C	0.4	Leave in Service
41	24	43	39	0.46	15	AV1	0.12	Leave in Service

Count	SG	Row	Column	Volts	% TW	Locn	Inch	Repair or Leave in service
42	24	45	41	1.11	29	AV2	0.14	Removed From Service
43	24	45	41	1.93	37	AV3	-0.24	Removed From Service

Tube R41 C65 in **BOLD** is TSP wear, all other tubes are AVB wear



ATTACHMENT B

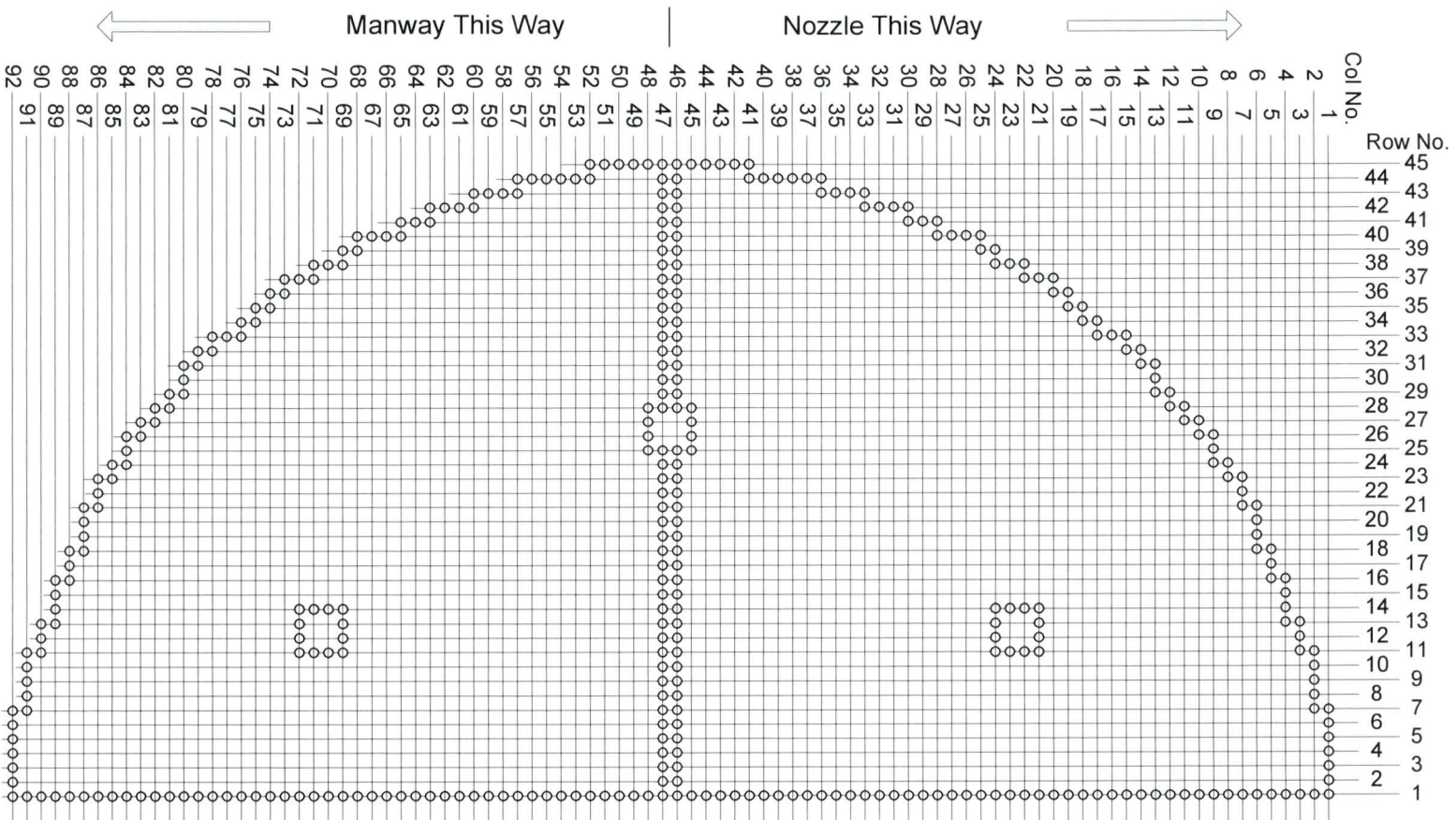
Indian Point 2 Listing of Individual Tubes Plugged This Inspection

Count	SG	Row	Col	Reason for Plugging	Stabilized
1	23	35	59	Plugged due to AVB Wear of 41% Through Wall	No
2	23	39	56	Preventatively plugged due to AVB Wear	No
3	24	45	41	Preventatively plugged due to AVB Wear	No
4	24	39	24	Preventatively plugged due to a possible loose part indication detected by eddy current	Yes
5	24	38	24	Preventatively plugged due to a possible loose part indication detected by eddy current	Yes
6	24	38	23	Preventatively plugged due to a possible loose part indication detected by eddy current	Yes

ATTACHMENT C

Indian Point 2 Steam Generator Tubesheet Map

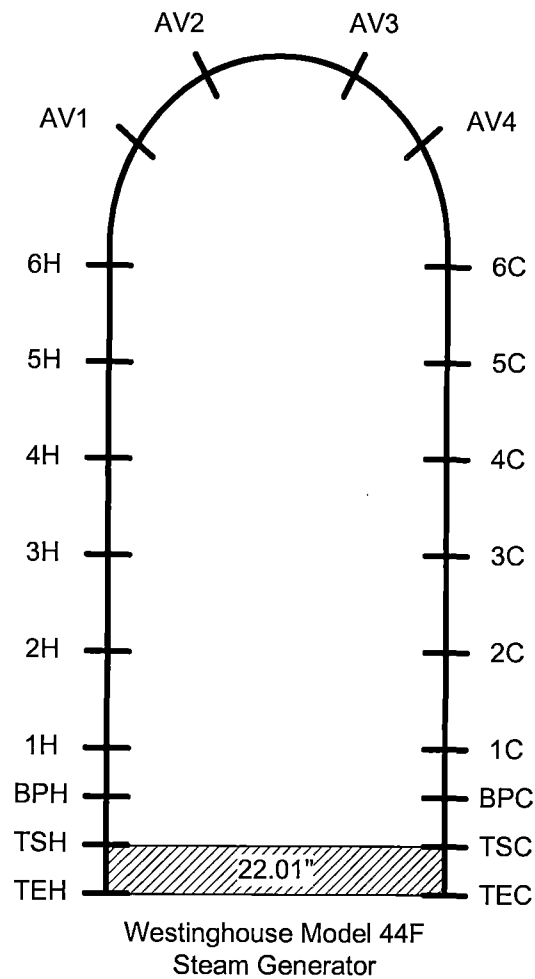
### Indian Point 2 Steam Generator Tubesheet Map



ATTACHMENT D

Indian Point 2 Steam Generator Landmark Information

**Indian Point 2  
Steam Generator  
Location Landmarks**



**Legend**

AV = Anti-Vibration Bar (AVB)  
C = cold leg  
H = hot leg  
# = support plate (TSP)  
BP = baffle plate (FDB)  
TS = tubesheet  
TE = tube end