



Entergy Nuclear Northeast
Indian Point Energy Center
450 Broadway, GSB
P.O. Box 249
Buchanan, N.Y. 10511-0249
Tel (914) 734-6710

Robert Walpole
Manger
Licensing

NL-10-079

August 24, 2010

ATTN: Document Control Desk
U.S. Nuclear Regulatory Commission
Washington, DC 20555-0001

SUBJECT: Technical Specification 5.6.7 - IP2 Steam Generator Tube Inspection Report -
Spring 2010 Refueling Outage
Indian Point Unit No. 2
Docket No. 50-247
License No. DPR-26

Dear Sir or Madam:

Technical Specification, 5.6.7, requires that a report be submitted to the NRC 180 days after the initial entry into Mode 4 following completion of a steam generator program inspection. Enclosed as Attachment 1 is a report of the results of the Indian Point Unit 2 Steam Generator Examination Program conducted during the 2010 refueling outage, submitted pursuant to Technical Specification 5.6.7. Attachment 2 provides Steam Generator Landmark Information.

There are no new commitments contained in this letter. If you have any questions or require additional information, please contact me at 914-734-6710.

Sincerely,

A handwritten signature in black ink, appearing to read "RW", with a large flourish extending to the right.

RW/mb

cc: next page

A001
NRC

Attachments: 1. Steam Generator Examination Program Results, 2010 Refueling Outage
(2R19)
2. Steam Generator Landmark Information

cc: Mr. M. Dapas, Acting Regional Administrator, NRC Region 1
Mr. J. Boska, Senior Project Manager, NRC, NRR, DORL
Mr. S. Aguilar, Material Control and Accounting Branch, NRC
NRC Resident Inspectors Office, Indian Point
Mr. Paul Eddy, NYS Dept. of Public Service
Mr. Francis J. Murray, Jr., President and CEO, NYSERDA

ATTACHMENT 1 TO NL-10-079

**Steam Generator Examination Program Results
2010 Refueling Outage (2R19)**

**Indian Point Unit 2
 Steam Generator Examination Program Results
 2010 Refueling Outage (2R19)**

1. Examination Program Description

At the time of the 2010 refueling outage (2R19) at Indian Point 2, the steam generators had accumulated approximately 83 effective full power months (EFPM) of operation since the first in-service inspection performed in 2002. The steam generators were replaced in 2000 and each have 3214 tubes made from thermally treated Alloy 600. The reactor coolant system operates with a hot leg temperature of 599°F. Refueling outage 2R19 was the fourth of five refueling outages in the first inspection period of 120 EFPM as defined in section 5.5.7.d.2 of Technical Specifications and the last scheduled inspection of the period. The steam generator inspections were performed from March 21 through 26, 2010.

Indian Point 2 Steam Generator Primary Inspection Plan

| Outage | Year | EFPM since SG Replacement | EFPM since Start of Inspection Period | Inspection Period | Nominal Inspection Scope |
|--------|------|---------------------------|---------------------------------------|----------------------------------|--------------------------|
| 2R15 | 2002 | 20.6 | N/A | First ISI | 100% |
| 2R16 | 2004 | 42.7 | 22.1 | First Inspection Period 120 EFPM | None |
| 2R17 | 2006 | 59.3 | 38.7 | | 50% |
| 2R18 | 2008 | 81.1 | 60.5 | | None |
| 2R19 | 2010 | 103.5 | 82.9 | | 50% |
| 2R20 | 2012 | 126 est. | 106 est. | | None |
| 2R21 | 2014 | 149 est. | 9 est. | Second Inspection Period 90 EFPM | 50% |
| 2R22 | 2016 | 172 est. | 32 est. | | None |
| 2R23 | 2018 | 195 est. | 55 est. | | 50% |
| 2R24 | 2020 | 217 est. | 78 est. | | none |

The following information is provided as required in section 5.6.7 of Technical Specifications.

- a. The scope of inspections performed on each SG,
- b. Active 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 active degradation mechanism,
- f. Total number and percentage of tubes plugged to date,
- g. The results of condition monitoring, including the results of tube pulls and in-situ testing, and
- h. The effective plugging percentage for all plugging in each SG.

2. Scope of Inspections Performed on each SG

The primary side inspection consisted of bobbin and +Point™ Eddy current inspection as summarized in the table below. This inspection was the second of two SG tube inspections scheduled during the first inspection period for the replacement SGs. One hundred percent of the tube locations were inspected at least once between the 2R17 and 2R19 campaigns for those damage mechanisms considered existing or potential. Tube wear at Anti-Vibration Bars (AVBs) is an existing damage mechanism. Tube wear at Tube Support Plates (TSPs), tube wear due to loose parts, and pitting are considered potential damage mechanisms.

| Location | Probe | Extent |
|--|---------|--|
| Active tubes in rows 3 and higher | Bobbin | 50% of tubes tube end to tube end |
| Tubes in rows 1 and 2 | Bobbin | 50% of straights sections, HL and CL |
| | +Point™ | 50% (same tubes as above) of row 1 and row 2 U-bends |
| Previous wear indications | Bobbin | All |
| Neighbors of previously plugged tubes | Bobbin | Adjacent tubes in the same row of tubes previously plugged for AVB wear. |
| Top of tubesheet Inspection for loose parts detection and wear | +Point™ | <ul style="list-style-type: none"> • Three tubes in from the annulus in the horizontal, vertical and diagonal directions in the hot leg and cold leg TTS ($\pm 3''$) in all SGs. • All row 1 & 2 tubes in the hot leg and cold leg TTS ($\pm 3''$) in all SGs. • Location of loose parts observed in previous inspection and remaining in SGs.⁽¹⁾ |
| All reported Bobbin indications | +Point™ | Special Interest Indications |
| Dents/Dings | +Point™ | <ul style="list-style-type: none"> • 100% inspection of DNT/DNG $\geq 5V$ in HL, UB & CL identified in 2R15 and 2R17 • 20% sample of DNT/DNG between 2.0 and 4.99 V in HL, UB & CL identified in 2R15 and 2R17 • Any new DNT/DNG $\geq 2V$. New being defined below⁽²⁾ which implies that it didn't meet the 2V threshold in 2R15 or 2R17 • DNR (Ding with rotation) will also be included in the sample plan |

| Location | Probe | Extent |
|---|---------|--|
| | | <ul style="list-style-type: none"> DNTs within the tubesheet are not required for inspection based upon PWSCC at BLG/EXP is not listed as potential for this inspection |
| Top of Tubesheet hot leg sludge pile region | +Point™ | 20% sample TTS (±3") in all SGs not including peripheral loose parts inspection. |

1. If historic loose part at TTS is not located, RPC plan should be expanded by two tubes in a bounding pattern to ensure part has not migrated.

2. "New" dents and dings as those which, by variances in repeatability of the eddy current process, not exhibit as amplitude response which is greater than the reporting threshold.

Scope Expansion: One tube in SG21 had AVB wear indications of 43 and 45% through wall prompting a full length bobbin inspection of an additional 20% of the tubes in that SG. This expansion resulted in 100% of the tubes in rows 22 through 45 being inspected, which are the rows most susceptible to AVB wear. In order to better characterize the AVB wear population for the purposes of the operational assessment, this expansion was also performed in SGs 22-24.

Summary of 2R19 SG Inspections (Number of Tests)

| Inspection | 21 SG | 22 SG | 23 SG | 24 SG | Total |
|---|-------|-------|-------|-------|-------|
| Bobbin - Full length bobbin (rows 3-45) | 1617 | 1614 | 1612 | 1618 | 6457 |
| Bobbin – Hot leg & Cold leg straight section (rows 1 & 2) | 184 | 184 | 184 | 184 | 736 |
| Bobbin – Scope Expansion (Rows 22 and above) | 670 | 675 | 677 | 665 | 2687 |
| Plus Pt. – U-Bends (rows 1 & 2) | 92 | 92 | 92 | 92 | 368 |
| Plus Pt. – Hot leg TTS | 1250 | 1212 | 1240 | 1238 | 4940 |
| Plus Pt. – Cold leg TTS | 696 | 700 | 699 | 696 | 2791 |
| Plus Pt. – Special interest/ DNT/ DNG | 111 | 55 | 65 | 72 | 303 |

3. Active Degradation Mechanisms Found

The only tube degradation mechanism found during the SG inspection in 2R19 was tube wear at Anti-Vibration Bars (AVB). The largest wear indication was measured at 45% throughwall in Steam Generator 21 tube Row 35 Column 49.

4. Nondestructive Examination Techniques Utilized

NDE Techniques used for Existing Degradation Mechanisms

| Degradation | Detection Probe | Detection ETSS | Sizing Probe | Sizing ETSS |
|----------------------|-----------------|----------------|--------------|-------------|
| Wear at AVB supports | Bobbin | 96004.1 | Bobbin | 96004.1 |

NDE Techniques used for Potential Degradation Mechanisms

| Degradation | Detection Probe | Detection ETSS | Sizing Probe | Sizing ETSS |
|--|------------------|--------------------|--------------|-------------|
| Wear at tube support plates and flow distribution baffle plate | Bobbin | 96004.1 | +Point | 96910.1 |
| Mechanical wear, and wear due to loose parts | Bobbin +Point | 27091.2 21998.1 | +Point | 21998.1 |
| Pitting | Bobbin | 96005.2 | +Point | 21998.1 |

NDE Techniques used for Information Purposes Only

| Degradation | Detection Probe | Detection ETSS | Sizing Probe | Sizing ETSS ⁽¹⁾ |
|--|------------------|--------------------|--------------|----------------------------|
| U-bend axial ODSCC | +Point | 21409.1 | +Point | 128431 |
| U-bend circumferential ODSCC | +Point | 21410.1 | +Point | 128431 |
| Axial ODSCC at expansion transitions | +Point | 21409.1 | +Point | 128431 |
| Circumferential ODSCC at expansion transitions | +Point | 21410.1 | +Point | 128431 |
| Axial ODSCC in dents/ding | Bobbin +Point | 24013.1 22841.3 | +Point | 128431 |
| Circumferential ODSCC in dents/ding | Bobbin +Point | 24013.1 22842.3 | +Point | 128431 |
| U-bend circumferential PWSCC | +Point | 96511.2 | +Point | 99997.1 |
| PWSCC at expansion transitions | +Point | 20510.1 | +Point | 20510.1 |

Note (1): ODSCC circumferential cracking measurements are provided in EPRI TR-107197

5. Location, Orientation and Measured Sizes of Service Induced Indications

The only service induced indications were those attributed to wear at the Anti-Vibration Bars (AVBs). There were 207 indications of tube wear at the AVBs in 127 tubes. These indications are listed in Section 10 and summarized below.

| Category | SG 21 | SG22 | SG23 | SG24 | Total |
|-----------------------------------|-------|------|------|------|-------|
| Tubes with Max. Indication <20% | 28 | 12 | 18 | 18 | 76 |
| Tubes with Max. Indication 20-39% | 8 | 5 | 7 | 5 | 25 |
| Tubes with Max. Indication >=40% | 1 | 0 | 0 | 0 | 1 |
| Total Tubes with Wear | 37 | 17 | 25 | 23 | 102 |

6. Number of Tubes Plugged During 2R19 for each Active Degradation Mechanism

Nine tubes were plugged during 2R19 for tube wear at Anti-Vibration Bars (AVBs). One was required per Section 5.5.7(c) of Technical Specifications for wear equal to or greater than 40% through wall. The remaining eight were plugged preemptively to support two cycles of operation before the next scheduled steam generator tube inspection. The tube plugging list from 2R19 is below.

| SG | Tube | Indication Location | Degradation Depth %TW | Reason for Plugging |
|----|---------|---------------------|-----------------------|----------------------------|
| 21 | R35 C49 | AV1 +0.00 | 16 | Wear > Repair Limit of 40% |
| | | AV2 +0.00 | 43 | |
| | | AV3 +0.00 | 45 | |
| | | AV4 +0.00 | 11 | |
| 21 | R37 C65 | AV1 +0.07 | 15 | Preemptively for AVB wear |
| | | AV2 +0.00 | 36 | |
| | | AV3 -0.07 | 14 | |
| 21 | R35 C47 | AV1 +0.00 | 17 | Preemptively for AVB wear |
| | | AV2 +0.00 | 25 | |
| | | AV3 +0.05 | 34 | |
| 21 | R45 C41 | AV1 -0.03 | 13 | Preemptively for AVB wear |
| | | AV2 -0.07 | 21 | |
| | | AV3 -0.05 | 30 | |
| | | AV4 +0.00 | 27 | |
| 22 | R39 C47 | AV1 +0.00 | 15 | Preemptively for AVB wear |

| SG | Tube | Indication Location | Degradation Depth %TW | Reason for Plugging |
|----|---------|---------------------|-----------------------|---------------------------|
| | | AV2 +0.00 | 39 | |
| | | AV3 +0.00 | 32 | |
| | | AV4 +0.00 | 24 | |
| 22 | R35 C56 | AV1 +0.00 | 17 | Preemptively for AVB wear |
| | | AV2 +0.00 | 23 | |
| | | AV3 +0.00 | 35 | |
| | | AV4 +0.00 | 17 | |
| 23 | R32 C36 | AV2 -0.05 | 27 | Preemptively for AVB wear |
| | | AV3 -0.02 | 35 | |
| | | AV4 -0.19 | 15 | |
| 23 | R37 C39 | AV1 -0.05 | 17 | Preemptively for AVB wear |
| | | AV2 -0.10 | 28 | |
| | | AV3 -0.14 | 34 | |
| | | AV4 +0.14 | 11 | |
| 24 | R41 C37 | AV1 +0.00 | 28 | Preemptively for AVB wear |
| | | AV2 +0.00 | 32 | |
| | | AV3 +0.00 | 23 | |

7. Total Number and Percentage of Tubes Plugged to Date

| | SG 21 | SG 22 | SG 23 | SG 24 | Total |
|----------------------------|-------|-------|-------|-------|-------|
| Total Number of Tubes | 3214 | 3214 | 3214 | 3214 | 12856 |
| Number of Plugged Tubes | 14 | 5 | 5 | 10 | 34 |
| % of Tubes Plugged to Date | 0.44% | 0.16% | 0.16% | 0.31% | 0.26% |

8. Results of Condition Monitoring

A Condition Monitoring assessment was performed, on a defect-specific basis, to demonstrate compliance with integrity criteria by the comparison of 2R19 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 requirements without further testing. Based upon the inspection results, all four steam generators were found to be in compliance with Condition Monitoring requirements.

All measured tube degradation was less than the condition monitoring limit. No in-situ pressure testing was required nor were any tubes pulled for examination.

9. Effective Plugging Percentage for all Plugging in each SG

Note: Since there are no sleeves installed and the safety analyses credit plugged tubes with the same value regardless of location, the effective tube plugging is equivalent to the percentage of tubes plugged.

| | SG 31 | SG 32 | SG 33 | SG 34 | Total |
|----------------------------|-------|-------|-------|-------|-------|
| Total Number of Tubes | 3214 | 3214 | 3214 | 3214 | 12856 |
| Number of Sleeved Tubes | 0 | 0 | 0 | 0 | 0 |
| Number of Plugged Tubes | 14 | 5 | 5 | 10 | 34 |
| % of Tubes Plugged to Date | 0.44% | 0.16% | 0.16% | 0.31% | 0.26% |

10. Listing of Service Induced Indications

| SG | Row | Col | Volts | Ind | Depth %TW | Locn | Inch1 |
|----|-----|-----|-------|------|-----------|------|-------|
| 21 | 41 | 28 | 0.19 | WEAR | 11 | AV1 | -0.27 |
| 21 | 33 | 29 | 0.35 | WEAR | 17 | AV3 | 0.12 |
| 21 | 33 | 29 | 0.26 | WEAR | 14 | AV4 | 0 |
| 21 | 33 | 33 | 0.52 | WEAR | 20 | AV2 | 0.17 |
| 21 | 33 | 33 | 0.28 | WEAR | 13 | AV3 | 0.02 |
| 21 | 33 | 34 | 1.54 | WEAR | 28 | AV1 | 0 |
| 21 | 33 | 34 | 0.95 | WEAR | 22 | AV2 | 0 |
| 21 | 33 | 34 | 0.98 | WEAR | 23 | AV3 | 0 |
| 21 | 33 | 34 | 0.32 | WEAR | 12 | AV4 | 0 |
| 21 | 37 | 36 | 0.26 | WEAR | 11 | AV1 | -0.02 |
| 21 | 37 | 36 | 0.21 | WEAR | 10 | AV2 | -0.07 |
| 21 | 33 | 37 | 0.23 | WEAR | 13 | AV2 | -0.12 |
| 21 | 33 | 38 | 0.29 | WEAR | 12 | AV2 | -0.05 |
| 21 | 33 | 38 | 0.27 | WEAR | 12 | AV3 | -0.05 |
| 21 | 32 | 39 | 0.18 | WEAR | 10 | AV1 | -0.2 |
| 21 | 32 | 39 | 0.19 | WEAR | 10 | AV2 | -0.12 |
| 21 | 41 | 39 | 0.3 | WEAR | 14 | AV3 | 0.07 |
| 21 | 42 | 40 | 0.26 | WEAR | 10 | AV2 | 0 |
| 21 | 45 | 41 | 0.26 | WEAR | 13 | AV1 | -0.03 |
| 21 | 45 | 41 | 0.6 | WEAR | 21 | AV2 | -0.07 |
| 21 | 45 | 41 | 1.22 | WEAR | 30 | AV3 | -0.05 |
| 21 | 45 | 41 | 0.97 | WEAR | 27 | AV4 | 0 |
| 21 | 45 | 43 | 0.26 | WEAR | 14 | AV2 | -0.07 |
| 21 | 33 | 46 | 0.32 | WEAR | 15 | AV1 | -0.05 |
| 21 | 33 | 46 | 0.24 | WEAR | 12 | AV2 | 0.02 |
| 21 | 30 | 47 | 0.53 | WEAR | 18 | AV1 | 0 |
| 21 | 30 | 47 | 0.65 | WEAR | 20 | AV2 | 0 |

| SG | Row | Col | Volts | Ind | Depth %TW | Locn | Inchl |
|----|-----|-----|-------|------|-----------|------|-------|
| 21 | 30 | 47 | 1.18 | WEAR | 27 | AV3 | 0 |
| 21 | 30 | 47 | 0.4 | WEAR | 15 | AV4 | 0 |
| 21 | 34 | 47 | 0.31 | WEAR | 13 | AV1 | 0 |
| 21 | 34 | 47 | 0.51 | WEAR | 18 | AV2 | 0 |
| 21 | 34 | 47 | 0.32 | WEAR | 13 | AV3 | 0 |
| 21 | 35 | 47 | 0.48 | WEAR | 17 | AV1 | 0 |
| 21 | 35 | 47 | 0.96 | WEAR | 25 | AV2 | 0 |
| 21 | 35 | 47 | 1.88 | WEAR | 34 | AV3 | 0.05 |
| 21 | 37 | 47 | 0.34 | WEAR | 14 | AV1 | 0 |
| 21 | 37 | 47 | 0.32 | WEAR | 13 | AV3 | 0 |
| 21 | 45 | 48 | 0.23 | WEAR | 13 | AV1 | -0.11 |
| 21 | 35 | 49 | 0.43 | WEAR | 16 | AV1 | 0 |
| 21 | 35 | 49 | 3.57 | WEAR | 43 | AV2 | 0 |
| 21 | 35 | 49 | 4.23 | WEAR | 45 | AV3 | 0 |
| 21 | 35 | 49 | 0.24 | WEAR | 11 | AV4 | 0 |
| 21 | 30 | 50 | 0.24 | WEAR | 13 | AV3 | 0 |
| 21 | 45 | 52 | 0.27 | WEAR | 14 | AV3 | -0.12 |
| 21 | 45 | 52 | 0.28 | WEAR | 15 | AV4 | -0.25 |
| 21 | 27 | 54 | 0.2 | WEAR | 12 | AV4 | 0 |
| 21 | 37 | 54 | 0.36 | WEAR | 17 | AV3 | -0.2 |
| 21 | 31 | 57 | 0.24 | WEAR | 11 | AV1 | 0 |
| 21 | 31 | 57 | 0.38 | WEAR | 15 | AV2 | 0.29 |
| 21 | 31 | 57 | 0.3 | WEAR | 12 | AV3 | 0.48 |
| 21 | 40 | 57 | 0.32 | WEAR | 13 | AV3 | 0 |
| 21 | 40 | 57 | 0.35 | WEAR | 14 | AV4 | 0 |
| 21 | 41 | 57 | 0.23 | WEAR | 10 | AV4 | 0 |
| 21 | 34 | 60 | 0.58 | WEAR | 22 | AV1 | 0 |
| 21 | 34 | 60 | 0.45 | WEAR | 19 | AV2 | 0 |
| 21 | 34 | 60 | 0.39 | WEAR | 18 | AV4 | 0 |
| 21 | 42 | 60 | 0.24 | WEAR | 13 | AV1 | -0.19 |
| 21 | 27 | 63 | 0.25 | WEAR | 11 | AV1 | -0.02 |
| 21 | 27 | 63 | 0.31 | WEAR | 13 | AV2 | -0.12 |
| 21 | 27 | 63 | 0.23 | WEAR | 10 | AV4 | -0.12 |
| 21 | 26 | 64 | 0.25 | WEAR | 14 | AV2 | 0.23 |
| 21 | 26 | 64 | 0.6 | WEAR | 23 | AV3 | 0.37 |
| 21 | 29 | 64 | 0.23 | WEAR | 13 | AV2 | 0.16 |
| 21 | 36 | 65 | 0.23 | WEAR | 10 | AV3 | 0 |
| 21 | 37 | 65 | 0.4 | WEAR | 15 | AV1 | 0.07 |
| 21 | 37 | 65 | 2.35 | WEAR | 36 | AV2 | 0 |
| 21 | 37 | 65 | 0.37 | WEAR | 14 | AV3 | -0.07 |
| 21 | 40 | 67 | 0.27 | WEAR | 14 | AV3 | -0.05 |
| 21 | 38 | 68 | 0.22 | WEAR | 13 | AV2 | 0.05 |
| 21 | 35 | 70 | 0.27 | WEAR | 14 | AV2 | -0.21 |
| 21 | 35 | 70 | 0.27 | WEAR | 14 | AV3 | -0.15 |
| 21 | 35 | 70 | 0.2 | WEAR | 12 | AV4 | -0.05 |
| 21 | 32 | 71 | 0.23 | WEAR | 10 | AV2 | 0.05 |

| SG | Row | Col | Volts | Ind | Depth %TW | Locn | Inch1 |
|----|-----|-----|-------|------|-----------|------|-------|
| 22 | 30 | 35 | 0.25 | WEAR | 11 | AV1 | 0 |
| 22 | 30 | 35 | 0.29 | WEAR | 12 | AV2 | -0.22 |
| 22 | 43 | 38 | 0.26 | WEAR | 12 | AV1 | -0.14 |
| 22 | 36 | 41 | 0.37 | WEAR | 15 | AV1 | -0.08 |
| 22 | 36 | 44 | 0.63 | WEAR | 20 | AV1 | 0 |
| 22 | 36 | 44 | 1.03 | WEAR | 27 | AV2 | -0.12 |
| 22 | 36 | 44 | 0.51 | WEAR | 18 | AV2 | 0.07 |
| 22 | 36 | 44 | 0.39 | WEAR | 15 | AV3 | -0.24 |
| 22 | 39 | 47 | 0.52 | WEAR | 15 | AV1 | 0 |
| 22 | 39 | 47 | 2.91 | WEAR | 39 | AV2 | 0 |
| 22 | 39 | 47 | 1.86 | WEAR | 32 | AV3 | 0 |
| 22 | 39 | 47 | 1.13 | WEAR | 24 | AV4 | 0 |
| 22 | 38 | 49 | 0.44 | WEAR | 13 | AV1 | 0 |
| 22 | 38 | 49 | 0.5 | WEAR | 15 | AV2 | 0 |
| 22 | 41 | 52 | 0.45 | WEAR | 15 | AV2 | 0 |
| 22 | 23 | 54 | 0.42 | WEAR | 16 | AV1 | 0 |
| 22 | 23 | 54 | 0.32 | WEAR | 13 | AV2 | 0 |
| 22 | 23 | 54 | 0.4 | WEAR | 15 | AV3 | 0 |
| 22 | 23 | 54 | 0.7 | WEAR | 22 | AV4 | 0 |
| 22 | 37 | 54 | 0.34 | WEAR | 12 | AV1 | 0 |
| 22 | 38 | 55 | 0.35 | WEAR | 13 | AV1 | -0.16 |
| 22 | 38 | 55 | 0.59 | WEAR | 19 | AV2 | -0.21 |
| 22 | 35 | 56 | 0.44 | WEAR | 17 | AV1 | 0 |
| 22 | 35 | 56 | 0.75 | WEAR | 23 | AV2 | 0 |
| 22 | 35 | 56 | 1.8 | WEAR | 35 | AV3 | 0 |
| 22 | 35 | 56 | 0.47 | WEAR | 17 | AV4 | 0 |
| 22 | 40 | 57 | 1.06 | WEAR | 26 | AV2 | 0 |
| 22 | 40 | 57 | 0.37 | WEAR | 14 | AV3 | 0 |
| 22 | 36 | 62 | 0.46 | WEAR | 15 | AV2 | -0.29 |
| 22 | 42 | 62 | 0.29 | WEAR | 11 | AV4 | 0 |
| 22 | 36 | 64 | 0.31 | WEAR | 14 | AV1 | -0.1 |
| 22 | 36 | 64 | 0.31 | WEAR | 14 | AV2 | -0.1 |
| 22 | 30 | 67 | 0.28 | WEAR | 13 | AV2 | -0.02 |
| 22 | 37 | 73 | 0.25 | WEAR | 12 | AV1 | -0.07 |
| 22 | 37 | 73 | 0.28 | WEAR | 13 | AV3 | 0 |
| 23 | 30 | 22 | 0.24 | WEAR | 12 | AV2 | -0.08 |
| 23 | 32 | 36 | 1.04 | WEAR | 27 | AV2 | -0.05 |
| 23 | 32 | 36 | 1.89 | WEAR | 35 | AV3 | -0.02 |
| 23 | 32 | 36 | 0.33 | WEAR | 15 | AV4 | -0.19 |
| 23 | 35 | 38 | 0.35 | WEAR | 15 | AV2 | -0.08 |
| 23 | 37 | 39 | 0.49 | WEAR | 17 | AV1 | -0.05 |
| 23 | 37 | 39 | 1.13 | WEAR | 28 | AV2 | -0.1 |
| 23 | 37 | 39 | 1.73 | WEAR | 34 | AV3 | -0.14 |
| 23 | 37 | 39 | 0.26 | WEAR | 11 | AV4 | 0.14 |
| 23 | 41 | 40 | 0.26 | WEAR | 11 | AV1 | -0.12 |
| 23 | 41 | 40 | 1.16 | WEAR | 28 | AV2 | -0.07 |

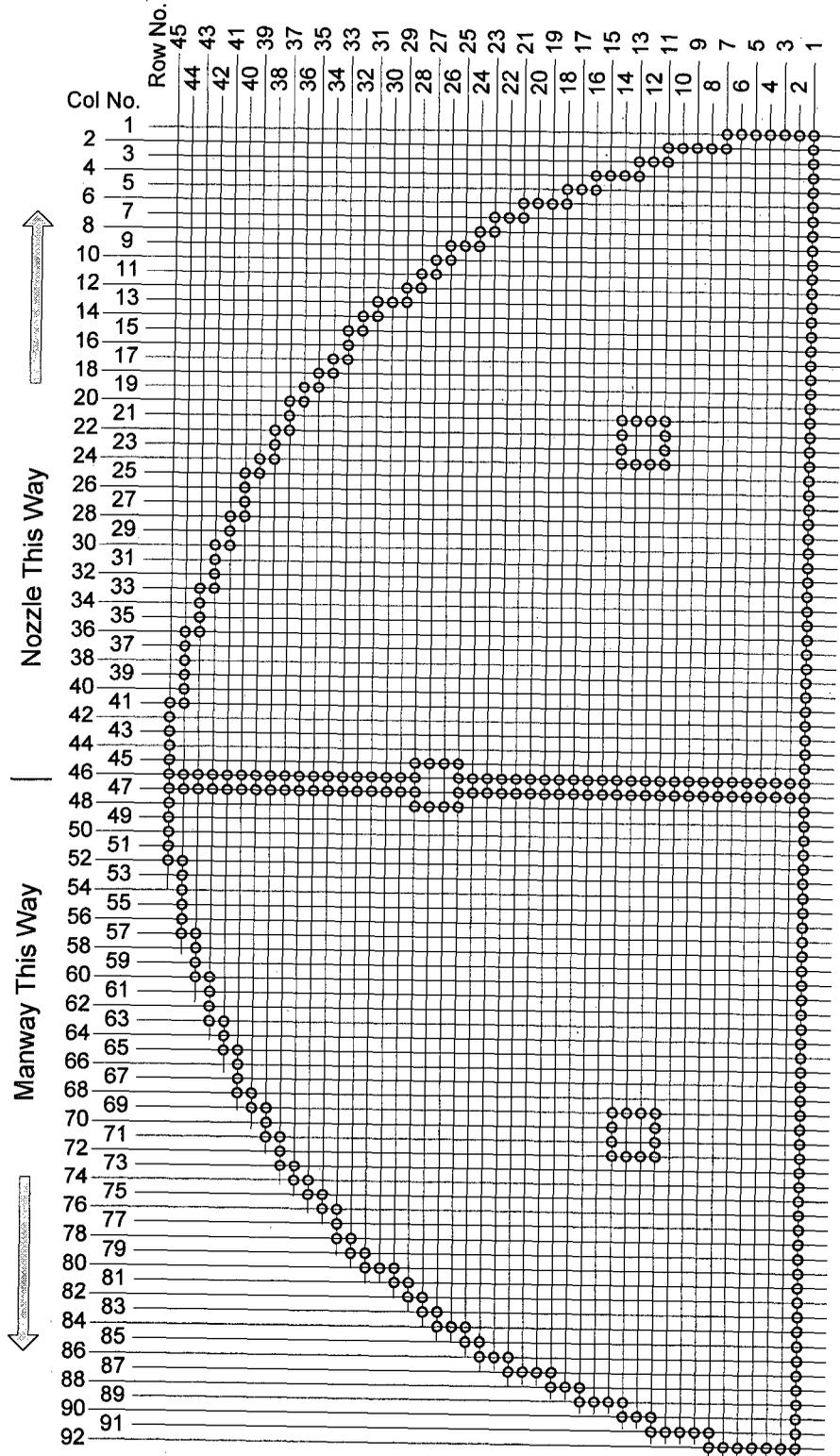
| SG | Row | Col | Volts | Ind | Depth %TW | Locn | Inchl |
|----|-----|-----|-------|------|-----------|------|-------|
| 23 | 41 | 40 | 0.47 | WEAR | 17 | AV3 | -0.12 |
| 23 | 41 | 40 | 0.5 | WEAR | 17 | AV4 | -0.14 |
| 23 | 29 | 41 | 0.26 | WEAR | 13 | AV2 | -0.32 |
| 23 | 35 | 41 | 0.26 | WEAR | 13 | AV2 | -0.05 |
| 23 | 41 | 43 | 0.34 | WEAR | 15 | AV1 | -0.15 |
| 23 | 34 | 44 | 0.29 | WEAR | 12 | AV2 | 0 |
| 23 | 35 | 46 | 0.39 | WEAR | 15 | AV2 | -0.05 |
| 23 | 35 | 46 | 0.41 | WEAR | 15 | AV3 | -0.12 |
| 23 | 45 | 46 | 0.24 | WEAR | 10 | AV3 | -0.02 |
| 23 | 40 | 47 | 0.24 | WEAR | 12 | AV3 | -0.12 |
| 23 | 40 | 53 | 0.47 | WEAR | 18 | AV4 | -0.11 |
| 23 | 29 | 55 | 0.32 | WEAR | 15 | AV1 | -0.24 |
| 23 | 29 | 55 | 0.31 | WEAR | 14 | AV2 | -0.05 |
| 23 | 29 | 55 | 0.4 | WEAR | 17 | AV4 | -0.02 |
| 23 | 39 | 56 | 0.71 | WEAR | 22 | AV1 | -0.17 |
| 23 | 39 | 56 | 0.24 | WEAR | 12 | AV2 | -0.2 |
| 23 | 39 | 56 | 0.99 | WEAR | 26 | AV3 | -0.07 |
| 23 | 40 | 58 | 0.51 | WEAR | 17 | AV2 | -0.07 |
| 23 | 40 | 58 | 0.58 | WEAR | 19 | AV3 | -0.07 |
| 23 | 35 | 59 | 0.32 | WEAR | 14 | AV2 | -0.22 |
| 23 | 35 | 59 | 0.73 | WEAR | 23 | AV3 | -0.37 |
| 23 | 39 | 59 | 0.46 | WEAR | 18 | AV1 | -0.2 |
| 23 | 39 | 59 | 0.81 | WEAR | 24 | AV3 | 0 |
| 23 | 36 | 60 | 0.31 | WEAR | 12 | AV1 | -0.07 |
| 23 | 32 | 62 | 0.32 | WEAR | 13 | AV1 | -0.12 |
| 23 | 34 | 62 | 0.35 | WEAR | 13 | AV1 | 0 |
| 23 | 34 | 62 | 0.52 | WEAR | 18 | AV2 | 0 |
| 23 | 34 | 62 | 0.34 | WEAR | 13 | AV3 | -0.1 |
| 23 | 38 | 62 | 0.46 | WEAR | 16 | AV2 | -0.29 |
| 23 | 38 | 62 | 0.29 | WEAR | 12 | AV3 | -0.1 |
| 23 | 32 | 63 | 0.23 | WEAR | 12 | AV1 | -0.05 |
| 23 | 32 | 63 | 0.25 | WEAR | 13 | AV2 | -0.05 |
| 23 | 34 | 64 | 0.51 | WEAR | 17 | AV1 | -0.12 |
| 23 | 34 | 64 | 0.5 | WEAR | 17 | AV2 | 0.07 |
| 23 | 34 | 64 | 0.96 | WEAR | 25 | AV3 | 0 |
| 23 | 34 | 64 | 0.41 | WEAR | 15 | AV4 | -0.19 |
| 23 | 41 | 64 | 0.23 | WEAR | 10 | AV1 | -0.11 |
| 23 | 41 | 64 | 0.39 | WEAR | 14 | AV2 | -0.1 |
| 23 | 34 | 65 | 0.37 | WEAR | 16 | AV1 | -0.05 |
| 23 | 34 | 65 | 0.38 | WEAR | 17 | AV2 | -0.15 |
| 23 | 34 | 65 | 0.37 | WEAR | 16 | AV3 | -0.07 |
| 23 | 34 | 65 | 0.28 | WEAR | 14 | AV4 | -0.07 |
| 24 | 24 | 8 | 0.33 | WEAR | 10 | AV3 | -0.23 |
| 24 | 37 | 25 | 0.39 | WEAR | 13 | AV1 | -0.12 |
| 24 | 37 | 25 | 0.27 | WEAR | 10 | AV2 | 0 |
| 24 | 36 | 32 | 0.77 | WEAR | 20 | AV2 | 0 |

| SG | Row | Col | Volts | Ind | Depth %TW | Locn | Inch1 |
|----|-----|-----|-------|------|-----------|------|-------|
| 24 | 37 | 33 | 0.3 | WEAR | 11 | AV1 | -0.12 |
| 24 | 41 | 37 | 1.42 | WEAR | 28 | AV1 | 0 |
| 24 | 41 | 37 | 1.88 | WEAR | 32 | AV2 | 0 |
| 24 | 41 | 37 | 1.03 | WEAR | 23 | AV3 | 0 |
| 24 | 43 | 39 | 0.43 | WEAR | 14 | AV1 | -0.19 |
| 24 | 44 | 39 | 0.27 | WEAR | 10 | AV3 | -0.05 |
| 24 | 45 | 41 | 0.43 | WEAR | 15 | AV2 | -0.1 |
| 24 | 45 | 41 | 0.53 | WEAR | 17 | AV3 | -0.19 |
| 24 | 32 | 45 | 0.43 | WEAR | 13 | AV1 | 0 |
| 24 | 32 | 45 | 0.37 | WEAR | 12 | AV2 | 0 |
| 24 | 32 | 45 | 0.3 | WEAR | 10 | AV3 | 0 |
| 24 | 36 | 47 | 0.25 | WEAR | 10 | AV1 | -0.17 |
| 24 | 34 | 59 | 0.84 | WEAR | 22 | AV1 | -0.15 |
| 24 | 34 | 59 | 0.65 | WEAR | 19 | AV2 | -0.05 |
| 24 | 34 | 59 | 0.4 | WEAR | 13 | AV3 | -0.25 |
| 24 | 38 | 60 | 0.34 | WEAR | 12 | AV3 | -0.19 |
| 24 | 33 | 63 | 0.48 | WEAR | 16 | AV2 | -0.17 |
| 24 | 33 | 63 | 0.44 | WEAR | 15 | AV3 | 0.27 |
| 24 | 33 | 63 | 0.45 | WEAR | 15 | AV4 | 0 |
| 24 | 28 | 64 | 0.34 | WEAR | 13 | AV3 | 0 |
| 24 | 28 | 64 | 0.34 | WEAR | 13 | AV4 | 0 |
| 24 | 33 | 64 | 0.28 | WEAR | 11 | AV1 | 0 |
| 24 | 33 | 64 | 0.41 | WEAR | 14 | AV2 | 0 |
| 24 | 33 | 64 | 0.58 | WEAR | 18 | AV3 | -0.2 |
| 24 | 33 | 64 | 0.69 | WEAR | 20 | AV4 | 0.07 |
| 24 | 34 | 65 | 0.27 | WEAR | 10 | AV2 | -0.05 |
| 24 | 32 | 69 | 0.41 | WEAR | 13 | AV2 | -0.25 |
| 24 | 32 | 69 | 0.42 | WEAR | 14 | AV3 | -0.3 |
| 24 | 33 | 69 | 0.5 | WEAR | 16 | AV3 | -0.07 |
| 24 | 37 | 70 | 0.39 | WEAR | 14 | AV2 | 0 |
| 24 | 33 | 71 | 0.43 | WEAR | 15 | AV1 | 0 |
| 24 | 33 | 71 | 0.43 | WEAR | 15 | AV2 | 0.02 |
| 24 | 33 | 71 | 0.41 | WEAR | 15 | AV3 | 0 |
| 24 | 33 | 71 | 0.49 | WEAR | 17 | AV4 | -0.02 |
| 24 | 36 | 71 | 0.42 | WEAR | 15 | AV1 | 0 |
| 24 | 36 | 71 | 0.81 | WEAR | 23 | AV2 | -0.36 |
| 24 | 36 | 71 | 0.26 | WEAR | 11 | AV3 | 0 |
| 24 | 37 | 71 | 0.34 | WEAR | 13 | AV3 | -0.22 |
| 24 | 35 | 73 | 0.29 | WEAR | 12 | AV1 | 0 |
| 24 | 35 | 73 | 0.36 | WEAR | 14 | AV2 | 0 |
| 24 | 35 | 73 | 0.34 | WEAR | 13 | AV3 | 0 |
| 24 | 35 | 73 | 0.31 | WEAR | 12 | AV4 | 0.05 |

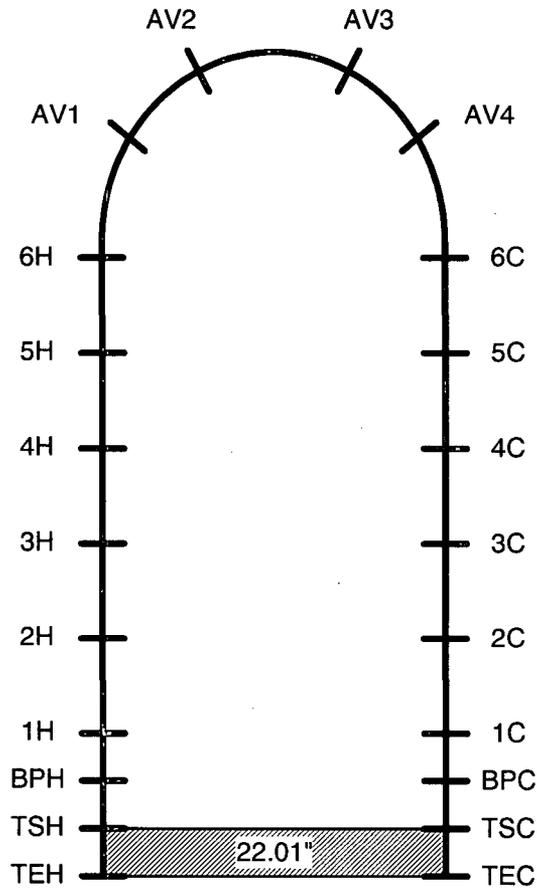
ATTACHMENT 2 TO NL-10-079

Steam Generator Landmark Information

Indian Point 2 Steam Generator Tubesheet Map



**Indian Point 2
Steam Generator
Location Landmarks**



Westinghouse Model 44F
Steam Generator

Legend

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