



October 13, 2022

U. S. Nuclear Regulatory Commission  
Attn: Document Control Desk  
Washington D C 20555-0001

RE: Point Beach Nuclear Plant, Unit 1  
Docket Nos. 50-266  
Renewed Facility Operating License DPR-24

Unit 1 (U1R40) Steam Generator Tube Inspection Report

Pursuant to the requirements of Point Beach Nuclear Plant (PBNP) Technical Specification, TS 5.6.8 "Steam Generator Tube Inspection Report," NextEra Point Beach, LLC is submitting the 180-day Steam Generator Tube Inspection Report. The enclosure to this letter provides the results of the Unit 1 (U1R40) steam generator tube inspections.

This letter contains no new regulatory commitments.

Should you have any questions regarding this submission, please contact Mr. Kenneth Mack, Fleet Licensing Manager, at 561-904-3635.

Sincerely,

A handwritten signature in black ink that reads "Diane Strand".

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Dianne Strand  
General Manager, Regulatory Affairs  
Enclosure

cc: USNRC Regional Administrator, Region III  
USNRC Project Manager, Point Beach Nuclear Plant  
USNRC Resident Inspector, Point Beach Nuclear Plant  
PSCW

**Point Beach Unit 1  
U1R40 Steam Generator Tube Inspection Report**

**Introduction:**

The enclosed Steam Generator Tube Inspection Report for Point Beach Unit 1 is submitted for the inspection of the SGs during refueling outage 40 (hereafter referred to as the U1R40 inspection or outage), as required by Technical Specification section 5.6.8. The inspection in U1R40 was performed in accordance with Technical Specification 5.5.8 and was the 1<sup>st</sup> inspection of the SGs in the 5<sup>th</sup> ISI period. The prior outage (U1R39) was a SG inspection "skip". At unit shutdown for the U1R40 inspection, the SGs had operated for approximately 32.8 EFPY since installation, including 22.1 EFPY in the 5<sup>th</sup> ISI period. Since the previous SG inspection (U1R38), the SGs operated for approximately 1.45 EFPY and 1.38 EFPY during fuel cycles 39 and 40, respectively, leading up to the U1R40 inspection. Initial entry into Mode 4 following completion of the U1R40 inspection was made on April 19, 2022. References to past SG Tube Inspection Reports and a list of acronyms used in this report are provided in Appendix A.

Point Beach Unit 1 is a Westinghouse 2-loop PWR with Model 44F steam generators. The SGs are U-tube heat exchangers with tube bundles fabricated using thermally treated Alloy 600 tubing. Each SG contains 3,214 tubes arranged in 45 rows and 92 columns, in a square-pitch configuration. Nominal tube OD is 0.875" with a 0.050" nominal wall thickness. Each SG tube bundle is supported by one drilled-hole flow distribution baffle (FDB) and 6 quatrefoil, broached-hole tube support plates (TSPs) all fabricated from stainless steel. Two (2) sets of anti-vibration bars (AVBs) in the U-bends also provide tube bundle support (AV1 / AV4, AV2 / AV3).

**A. Scope of Inspections Performed on each SG**

The U1R40 inspection scope was selected to meet the requirements of plant Technical Specification section 5.5.8, NEI 97-06 Rev 3 and its referenced EPRI SGMP Guidelines. In addition, Point Beach intends to submit a License Amendment Request (LAR) to adopt "Revised Frequencies for Steam Generator Tube Inspections" (TSTF-577 Rev. 1)<sup>1</sup>. SG inspections in U1R40 will be credited during the LAR process as the implementation outage for TSTF-577 Rev. 1; therefore, the scope of inspections performed was also selected to meet the requirements therein. Unless otherwise noted, the U1R40 base inspection scope in each SG was:

Primary-side:

- 100% full-length enhanced probe<sup>2</sup> exams of all active tubes.
  - U-bends of rows 1 & 2 were inspected with the +Point™ probe between the uppermost TSP on the HL and the CL.
  - All other active tubes were inspected full-length with both the array and bobbin coils.
  - Special interest exam of peripheral tubes at the TTS, BLG/OXP indications within the H\* depth of the tubesheet, tubes with high residual stress, and all tubing within the tubesheet program are included in utilizing 100% full-length enhanced probe exams.
- 100% inspection of dings/dents >5V in the HL, U-bend and CL using the +Point™ probe.
  - All dings/dents ≤5V were screened with the bobbin coil.

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<sup>1</sup> TSTF-577 Rev. 1, "Revised Frequencies for Steam Generator Tube Inspections", NRC ADAMS Accession No. ML21099A086.

<sup>2</sup> The enhanced probe inspection method is described in the NRC Final Safety Evaluation for TSTF-577 Rev. 1 (NRC ADAMS Accession No. ML21098A188).

- Various diagnostic/special interest exams using the +Point™ probe including all I-codes from the X-probe exams (bobbin/array coils), tubes in the vicinity of newly identified or prior PLPs and tubes adjacent to the locations of known foreign objects.
- Visual inspection of all mechanical and welded plugs.
- Visual inspection of all channel head bowl components and bowl scan everywhere within the channel head bowl with remote visual camera in both the HL and CL per Westinghouse NSAL 12-1 Rev 1, "Steam Generator Channel Head Degradation," October 2017.

Secondary-side:

- Visual/cleanliness inspection at the TTS (annulus, no-tube lane) after sludge lancing the TTS.
- Foreign object search and recovery (FOSAR) at the TTS including in-bundle exams.
- Upper-bundle visual inspection at the top TSP (06H/06C).
- Visual inspection of components of the Upper Internals including the feedwater ring & supports, J-tubes, and moisture separator components. UT thickness measurements were also obtained at select locations on the feedwater ring.

**B. Degradation Mechanisms Found**

The following degradation mechanisms were identified during the U1R40 inspection:

- Wear at AVB contact points.
- Wear at broached TSPs.
- Wear due to foreign objects.
- Historical maintenance anomalies from using legacy sludge lance equipment.

No degradation was identified due to a corrosion damage mechanism. No degradation mechanism found was such that an expansion of the base scope inspection was required.

**C. NDE Techniques utilized for each Degradation Mechanism**

Table 1a is the list of the EPRI ETSSs used for degradation detection during the U1R40 ECT inspection.

**Table 1a - NDE Detection Techniques for Degradation Mechanisms**

Detection probe	ETSS used for Detection	Degradation Mechanism	Location / Applicability
Bobbin	I96041.1 R6	Wear	AVB locations
	96004.1 R13		TSP and FDB locations
	27091.2 R2		Due to foreign objects
X-probe	1790X.1 R0, 1790X.3 R0*		
+Point™	21998.1 R4	Pitting	In the freespan and sludge pile
Bobbin	96005.2 R9		
	I-28411 R4	In the freespan	
	I-28413 R5	At broached TSPs	
	24013.1 R2	At DNG/DNT ≤5V (at TSPs, freespan)	
10013.1 R1	At FDB locations		
X-probe	20402.1 R5	AT TSPs, freespan	
+Point™	20402.1 R5, 20403.1 R5	At Dents/Dings > 5V	
	I-28424 R4, I-28425 R4	sludge pile/expansion transition	
	I28424 R4	In low row U-bends	
	10411.1 R0		
	96511.2 R16, 99997.1 R10	Axial/Circ PWSCC	
	20511.1 R8 / 20510.1 R7	At BLGs/OXPs	
20511.1 R8	Axial PWSCC	At expansion transition	
20510.1 R7	Circ PWSCC		
X-probe	20501.1 R4 / 20500.1 R4	Axial/Circ PWSCC	expansion transition
	20402.1 R5, 20403.1 R5 / 20400.1 R5	Axial/Circ ODSCC	sludge pile/expansion transition

\* where X is between 1 and 6, and depends on FO wear morphology.

Table 1b is the list of the EPRI ETSSs used for degradation sizing based on the degradation mechanisms reported during the U1R40 ECT inspection.

**Table 1b - NDE Sizing Techniques for Degradation Mechanisms**

Sizing probe	ETSS used for Sizing	Degradation Mechanism	Location / Applicability
Bobbin	I96041.1 R6	Wear	At AVB locations
+Point™	96910.1 R11		At broached TSP locations
	21998.1 R4		FO wear (volumetric) in the freespan. Extended for use at TTS expansion transition and within support structures (with/without loose part present).

**D. Location, orientation (if linear), and measured sizes (if available) of service induced indications**

For each SG, Attachment B provides the listing of AVB, TSP and FO wear indications identified during the U1R40 inspection, including locations and measured sizes. For AVB wear, the indication depth as measured by the bobbin probe is provided; TSP and FO wear indications were sized using the +Point™ probe.

**E. Number of tubes plugged during the inspection outage for each degradation mechanism**

Fifteen (15) tubes were plugged based on the U1R40 inspection; all are in SG-B. This is summarized below in Table 2:

**Table 2 – U1R40 Tubes Plugged**

SG	Tube	Degradation Mechanism	Notes
B	R35C61	FO wear at 02H-0.1	36%TW indication (SVI) attributed to FO wear. Loose part not present; tube plugged.
	R1C20	PLP/FO Wear at 05H+38.46	21%TW indication (SVI) attributed to PLP/FO wear (with part present). Tube was plugged and stabilized.
	R1C18	No wear (PLP signal at 05H+31.46)	Tubes were preventively plugged and stabilized based on their proximity to a PLP/FO near tube R1C20, located just under the 06H TSP.
	R1C19	No wear (PLP signal at 05H+35.67)	
	R2C19	No wear (PLP signals at 05H+38.71, 05H+33.91)	
	R2C20	No wear (PLP signals at 05H+37.76, 05H+33.7)	
	R1C21, R2C21	none	
	R1C17, R2C17, R2C18, R3C18, R3C19, R3C20, R3C21	none	Tubes were preventively plugged to add margin to the OA, based on their proximity to a PLP/FO near tube R1C20, located just under the 06H TSP.

**F. Number and percentage of tubes plugged to date, and the effective plugging percentage in each steam generator**

The number and percentage of SG tubes plugged to-date, and the effective plugging percentage in each SG are summarized in Table 3.

**Table 3 - Tubes plugged to-date and effective plugging percentage**

	SG-A	SG-B	Total
Tubes Plugged	6	23	29
Percent Plugged	0.19%	0.72%	0.45%

**G. Results of Condition Monitoring, including the results of tube pulls and in-situ testing**

All indications found in U1R40 satisfy the condition monitoring (CM) requirements of NEI 97-06 Rev 3 and Point Beach Technical Specifications for structural and leakage integrity. No indication exceeded the structural limits. All indications of degradation were screened against the in-situ pressure test (ISPT) selection criteria contained in the EPRI SGMP Steam Generator In-Situ Pressure Test Guidelines, Rev 5, and provided for Point Beach Unit 1 conditions. No tube pulls were performed, and no ISPT was performed or required. The U1R40 inspection results validate the projections and conclusions of the previous OA (U1R38). Appendix B has a listing of all mechanical wear degradation.

1. Wear at AVB locations has been the dominant mode of degradation for the Point Beach Unit 1 SGs and account for most of the indications reported (Attachment B). The maximum reported AVB and TSP wear indications were 37%TW and 16%TW, respectively. The indications had not changed since the last inspection and fell below their respective CM limits of 58.3%TW

and 48.3%TW. The SG performance criteria for structural and leakage integrity were satisfied for both AVB and TSP wear.

2. A previously reported FO wear (VOL) indication located just above the TTS in the CL of SG-B at tube R11C84, was again reported in U1R40. The indication (24%TW) had not grown, and no FOs were observed in the vicinity of the tube during FOSAR exams. Two new FO wear indications (SVI) were reported in the HL of SG-B: one indication was located at a broached TSP opening in tube R35C61 and was attributed to a transient FO; no PLP signals were present at tubes in proximity to this indication. This was the deepest FO wear indication (36%TW) identified in U1R40 and was below the CM limit (50.5%TW) for FO wear. The tube was removed from service. The other indication (21%TW) was located on tube R1C20 – a few inches below the uppermost TSP (06H). PLP signals were also reported on this tube and on 4 other neighboring tubes. It is not known from where the PLPs originated, and a visual exam of the PLP locations from the uppermost TSP was not feasible. If the part migrates during operation, it is likely to remain below the uppermost TSP. These tubes (and others in the vicinity) were preventively plugged and stabilized. To add margin to the OA, several other tubes having no FO wear or PLP signals were also preventively plugged based on their proximity to the PLP/FO wear location in tube R1C20. Table 2 summarizes the tubes removed from service due to the PLP/FO wear indications.
3. No degradation was detected during the inspection of tubes with high residual stress tubes, bulges & over-expansions, and DNG/DNT indications. To date, no corrosion degradation mechanisms have been observed in the Point Beach Unit 1 SGs.
4. During the U1R40 inspection, a lead analyst review was performed on a set of indications<sup>3</sup> that were likely caused by insertion/removal of historical sludge lancing equipment. It was initially reported that mechanical deformation had occurred at these tube locations; however, the lead analyst review concluded that the ECT signals showed no appreciable wall loss. For tracking purposes, these indications were re-classified from historical *geometric* anomalies to historical *maintenance* anomalies. In U1R40, these signals were reported using an FSH, DNG or NDD reporting code. No new instances of these signals have been observed and the historic signals have not changed; therefore, CM is satisfied.
5. Channelhead Components Visual Inspection:
  - Tube Plug Inspection: During the inspection of tube plugs in U1R40, all installed plugs were confirmed to be in their correct location. In addition, all plugs were found to be dry; no dripping plugs were identified. No degradation or visible signs of leakage were noted on the plugs during the visual inspection.
  - Other Channelhead Inspections: Visual inspection of various channelhead components were performed to identify degradation per guidance in Westinghouse NSAL 12-1 Rev 1, "Steam Generator Channel Head Degradation" and LR-ISG-2016-01, "Changes to Aging Management Guidance for Various Steam Generator Components." Areas inspected include the divider plate-to-channelhead weld, the weld at the top of the channelhead bowl drain tube, the channelhead-to-tubesheet girth weld seam region, the divider plate, and all clad surfaces of the channelhead bowl and tubesheet. The region with the previously reported missing cladding at one location<sup>4</sup> in SG-B, was again inspected in U1R40. The cladding defect does not appear to have changed and will be continuously monitored in

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<sup>3</sup> The list of indications and locations is identical to the indication set reported in section 5.6 of the U1R34 SG Tube Inspection Report (ADAMS Accession No. ML13268A108).

<sup>4</sup> For a previous discussion of the missing cladding in SG-B, see report in ADAMS Accession No. ML16264A202.

future inspections. No other degradation of channelhead components was observed in U1R40.

6. Secondary-side Inspections and Maintenance:

- A total of 28.5 lbs. of sludge was removed from the 2 SGs based on secondary-side cleaning in U1R40 (13 lbs. in SG-A, 15.5 lbs. in SG-B). Two small metallic objects (possible gasket material) were identified in SG-B during FOSAR activities at the TTS. An attempt was made to remove one of the objects but was unsuccessful. The other objects identified during TTS in-bundle exams include several pieces of small sludge rocks, tube scale and wire bristles. A FO evaluation is in place (until the next SG exam) for all objects identified which have not been retrieved. No tube damage was observed in any SG during FOSAR activities. No evidence of tube fouling or blockage of the TSP quatrefoil openings was observed during upper tube-bundle visual exams in the SGs at the uppermost TSP.
- Upper Internals Inspection: Visual exams of components of the Upper Internals revealed no damage or degradation. In addition, no anomalies were found in the UT wall thickness measurements taken on the feedrings.

**H. Primary-to-secondary leakage rate observed in each SG during the previous cycle**

Point Beach Unit 1 has observed primary-to-secondary leakage ranging from 0.0 to 0.17 gpd during the previous 2 fuel cycles (Cycles 39 and 40). This low-level leakage has existed for several cycles, is not increasing, and is conservatively assumed to be from one SG.

**I. Calculated accident induced leakage rate**

As described in the H\* alternate repair criteria (ARC) for Point Beach Unit 1, the accident induced leakage rate from the portion of the tubes below 20.6 inches from the TTS is calculated from any observed normal operating leakage that cannot be attributed to a source other than the tubesheet expansion region. For Point Beach Unit 1, the maximum operational primary-to-secondary leakage rate from the portion of the tubes below 20.6 inches from the top of the tubesheet is determined by multiplying any normal operating leakage by a factor of 5.22 to determine the accident induced leakage rate. Based on the maximum observed operational primary-to-secondary leakage (per section H of this report), the calculated accident induced leakage rate from the portion of the tubes below 20.6 inches from the top of the tubesheet is 0.89 gpd ( $=0.17 \text{ gpd} \times 5.22$ ).

**J. Results of monitoring for tube axial displacement (slippage)**

A condition for licensing H\* was to monitor for tube slippage within the tubesheet region. Monitoring for tube slippage was completed during the U1R40 inspections. No tube slippage was reported.

**APPENDIX A - Additional Information**

References to recent SG Tube Inspection Reports (SGTIR)

EOC #	Outage	ADAMS Accession No.
EOC-34	U1R34	ML13268A108
EOC-36	U1R36	ML16264A202
EOC-38	U1R38	ML19287A002

Abbreviations and Acronyms:

ARC	Alternate Repair Criteria	NDD	No Degradation Detected
AVB	Anti Vibration Bar	NEI	Nuclear Energy Institute
BLG	Bulge	NSAL	Nuclear Safety Advisory Letter
CL	Cold Leg	OD	Outside Diameter
CM	Condition Monitoring	ODSCC	Outside Diameter SCC
DNG	Ding	EXP	Over-expansion
DNT	Dent	PLP	Possible Loose Part
ECT	Eddy Current Testing	PWSCC	Primary Water SCC
EFPM	Effective Full Power Months	SG	Steam Generator
EFPY	Effective Full Power Years	SGMP	SG Management Program
EPRI	Electric Power Research Institute	TEC	Tube End Cold
ETSS	Exam Technique Spec Sheet	TEH	Tube End Hot
FDB	Flow Distribution Baffle	TS	Tubesheet
FO	Foreign Object	TSC	Tube Sheet Cold
FOSAR	Foreign Object Search and Retrieval	TSH	Tube Sheet Hot
FSH	Freespan Signal in History	TSP	Tube Support Plate
HL	Hot Leg	TTS	Top of Tube Sheet
INR	Indication Not Reportable	TW	Through Wall
ISPT	In-Situ Pressure Test	VOL	Volumetric



Appendix B – U1R40 Listing of Indications

SG-A

ROW	COL	VOLT	%TW	LOCATION
11	45	0.24	10	AV1 0.13
11	53	0.2	9	AV4 -0.29
19	54	0.28	12	AV1 0.00
19	54	0.95	25	AV2 0.00
19	54	0.38	14	AV3 0.00
19	54	0.49	17	AV4 -0.17
19	61	0.5	17	AV1 -0.15
19	61	0.64	20	AV2 0.17
19	61	0.25	11	AV4 -0.21
24	63	0.25	11	AV1 0.25
24	63	0.66	21	AV2 0.00
24	63	0.62	20	AV3 0.00
24	63	0.19	9	AV4 -0.16
24	85	0.19	8	AV2 0.07
26	83	0.22	10	AV3 0.07
27	71	0.34	13	AV2 0.21
27	71	0.54	18	AV3 -0.12
27	71	0.27	11	AV4 0.17
29	41	0.27	11	AV2 -0.37
29	81	0.17	8	AV2 0.07
31	35	0.36	14	AV4 0.12
31	36	0.25	11	AV4 -0.20
31	63	0.5	17	AV2 0.23
31	63	0.28	11	AV3 0.17
31	79	0.11	6	AV3 0.12
32	14	0.1	5	AV2 -0.08
32	14	0.16	7	AV3 -0.33
32	14	0.09	4	AV4 0.30
32	68	0.39	14	AV1 0.16
32	68	0.29	12	AV2 0.21
32	71	0.56	18	AV2 0.21
32	71	0.37	14	AV3 0.17
32	78	0.18	8	AV3 0.22
32	79	0.1	5	AV1 0.14
33	18	0.76	22	AV3 -0.23
33	18	0.47	15	AV4 -0.17
33	36	0.26	11	AV3 -0.20
33	36	0.31	13	AV4 -0.17
33	37	0.23	10	AV3 -0.18

ROW	COL	VOLT	%TW	LOCATION
33	37	0.4	15	AV4 -0.25
33	48	0.3	12	AV3 -0.35
33	48	0.26	11	AV4 -0.11
33	57	0.45	16	AV1 0.00
33	57	0.59	19	AV2 -0.20
33	66	0.74	22	AV1 0.16
33	66	1.01	26	AV2 0.05
33	66	0.19	9	AV3 0.22
33	71	0.68	21	AV2 0.19
33	71	0.48	17	AV3 0.12
34	33	0.44	15	AV1 -0.30
34	33	0.78	22	AV2 0.18
34	65	0.39	14	AV3 -0.09
34	65	0.63	19	AV4 0.20
34	69	0.26	11	AV1 0.11
34	69	0.49	17	AV2 0.16
35	18	0.26	10	AV2 0.20
35	18	0.26	11	AV3 -0.23
35	43	0.29	11	AV3 -0.25
35	43	0.41	14	AV4 -0.15
35	56	1.09	26	AV1 0.22
35	56	2.43	37	AV2 0.12
37	20	0.16	7	AV4 -0.26
38	22	0.14	7	AV2 -0.21
38	22	0.25	10	AV3 -0.10
38	22	0.19	8	AV4 -0.30
38	43	1.41	29	AV1 -0.21
38	43	0.98	25	AV2 -0.29
38	43	1.12	27	AV2 0.18
38	54	1.01	24	AV3 -0.38
38	54	0.33	12	AV4 -0.15
38	70	0.25	11	AV4 -0.16
39	68	0.1	5	AV2 0.05
39	68	0.18	7	AV3 0.00
39	68	0.11	5	AV4 0.33
39	69	0.3	12	AV3 0.05
40	25	0.1	5	AV1 -0.12
40	25	0.21	9	AV2 -0.29
40	25	0.17	8	AV3 -0.05

ROW	COL	VOLT	%TW	LOCATION
40	27	0.16	7	AV3 0.03
40	42	0.26	11	AV1 0.50
40	44	0.57	19	AV3 -0.18
40	47	0.62	19	AV3 -0.23
40	66	0.25	11	AV1 0.05
40	66	0.22	10	AV4 -0.30
42	61	0.1	5	AV1 -0.30
42	61	0.26	11	AV4 0.19
43	52	0.22	9	AV4 -0.07
43	54	0.15	7	AV3 0.00
43	56	0.16	7	AV4 0.00
44	54	0.2	8	AV1 0.18
44	54	0.14	6	AV4 0.00
45	41	0.18	8	AV1 -0.36
45	41	0.25	10	AV4 0.00
45	42	0.21	9	AV1 -0.06
45	42	0.19	8	AV4 -0.20
45	43	0.19	8	AV1 -0.18
45	43	0.26	11	AV4 -0.07
45	45	0.29	12	AV4 -0.30
45	49	0.1	5	AV1 0.29
45	49	0.09	4	AV2 -0.27
45	49	0.21	9	AV4 -0.17
45	50	0.24	10	AV4 -0.17
45	51	0.15	7	AV4 0.06
45	52	0.15	7	AV2 0.03
45	52	0.24	10	AV3 -0.15
45	52	0.14	6	AV4 -0.22
ROW	COL	VOLT	%TW	LOCATION
18	87	0.27	11	02C 0.53
21	85	0.35	14	02C 0.55
25	26	0.15	10	06H 0.29
29	70	0.08	6	06H -0.67
36	73	0.22	9	02C 0.55
37	73	0.19	9	01C 0.32
39	24	0.22	10	03C 0.48
39	67	0.26	11	02C 0.48
40	43	0.18	11	03H -0.77
41	65	0.4	16	02C 0.52

Appendix B – U1R40 Listing of Indications

SG-B

ROW	COL	VOLT	%TW	LOCATION
14	15	0.16	7	AV3 0.00
15	86	0.18	7	AV3 0.27
15	87	0.19	8	AV3 0.00
16	47	0.18	7	AV2 0.00
17	70	0.18	7	AV3 0.00
17	79	0.19	8	AV2 0.00
19	36	0.14	6	AV3 -0.43
21	79	0.16	7	AV2 0.37
21	79	0.16	7	AV3 0.38
22	58	0.12	6	AV1 -0.17
22	58	0.57	19	AV2 0.31
22	58	0.46	16	AV3 0.29
22	58	0.4	15	AV4 0.00
23	33	0.31	11	AV1 0.00
23	33	0.5	16	AV2 0.00
23	33	0.69	20	AV3 0.00
23	33	0.13	5	AV4 0.00
23	79	0.15	6	AV2 -0.18
23	86	0.19	9	AV2 0.00
23	86	0.21	9	AV3 -0.19
24	13	0.14	6	AV2 -0.23
26	28	0.19	8	AV2 0.00
27	82	0.16	7	AV2 0.00
28	13	0.19	8	AV2 -0.20
28	41	0.17	7	AV4 0.00
28	79	0.21	9	AV2 0.00
29	13	0.11	5	AV2 -0.28
29	40	0.18	8	AV2 -0.20
29	55	0.36	12	AV1 0.17
29	55	0.14	6	AV3 0.05
31	25	0.18	8	AV4 0.11
32	14	0.17	7	AV2 0.22
32	32	0.28	11	AV3 0.00
32	32	0.15	7	AV4 -0.16
32	44	0.11	5	AV3 -0.15
32	46	0.17	7	AV1 0.00
32	46	0.38	14	AV2 -0.08
32	46	0.45	15	AV3 -0.18
32	46	0.28	11	AV4 0.20

ROW	COL	VOLT	%TW	LOCATION
32	49	0.55	16	AV1 0.26
32	49	0.47	15	AV2 -0.18
32	70	0.37	14	AV1 0.00
32	70	0.46	16	AV2 0.00
33	16	0.08	4	AV1 -0.37
33	16	0.31	11	AV3 -0.19
33	17	0.19	8	AV2 -0.17
33	71	0.5	16	AV1 -0.19
33	71	0.24	10	AV2 -0.15
33	71	0.13	6	AV3 -0.18
34	17	0.22	9	AV2 0.03
34	18	0.13	6	AV2 -0.06
34	75	0.23	10	AV2 0.00
35	18	0.15	7	AV2 -0.08
35	24	0.23	9	AV4 0.03
36	73	0.26	11	AV2 0.00
36	74	0.13	6	AV1 0.00
36	74	0.17	8	AV4 -0.27
37	73	0.27	11	AV3 0.00
38	22	0.2	8	AV1 -0.15
38	22	0.15	7	AV2 -0.08
39	24	0.17	7	AV1 0.19
39	69	0.17	8	AV2 0.00
39	69	0.15	7	AV3 0.00
41	29	0.18	7	AV1 -0.14
41	29	0.15	7	AV4 -0.26
42	31	0.27	10	AV4 -0.13
42	32	0.29	12	AV1 0.25
42	33	0.17	7	AV1 0.00
42	58	0.24	10	AV1 -0.11
42	59	0.19	8	AV1 0.23
43	33	0.23	9	AV1 0.00
43	57	0.11	5	AV4 0.37
43	59	0.15	6	AV4 0.07
44	41	0.18	8	AV2 0.03
44	50	0.22	9	AV3 0.00
44	54	0.21	9	AV1 0.00
44	54	0.19	8	AV3 0.00
45	44	0.21	9	AV1 0.22

ROW	COL	VOLT	%TW	LOCATION
45	44	0.19	8	AV2 0.00
45	44	0.23	10	AV3 0.00
45	46	0.26	10	AV1 0.06
45	49	0.32	11	AV3 0.00
ROW	COL	VOLT	%TW	LOCATION
1	20	0.15	21	05H 38.46
3	85	0.13	7	04H 0.00
5	45	0.36	11	05C 0.45
7	1	0.12	7	05H -0.63
11	84	0.19	24	TSC 1.02
34	18	0.3	15	01H 0.23
35	61	0.33	36	02H -0.10
38	22	0.4	12	04C 0.34
39	69	0.45	13	01C 0.36