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TS 5.6.9

July 16, 2019

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

Calvert Cliffs Nuclear Power Plant, Unit No. 12
Renewed Facility Operating License No. DPR-69
NRC Docket No. 50-318

Subject: Spring 2019 – 180 Day Steam Generator Report

Reference: 1. Calvert Cliffs Nuclear Power Plant Units 1 and 2 Technical Specification 5.6.9

In accordance with Reference 1, Attachment (1) provides the results of the steam generator tube inspection conducted on Calvert Cliffs Unit 2 in 2019. This report includes the number and extent of tubes examined and indications identified.

There are no regulatory commitments contained in this correspondence.

Should you have questions regarding this matter, please contact Mr. Larry D. Smith at (410) 495-5219.

Respectfully,

Larry D. Smith
Regulatory Assurance Manager

LDS/KLG/lmd

A001
NRR

Attachment: (1) Calvert Cliffs CC2R23 180-Day Steam Generator Tube Inspection Report

cc:

NRC Project Manager, Calvert Cliffs
NRC Regional Administrator, Region I
NRC Resident Inspector, Calvert Cliffs
D. A. Tancabel, MD-DNR

ATTACHMENT (1)

Calvert Cliffs CC2R23 180-Day Steam Generator Tube Inspection Report

Calvert Cliffs Nuclear Power Plant
July 16, 2019

Exelon Generation Company, LLC

Calvert Cliffs Nuclear Power Plant

1650 Calvert Cliffs Parkway

Lusby, MD 20657

Calvert Cliffs Unit 2

STEAM GENERATOR TUBE INSPECTION REPORT

REFUELING OUTAGE 23

March 2019

Rev. 0

Revisions

Rev 0	Initial Issue

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1.0 Introduction

Calvert Cliffs Nuclear Power Plant Unit 2 (CCNPP2) has two recirculating steam generators designed and fabricated by Babcock and Wilcox (B&W) of Cambridge, Ontario, Canada. These replacement steam generators (RSG's), SG21 and SG22 were installed in 2003.

Each RSG contains 8471 tubes. Three tubes were plugged in SG21 during manufacturing. The tubing material is thermally treated Inconel 690 having a nominal outer diameter (OD) of 0.75 inches and a nominal wall thickness of 0.042 inches. The RSG's were designed and fabricated to the ASME Boiler and Pressure Vessel Code, Section III, subsection NB (Class 1), 1989 Edition with no Addenda. All tubes with a bend radius of 12 inches or less (the first 18 rows) were thermally stress-relieved following bending to reduce the residual stress imparted during bending.

The straight section of the tube bundle is supported by seven 410 stainless steel (SA-240 Type 410S) lattice grid supports. The fan Bar U-Bend support system incorporates sets of SA-240 Type 410S stainless steel Fan Bars on each side of the bundle as shown in Appendix A. Appendix B shows the tube support layout and identification for the CCNPP2 Steam Generators.

Technical Specification (TS) 5.5.9.d provides the requirements for SG inspection frequencies and requires periodic tube inspections be performed. TS 5.5.9.d requires that 100% of the Unit-2 tubes be inspected at sequential periods of 144, 120, 96, and thereafter 72 effective full power months (EFPM).

During the CCNPP2 spring 2019 refueling outage (CC2R23) both Unit 2 steam generators (SG21 and SG22) were inspected in accordance with CCNPP TS 5.5.9. This was the fifth in-service inspection of the replacement steam generators. The SG's had been in operation for 13.145 effective full power years (EFPY) at the time of the inspection.

The next section summarizes the results of the inspection in accordance with the 180-Day reporting requirements of TS 5.6.9. **Bold** wording restates the TS requirement, followed by the required CC2R23 information.

A report shall be submitted within 180 days after the initial entry into Mode 4 following completion of an inspection performed in accordance with the Specification 5.5.9, Steam Generator (SG) Program. CCNPP2 reached Mode 4 returning from CC2R23 on March 14th, 2019.

The report shall include:

2.0 The Scope of the inspections performed on each SG (5.6.9.a)

- Eddy Current Bobbin probe examinations (both SG's)
  - 100% Full Length (FL) of all in-service tubes with a bobbin coil probe for tube-to-support wear at the fan bars and lattice grids and for potential foreign objects and associated wear
- Eddy Current Array Probe (both SG's)
  - 100% Array probe examination of all in-service tubes from the bottom end of the tube to the 1st lattice grid on both the hot and cold legs for potential foreign objects and associated wear
  - In addition to the 100% of the in-service tubes that were examined by Array Probe as mentioned above, the following Array probe examinations were performed, if not already covered by the baseline Array probe scope:
    - Inspect all previous Possible Loose Parts indications (PLPs) (part not removed) plus a one tube bounding examination of such tubes at the elevation of interest
    - Inspect a one-tube border region around all tubes previously plugged for Loose Part Wear (LPW)
    - Inspect a one-tube border region around all tubes previously plugged for PLPs
- Special Interest inspection of Bobbin indications and/or Secondary Side Visual conditions with Array probe
  - All new PLPs and foreign object wear indications plus a one-tube bounding examination if the locations are outside the baseline Array probe examination range
  - All foreign objects identified by secondary side visual inspection plus a one-tube bounding examination of tubes surrounding the foreign object if it falls outside the baseline Array probe examination range
  - Twenty deepest Fan Bar Wear (FBW) bobbin indications in each SG.
  - Ten deepest wear indications detected at lattice supports in each SG (or all if there are less than ten)
  - A sample of Manufacturing Burnish Marks (MBMs), Dents (DNTs), and Dings (DNGs) as directed by BWXT or CCNPP Engineering
- All bobbin probe I-codes
- Special Interest inspection with +Point™
  - All newly-reported array probe PLPs
- Visual Examination
  - Visual inspection of all installed tube plugs in both SGs in accordance with the EPRI PWR Steam Generator Examination Guidelines, Rev 8 (section 6.10). This included both welded and mechanical plugs.

- Visual inspections of the hot and cold leg channel heads including the divider plate/tubesheet interface, the entire bowl per NSAL 12-1 methods for evidence of cladding degradation and/or cracking.

- The following secondary side inspections were performed (both SG's unless otherwise stated)
  - Secondary side visual inspection of tubesheet, the annulus, and the no-tube lane regions looking in-bundle into the high flow regions.
  - Secondary side visual inspection of the 1st lattice grid support
  - Targeted top of tube sheet inspection locations identified as PLP by eddy current
  - Visual Upper Bundle U-bend inspection (SG22 only)
  - Feedring, J-Nozzles, Primary Moisture Separators inspection (SG22 only)
  - Visual inspection of secondary moisture separators (SG22 only)
  - Laser profilometry of the secondary moisture separator baseplates (SG22 only)

3.0 Degradation mechanisms found (5.6.9.b)

Three degradations mechanisms were confirmed to be present in the CCNPP U2 SG's. These are: 1) fan bar wear, 2) lattice grid support wear, and 3) foreign object wear. No other degradation mechanisms, including tube-to-tube wear, were detected.

The visual inspection of the cladding, previously installed plugs, and divider plate found no degradation.

The secondary side visual inspections of the upper bundle, 1st lattice grid support, and SG22 steam drum and primary moisture separators found no degradation.

4.0 Nondestructive examination techniques utilized for each degradation mechanism (5.6.9.c)

The bobbin probe was used as the primary means of detecting tube degradation except for loose parts/wear located between the Top of Tubesheet (TTS) and the first lattice support. At this location, the Array probe was used for the primary means of detection, along with detection of TTS expansion transition IGA/SCC and pitting (proactive examinations). The rotating coil probe was used primarily as a diagnostic tool for indication characterization.

Table 1 below identifies NDE examination techniques utilized for each identified degradation mechanism.

Table 1 – NDE Techniques Utilized for Sizing Identified Degradation

Degradation Mechanism	Inspection Type	EPRI ETSS
Fan Bar Wear	Bobbin	I-96041.1
Foreign Object Wear*	Array	17901.1**
Lattice Grid Support Wear	Bobbin (%TW depth)	96004.1
	Array (length)	11956.3

* The Array probe was the primary means of detecting and sizing foreign object wear during the inspection. However, the +Point™ probe was also used for further characterization and sizing of wear for trending purposes.

** There are other EPRI techniques qualified for sizing of foreign object wear depending on the shape of the flaw. ETSS 17901.1 was selected based on the circumferential groove characteristic of the foreign object wear indications detected during the CC2R23 inspection.

5.0 Location, orientation (if linear), and measured sizes (if available) of service induced indications (5.6.9.d)

5.1 Fan Bar Wear

Fan bar wear (FBW) is a mechanical degradation process which produces volumetric tube wear at the interface between the U-bend anti-vibration supports (fan bars) and the tubes. A total of 421 FBW indications were identified in the Calvert Cliffs Unit 2 RSGs during CC2R23. Fifty-nine (59) of the indications were newly reported during the CC2R23 outage. There were 13 and 46 new indications in SG21 and SG22, respectively.

It should be noted that the total quantity of indications decreased in both steam generators compared to the previous inspection in CC2R21. This decrease is attributed to the change in the reporting threshold for fan bar wear. The reporting threshold was increased from 5%TW in CC2R21 to 7%TW in CC2R23. Therefore, the indications that measured 5%TW and 6%TW in CC2R21 weren't reported again in CC2R23 unless they measured at least 7%TW in CC2R23. Considering only those indications greater than or equal to 7%TW, the total number of indications still increased slightly from 393 indications in CC2R21 to 421 indications in CC2R23.

Table 2 provides a summary of the fan bar wear indications from CC2R23. The maximum depth among these indications was 28% TW, which is consistent with results from previous inspections. Growth of the repeat indications was minimal and consistent with previous results.

Figure 1 provides the distribution of fan bar wear depths for both steam generators as reported with the bobbin coil probe. As shown in the figure, SG22 contained more indications. Most of the indications in both SG's are less than 20% TW.

Figures 2 and 3 provide tube map locations of the reported FBW. Although the tube maps shown in Figures 2 and 3 provide a view of the tubesheet primary face from the hot leg side, both the hot leg and cold leg FBW indications are included on each map. Most of the wear continues to occur in larger U-bend radius tubes clustered towards the center-most tube columns.

Appendix C provides a complete list of FBW indications reported in CC2R23.

Table 2 – Fan Bar Wear Indication Summary

Description	SG21	SG22
Total Number of In-Service Tubes Prior to CC2R21	8434	8439
Number of FBW Indications	134	287
Maximum Depth of FBW (%TW)	25%	28%
Number of TSP Wear Indications ≥40%TW	0	0
Number of Newly-Reported Indications	13	46
Number of Tubes Plugged due to FBW	0	0

Figure 1 – Distribution of Fan Bar Wear Depth

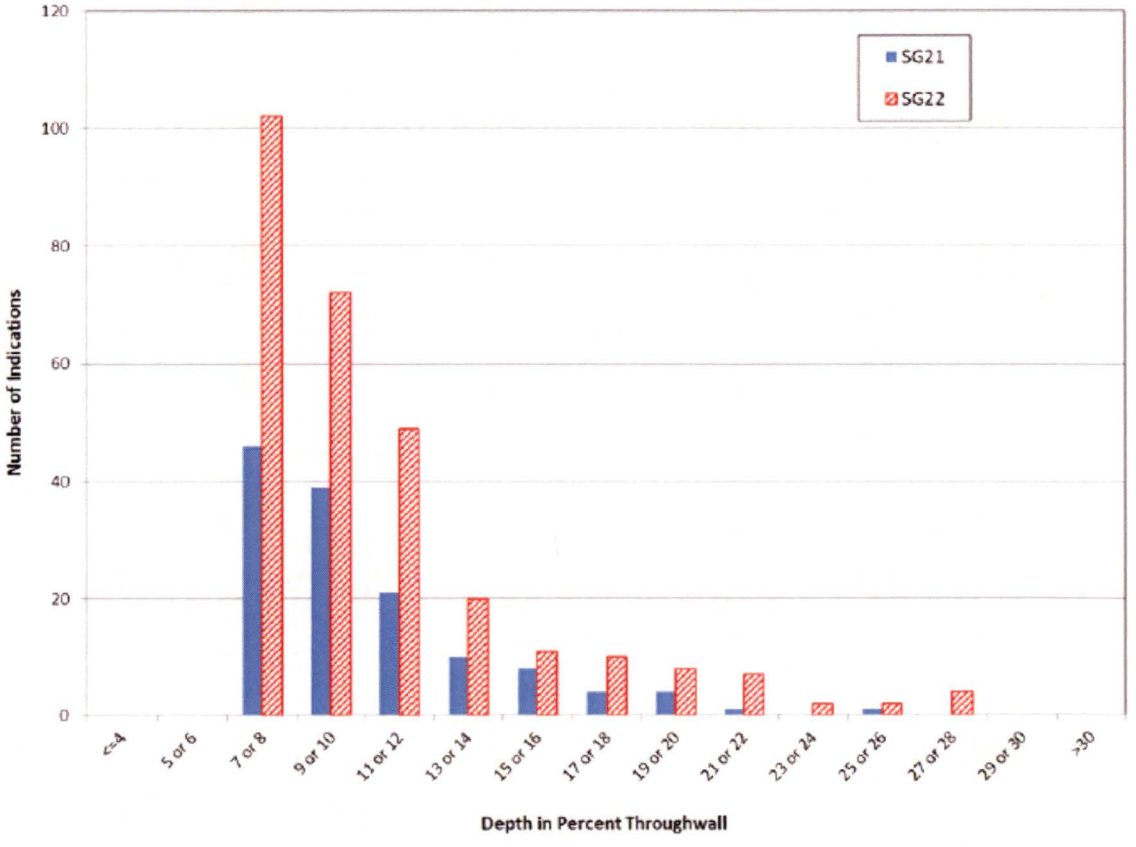


Figure 2 – SG21 Fan Bar Wear Map

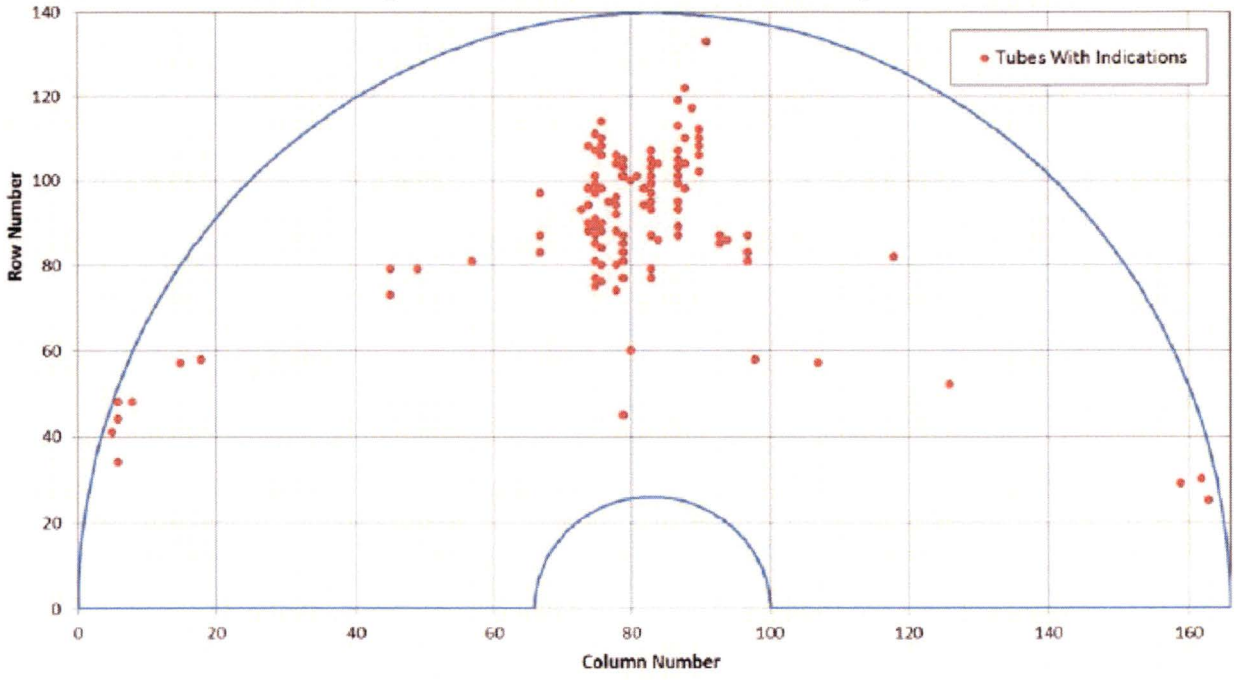
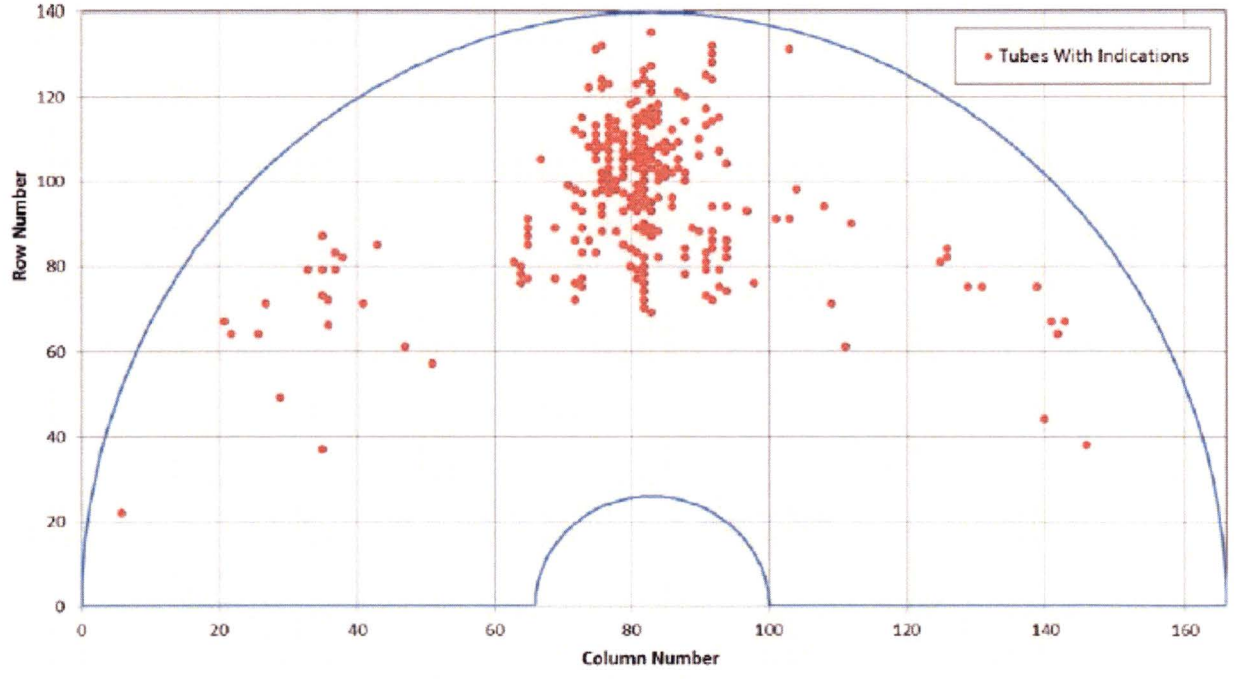


Figure 3 – SG22 Fan Bar Wear Map



5.2 Lattice Grid Support Wear

Three indications of wear related to the lattice grid supports were reported during the CC2R23 outage (two indications in SG21 and one indication in SG22). All three of these indications had been previously reported and were inspected with array probes to confirm that the morphologies of the indications were consistent with lattice grid wear and not some other damage mechanism such as foreign object wear. No new indications of lattice grid wear were reported during the CC2R23 inspections. Table 3 provides a listing of these indications.

Table 3 – Summary of Lattice Grid Support Wear Indications

SG	Row	Col	Location	Bobbin Depth	Axial Extent
SG21	131	65	07H +0.52	11% TW	0.28"
SG21	137	91	03H -1.50	11% TW	0.26"
SG22	102	30	02C -1.43	13% TW	0.28"

5.3 Foreign Object Wear

During the CC2R23 inspection, 22 foreign object wear indications were detected in 18 tubes. These indications were reported as LPW (Loose Part Wear) in the eddy current database.

One of the indications (R121-C117 in SG21) was newly reported. Both eddy current and visual inspections of the surrounding locations concluded that the part that caused the wear is no longer present. The other 21 indications had been reported in the previous inspection during the CC2R21 outage. These legacy indications also have no part present based on eddy current and/or visual inspections of the affected and surrounding tubes.

All these indications were sized with array data using EPRI ETSS 17901.1. This was the first use of the array technique for sizing of foreign object wear at Calvert Cliffs Unit 2. In the previous CC2R21 outage, foreign object wear indications were depth sized using +Point™ ETSS 27901.1. To do a valid growth rate comparison, the array data from the CC2R21 outage were reviewed to determine the array depths from CC2R21 to use to compare to the array depth found in CC2R23. Since the parts were no longer present, as expected, there was no noticeable change in the depths of these indications.

All these LPW indications were sized below the site plugging limit. Since no objects were present to cause further wear and all LPW %TW were less than the 40%TW Tech Spec. plugging limit (5.5.9.c), all 18 tubes were returned to service.

Table 4 provides a summary of the foreign object wear indications detected in the Unit 2 RSGs.

Table 4 – Summary of Foreign Object Wear

SG	Row	Col	Location	%TW	Axial Extent (in.)	New in 2019
SG21	12	66	TSH +0.10	28	0.18	No
SG21	12	66	TSH +0.38	22	0.31	No
SG21	12	162	TSH +0.05	30	0.15	No
SG21	13	65	TSH +0.05	25	0.15	No
SG21	14	66	TSH +0.44	17	0.23	No
SG21	14	66	TSH +0.44	14	0.23	No
SG21	72	146	TSH +0.23	34	0.23	No
SG21	75	147	TSH +18.11	18	0.20	No
SG21	77	147	TSH +17.63	18	0.23	No
SG21	77	149	TSH +20.72	20	0.28	No
SG21	121	117	TSH +0.61	21	0.28	Yes
SG21	137	73	TSC +14.98	18	0.38	No
SG21	137	75	TSC +14.43	25	0.38	No
SG21	137	75	TSC +14.76	16	0.36	No
SG22	14	4	TSC +0.48	26	0.38	No
SG22	17	1	TSC -0.05	19	0.33	No
SG22	18	2	TSC +0.18	22	0.26	No
SG22	82	42	04H -1.33	26	0.20	No
SG22	112	82	04H +37.85	21	0.33	No
SG22	124	116	TSC +12.76	14	0.20	No
SG22	126	116	TSC +12.56	18	0.23	No
SG22	126	116	TSC 12.84	33	0.33	No

6.0 Number of tubes plugged during the inspection outage for each active degradation mechanism (5.6.9.e)

Zero (0) tubes were plugged during the CC2R23 outage.

7.0 Total number and percentage of tubes plugged to date and the effective plugging percentage in each steam generator (5.6.9.f)

Table 5 provides the post CC2R23 outage tube plugging status of the CCNPP2 SG's. There are currently 37 tubes plugged in SG21 and 32 tubes plugged in SG22.

Table 5 – Tube Plugging Summary

SG	Tubes Installed	Tubes plugged to-Date
SG21	8471	37 (0.437%)
SG22	8471	32 (0.378%)
Total	16,942	69 (0.407%)

There are no sleeves installed in the CCNPP2 steam generators, therefore the effective plugging percentage is the same as stated Table 5 above.

8.0 The results of condition monitoring, including results of tube pulls and in-situ testing (5.6.9.g)

The condition monitoring assessment is summarized in Figures 4 through 6. These figures provide the condition monitoring limit curves corresponding to the NDE sizing technique employed for each degradation type. All reported degradation falls below the applicable condition monitoring curve and therefore satisfies the Technical Specification structural performance criteria. No tube-pulls or in-situ pressure testing were required.

8.1 Fan Bar Wear

EPRI Examination Technique Specification Sheet (ETSS) 96041.1 was used for depth sizing of fan bar wear. Based on the sizing parameters for this technique, the CM curve shown in Figure 4 was generated and documented in the CMOA. A minimum of the twenty deepest indications in each steam generator were inspected with array to validate the flaw shape and length assumptions. The longest of these deepest flaws measured 1.55 inches with array. Most of the indications were tapered, but a few indications had relatively flat profiles.

The indications that were inspected with array were plotted at their total length as measured with array probes. All other fan bar wear indications detected by bobbin were conservatively plotted at a bounding axial length of 1.8 inches based on current and previous length sizing of the deepest indications. Since some of the indications were flat, all indications were conservatively plotted using the maximum bobbin depth as opposed to the structural (or burst-equivalent) depth. As shown, all indications lie well below the CM curve. Hence, structural integrity of the fan bar wear indications is demonstrated.

8.2 Foreign Object Wear

EPRI Examination Technique Specification Sheet (ETSS) 17901.1 was used for depth and length sizing of all foreign object wear indications. Based on the sizing parameters for this array probe technique, the CM curve shown in Figure 5 was generated and documented in the CMOA. As shown, all 22 indications lie well below the CM curve. Hence, structural integrity of the foreign object wear indications is demonstrated.

8.3 Lattice Grid Wear

EPRI Examination Technique Specification Sheet (ETSS) 96004.1 was used for depth sizing of lattice grid wear. Based on the sizing parameters for this technique, the CM curve shown in Figure 6 was generated and documented in the DA. Since all three of the lattice grid wear indications were inspected with the Array probe, the lengths measured from the Array inspections are reflected in the figure. As shown, all 3 indications lie well below the CM curve. Hence, structural integrity of the lattice grid wear indications is demonstrated.

Figure 4 – Condition Monitoring Results for Fan Bar Wear

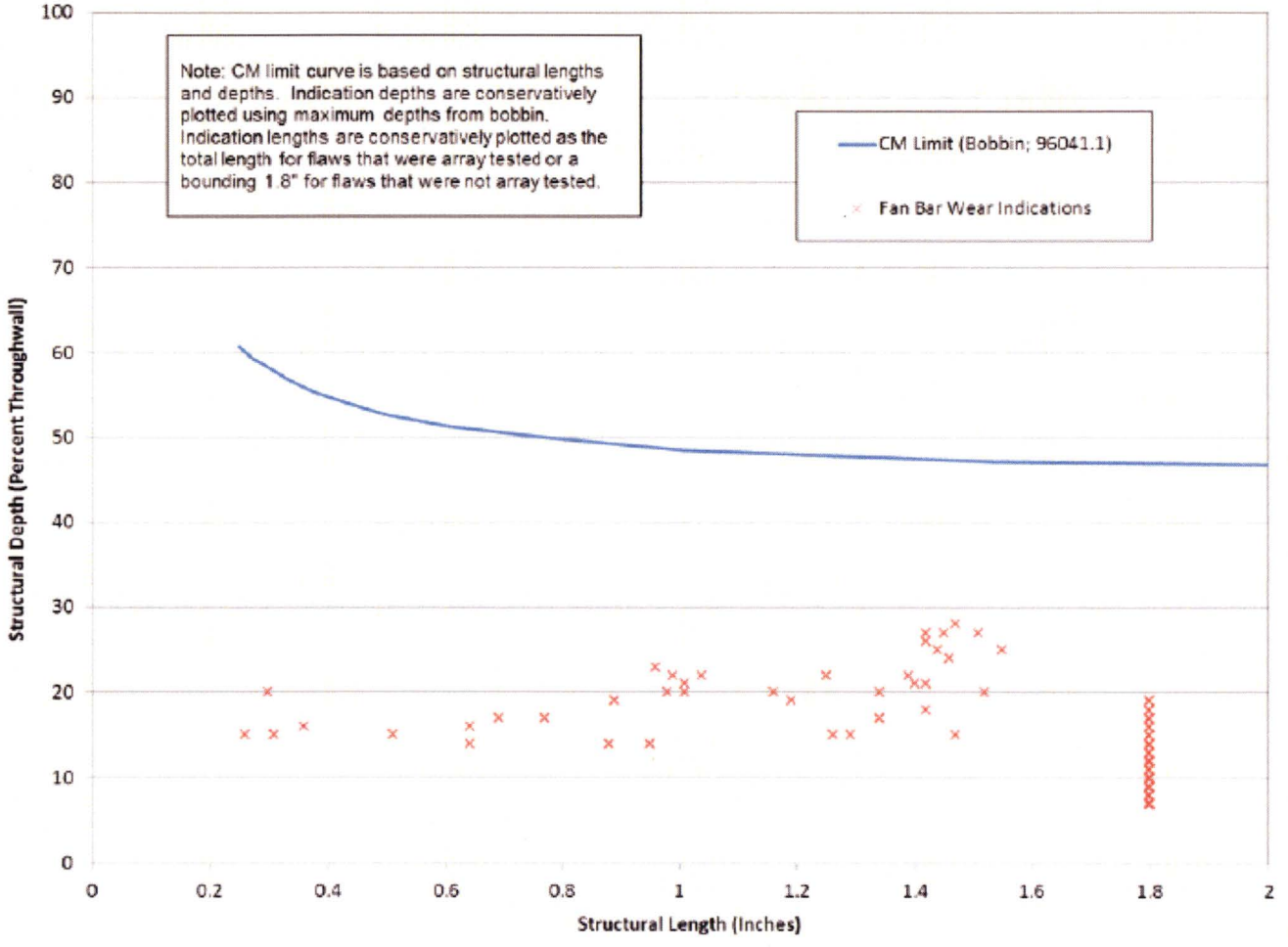


Figure 5 – Condition Monitoring for Foreign Object Wear

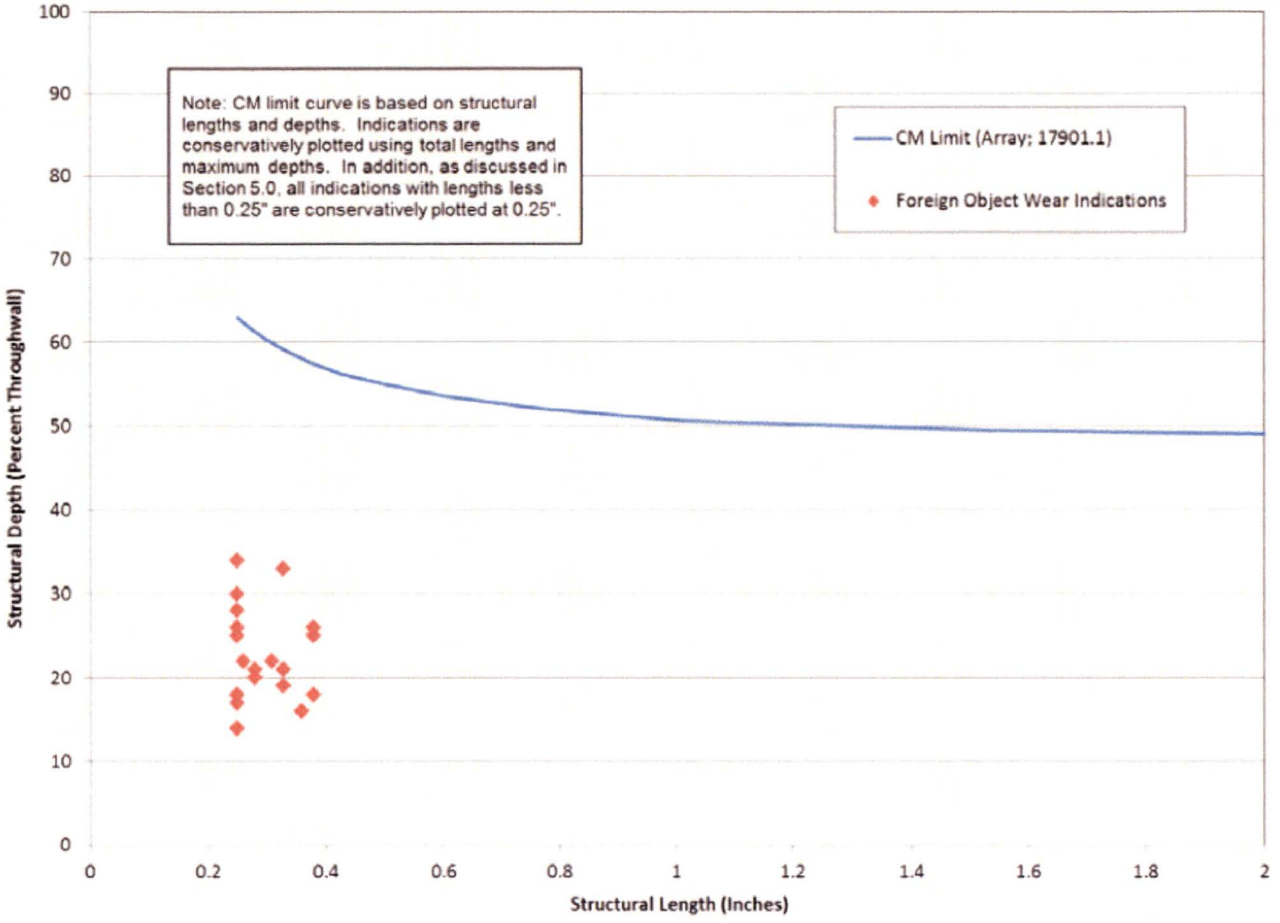
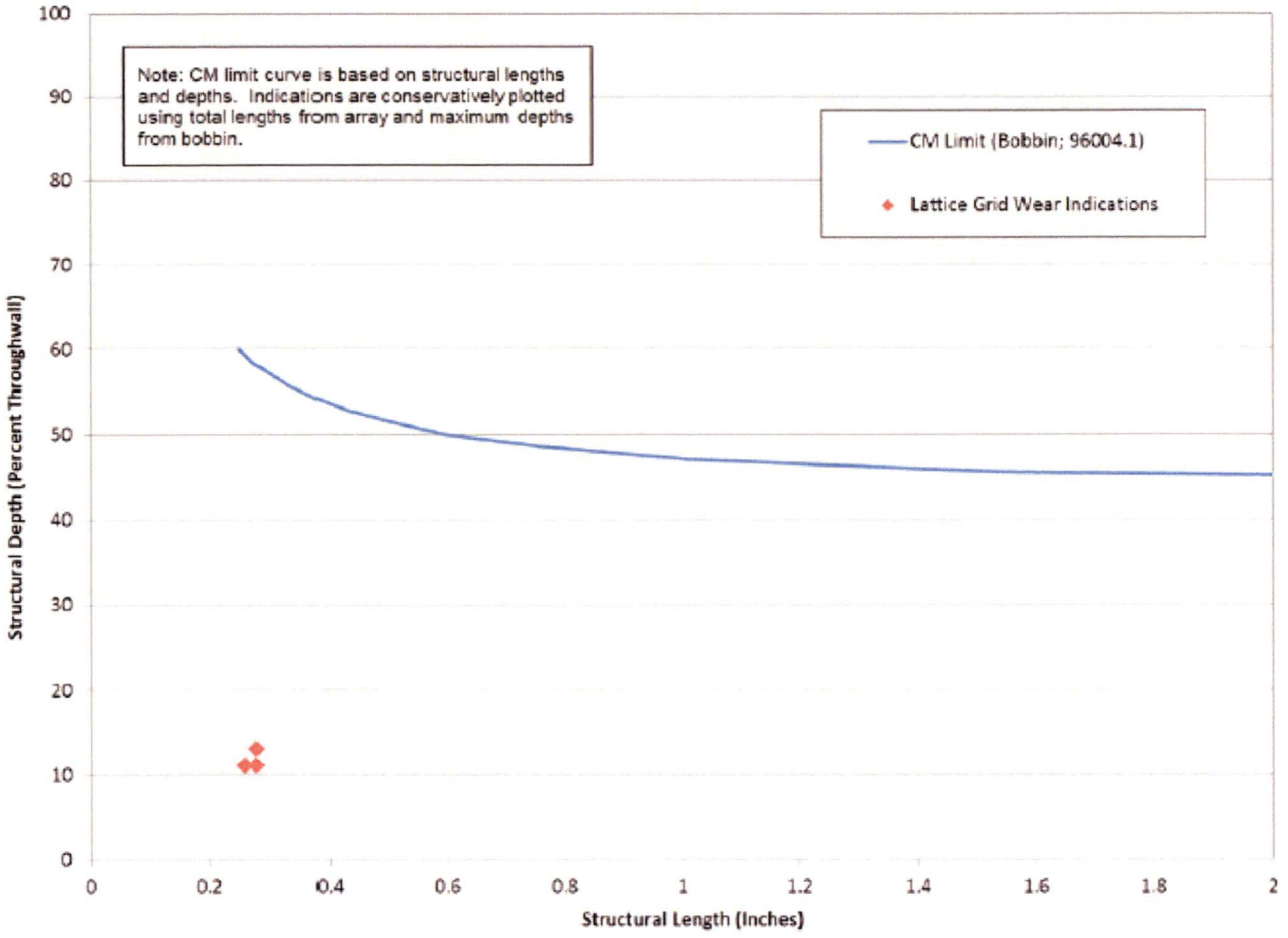


Figure 6 – Condition Monitoring for Lattice Grid Wear

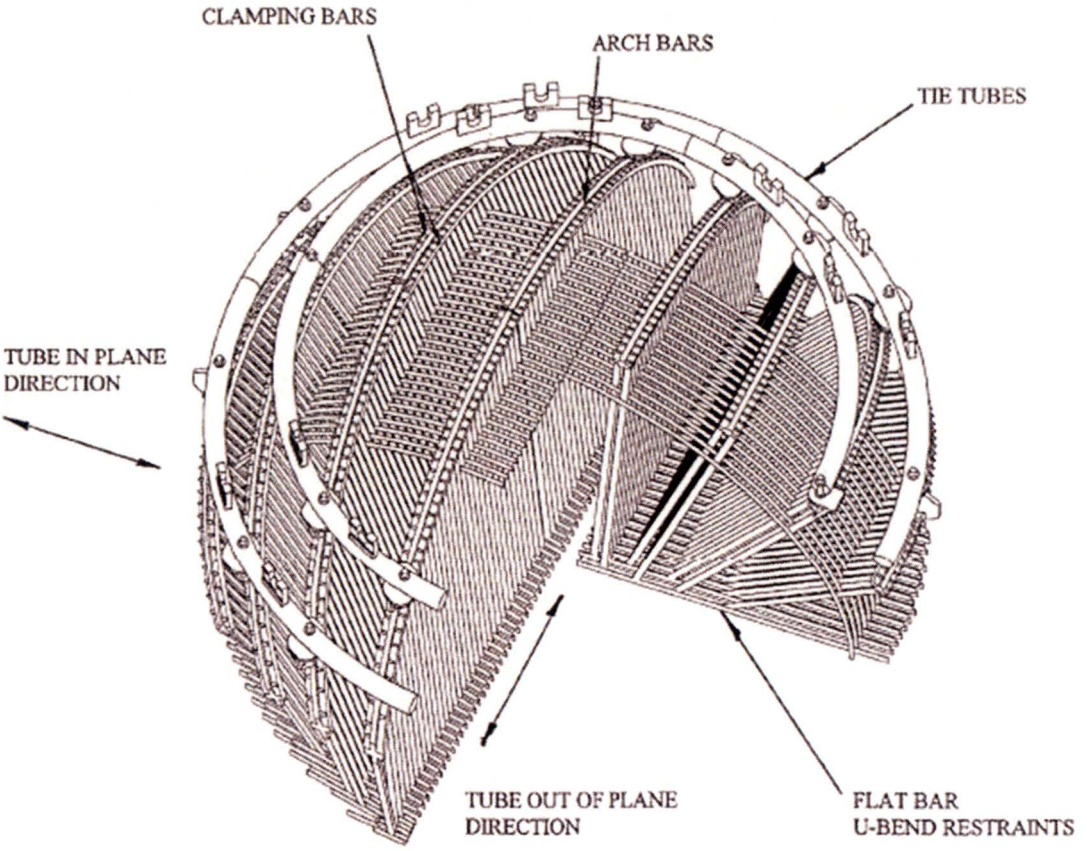


8.4 Operational Leakage Criterion and Validation of Previous OA

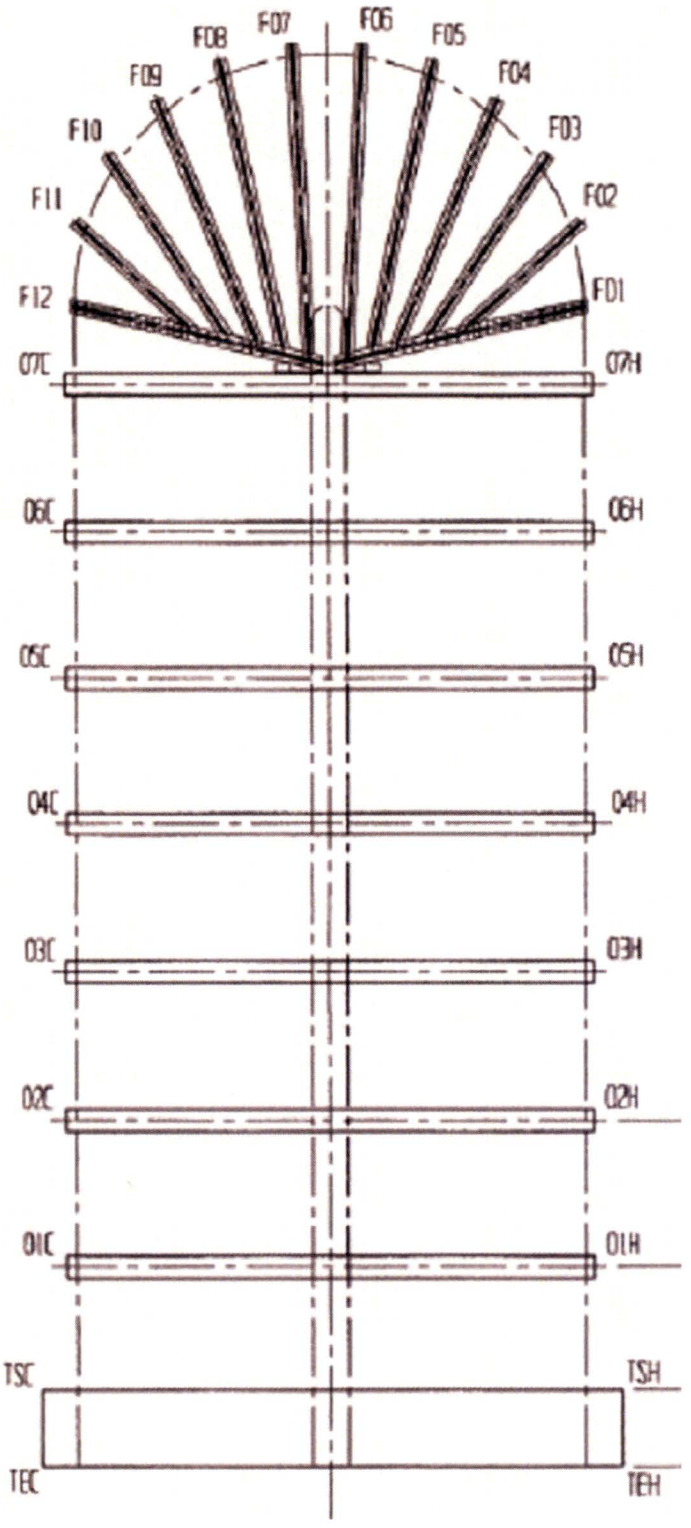
The operational leakage criterion was also satisfied by the absence of any measureable primary to secondary leakage since the previous inspection.

The results of the 2019 (CC2R23) inspection and the condition monitoring assessment confirm that the 2015 (CC2R21) operational assessment was appropriately bounding.

APPENDIX A – Typical U-Bend Support System



Appendix B Calvert Cliffs U-2 Tube Support Layout



APPENDIX C – CC2R23 Fan Bar Wear Summary

Table C-1: SG21 Fan Bar Wear Summary

Row	Col	% TW	Support	Inch
25	163	8	F07	2.12
29	159	13	F06	1.79
30	162	7	F07	-0.88
34	6	15	F06	-1.27
41	5	9	F06	-0.74
44	6	16	F06	2.08
45	79	7	F07	0.84
48	6	10	F06	1.87
48	8	7	F06	1.88
52	126	12	F08	-0.73
57	15	10	F06	-0.72
57	107	15	F08	1.86
58	18	10	F05	1.95
58	98	8	F05	-1.94
60	80	7	F06	0.61
73	45	8	F06	-0.77
74	78	9	F08	1.86
75	75	8	F08	0.86
76	76	8	F07	-0.79
77	75	7	F08	0.84
77	79	13	F08	0.81
77	83	11	F08	0.49
79	45	12	F06	-0.72
79	49	8	F06	-1.73
79	83	8	F06	-0.52
80	76	10	F07	-0.83
80	78	12	F08	1.83
81	57	7	F06	-1.78
81	75	8	F08	0.78
81	79	14	F08	0.76
81	97	7	F08	1.82
82	118	11	F06	1.58
83	67	7	F08	0.79
83	79	13	F08	0.77
83	97	8	F08	1.85
84	76	10	F07	-0.76
85	75	8	F07	1.66
85	75	9	F08	0.75
85	79	17	F08	0.79
85	93	11	F08	1.8
86	84	10	F06	-0.72
86	94	11	F08	0.65
87	67	9	F08	0.79
87	75	8	F08	0.81
87	79	8	F08	0.79
87	83	7	F06	0
87	83	9	F08	-0.59
87	87	13	F08	1.8
87	93	12	F08	1.73
87	97	9	F08	1.87
88	74	7	F08	1.93
88	76	8	F08	1.8
88	78	8	F06	1.09
89	75	15	F06	-0.7
89	75	8	F08	0.81
89	87	9	F08	1.89
90	74	9	F08	1.88
90	76	7	F07	-0.79
91	75	8	F08	0.79
92	78	14	F08	1.7
93	73	11	F08	0.77
93	83	11	F06	-0.56
93	87	7	F08	1.78
94	74	9	F06	-1.67
94	78	16	F08	1.83
94	82	11	F06	-1.74
95	77	8	F06	-1.69
95	83	9	F08	-0.59
95	87	20	F08	1.71
95	87	12	F09	0.79
96	78	7	F08	1.8
97	67	10	F08	0.79
97	75	11	F06	-0.7
97	75	10	F07	1.76
97	83	10	F08	0.5
98	74	8	F06	-1.71
98	74	8	F08	1.89
98	76	8	F07	-0.79
98	82	8	F06	-1.7
98	82	10	F08	1.92
98	88	9	F08	0.86
99	75	9	F07	1.76
99	83	7	F06	-0.49
99	83	8	F07	-0.56
99	83	9	F08	-0.56
99	87	17	F06	-1.18
100	80	8	F06	-1.69
101	75	19	F06	-0.63
101	75	15	F07	1.25
101	75	7	F09	-1.41
101	79	9	F06	-0.66
101	79	8	F07	1.75
101	79	10	F08	0.84
101	81	7	F07	-0.83
101	83	10	F07	-0.05
101	83	10	F08	-0.18
101	87	9	F06	-1.58
101	87	12	F07	0.75
102	90	10	F06	-0.75
103	79	9	F08	0.77
103	83	11	F06	0.5
103	87	9	F06	-1.67
103	87	14	F07	0.63
104	78	9	F07	0.82
104	78	7	F08	1.89
104	84	9	F06	-0.61
104	88	13	F05	-1.31
104	88	22	F06	-0.73
104	88	9	F07	1.79
105	79	9	F07	1.85
105	83	13	F07	-0.02

Row	Col	% TW	Support	Inch
105	87	11	F07	0.75
106	76	20	F06	1.2
106	76	7	F07	-1.24
106	78	10	F07	0.77
106	90	10	F06	-0.7
107	75	7	F07	1.8
107	83	10	F06	0.05
107	83	12	F07	-0.02
107	87	19	F07	0.82
108	74	8	F07	0.7
108	76	25	F06	1.15
108	90	12	F06	-0.75
110	76	7	F06	1.14
110	88	11	F06	-0.68
110	90	9	F06	-0.59
111	75	17	F06	-0.7
112	90	13	F06	-0.73
113	87	11	F07	0.75
114	76	15	F06	-0.88
117	89	18	F06	-1.25
119	87	15	F07	0.77
122	88	8	F09	1.81
133	91	12	F02	0.84

Table C-2: SG22 Fan Bar Wear Summary

Row	Col	% TW	Support	Inch
22	6	12	F07	-0.57
37	35	7	F07	1.84
38	146	9	F07	-0.82
44	140	9	F07	-0.8
49	29	7	F07	1.83
57	51	8	F06	-0.5
61	47	9	F06	0.77
61	111	10	F08	1.71
64	22	10	F05	2.07
64	26	11	F05	1.97
64	142	12	F05	1.96
66	36	7	F08	-1.73
67	21	10	F06	-0.75
67	141	10	F05	-0.72
67	143	9	F06	-0.59
69	83	9	F08	-0.59
70	82	8	F06	-1.85
71	27	11	F06	-0.59
71	41	7	F06	-0.66
71	109	9	F05	0.85
72	36	7	F06	-1.57
72	72	10	F08	1.86
72	82	7	F08	1.94
72	92	12	F08	0.83
73	35	10	F06	-0.61
73	91	14	F08	1.95
74	82	8	F07	0.74
74	82	8	F08	1.93
74	82	10	F06	-1.8
74	94	13	F08	0.85
75	73	9	F08	0.76
75	93	7	F08	1.79
75	129	11	F05	-0.7
75	131	7	F05	-0.77
75	139	8	F06	-0.66
76	64	9	F08	1.87
76	72	15	F08	1.86
76	72	11	F06	-1.86
76	82	9	F07	0.82
76	82	11	F06	-1.3
76	82	8	F08	1.93
76	98	9	F08	0.7
77	65	13	F08	0.7
77	69	8	F08	0.79
77	73	8	F08	0.81
77	81	8	F07	-0.87
78	64	9	F08	1.89
78	82	13	F06	-1.85
78	88	7	F08	0.74
79	33	10	F06	-0.66
79	35	11	F06	-0.57
79	37	10	F06	-0.59
79	81	13	F07	-0.9
79	91	7	F08	1.86
79	93	26	F08	1.49
80	64	8	F09	-2.02
80	80	8	F06	-1.81
80	82	8	F06	-1.8
80	82	8	F05	-0.85
81	63	7	F08	-1.01
81	91	8	F08	1.88
81	125	8	F06	-0.7
82	38	8	F06	-0.25
82	82	8	F06	-1.88
82	82	11	F07	1.31
82	84	8	F06	1.32
82	84	9	F08	0.85
82	88	8	F08	0.81
82	94	9	F08	0.72
82	126	9	F06	-1.7
83	37	12	F06	-0.84
83	73	20	F08	0.79
83	75	12	F02	0.85
83	81	9	F07	-1.33
83	91	12	F08	1.88
84	80	9	F06	-1.83
84	88	8	F08	0.79
84	92	17	F08	0.72
84	94	20	F08	0.79
84	126	10	F05	2.14
85	43	8	F06	-0.59
85	65	9	F08	0.72
85	79	12	F08	0.72
85	79	8	F08	-1.24
86	72	8	F05	-0.87
86	72	13	F06	-1.82
86	74	12	F06	-1.89
86	92	9	F08	0.79
86	94	16	F08	0.77
87	35	8	F06	-0.52
87	65	15	F08	0.73
87	83	24	F07	-0.04
87	83	18	F08	0
88	76	8	F06	1.81
88	78	11	F06	-1.09
88	82	13	F06	1.37
88	82	7	F05	1.81
88	84	8	F07	-0.88
88	90	7	F09	1.97
88	92	10	F08	0.79
89	65	16	F08	0.73
89	69	12	F08	0.81
89	73	21	F08	0.77
89	81	7	F06	-0.8
89	83	8	F06	0.48
89	83	8	F07	0.52
89	83	9	F08	-0.61
89	89	12	F08	-1.25
90	82	7	F06	-1.85
90	112	9	F06	1.64
91	65	22	F08	0.7

Row	Col	% TW	Support	Inch	Row	Col	% TW	Support	Inch	Row	Col	% TW	Support	Inch
91	101	8	F05	-0.81	100	78	8	F07	0.7	105	87	12	F01	0.48
91	103	7	F05	-0.9	100	78	11	F08	-1.9	106	80	7	F07	1.31
92	76	12	F06	1.32	100	82	8	F08	1.84	106	82	14	F06	-1.83
93	73	8	F06	-0.77	100	82	16	F07	0.74	106	82	20	F07	0.8
93	79	10	F06	-0.83	100	82	17	F06	-1.29	106	90	21	F07	1.21
93	81	8	F06	-0.79	100	84	7	F07	1.74	107	75	14	F06	-0.81
93	83	9	F06	0.48	100	88	11	F07	1.84	107	77	10	F06	-0.81
93	83	9	F07	0.44	101	77	12	F06	-0.81	107	79	8	F06	-0.89
93	97	8	F10	-0.97	101	79	7	F07	1.8	107	81	22	F06	-0.79
93	97	9	F08	1.82	101	85	8	F09	1.38	107	81	12	F08	-1.4
94	72	7	F08	1.83	102	76	13	F07	-1.34	107	83	12	F07	-0.04
94	76	9	F06	1.77	102	76	10	F06	1.69	107	85	12	F09	1.28
94	80	9	F06	-1.83	102	82	10	F09	0.78	107	85	9	F06	1.19
94	82	17	F06	-1.32	102	84	7	F07	1.75	107	93	7	F07	0.75
94	82	10	F07	0.79	102	86	9	F02	0.87	108	74	7	F06	-1.8
94	86	8	F06	0.74	102	88	8	F07	1.79	108	76	7	F08	1.3
94	92	12	F08	0.77	103	77	13	F06	-0.83	108	76	8	F09	0.74
94	94	10	F08	0.72	103	79	9	F07	1.81	108	82	12	F09	0.72
94	108	8	F05	1.81	103	79	10	F06	-0.78	108	82	11	F08	1.27
95	81	7	F07	-1.38	103	81	9	F08	-1.41	108	82	20	F07	0.74
95	83	10	F07	0.41	103	81	8	F06	-0.72	108	84	13	F07	1.78
96	80	9	F06	-1.77	103	83	16	F06	0.46	108	84	11	F06	-0.74
96	82	8	F06	1.25	103	85	10	F08	1.25	108	86	15	F07	1.2
96	84	18	F07	1.24	103	87	10	F07	0.72	108	86	25	F06	-1.2
96	86	7	F06	0	103	87	7	F09	0.75	109	75	14	F06	-0.79
97	73	7	F06	-0.79	104	82	11	F06	-1.92	109	77	21	F06	-0.77
97	75	7	F06	-0.84	104	82	8	F09	0.78	109	79	23	F06	-0.75
97	77	9	F06	-0.85	104	82	11	F07	0.76	109	81	16	F06	-0.81
97	79	8	F06	-0.83	104	84	11	F07	1.76	109	81	9	F07	-1.38
97	81	10	F07	-1.31	104	94	18	F06	-1.32	109	81	16	F08	-1.18
98	72	8	F08	1.85	105	67	10	F07	-1.34	109	85	19	F07	-1.23
98	76	9	F06	1.67	105	75	10	F06	-0.83	109	87	12	F07	0.75
98	78	7	F07	0.66	105	77	13	F06	-0.81	110	78	11	F07	0.75
98	78	13	F08	1.77	105	79	12	F07	1.84	110	82	9	F07	0.75
98	82	8	F07	0.72	105	79	19	F06	-0.78	110	90	7	F08	-1.45
98	104	7	F06	1.35	105	81	14	F08	1.32	111	73	27	F06	-1.34
99	71	13	F08	-0.76	105	81	7	F07	1.8	111	75	22	F06	-0.83
99	77	19	F06	-0.79	105	81	9	F06	-0.8	111	77	27	F06	-0.83
99	81	8	F06	-0.76	105	83	14	F07	0.44	111	79	10	F07	1.73
100	76	9	F06	-1.93	105	83	8	F06	0.48	111	79	17	F06	-0.79

Row	Col	% TW	Support	Inch
111	81	14	F06	-0.83
112	72	8	F08	1.76
112	78	10	F07	0.68
112	86	11	F06	-1.16
113	75	11	F06	-0.79
113	77	28	F06	-0.81
113	81	8	F08	1.36
113	81	15	F06	-1.27
113	83	7	F06	0.46
113	83	11	F07	0.46
113	91	20	F02	-2.26
114	78	8	F07	0.7
114	82	10	F06	1.25
114	84	15	F06	-1.2
114	88	17	F05	1.34
114	92	8	F06	-0.75
115	73	8	F06	-0.79
115	77	9	F06	-0.77
115	81	7	F06	1.19
115	83	9	F06	0.46
115	83	9	F07	0.44
115	93	11	F07	0.75
116	82	21	F07	1.25
116	84	11	F08	-1.96
117	83	7	F05	-0.15
117	83	7	F08	0
117	83	18	F06	-0.04
117	83	7	F07	0.48
117	91	17	F07	1.35
118	80	7	F06	0.77
118	84	7	F07	1.64
119	81	12	F06	-0.75
120	88	11	F08	-1.2
121	83	10	F08	0.44
121	87	8	F07	0.77
122	74	8	F07	0.66
122	76	10	F08	-0.72
123	77	8	F06	-0.81
123	81	11	F07	1.54
123	83	7	F06	0.68
123	83	27	F07	0.15
124	76	8	F06	0.73
124	82	7	F09	-1.36
124	82	14	F06	-1.36
124	82	12	F08	-1.47
124	92	7	F06	-0.86
125	91	11	F03	-2.05
126	82	10	F07	1.12
127	83	7	F07	0.07
128	92	12	F08	-1.29
130	92	12	F06	1.8
131	75	9	F06	-1.01
131	103	9	F03	-0.42
132	76	7	F08	-1.27
132	92	10	F03	-2.03
135	83	11	F07	0.07