Exelon Generation Company, LLC

Braidwood Station
35100 South Route 53, Suite 84
Braceville, IL 60407-9619

www.exeloncorp.com

February 27, 2017
BW170017

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

Braidwood Station, Unit 1
Renewed Facility Operating License No. NPF-72
NRC Docket No. STN 50-456

Subject: Braidwood Station, Unit 1 Steam Generator Tube Inspection Report for Refueling Outage 19

In accordance with Technical Specification 5.6.9, "Steam Generator (SG) Tube Inspection Report," Exelon Generation Company, LLC is reporting the results of the SG inspections that were completed during Braidwood Station, Unit 1 Refueling Outage 19 (A1R19).

Please direct any questions you may have regarding this submittal to Mr. Steven Reynolds, Regulatory Assurance Manager, at (815) 417-2800.

Respectfully,

Marri Marchionda-Palmer
Site Vice President
Braidwood Station

Attachment: Braidwood Station, Unit 1 Steam Generator Tube Inspection Report Refueling Outage 19

cc: NRC Regional Administrator, Region III
NRC Senior Resident Inspector – Braidwood Station
NRC Project Manager, NRR – Braidwood and Byron Stations
Illinois Emergency Management Agency – Division of Nuclear Safety

Exelon Generation Company, LLC

BRAIDWOOD STATION UNIT 1
35100 South Rte. 53, Suite 84
Braceville, IL 60407

COMMERCIAL OPERATION: July 29, 1988

BRAIDWOOD STATION UNIT 1
STEAM GENERATOR EDDY CURRENT INSPECTION REPORT

REFUELING OUTAGE 19 (A1R19)

September 2016

Mailing Address
4300 Winfield Road
Warrenville, IL 60555

TABLE OF CONTENTS

Introduction

Braidwood Station Unit 1 operates with four Babcock & Wilcox Replacement Steam Generators (SGs) in the four loop pressurized water reactor system. The SGs each contain 6633 thermally treated Alloy-690 U-tubes that have a nominal diameter of 0.6875 inches and a nominal thickness of 0.040 inches. The tubes are supported by stainless steel lattice grid structures and fan bars. The tubes are hydraulically expanded into the full depth of the tubesheet. Main Feedwater enters the SGs above the tube bundle through a feedring and J-tubes. The replacement SGs were installed at the end of Cycle 7, in fall 1998.

Technical Specification (TS) 5.5.9.d provides the requirements for SG inspection frequencies and requires periodic SG tube inspections to be performed. TS 5.5.9.d require that 100% of the Unit 1 tubes are to be inspected at sequential periods of 144,120, 96, and thereafter 72 Effective Full Power Months (EFPM). The first sequential period shall be considered to begin after the first inservice inspection of the SGs.

The Braidwood Unit 1 replacement SGs are currently in their thirteenth (13^{th}) cycle of operation and are on an 18-month fuel cycle. During Cycles 17, 18, and 19, Braidwood Unit 1 operated a total of 4.218 Effective Full Power Year (EFPY) since the previous SG inspection during A1R16. The replacement SG's have operated a total of 16.972 EFPY through the end of Cycle 19, which is 44.16 EFPM within the 120 EFPM inspection period.

The A1R19 SG inspections were performed consistent with the Electric Power Research Institute (EPRI) "PWR Steam Generator Examination Guidelines: Revision 7," applicable interim guidance and Nuclear Energy Institute (NEI) 97-06, "Steam Generator Program Guidelines" Revision 3. The field inspection activities were conducted from September 29, 2016 through October 5, 2016 by the Westinghouse Electric Company LLC.

Steam Generator Inspection Scope (TS 5.6.9.a)

Braidwood Unit 1 Refueling Outage 19 (A1R19) was the third outage and first SG inspection of the 120 EFPM period, the next SG inspection is planned for A1R22, which will be the sixth refuel outage within the 120 EFPM period. The following inspections were performed during A1R19 to ensure that 100% of the tubes were inspected during the period as required by TS 5.5.9.d.

Primary Side Scope:

- 100% full-length bobbin coil eddy current examination of all four SGs.
- All Hot leg Dent & Dings $\geq$2.0 volts in all four SG's with + Point™.
- Special Interest inspection of bobbin and X-Probe indications with +Point™.
- Bobbin examinations of all in-service tubes within five tube of the no-tube lane or periphery using Westinghouse ETSS-FOW-AHC-BOB for foreign object wear detection.
- Visual Inspection of all existing tube plugs (85 plugs)
- Visual inspection of tubesheet, divider plate, channel head welds and cladding for degradation.

Secondary Side Scope:

- Sludge lancing in all four SGs including "post sludge lance" Foreign Object Search and Retrieval (FOSAR)
- Feedring Inspection (1D SG)
- Steam Drum Internal Inspection (1D SG)
- Upper Bundle Inspection (1D SG)

Degradation Mechanisms Found (TS 5.6.9.b)

No evidence of cladding or weld breaches or evidence of channel head wastage was identified during the primary side visual inspections of all four SG's. In addition, no degradation or structural distortion was observed during Foreign Object Search and Retrieval (FOSAR) or during visual inspections of the 1D SG upper bundle, feedring, and steam drum region.

The Table below provides a summary of all the degradation, by mechanism, identified during the A1R19 inspections (all mechanisms were present during previous inspections). No evidence of any cracking was found. No degradation was identified during the secondary side visual inspections.

Summary of A1R19 Degradation Indications by Mechanism

Degradation Mechanism	1A SG	1B SG	1C SG	1D SG	Total
Fan Bar Wear	8	18	38	20	84
Lattice Grid Wear	4	4	2	1	11
Foreign Object Wear	9	1	3	0	13

Nondestructive Examination Techniques Utilized for Each Degradation Mechanism Found During A1R19 (TS 5.6.9.c)

Steam Generator eddy current examination techniques used (see Table below) were qualified in accordance with Appendix H or Appendix I of the EPRI PWR SG Examination Guidelines Revision 7. Each examination technique was evaluated to be applicable to the tubing and the degradation mechanisms found in the Braidwood Station Unit 1 SGs during A1R19.

APPENDIX H & APPENDIX I TECHNIQUES

Location	Degradation Mode	Orientation	ETSS	ETSS Rev	Probe
Fan Bar	Wear	Vol	96004.1 (D) 96004.3 (S)	13	Bobbin
Lattice Grid	Wear	Vol	96004.1 (D) 96004.3 (S)	13	Bobbin
Foreign Objects	Wear	Vol	96004.1 (D) 27091.1/.2(D) 96910.1 (D) 13091.1 (D&S) I28413 (D) FOW-AHC-BOB (D) 27902.1 (S)	13 2 7 0 3 0 2	Bobbin Bobbin +Point +Point Bobbin Bobbin +Point

(D) = Detection
(S) = Sizing

Location, Orientation (if linear), and Measured Sizes of Service Induced Indications (TS 5.6.9.d)

- Fan bar Wear – A total of 84 indications of fan bar wear were found in the Steam Generators. The deepest indication measured 16%TW as measured by the EPRI Appendix H qualified bobbin coil examination technique 96004.3 which is consistent with results from previous inspections. No tubes were plugged as a result of fan bar wear. The Table below provides a summary of Fan bar wear degradation. Refer to Attachment A for detailed locations and sizing for all Fan Bar wear indications.

A1R19 Fan Bar Wear Summary

	1A SG Indications	1B SG Indications	1C SG Indications	1D SG Indications	Total
<10% TW	8	18	32	9	67
10-19% TW	0	0	6	11	17
>= 20% TW	0	0	0	0	0
TOTAL	8	18	38	20	84

- Lattice Grid Wear – Eleven (11) indications of wear related to the lattice grid supports in eleven tubes were reported during the A1R19 outage. The deepest indication measured 9%TW as measured by the EPRI Appendix H qualified bobbin coil examination technique 96004.3. Two (2) of these indications were newly reported, not present in past history. These indications were inspected with +Point™ to confirm that the morphologies of the indications were consistent with lattice grid wear. The new number of indications is in line with Byron Unit-1 SGs, which are of the same design. No tubes were plugged as a result of lattice grid wear. The table below provides a listing of all tubes that contain lattice grid wear.

A1R19 Lattice Grid Wear Indication Listing

SG	Row	Col	Location	A1R19 Depth (% TW)	Newly Reported or Repeat?
1A	39	70	01H - 1.51	8	Repeat
1A	72	19	05H + 0.2	2	Repeat
1A	75	108	07H – 1.48	7	Repeat
1A	118	71	01C + 0.9	4	Repeat
1B	47	24	08H – 1.6	5	Repeat
1B	87	24	01C – 0.76	9	New
1B	90	107	07H + 055	8	Repeat
1B	119	70	02C + 1.13	9	Repeat
1C	9	92	05C – 1.54	8	Repeat
1C	73	90	05H + 1.27	2	New
1D	41	70	08H – 1.55	7	Repeat

- Foreign Object Wear – A total of 13 indications of secondary side foreign object (FO) wear were reported in 12 tubes during A1R19. The largest depth measured was 27% TW using Examination Technique Specification Sheet (ETSS) 27902.1. Four tubes in SG 1A (R81C22, R82C23, R83C22*, and R84C23) are clustered around a foreign object that could not be removed during the FOSAR effort. These four tubes were plugged and stabilized. The remaining nine tubes with foreign object wear indications were left in service since the object that presumably caused the indication is no longer present and the measured depth was less than the Technical Specification limit of 40%TW.

  * Tube R83C22 only contained a PLP (Possible Loose Part) signal without wear.

A1R19 Foreign Object Wear

SG	Row	Col	Location	A1R19 Depth (%TW)	A1R19 Axial Extent (Inches)	A1R19 Circumferential Extent (Inches)/(Degrees)	Foreign Object Still Present?
SG 1A	17	138	TSH + 0.19	16	0.17"	0.37"/62°	No
SG 1A	20	139	TSH + 0.09	7	0.14"	0.34"/57°	No
SG 1A	81	22	TSC + 1.12	27	0.53"	0.42"/71°	Yes
SG 1A	82	23	TSC + 0.77	24	0.33"	0.29"/48°	Yes
SG 1A	82	23	TSC + 0.21	22	0.25"	0.17"/28°	Yes
SG 1A	84	23	TSC + 0.21	19	0.23"	0.2"/34°	Yes
SG 1A	96	107	TSH + 0.13	12	0.14"	0.22"/37°	No
SG 1A	97	108	TSH + 0.27	11	0.11"	0.29"/48°	No
SG 1A	98	107	TSH + 0.12	10	0.12"	0.2"/34°	No
SG 1B	98	47	TSH + 0.03	16	0.11"	0.22"/37°	No
SG 1C	1	72	TSH + 0.22	1	0.15"	0.26"/43°	No
SG 1C	2	73	TSH + 0.33	1	0.21"	0.31"/52°	No
SG 1C	5	72	TSH + 0.22	25	0.3"	0.28"/46°	No

Plugging Summary (TS 5.6.9.e and TS 5.6.9.f)

As a result of the A1R19 SG inspections, performed in accordance with TS 5.5.9.d, the modes of tube degradation found were Fan Bar wear, Lattice Grid wear, and secondary side foreign object (FO) wear. Four (4) tubes in 1A SG (R81C22, R82C23, R83C22, and R84C23) were stabilized and plugged based on an irretrievable object in 1A Steam Generator. Inspection results justified a 3-cycle inspection interval with no adverse consequences for all four SGs.

Note: There are no approved tube repair methods for the Unit 1 SGs. No tube sleeving was performed.

A1R19 Tube Plugging by Degradation Mechanism (TS 5.6.9.e)

Degradation Mechanism	1A SG	1B SG	1C SG	1D SG	Total
Fan Bar Wear	0	0	0	0	0
Lattice Grid Wear	0	0	0	0	0
Foreign Object Wear	0	0	0	0	0
Preventative	4	0	0	0	4
Total Plugged during A1R19	4	0	0	0	4

Tube Plugging to Date (Number and Percentage per SG) (TS 5.6.9.f)

	1A SG	1B SG	1C SG	1D SG	Total
Total Plugged during A1R19	4	0	0	0	4
Total Stabilized during A1R19	4	0	0	0	4
Total Plugged through A1R19	32	40	16	1	89
Total Percent Plugged through A1R19	0.48%	0.60%	0.24%	0.02%	0.33%

Results of Condition Monitoring (TS 5.6.9.g)

A Condition Monitoring (CM) assessment was performed for each inservice degradation mechanism found during the A1R19 SG inspection. The condition monitoring assessment was performed in accordance with TS 5.5.9.a and NEI 97-06 Rev. 3 using the EPRI Steam Generator Integrity Assessment Guidelines, Revision 3. For each identified degradation mechanism, the as-found condition was compared to the appropriate performance criteria for tube structural integrity, accident induced leakage, and operational leakage as defined in TS 5.5.9.b. For each degradation mechanism a tube structural limit was determined to ensure that SG tube integrity would be maintained over the full range of normal operating conditions, all anticipated transients in the design specifications, and design basis accidents. The structural limits for wear related degradation were performed in accordance with the EPRI Steam Generator Integrity Assessment Guidelines and the EPRI Steam Generator Degradation Specific Management Flaw Handbook, Revision 1 (Flaw Handbook).

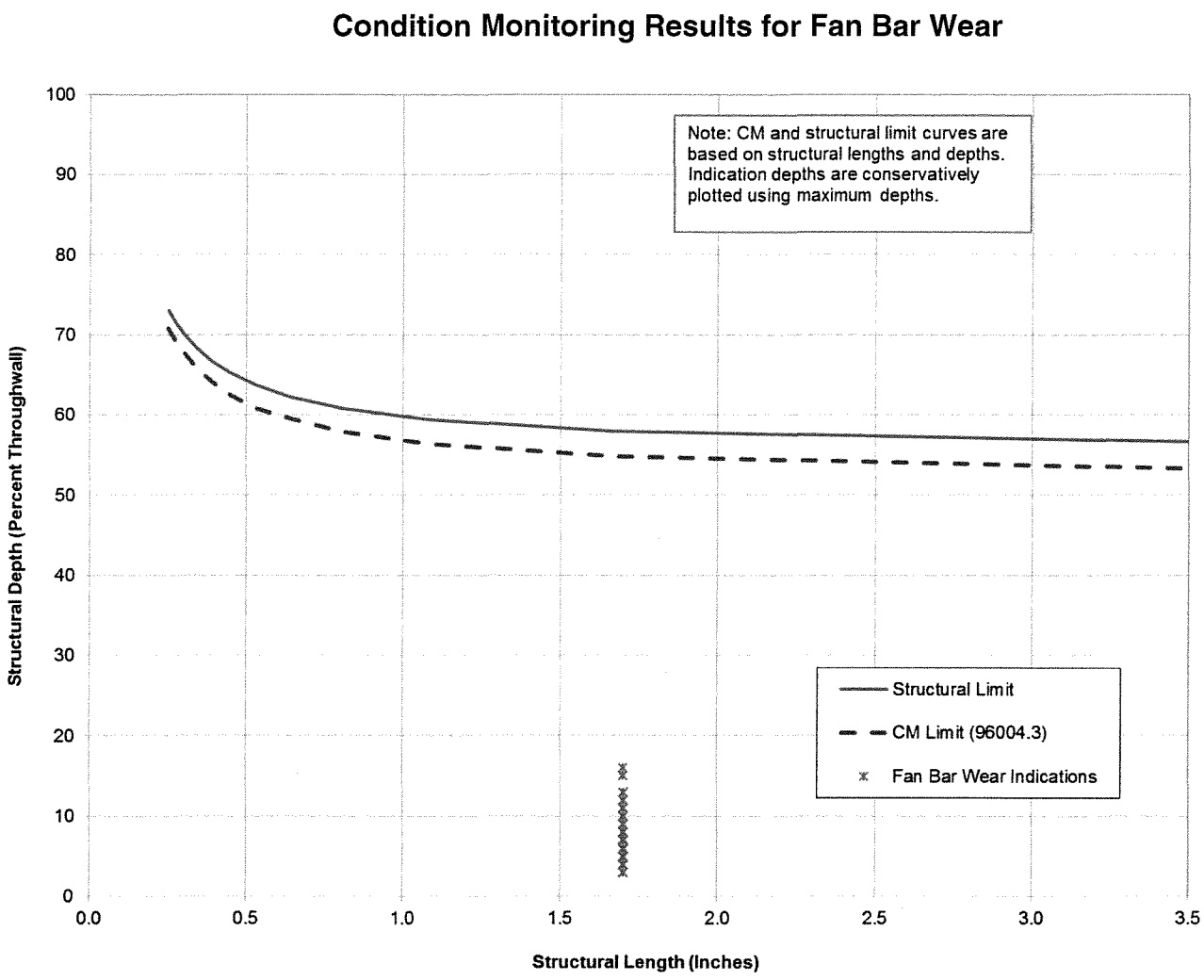
Condition monitoring was verified by comparing the dimensions of each flaw against the CM curves that were documented in the Degradation Assessment (DA). The CM curves are a plot of depth versus axial extent. The curves account for uncertainties in the burst pressure model, material properties, and NDE sizing errors. The CM curves are generated via random sampling of these uncertainties using Monte Carlo simulation techniques. The CM curves account for pressure loading only. Non-pressure loads were also considered. Non-pressure loads are those loads acting on the tube due to mechanical and/or thermal conditions and include bending and/or axial loads. A review of the screening guidance from the EPRI SG Integrity Assessment Guidelines provides the basis for concluding that the structural and CM limits are not impacted by non-pressure loads for Braidwood Unit 1. Therefore, use of the CM curves based on pressure loading only is appropriate and justified.

No indications met the requirements for proof or leakage testing; therefore, no In Situ pressure tests were performed during A1R19. In addition, no tube pulls were performed during A1R19.

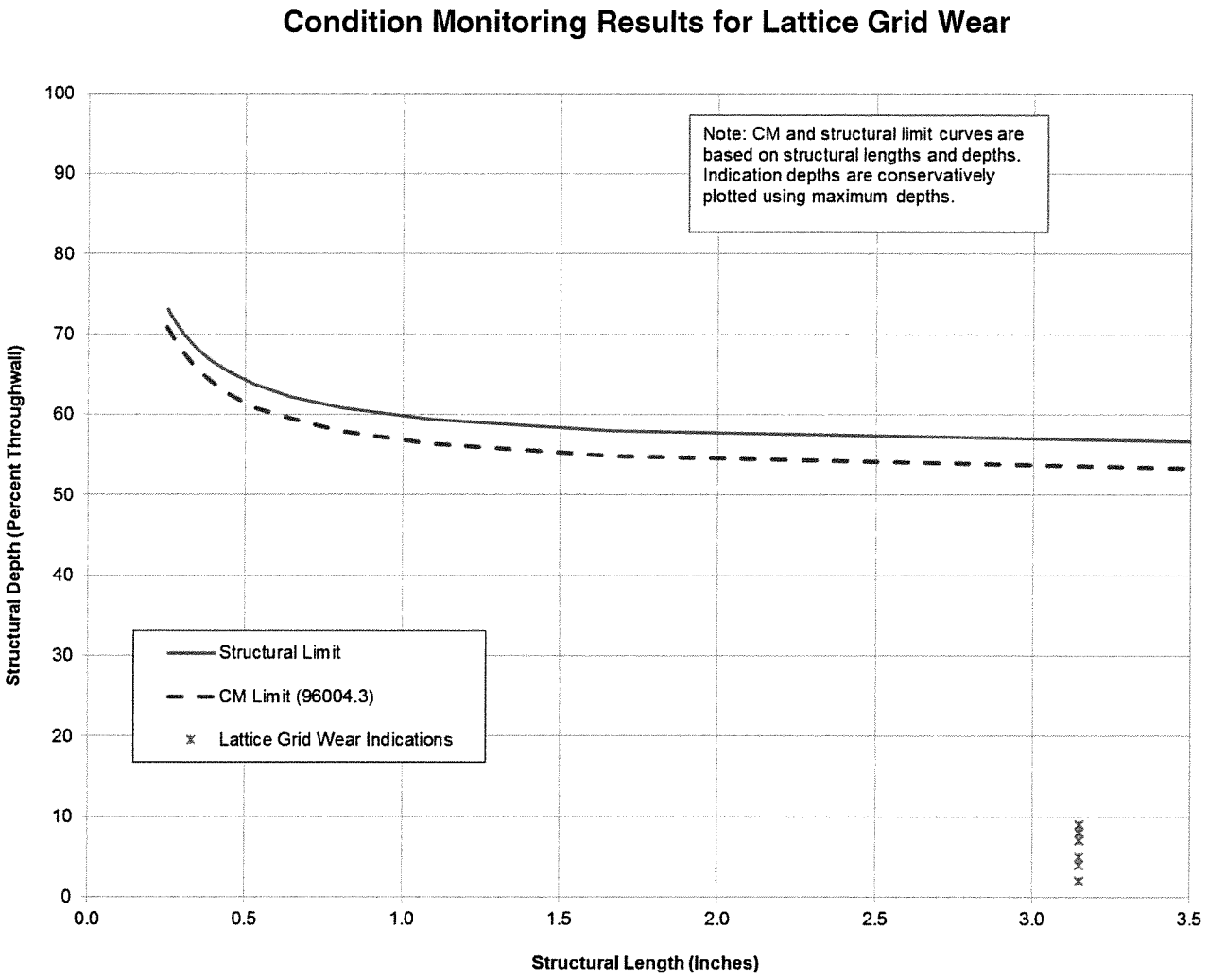
Braidwood Station Unit 1 did not observe any SG primary to secondary operational leakage over the last 3 operating cycles preceding the inspection. This is based on chemistry sampling taken from the Steam Jet Air Ejector, liquid SG blowdown sample locations, and no potential sources of tube leakage were found during SG tube inspections.

The sections below provide a summary of the condition monitoring assessment for each degradation mechanism found during A1R19.

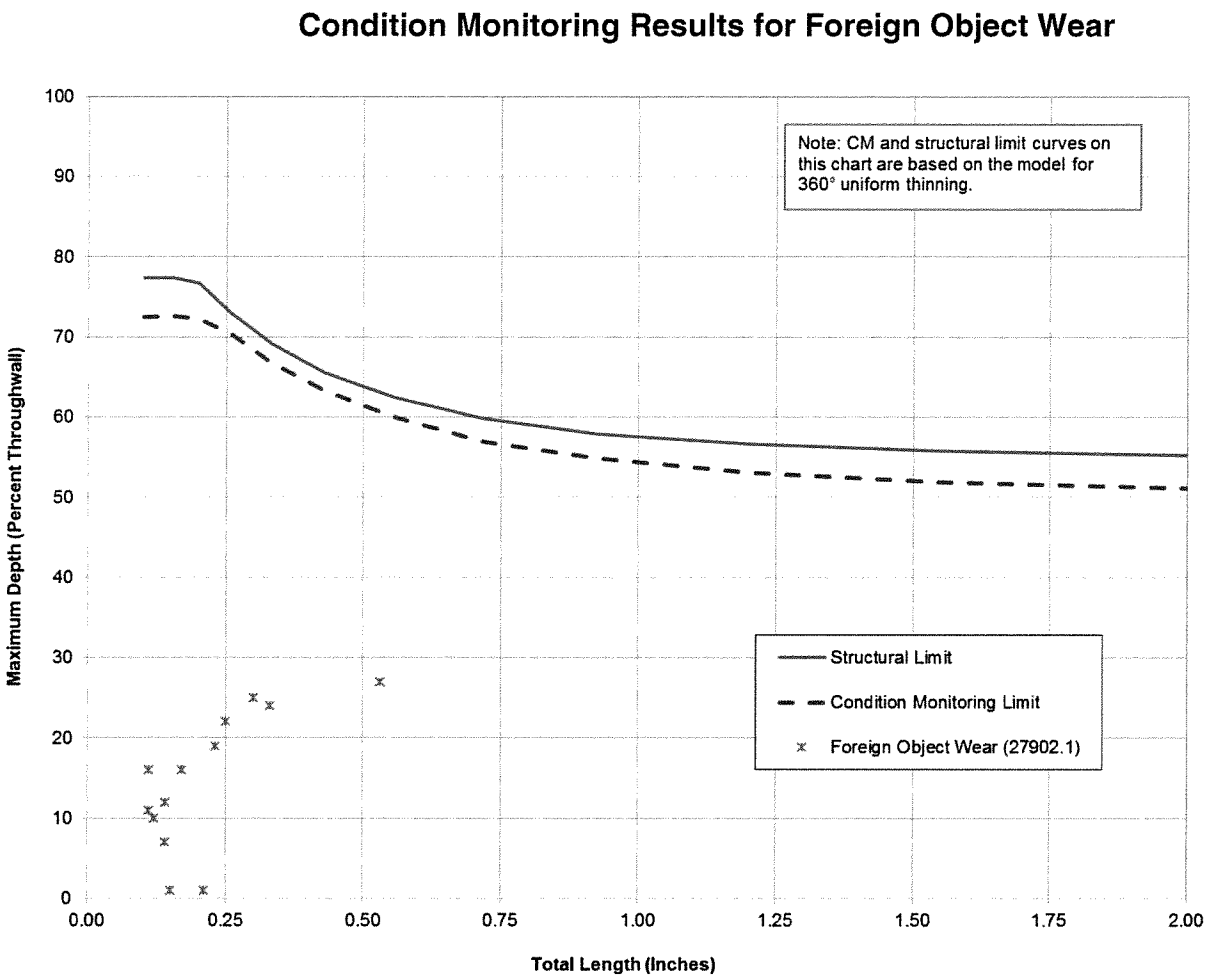
Fan Bar Wear- The largest Fan Bar wear indication found during the A1R19 inspection was 16% TW as measured by the EPRI Appendix H qualified technique 96004.3, Rev. 13. This is well below the Fan Bar wear structural limit and CM limit curves. No tubes were required to be plugged.



Lattice Grid Wear- The largest Lattice Grid wear indication found during the A1R19 inspection was 9% TW, as measured by the EPRI Appendix H qualified technique 96004.3, Rev. 13. This is well below the Lattice Grid wear structural limit and CM limit curves. No tubes were required to be plugged.



Foreign Object Wear - The largest foreign object wear indication found during the A1R19 inspection was 27% TW with axial length of 0.62 inches as measured by the EPRI Appendix H qualified technique 27902.1, Rev 2. This is well below the Foreign Object wear structural limit and CM limit curves. No tubes were required to be plugged due to FO wear. The four tubes were plugged preventivaly due to the priority "1" object not being retrieved.



ATTACHMENT A
Fan Bar Wear Indications

SG 1A

SG	Date	Row	Col	Ind	Per	Volts	Deg	Chn	Locn	Inch1	BegT	EndT	PDia	PType	Cal
1A	01-Sep-16	31	4	PCT	6	0.38	0	P2	F05	0.88	TEC	TEH	0.56	CBACZ	73
1A	01-Sep-16	57	78	PCT	5	0.25	0	P2	F05	1.76	TEC	TEH	0.56	CBACZ	55
1A	01-Sep-16	63	70	PCT	3	0.16	0	P2	F05	0.52	TEC	TEH	0.56	CBACZ	51
1A	01-Sep-16	68	49	PCT	4	0.21	0	P2	F04	0.63	TEC	TEH	0.56	CBACZ	63
1A	01-Sep-16	71	62	PCT	4	0.23	0	P2	F04	-1.6	TEC	TEH	0.56	CBACZ	45
1A	01-Sep-16	77	84	PCT	3	0.25	0	P2	F05	-0.98	TEC	TEH	0.56	CBACZ	53
1A	01-Sep-16	84	87	PCT	8	0.39	0	P2	F05	-0.86	TEC	TEH	0.56	CBACZ	55
1A	01-Sep-16	88	67	PCT	4	0.25	0	P2	F07	1.9	TEC	TEH	0.56	CBACZ	49

SG 1B

SG	Date	Row	Col	Ind	Per	Volts	Deg	Chn	Locn	Inch1	BegT	EndT	PDia	PType	Cal
1B	01-Sep-16	42	137	PCT	5	0.21	0	P2	F06	1.16	TEC	TEH	0.56	CBACZ	81
1B	01-Sep-16	45	130	PCT	7	0.29	0	P2	F05	-1.41	TEC	TEH	0.56	CBACZ	81
1B	01-Sep-16	52	63	PCT	7	0.23	0	P2	F05	1.2	TEC	TEH	0.56	CBACZ	49
1B	01-Sep-16	57	42	PCT	8	0.43	0	P2	F05	-1.53	TEC	TEH	0.56	CBACZ	29
1B	01-Sep-16	60	73	PCT	7	0.28	0	P2	F05	-1.9	TEC	TEH	0.56	CBACZ	45
1B	01-Sep-16	65	70	PCT	6	0.42	0	P2	F06	-1.19	TEC	TEH	0.56	CBACZ	47
1B	01-Sep-16	68	65	PCT	6	0.23	0	P2	F05	0.4	TEC	TEH	0.56	CBACZ	45
1B	01-Sep-16	71	62	PCT	4	0.22	0	P2	F04	0.74	TEC	TEH	0.56	CBACZ	47
1B	01-Sep-16	73	102	PCT	8	0.34	0	P2	F05	1.05	TEC	TEH	0.56	CBACZ	73
1B	01-Sep-16	76	73	PCT	9	0.38	0	P2	F05	-0.86	TEC	TEH	0.56	CBACZ	45
1B	01-Sep-16	78	57	PCT	7	0.32	0	P2	F07	-1.38	TEC	TEH	0.56	CBACZ	41
1B	01-Sep-16	80	71	PCT	6	0.21	0	P2	F05	1.12	TEC	TEH	0.56	CBACZ	49
1B	01-Sep-16	82	69	PCT	5	0.24	0	P2	F06	-1.16	TEC	TEH	0.56	CBACZ	45
1B	01-Sep-16	82	79	PCT	7	0.24	0	P2	F06	1.9	TEC	TEH	0.56	CBACZ	57
1B	01-Sep-16	88	69	PCT	7	0.28	0	P2	F08	0.66	TEC	TEH	0.56	CBACZ	45
1B	01-Sep-16	100	57	PCT	6	0.38	0	P2	F07	1.77	TEC	TEH	0.56	CBACZ	41
1B	01-Sep-16	107	68	PCT	7	0.31	0	P2	F05	1.49	TEC	TEH	0.56	CBACZ	51
1B	01-Sep-16	111	70	PCT	6	0.39	0	P2	F06	-1.32	TEC	TEH	0.56	CBACZ	47

ATTACHMENT A
Fan Bar Wear Indications

SG 1C

SG	Date	Row	Col	Ind	Per	Volts	Deg	Chn	Locn	Inch1	BegT	EndT	PDia	PType	Cal
1C	01-Sep-16	35	70	PCT	8	0.38	0	P2	F05	1.85	TEC	TEH	0.56	CBACZ	41
1C	01-Sep-16	49	74	PCT	6	0.28	0	P2	F05	0.51	TEC	TEH	0.56	CBACZ	37
1C	01-Sep-16	55	56	PCT	6	0.3	0	P2	F05	1.85	TEC	TEH	0.56	CBACZ	63
1C	01-Sep-16	57	78	PCT	6	0.33	0	P2	F06	0.82	TEC	TEH	0.56	CBACZ	37
1C	01-Sep-16	59	68	PCT	5	0.17	0	P2	F05	0.51	TEC	TEH	0.56	CBACZ	43
1C	01-Sep-16	66	61	PCT	11	0.47	0	P2	F07	1.65	TEC	TEH	0.56	CBACZ	61
1C	01-Sep-16	74	63	PCT	4	0.22	0	P2	F06	-1	TEC	TEH	0.56	CBACZ	57
1C	01-Sep-16	74	75	PCT	6	0.24	0	P2	F05	-0.91	TEC	TEH	0.56	CBACZ	39
1C	01-Sep-16	75	50	PCT	7	0.26	0	P2	F06	1.74	TEC	TEH	0.56	CBACZ	65
1C	01-Sep-16	76	65	PCT	4	0.16	0	P2	F05	0.93	TEC	TEH	0.56	CBACZ	61
1C	01-Sep-16	77	66	PCT	7	0.26	0	P2	F05	-0.54	TEC	TEH	0.56	CBACZ	45
1C	01-Sep-16	77	68	PCT	15	0.63	0	P2	F05	-0.57	TEC	TEH	0.56	CBACZ	43
1C	01-Sep-16	79	66	PCT	8	0.3	0	P2	F05	-0.57	TEC	TEH	0.56	CBACZ	45
1C	01-Sep-16	79	94	PCT	10	0.59	0	P2	F06	-1.18	TEC	TEH	0.56	CBACZ	33
1C	01-Sep-16	80	63	PCT	6	0.3	0	P2	F06	-1.54	TEC	TEH	0.56	CBACZ	57
1C	01-Sep-16	90	79	PCT	15	0.71	0	P2	F06	1.58	TEC	TEH	0.56	CBACZ	39
1C	01-Sep-16	91	72	PCT	7	0.26	0	P2	F06	0.55	TEC	TEH	0.56	CBACZ	39
1C	01-Sep-16	92	57	PCT	7	0.29	0	P2	F05	1.54	TEC	TEH	0.56	CBACZ	75
1C	01-Sep-16	92	69	PCT	11	0.63	0	P2	F05	-0.87	TEC	TEH	0.56	CBACZ	41
1C	01-Sep-16	93	78	PCT	5	0.24	0	P2	F05	-0.7	TEC	TEH	0.56	CBACZ	37
1C	01-Sep-16	94	63	PCT	6	0.36	0	P2	F05	-1.4	TEC	TEH	0.56	CBACZ	57
1C	01-Sep-16	95	58	PCT	9	0.37	0	P2	F05	-0.77	TEC	TEH	0.56	CBACZ	75
1C	01-Sep-16	96	57	PCT	7	0.28	0	P2	F05	0.52	TEC	TEH	0.56	CBACZ	75
1C	01-Sep-16	97	86	PCT	7	0.4	0	P2	F05	1.34	TEC	TEH	0.56	CBACZ	37
1C	01-Sep-16	97	88	PCT	5	0.22	0	P2	F05	1.28	TEC	TEH	0.56	CBACZ	35
1C	01-Sep-16	98	59	PCT	9	0.64	0	P2	F05	1.2	TEC	TEH	0.56	CBACZ	73
1C	01-Sep-16	99	84	PCT	5	0.2	0	P2	F07	0.69	TEC	TEH	0.56	CBACZ	39
1C	01-Sep-16	100	75	PCT	7	0.28	0	P2	F05	-1.5	TEC	TEH	0.56	CBACZ	39
1C	01-Sep-16	101	60	PCT	5	0.32	0	P2	F05	1.49	TEC	TEH	0.56	CBACZ	73
1C	01-Sep-16	101	84	PCT	8	0.34	0	P2	F07	0.65	TEC	TEH	0.56	CBACZ	39
1C	01-Sep-16	102	61	PCT	10	0.43	0	P2	F05	0.95	TEC	TEH	0.56	CBACZ	75
1C	01-Sep-16	104	63	PCT	8	0.53	0	P2	F05	1.38	TEC	TEH	0.56	CBACZ	73
1C	01-Sep-16	105	72	PCT	7	0.25	0	P2	F03	-0.63	TEC	TEH	0.56	CBACZ	45
1C	01-Sep-16	106	59	PCT	8	0.56	0	P2	F05	0.95	TEC	TEH	0.56	CBACZ	73
1C	01-Sep-16	107	70	PCT	9	0.38	0	P2	F05	1.44	TEC	TEH	0.56	CBACZ	47
1C	01-Sep-16	107	76	PCT	4	0.16	0	P2	F05	-1.58	TEC	TEH	0.56	CBACZ	45
1C	01-Sep-16	107	80	PCT	7	0.21	0	P2	F05	1.41	TEC	TEH	0.56	CBACZ	43
1C	01-Sep-16	111	88	PCT	5	0.19	0	P2	F08	1.84	TEC	TEH	0.56	CBACZ	43

ATTACHMENT A
Fan Bar Wear Indications

SG 1D

SG	Date	Row	Col	Ind	Per	Volts	Deg	Chn	Locn	Inch1	BegT	EndT	PDia	PType	Cal
1D	01-Sep-16	35	138	PCT	12	0.3	0	P2	F05	1.29	TEC	TEH	0.56	CBACZ	39
1D	01-Sep-16	50	57	PCT	5	0.15	0	P2	F05	1.26	TEC	TEH	0.56	CBACZ	55
1D	01-Sep-16	72	71	PCT	7	0.26	0	P2	F06	0.97	TEC	TEH	0.56	CBACZ	23
1D	01-Sep-16	81	70	PCT	13	0.58	0	P2	F06	-1.32	TEC	TEH	0.56	CBACZ	23
1D	01-Sep-16	85	68	PCT	10	0.36	0	P2	F07	1.43	TEC	TEH	0.56	CBACZ	55
1D	01-Sep-16	85	70	PCT	16	0.75	0	P2	F06	-1.38	TEC	TEH	0.56	CBACZ	23
1D	01-Sep-16	86	67	PCT	6	0.32	0	P2	F06	0.66	TEC	TEH	0.56	CBACZ	53
1D	01-Sep-16	86	69	PCT	13	0.55	0	P2	F07	-1.25	TEC	TEH	0.56	CBACZ	55
1D	01-Sep-16	87	64	PCT	11	0.41	0	P2	F06	1.26	TEC	TEH	0.56	CBACZ	55
1D	01-Sep-16	93	70	PCT	11	0.47	0	P2	F06	-1.08	TEC	TEH	0.56	CBACZ	23
1D	01-Sep-16	95	68	PCT	10	0.37	0	P2	F05	-1.31	TEC	TEH	0.56	CBACZ	55
1D	01-Sep-16	95	68	PCT	13	0.52	0	P2	F06	1.24	TEC	TEH	0.56	CBACZ	55
1D	01-Sep-16	96	69	PCT	12	0.47	0	P2	F08	0.53	TEC	TEH	0.56	CBACZ	55
1D	01-Sep-16	97	72	PCT	7	0.54	0	P2	F06	0.49	TEC	TEH	0.56	CBACZ	21
1D	01-Sep-16	97	74	PCT	10	0.37	0	P2	F08	-0.67	TEC	TEH	0.56	CBACZ	23
1D	01-Sep-16	99	64	PCT	8	0.28	0	P2	F05	-1.41	TEC	TEH	0.56	CBACZ	55
1D	01-Sep-16	100	67	PCT	3	0.12	0	P2	F08	1.32	TEC	TEH	0.56	CBACZ	53
1D	01-Sep-16	103	68	PCT	9	0.32	0	P2	F07	-1.25	TEC	TEH	0.56	CBACZ	55
1D	01-Sep-16	104	53	PCT	7	0.33	0	P2	F05	1.45	TEC	TEH	0.56	CBACZ	59
1D	01-Sep-16	104	77	PCT	7	0.45	0	P2	F06	-1.33	TEC	TEH	0.56	CBACZ	21