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Vogtle Electric Generating Plant - Unit 1
Refueling Outage 1R19 Steam Generator Tube Inspection Report

Ladies and Gentlemen:

In accordance with the requirements of Vogtle Electric Generating Plant Technical Specification 5.6.10, Southern Nuclear Operating Company submits the enclosed report of the steam generator tube inspections performed during the nineteenth refueling outage on Unit 1 (1R19.)

This letter contains no NRC commitments. If you have any questions, please contact Ken McElroy at (205) 992-7369.

Respectfully submitted,

C. R. Pierce

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Regulatory Affairs Director

CRP/JMC/lac

Enclosure: 1R19 Steam Generator Tube Inspection Report

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Vogtle Electric Generating Plant – Unit 1
Refueling Outage 1R19 Steam Generator Tube Inspection Report

Enclosure

1R19 Steam Generator Tube Inspection Report

Enclosure to NL-16-0581
1R19 Steam Generator Tube Inspection Report

Introduction

The Vogtle Electric Generating Plant (Vogtle) nineteenth refueling outage on Unit 1 (1R19) was conducted after cumulative Steam Generator (SG) service was equivalent to approximately 1.4 effective full power years (EFPY) from previous eddy current inspections. Approximately 7.2 effective full power months (EFPM) of the 72 EFPM in the fourth sequential period have been accrued making 1R19 the first inspection of the period. No tube leakage was reported during the operating interval. Condition Monitoring (CM) and Operational Assessment (OA) analyses based on conservative assumptions demonstrated that no tubes exceeded Regulatory Guide 1.121 or NEI-97-06 Revision 3 criteria for tube integrity during the cycle.

The Westinghouse Nuclear Services Division Steam Generator Maintenance Services Group performed eddy current inspections. NDE Technology performed secondary data analysis under direct contract with Southern Nuclear Operating Company (SNC). During Vogtle 1R19, a total of three tubes were plugged, one in SG2 and two in SG3. None of the indications exceeded the condition monitoring limits identified in the Degradation Assessment (DA) and therefore did not require in situ pressure testing. Permanent H* Alternate Repair Criteria (ARC) has been approved for implementation by the Nuclear Regulatory Commission (NRC). Therefore, SNC and Westinghouse omitted tube end +Point™ inspections below top of tubesheet (TTS) -15.2 inches. TTS inspections ranged from TTS +3 inches to TTS -15.2 inches. The scope of inspections performed and results on Vogtle Unit 1 SGs follow.

Vogtle 1R19 SG Scope

The 1R19 inspection program, in accordance with the EPRI PWR SG Examination Guidelines, Revision 7, addressed known Vogtle 1 degradation mechanisms observed in prior inspections as well as those regarded as potential degradation mechanisms. The scope for 1R19 involved the scheduled inspections listed below:

- 100% full length Bobbin examination of SG2 and SG3 tubes, except for Rows 1 and 2. Rows 1 and 2 were inspected with Bobbin from tube end to the top tube support plate (TSP) from both hot leg (HL) and cold leg (CL).

- 100% +Point™ examination of Row 1 and Row 2 U-bends from the top TSP on the HL to the top TSP on the CL in SG2 and SG3.

- +Point™ examination of Special Interest of bobbin possible flaw locations including U-bends in both the HL and CL.

- 100% +Point™ examination of HL tubes in all SGs from the top of the tubesheet (TTS) to the licensed ARC depth for H* (TSH +3/-15.2 inches). This inspection captured 100% of the TTS and bulge (BLG)/

overexpansion (OXP) populations, along with the periodic sample that comes with regulatory approval of the ARC.

  - BLG = differential mix diameter discontinuity signal within the tubesheet of 18 volts or greater as measured by bobbin coil probe.
  - OXP = a tube diameter deviation within the tubesheet of 1.5 mils or greater as measured by bobbin coil profile analysis.

- +Point™ examination of CL periphery and tubelane tubes three tubes deep from TTS +/- 3 inches in all SGs.

- 25% +Point™ examination of dents and dings ≥ 2 volts in HL straight lengths and U-bends of all SGs. This sample was taken from the total number of dents and dings identified during previous inspections and any additional identified by the bobbin program.

- 100% visual inspection of tube plugs from the primary side in all four SGs.

- Visual inspection in all SGs of channel head primary side HL and CL inclusive of the entire divider plate to channel head weld and all visible clad surfaces.

Activities performed in the Secondary Side:

- TTS Sludge Lancing in all 4 SGs.
- Upper Bundle In-Bundle (UBIB) and Top TSP Visual Inspections
- Upper Steam Drum Inspection in SG4
- Foreign Material Search and Retrieval (FOSAR) in all 4 SGs.

FOSAR inspections included:

- Tubesheet annulus and tubelane region including the HL and CL periphery tubes.
- Possible Loose Parts (PLP) locations from eddy current tube inspections.
- Legacy objects.

Inspection Expansion

No Non-Destructive Examination (NDE) inspection scope expansion was required during the Vogtle 1R19 SG in-service inspections.

Damage Mechanisms Found and NDE Techniques Utilized

Based on SG eddy current and visual inspection data, the existing degradation mechanisms in the Vogtle 1 SGs are below. All of the damage mechanisms found during 1R19 inspections were identified in previous inspections and included in the 1R19 SG Degradation Assessment.

- Mechanical Wear due to Foreign Objects

  - +Point™ and bobbin techniques were used to evaluate the wear indications
- Mechanical Wear at Anti-Vibration Bar (AVB) Supports
  - Bobbin techniques were used to evaluate the wear indications
- Mechanical Wear and Wall Loss from Secondary Side Cleaning Processes
  - Bobbin techniques were used to evaluate the wear indications

Service Induced Indication Descriptions

Mechanical Wear due to Foreign Objects

Foreign objects have been reported as the cause for tube wear at Vogtle 1 during prior inspections. Foreign object wear is therefore classified as an existing degradation mechanism and was addressed in the SG inspections during 1R19.

Table 1 lists the data record for the eddy current signals corresponding to a PLP or a foreign object wear indication (PCT). All PLP signals in Table 1, whether historical or newly reported during 1R19, have been visually inspected from the SG secondary side to determine whether a loose part could be found. In some cases a loose part or foreign object was observed and logged for retrieval or analysis, while no object was present in others. No wear was visually observed associated with known foreign objects in the SG secondary side.

Table 2 lists tube wear indications attributable to loose parts and foreign objects. The PCT indications in SG1 tube rows 24, 39 and 41 show no apparent growth or change outside of measurement uncertainties. The wear indications in SG1 tube column 82 rows 55 and 56 were initially identified in 1R17 and have shown no change since that time. The PCT indication in SG2 shows no change from prior inspections outside of NDE measurement uncertainties, either.

A historical SG2 bobbin wear indication at R32C35 near TSP 1C was +Point™ tested as special interest during 1R19 with no degradation found (NDF). This location has been assigned as a Distorted Support Signal (DSS) for tracking at future inspections. SG3 has one newly identified wear indication at R29C111. Historical review shows that it was present, though unreported, since 1R18 with little to no change in character and no foreign object present. The indications in SG4 have been historically present with no change in eddy current response for at least two cycles of operation. Based on the inspection data, 1R19 condition monitoring has been met for degradation associated with foreign object wear indications.

Table 1: Vogtle 1R19 Possible Loose Part Indications (PLP)

SG	Row	Column	Indication	Location
1	25	8	PLP	TSH+0.55
1	25	9	PLP	TSH+0.55
1	20	60	PLP	TSH+0.24
1	3	79	PLP	TSC+0
1	53	80	PLP	TSC+0.18
1	36	87	PLP	TSH+0.07
1	36	88	PLP	TSH+0.08
1	14	112	PLP	TSH+1.58
1	15	112	PLP	TSH+1.54
1	18	116	PLP	TSC+0.3
1	19	116	PLP	TSC+0.18
2	18	8	PLP	TSH+0.82
2	19	8	PLP	TSH+0.7
2	50	35	PLP	TSH+0.39
2	51	35	PLP	TSH+0.43
2	10	44	PLP	TSH+0.09
2	35	106	PLP	TSH+0.23
2	36	106	PLP	TSH+0.12
4	30	18	PLP	TSH+1.19
4	31	18	PLP	TSH+1.22

Table 2: Vogtle 1R19 Foreign Object Wear Indications (PCT)

SG	Row	Column	Indication	Percent[1]	Location
1	24	66	PCT	10	3C+27.24
1	55	82	PCT	24	BPH+0.52
1	56	82	PCT	4	BPH+0.62
1	41	97	PCT	25	TSC+0.07
1	39	100	PCT	11	TSH+0.27
1	41	100	PCT	13	TSH+0.21
1	41	100	PCT	29	TSH+0.12
1	41	101	PCT	23	TSH+0.15
1	41	102	PCT	17	TSH+0.15
1	41	103	PCT	22	TSH+0.42
2	6	1	PCT	8	1C+1.21
3	29	111	PCT	12[2]	BPH-0.27
3	30	111	PCT	31	BPH+0.88
4	40	57	PCT	5	6H+13.84
4	49	89	PCT	11	BPH+0.27
4	38	104	PCT	14	BPH+0.17

[1]Indicates the tube percent through wall depth measured by a qualified bobbin or +Point™ technique.
[2]Location is newly reported in 1R19 and was not tested in 1R18. An eddy current data history review was performed and showed that the indication was present and unchanged in the 1R17 bobbin data.

TSH- Tubesheet region on HL side
TSC-Tubesheet region on CL side
3C- Tube Support Plate 3 on CL side
1C- Tube Support Plate 1 on CL side
6H- Tube Support Plate 6 on HL side
BPH- Baffle Plate on HL side

Mechanical Wear at Anti-Vibration Bar (AVB) Supports

All AVB wear locations have been examined in SG2 and SG3 and two of the wear locations exceeded the technical specification plugging limit of 40% through-wall (TW). The corresponding inspection of AVB wear locations in SG1 and SG4 was last performed during 1R18 and the results were assessed for operation through 1R20. Two separate indications of AVB wear were initially detected during 1R19 in SG3 at tube R20C54. The first indication on R20C54 measured 30% TW at AV2 and the second measured 18% TW at AV5. This tube was plugged administratively during 1R19 due to potential uncertainties surrounding the degradation growth.

The maximum AVB wear indication reported during 1R19 was 40% TW, which occurred in two locations: SG2 at R41C102 at AV5 and SG3 R45C62 at AV4. Both these tubes were plugged because the measured degradation exceeded the Vogtle SG Technical Specification requirement for tube plugging of 40% TW or greater. These wear indications are significantly less than the maximum projected depth for AVB wear indications at the end of Cycle 19. Based on the inspection data in comparison to the limits, CM has been met at the 1R19 inspection for

degradation associated with AVB wear. AVB wear identified is provided in Table 3 (SG2) and Table 4 (SG3).

Table 3: Vogtle 1R19 SG2 AVB Wear Indications

Row	Column	%TWD[1]	Location[2]		Row	Column	%TWD[1]	Location
32	12	6	AV1		46	50	34	AV2
32	12	20	AV3		46	50	32	AV3
35	13	8	AV3		46	50	30	AV4
35	13	9	AV4		46	50	25	AV5
35	13	10	AV5		46	50	12	AV6
35	13	6	AV6		46	53	13	AV5
36	13	6	AV3		42	56	10	AV2
35	14	16	AV3		46	58	26	AV2
35	14	14	AV5		46	58	11	AV3
35	17	11	AV3		46	58	13	AV4
35	18	12	AV6		46	58	16	AV5
39	18	15	AV4		53	61	10	AV5
39	20	14	AV3		43	63	15	AV4
40	22	11	AV3		42	66	12	AV3
40	22	11	AV4		43	68	13	AV3
35	25	11	AV3		43	68	14	AV5
40	30	12	AV4		42	72	16	AV2
35	32	12	AV4		42	72	16	AV3
35	32	8	AV6		42	72	12	AV5
41	33	26	AV4		56	72	12	AV2
41	33	21	AV5		56	72	14	AV3
37	34	9	AV2		57	72	11	AV1
54	36	11	AV2		33	74	12	AV3
40	37	14	AV4		54	75	9	AV5
39	38	21	AV2		42	76	7	AV1
40	41	11	AV2		42	76	30	AV2
40	41	16	AV3		42	76	19	AV3
40	41	13	AV4		42	76	20	AV4
36	42	11	AV2		42	76	37	AV5
36	42	11	AV4		42	76	20	AV6
41	42	19	AV2		52	79	10	AV4
41	42	11	AV3		53	79	14	AV2
41	42	31	AV4		53	79	19	AV3
41	42	36	AV5		57	79	11	AV4
26	49	12	AV2		57	79	13	AV5
46	49	13	AV2		43	81	10	AV5
46	49	25	AV3		51	81	11	AV2
46	49	22	AV4		51	81	12	AV4
46	50	24	AV1		35	83	12	AV3

Table 3 (continued): Vogtle 1R19 SG2 AVB Wear Indications

Row	Column	%TWD[1]	Location[2]		Row	Column	%TWD[1]	Location
35	83	8	AV4		38	89	10	AV6
35	83	16	AV5		49	89	12	AV3
35	83	13	AV6		49	89	22	AV4
50	83	13	AV2		49	89	24	AV5
50	83	10	AV3		50	89	17	AV2
53	83	29	AV2		50	89	16	AV3
53	83	26	AV3		50	89	35	AV4
53	83	10	AV4		47	90	9	AV3
55	83	17	AV5		42	91	18	AV4
42	84	12	AV3		43	91	29	AV2
42	84	10	AV4		43	91	18	AV3
42	84	13	AV5		43	91	9	AV4
43	84	12	AV3		43	91	28	AV5
43	84	11	AV5		43	91	11	AV6
50	84	12	AV2		49	91	10	AV5
50	84	30	AV3		52	91	18	AV2
50	84	31	AV4		52	91	11	AV5
50	84	13	AV5		42	92	17	AV4
54	84	8	AV2		42	92	13	AV5
54	84	22	AV3		50	92	15	AV2
54	84	20	AV4		50	92	19	AV3
54	84	29	AV5		50	92	12	AV4
55	84	21	AV5		40	93	17	AV2
42	86	14	AV3		40	93	9	AV3
48	86	12	AV4		40	93	21	AV5
42	87	9	AV2		43	93	14	AV2
43	87	13	AV2		43	93	21	AV3
43	87	16	AV3		43	93	20	AV4
43	87	10	AV4		43	93	12	AV5
43	87	21	AV5		42	94	19	AV3
53	87	12	AV5		42	94	24	AV4
42	88	16	AV4		42	94	14	AV5
43	88	10	AV2		43	94	10	AV2
43	88	17	AV3		43	94	11	AV3
43	88	17	AV5		45	94	9	AV3
38	89	10	AV2		46	94	10	AV4
38	89	10	AV3		40	95	8	AV3
38	89	10	AV4		42	95	11	AV2
38	89	14	AV5		43	95	15	AV4

Table 3 (continued): Vogtle 1R19 SG2 AVB Wear Indications

Row	Column	%TWD[1]	Location[2]		Row	Column	%TWD[1]	Location
43	95	13	AV5		41	102	9	AV4
43	95	10	AV6		41	102	40	AV5
42	96	13	AV2		39	103	37	AV5
42	96	14	AV3		41	103	16	AV5
42	96	17	AV4		35	104	11	AV3
42	96	15	AV5		35	105	14	AV5
43	96	12	AV5		35	105	9	AV6
44	96	9	AV5		38	105	11	AV5
46	96	12	AV2		39	105	15	AV2
37	97	13	AV3		39	105	15	AV3
42	97	11	AV2		39	105	22	AV5
42	97	22	AV3		40	105	13	AV2
42	97	35	AV4		40	105	24	AV5
42	97	9	AV5		34	106	15	AV3
40	98	23	AV5		38	106	28	AV5
46	98	11	AV5		38	107	12	AV3
48	98	9	AV3		38	107	11	AV6
48	98	15	AV4		34	108	14	AV4
48	98	17	AV5		36	108	9	AV6
48	98	21	AV6		38	108	10	AV3
38	99	7	AV3		38	108	12	AV4
35	100	10	AV5		28	112	8	AV2
39	100	9	AV5		28	112	11	AV6
41	100	13	AV5		27	115	11	AV6
42	100	19	AV3					
42	100	21	AV4					
44	100	9	AV4					
35	101	11	AV5					
42	101	10	AV2					
42	101	15	AV4					
42	101	14	AV5					
41	102	22	AV3					

Table 4: Vogtle 1R19 SG3 AVB Wear Indications

Row	Column	%TWD[1]	Location[2]	Row	Column	%TWD[1]	Location
28	8	16	AV1	44	22	10	AV3
28	8	20	AV6	44	22	10	AV4
36	13	12	AV5	44	22	15	AV5
35	16	12	AV1	45	22	12	AV5
35	16	17	AV3	42	23	8	AV2
35	16	12	AV4	42	23	13	AV3
35	16	11	AV5	42	23	29	AV4
38	17	13	AV6	42	23	15	AV5
39	17	13	AV2	46	24	12	AV4
39	17	28	AV3	42	25	13	AV4
39	17	22	AV4	42	25	11	AV5
39	17	11	AV5	46	25	9	AV3
39	17	28	AV6	46	25	13	AV4
40	18	8	AV3	46	25	16	AV5
40	18	10	AV4	46	25	11	AV6
40	18	10	AV6	39	26	30	AV2
40	19	11	AV1	39	26	13	AV5
40	19	16	AV2	42	26	16	AV4
40	19	12	AV4	42	26	17	AV5
40	19	22	AV5	44	26	27	AV2
40	19	15	AV6	47	26	14	AV5
41	19	14	AV3	42	27	15	AV2
41	19	20	AV4	42	27	14	AV4
41	19	32	AV5	42	27	30	AV5
39	20	12	AV4	48	27	10	AV2
41	20	16	AV4	42	28	10	AV2
41	20	14	AV5	42	28	8	AV3
39	21	13	AV2	42	28	9	AV4
39	21	13	AV5	42	28	8	AV5
41	21	19	AV4	42	28	9	AV6
41	21	17	AV5	36	29	10	AV2
42	21	17	AV2	39	29	17	AV2
42	21	17	AV3	42	29	10	AV3
42	21	18	AV4	42	29	16	AV4
42	21	22	AV5	42	29	10	AV5
42	22	10	AV2	40	30	20	AV5
42	22	9	AV4	40	30	10	AV6
42	22	10	AV5	47	30	11	AV5
42	22	11	AV6	50	33	13	AV4

Table 4 (continued): Vogtle 1R19 SG3 AVB Wear Indications

Row	Column	%TWD[1]	Location[2]		Row	Column	%TWD[1]	Location
36	34	10	AV2		45	46	20	AV5
36	34	14	AV5		39	48	6	AV4
36	34	11	AV6		45	48	18	AV2
38	34	9	AV2		45	48	27	AV3
38	34	12	AV4		45	48	18	AV5
38	34	10	AV5		45	49	28	AV2
49	34	26	AV4		45	49	33	AV3
49	34	11	AV5		42	50	8	AV1
38	35	13	AV5		42	50	28	AV2
39	35	13	AV2		42	50	16	AV3
39	35	30	AV3		42	50	35	AV4
39	35	22	AV4		42	50	10	AV5
39	35	15	AV5		28	51	11	AV5
40	35	14	AV4		39	51	12	AV3
42	35	29	AV4		32	52	8	AV1
42	35	19	AV5		58	52	16	AV6
47	35	11	AV2		57	53	15	AV6
47	35	16	AV4		20	54	30	AV2
40	38	10	AV6		20	54	18	AV5
42	38	10	AV6		51	55	13	AV3
47	38	17	AV2		51	55	16	AV4
47	38	31	AV4		51	55	12	AV5
47	38	11	AV5		39	57	10	AV2
45	40	21	AV3		42	58	11	AV2
45	40	14	AV4		42	58	19	AV3
45	40	17	AV5		45	61	12	AV3
45	40	10	AV6		45	61	18	AV4
40	41	10	AV3		45	61	23	AV5
42	43	17	AV2		59	61	12	AV4
42	43	17	AV5		39	62	7	AV4
42	43	10	AV6		45	62	37	AV3
36	44	10	AV2		45	62	40	AV4
36	44	12	AV5		39	63	14	AV3
47	45	11	AV2		42	63	17	AV4
47	45	22	AV4		59	63	13	AV6
45	46	10	AV1		45	64	25	AV3
45	46	33	AV2		39	66	15	AV3
45	46	32	AV3		39	66	11	AV4
45	46	20	AV4		39	66	13	AV5

Table 4 (continued): Vogtle 1R19 SG3 AVB Wear Indications

Row	Column	%TWD[1]	Location[2]		Row	Column	%TWD[1]	Location
42	66	11	AV3		49	96	13	AV4
42	66	16	AV4		49	96	14	AV5
39	67	14	AV3		49	96	27	AV6
39	67	13	AV4		40	97	16	AV3
42	67	12	AV3		40	97	14	AV4
45	67	22	AV3		40	98	19	AV2
45	67	23	AV4		40	98	9	AV3
59	68	14	AV6		40	98	12	AV4
38	69	8	AV3		41	99	9	AV3
45	69	13	AV2		41	99	24	AV5
45	69	19	AV5		40	100	19	AV2
45	77	12	AV2		40	100	16	AV5
45	77	10	AV3		41	100	9	AV2
45	77	10	AV4		45	100	8	AV5
45	82	21	AV3		40	101	14	AV2
45	82	16	AV4		40	101	13	AV5
51	82	19	AV3		39	102	15	AV2
51	82	39	AV4		39	102	22	AV5
51	82	22	AV5		40	102	28	AV2
50	83	15	AV5		40	102	13	AV6
53	84	19	AV3		41	102	20	AV2
53	84	29	AV4		41	102	30	AV3
53	84	12	AV5		41	102	29	AV4
50	86	14	AV2		41	102	11	AV5
50	86	16	AV5		41	102	10	AV6
54	88	11	AV1		44	102	10	AV4
54	88	13	AV6		39	104	5	AV3
41	89	8	AV5		39	104	9	AV4
40	91	12	AV3		39	104	38	AV5
49	92	13	AV5		40	104	11	AV2
51	92	14	AV6		40	104	23	AV4
49	93	11	AV6		40	104	14	AV6
47	95	7	AV6		40	105	11	AV6
40	96	12	AV3		37	106	12	AV6
47	96	25	AV4		38	106	19	AV3

Table 4 (continued): Vogtle 1R19 SG3 AVB Wear Indications

Row	Column	% TWD[1]	Location[2]
38	106	14	AV5
38	106	18	AV6
40	106	11	AV6
37	107	19	AV1
37	107	13	AV4
37	107	13	AV5
38	107	11	AV4
37	108	9	AV6
25	115	10	AV5

Mechanical Wear and Wall Loss from Secondary Side Cleaning Processes

Table 5 lists tube locations and volumetric indications associated with the ultrasonic energy cleaning (UEC) and pressure pulse cleaning (PPC) secondary side cleaning processes. The examinations required to be performed to address this existing degradation mechanism are an element of the bobbin inspection program, which has alternated between two SGs each inspection in the past. The volumetric indications reported in Row 1 tubes have also been observed by visual inspection in prior outages. Visually they resembled tube oxide removal patterns observed in qualification testing for UEC. No foreign objects have been determined to be associated with these tube wear indications. These tubes have been left in service for several inspection intervals with no indications of tube wall loss outside of NDE measurement uncertainties. Based on the inspection data presented in Table 5 in comparison to the limits, CM has been met at the 1R19 inspection for degradation associated with indications of wear and wall loss from secondary side cleaning processes.

Table 5: Vogtle 1R19 Tube Wall Loss from Secondary Cleaning Process

SG	Row	Column	Volts	Indication	%TWD	Location
1	1	83	0.13	PCT	12	TSH
1	1	87	0.57	PCT	38	TSH
1	58	70	0.31	PCT	24	BPH
2	1	70	0.06	PCT	6	TSC
2	1	70	0.08	PCT	8	TSC
2	1	70	0.04	PCT	4	TSC
2	1	78	0.05	PCT	5	TSC
2	1	78	0.1	PCT	9	TSC
2	1	82	0.04	PCT	5	TSC
2	1	91	0.41	PCT	19	BPC
2	10	101	0.36	PCT	13	BPH
2	16	6	0.12	PCT	11	BPC
2	16	7	0.37	PCT	28	BPC

%TWD-Percent Through-wall Depth
PCT- Volumetric Indication
TSH-Tubesheet Region on the HL Side
BPH-Baffle Plate on the HL side
TSC-Tubesheet Region on the CL side
BPC-Baffle Plate on the CL side

ODSCC at the Hot Leg Expansion Transitions

Outside Diameter Stress Corrosion Cracking (ODSCC) at the hot leg expansion transitions is an existing degradation mechanism for Vogtle 1 and this experience has been considered in the Vogtle 1R19 eddy current inspection scope development in accordance with the guidelines. There were no ODSCC indications reported at or near the top of the tubesheet HL expansion transitions from +Point™ analyses during Vogtle 1R19. Therefore, condition monitoring requirements have been satisfied at the 1R19 inspection for degradation associated with ODSCC at the hot leg expansion transitions.

PWSCC at Tube Bulge and Overexpansion Locations

Primary Water Stress Corrosion Cracking (PWSCC) in tubesheet joint profile anomalies such as BLGs and OXPs is an existing degradation mechanism in the Vogtle 1 SGs. There were no indications of PWSCC reported at or near BLGs/OXPs from +Point™ analyses during 1R19. No measureable primary to secondary leakage was identified during the current operating interval and therefore H* leak rate factor application does not apply. Condition monitoring requirements have been satisfied at the Vogtle 1R19 inspection for degradation associated with PWSCC at the tube bulge and overexpansion locations.

PWSCC in the Small Radius U-Bends

Axial PWSCC in the Row 1 and 2 U-bends is classified as an existing degradation mechanism in the Vogtle 1 SGs. Both axial and circumferential PWSCC at the U-bends are detectable by +Point™. There were no PWSCC indications reported from the inspection of small radius U-bends from +Point™ analyses during 1R19. Therefore, condition monitoring requirements have been

satisfied for degradation associated with PWSCC at the tube small radius U-bends.

Tube Slippage Monitoring and Leakage Considerations

The bobbin data collected from SG2 and SG3 have been screened for large amplitude tubesheet indications greater than 50 volts with a phase angle between 25° and 50°, which is suggestive of tube severance. No tube severance indications were reported; therefore, no indications of slippage were identified. None of the indications reported during the Vogtle 1R19 SG inspections are evaluated to have primary to secondary leakage as accident induced conditions. There was no leakage from the portion of tubing within the H* depth for which to apply the leak rate factor associated with the alternate repair criteria. There was no calculated leakage from any other sources and none of the tube plugs installed in the Vogtle 1 SGs require considerations for leakage. Therefore, the accident induced leakage rate for these indications would be zero, and the accident induced leakage performance criterion is satisfied.

Number of Tubes Plugged

During 1R19 from the primary side, Vogtle performed a 100% visual inspection of installed tube plugs in all four SGs. No anomalous conditions, degraded tube plug or surrounding boron deposits have been reported during these visual inspections. All tubes were present and in the proper locations.

Three tubes were plugged during Vogtle 1R19 (Table 6). The status of tubes plugged at Vogtle Unit 1 after the outage is presented in Table 7.

Table 6: Vogtle 1R19 Plugging List

SG	Row	Column	Indication
2	41	102	AVB wear
3	20	54	AVB wear
3	45	62	AVB wear

Table 7: Total Plugged Tubes after Vogtle 1R19

SG	#Tubes	1R19 # Plugged	Total # Plugged	% Plugging
1	5,626	0	28	0.50%
2	5,626	1	22	0.39%
3	5,626	2	36	0.64%
4	5,626	0	78	1.39%
Total	22,504	3	164	0.73%

Other Inspections

Channel Head Primary Side Bowl Inspections

During Vogtle 1R19, visual inspections of the SG HL and CL divider plate and drain line areas, inclusive of the entire divider plate to channel head weld and all visible clad surfaces, were performed in accordance with Westinghouse NSAL-12-1 and industry operating experience. Inspection was performed using the SG manway channel head bowl cameras. No channel head degradation was observed in all SGs.

Secondary Side Activities Discussion

Sludge lancing was performed in all four steam generators during Vogtle 1R19. A total of 24.5 pounds of sludge was removed from all four SGs. FOSAR inspections were performed at the top of tubesheet around the annulus on the HL and CL side as well as the no-tube lane through the center of the tube bundle. FOSAR inspections were conducted in the secondary side of all four SGs during Vogtle 1R19. The FOSAR scope also included known foreign object locations from prior inspections. Secondary side locations of historical PLP indications and new PLP indications identified by the eddy current program were also visually inspected. UBIB inspection and a remote camera inspection of the top tube support plate (TSP7) were performed in SG1 during Vogtle 1R19. The tube freespans and the tops of the support plates viewed were largely free from significant deposit buildup. A SG steam drum upper internals and feedring inspection was performed in SG4. There were no structurally significant anomalies observed during the inspection of the SG4 upper internals.

Condition Monitoring Conclusions

Based on the inspection data and the condition monitoring assessment, no tubes exhibited degradation in excess of the condition monitoring limits. No tubes required in situ pressure testing to demonstrate structural and leakage integrity. There was no reported SG primary to secondary leakage prior to the end of the Vogtle 1 SG inspection interval. No new indications of secondary side tube degradation attributable to foreign objects have been identified. All indications detected in this inspection were below the calculated integrity limits and therefore met the condition monitoring requirements provided. The condition of the Vogtle SG upper internal components has been found acceptable for the continued operation and present no concerns to the integrity of the SG tubing. Therefore, the SG performance criteria for structural and leakage integrity were satisfied for the preceding Vogtle 1 SG operating interval.