

ENCLOSURE

SEQUOYAH NUCLEAR PLANT

UNIT 2

CYCLE 5 INSPECTION

APRIL 1992

STEAM GENERATOR TUBING INSPECTION RESULTS

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SEQUOYAH NUCLEAR PLANT UNIT 2
CYCLE 5 INSPECTION
APRIL 1992

STEAM GENERATOR (S/G) TUBING INSPECTION RESULTS

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Table 1

SEQUOYAH NUCLEAR PLANT UNIT 2
CYCLE 5 INSPECTION
APRIL 1992

INSPECTION SUMMARY

	<u>S/G 1</u>	<u>S/G 2</u>	<u>S/G 3</u>	<u>S/G 4</u>
Total tubes examined	2968	3288	3292	2461
Tubes recording defects (≥40% wall loss)	3	16	11	2
Tubes recording degradations (≥20% to <40% wall loss)	9	20	6	4
Tubes recording imperfections (<20% wall loss)	17	16	6	7

Table 2

SEQUOYAH NUCLEAR PLANT UNIT 2
CYCLE 5 INSPECTION
APRIL 1992

S/G 1 INSPECTION SUMMARY

	<u>Number of Tubes</u>
General defect examinations [Extent (Probe Type)]	
Full length (bobbin coil) - tube end to tube end	1713
Partial length (bobbin coil) - tubesheet to opposite tube end	19
Partial length (bobbin coil) - hot leg and U-bend	2
Partial length (bobbin coil) - cold leg	71
Specialty examinations [Extent (Probe Type)]	
Hot leg top of tubesheet (RPC)	1838
Support plate intersection (RPC)	311
U-bend (RPC)	94
<u>Total Number of Tubes Examined</u>	2968

<u>Indications</u>	<u>Number of Tubes</u>
Tubes recording defects (≥40% wall loss)	3
Tubes recording degradations (≥20% to <40% wall loss)	9
Tubes recording imperfections (<20% wall loss)	17

Table 3

SEQUOYAH NUCLEAR PLANT UNIT 2
CYCLE 5 INSPECTION
APRIL 1992

S/G 2 INSPECTION SUMMARY

	<u>Number of Tubes</u>
General defect examinations [Extent (Probe Type)]	
Full length (bobbin coil) - tube end to tube end	1934
Partial length (bobbin coil) - tubesheet to opposite tube end	37
Partial length (bobbin coil) - hot leg and U-bend	1
Partial length (bobbin coil) - cold leg	68
Specialty examinations [Extent (Probe Type)]	
Hot leg top of tubesheet (RPC)	3288
Support plate intersection (RPC)	300
U-bend (RPC)	94
<u>Total Number of Tubes Examined</u>	3288

<u>Indications</u>	<u>Number of Tubes</u>
Tubes recording defects (≥40% wall loss)	16
Tubes recording degradations (≥20% to <40% wall loss)	20
Tubes recording imperfections (<20% wall loss)	16

Table 4

SEQUOYAH NUCLEAR PLANT UNIT 2
CYCLE 5 INSPECTION
APRIL 1992

S/G 3 INSPECTION SUMMARY

	<u>Number of Tubes</u>
General defect examinations [Extent (Probe Type)]	
Full length (bobbin coil) - tube end to tube end	1418
Partial length (bobbin coil) - tube sheet to opposite tube end	5
Partial length (bobbin coil) - cold leg	52
Specialty examinations [Extent (Probe Type)]	
Hot leg top of tubesheet (RPC)	3292
Support plate intersection (RPC)	214
U-bend (RPC)	93
<u>Total Number of Tubes Examined</u>	3292

<u>Indications</u>	<u>Number of Tubes</u>
Tubes recording defects (≥40% wall loss)	11
Tubes recording degradations (≥20% to <40% wall loss)	6
Tubes recording imperfections (<20% wall loss)	6

Table 5

SEQUOYAH NUCLEAR PLANT UNIT 2
CYCLE 5 INSPECTION
APRIL 1992

S/G 4 INSPECTION SUMMARY

	<u>Number of Tubes</u>
General defect examinations [Extent (Probe Type)]	
Full length (bobbin coil) - tube end to tube end	1321
Partial length (bobbin coil) - tubesheet to opposite tube end	12
Partial length (bobbin coil) - cold leg	53
Specialty examinations [Extent (Probe Type)]	
Hot leg top of tubesheet (RPC)	1433
Support plate intersection (RPC)	216
U-bend (RPC)	94
<u>Total Number of Tubes Examined</u>	2461

Indications

Tubes recording defects (≥40% wall loss)	2
Tubes recording degradations (≥20% to <40% wall loss)	4
Tubes recording imperfections (<20% wall loss)	7

Table 6

SEQUOYAH NUCLEAR PLANT UNIT 2
CYCLE 5 INSPECTION
APRIL 1992

INDICATIONS
S/G 1

<u>Row</u>	<u>Col</u>	<u>Location</u>	<u>% Thru-Wall</u>	<u>Characterization</u>	<u>Resolution</u>	<u>Exam Scope</u>
<u>INITIAL SAMPLE</u>						
8	54	HTS - 0.57	SAI	PWSCC-AXIAL	PLUG TUBE	1397 BC
10	57	CTS +46.61	10	MFG FLAW	(2)	1430 RPC-HTS
20	58	H07 + 0.09	6	ODI	(2)	311 RPC-H01
25	10	CTS + 8.76	10	MFG FLAW	(2)	94 RPC-U/B
26	52	H02 +35.58	18	MFG FLAW	(2)	
32	64	AV2 + 0.0	21	AVB WEAR	(2)	
		AV4 + 0.0	17	AVB WEAR		
33	44	AV2 + 0.0	12	AVB WEAR	(2)	
33	51	AV2 + 0.0	32	AVB WEAR	(1)	
33	56	AV3 + 0.0	44	AVB WEAR	PLUG TUBE	
33	57	AV2 + 0.0	34	AVB WEAR	(1)	
		AV3 + 0.0	34	AVB WEAR		
33	58	AV2 + 0.0	42	AVB WEAR	PLUG TUBE	
		AV3 + 0.0	42	AVB WEAR		
		AV4 + 0.0	35	AVB WEAR		
33	59	AV1 + 0.0	30	AVB WEAR	(1)	
		AV3 + 0.0	25	AVB WEAR		
34	19	C01 + 0.16	8	Cold Leg WASTAGE	(2)	
34	47	AV1 + 0.0	25	AVB WEAR		
		AV2 + 0.0	35	AVB WEAR		
		AV3 + 0.0	39	AVB WEAR	PLUG TUBE	
		AV4 + 0.0	27	AVB WEAR		
34	53	AV2 + 0.0	34	AVB WEAR	(1)	
		AV3 + 0.0	26	AVB WEAR		
35	75	C04 +17.98	10	MFG FLAW	(2)	
36	62	H05 +21.79	8	MFG FLAW	(2)	
37	21	CTS +34.98	11	MFG FLAW	(2)	
37	62	AV3 + 0.0	26	AVB WEAR	(1)	
38	42	HTS +40.06	12	MFG FLAW	(2)	
		HTS +32.99	10	MFG FLAW		
40	26	H05 +45.42	7	MFG FLAW	(2)	
42	62	HTS +13.28	10	MFG FLAW	(2)	
44	34	C01 + 0.0	18	Cold Leg WASTAGE	(2)	
46	46	C01 + 0.12	37	Cold Leg WASTAGE	PLUG TUBE	

Steam Generator 1 Initial Sample Inspection results have been classified as C-2.

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Table 6

SEQUOYAH NUCLEAR PLANT UNIT 2
CYCLE 5 INSPECTION
APRIL 1992

INDICATIONS

S/G 1

(Continued)

<u>Row</u>	<u>Col</u>	<u>Location</u>	<u>% Thru-Wall</u>	<u>Characterization</u>	<u>Resolution</u>	<u>Exam Scope</u>
<u>First Expansion Sample</u>						
29	63	AV2 + 0.0	20	AVB WEAR	(1)	408 BC
		AV3 + 0.0	31	AVB WEAR		408 RPC-HTS
34	29	H02 + 0.12	9	ODI	(2)	
35	71	C06 + 7.17	18	MFG FLAW	(2)	
36	66	AV3 + 0.0	19	AVB WEAR	(2)	
43	46	HTS +47.98	14	MFG FLAW	(2)	

Steam Generator 1 First Expansion Inspection results have been classified as C-1.

Notes: (1) Reexamine during future inspections.
(2) None required.

Table 6
(Continued)

SEQUOYAH NUCLEAR PLANT UNIT 2
CYCLE 5 INSPECTION
APRIL 1992

INDICATIONS
S/G 2

Row	Col	Location	% Thru-Wall	Characterization	Resolution	Exam Scope
INITIAL SAMPLE						
3	52	HTS - 0.64	SAI	PWSCC-AXIAL	PLUG TUBE	1632 BC
3	55	HTS - 0.51	SAI	PWSCC-AXIAL	PLUG TUBE	1448 RPC-HTS
5	31	CO2 + 0.06	16	Cold Leg WASTAGE	(2)	300 RPC-H01
6	93	CO1 + 0.09	25	Cold Leg WASTAGE	(1)	94 RPC-U/B
8	19	HTS - 0.09	COI	PWSCC-CIRC	PLUG TUBE	
8	50	HTS +48.01	13	MFG FLAW	(2)	
8	54	HTS - 0.54	SAI	PWSCC-AXIAL	PLUG TUBE	
9	26	HTS - 1.42	SAI	PWSCC-AXIAL	PLUG TUBE	
9	60	HTS - 2.49	MAI	PWSCC-MULT AXIAL	PLUG TUBE	
11	3	CO1 - 0.22	38	Cold Leg WASTAGE	PLUG TUBE	
12	2	H05 +25.24	12	MFG FLAW	(2)	
12	67	HTS - 0.05	COI	PWSCC-CIRC	PLUG TUBE	
18	89	CO1 + 0.0	19	Cold Leg WASTAGE	(2)	
20	24	H02 + 4.77	11	MFG FLAW	(2)	
24	61	AV2 + 0.0	23	AVB WEAR	(1)	
25	45	HTS - 0.50	SAI	PWSCC-AXIAL	PLUG TUBE	
26	12	H01 + 0.0	55	ODSCC/IGA-AXIAL	PLUG TUBE	
29	32	AV3 + 0.0	20	AVB WEAR	(1)	
		AV4 + 0.0	22	AVB WEAR		
29	34	AV2 + 0.0	29	AVB WEAR		
		AV3 + 0.0	40	AVB WEAR	PLUG TUBE	
		AV4 + 0.0	18	AVB WEAR		
29	37	AV2 + 0.0	15	AVB WEAR	(2)	
29	42	AV1 + 0.0	23	AVB WEAR	(1)	
		AV2 + 0.0	22	AVB WEAR		
		AV3 + 0.0	31	AVB WEAR		
		AV4 + 0.0	16	AVB WEAR		
29	56	CO4 + 0.03	17	ODI	(2)	
30	44	H04 + 2.90	5	MFG FLAW	(2)	
30	51	HTS - 1.12	SAI	PWSCC-AXIAL	PLUG TUBE	
31	13	CO1 + 0.0	37	Cold Leg WASTAGE	PLUG TUBE	
32	54	AV3 + 0.0	33	AVB WEAR	(1)	
32	55	AV1 + 0.0	20	AVB WEAR	(1)	
		AV2 + 0.0	26	AVB WEAR		
		AV3 + 0.0	33	AVB WEAR		
32	59	AV1 + 0.0	21	AVB WEAR		
		AV2 + 0.0	42	AVB WEAR	PLUG TUBE	
		AV3 + 0.0	33	AVB WEAR		

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Table 6
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SEQUOYAH NUCLEAR PLANT UNIT 2
CYCLE 5 INSPECTION
APRIL 1992

INDICATIONS
S/G 2
(Continued)

Row	Col	Location	% Thru-Wall	Characterization	Resolution	Exam Scope
<u>INITIAL SAMPLE</u> (continued)						
32	79	C01 + 0.0	33	Cold Leg WASTAGE	(1)	
33	49	AV1 + 0.0	20	AVB WEAR	(1)	
		AV2 + 0.0	21	AVB WEAR		
		AV3 + 0.0	30	AVB WEAR		
		AV4 + 0.0	18	AVB WEAR		
33	53	C02 + 0.0	6	Cold Leg WASTAGE	(2)	
34	63	AV2 + 0.0	27	AVB WEAR	(1)	
34	64	AV2 + 0.0	30	AVB WEAR	(1)	
34	77	C01 - 0.30	39	Cold Leg WASTAGE	PLUG TUBE	
35	18	C02 + 0.0	45	Cold Leg WASTAGE	PLUG TUBE	
		C01 + 0.0	33	Cold Leg WASTAGE		
36	18	C01 + 0.8	19	Cold Leg WASTAGE	(1)	
38	24	C01 + 0.0	29	Cold Leg WASTAGE	(1)	
38	46	AV3 + 0.0	16	AVB WEAR	(2)	
		AV4 + 0.0	16	AVB WEAR		
39	49	AV4 + 0.0	19	AVB WEAR	(2)	
40	25	C01 + 0.0	22	Cold Leg WASTAGE	(1)	
42	31	C01 + 0.0	32	Cold Leg WASTAGE	(1)	
42	64	C01 + 0.0	28	Cold Leg WASTAGE	(1)	
42	66	C01 + 0.09	17	Cold Leg WASTAGE	(1)	
43	33	C01 + 0.21	57	Cold Leg WASTAGE	PLUG TUBE	
43	36	C01 + 0.0	57	Cold Leg WASTAGE	PLUG TUBE	
43	63	C01 + 0.0	26	Cold Leg WASTAGE	(1)	
44	33	C01 + 0.18	13	Cold Leg WASTAGE	(2)	
46	48	C01 + 0.17	8	Cold Leg WASTAGE	(2)	

Steam Generator 2 Initial Sample Inspection results have been classified as C-2.

First Expansion Sample

13	79	HTS - 0.34	SAI	PWSCC-AXIAL	PLUG TUBE	408 BC
23	82	H06 + 0.08	33	ODI	(1)	1193 RPC-HTS
24	78	C07 + 0.0	16	ODI	(2)	
26	70	AV3 + 0.0	31	AVB WEAR	(1)	

Steam Generator 2 First Expansion Inspection results have been classified as C-2.

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Table 6
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SEQUOYAH NUCLEAR PLANT UNIT 2
CYCLE 5 INSPECTION
APRIL 1992

INDICATIONS
S/G 2
(Continued)

<u>Row</u>	<u>Col</u>	<u>Location</u>	<u>% Thru-Wall</u>	<u>Characterization</u>	<u>Resolution</u>	<u>Exam Scope</u>
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<u>Second Expansion Sample</u>						
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No indications.

647 RPC-HTS

Steam Generator 2 Second Expansion Inspection results have been classified as C-1.

Notes: (1) Reexamine during future inspections.
(2) None Required.

Table 6
(Continued)

SEQUOYAH NUCLEAR PLANT UNIT 2
CYCLE 5 INSPECTION
APRIL 1992

INDICATIONS
S/G 3

Row	Col	Location	% Thru-Wall	Characterization	Resolution	Exam Scope
<u>Initial Sample</u>						
8	2	C01 + 0.14	26	Cold Leg WASTAGE	(1)	1068 BC
11	2	C01 + 0.03	19	Cold Leg WASTAGE	(2)	1436 RPC-HTS
12	28	C05 +12.05	5	MFG FLAW	(2)	214 RPC-H01
12	54	HTS - 0.75	SAI	PWSCC-AXIAL	PLUG TUBE	93 RPC-U/B
12	61	HTS - 2.19	SAI	PWSCC-AXIAL	PLUG TUBE	
15	70	HTS - 1.09	SAI	PWSCC-AXIAL	PLUG TUBE	
18	25	HTS - 0.91	SAI	PWSCC-AXIAL	PLUG TUBE	
22	31	HTS - 0.45	SAI	PWSCC-AXIAL	PLUG TUBE	
22	33	HTS - 2.54	SAI	PWSCC-AXIAL	PLUG TUBE	
25	32	HTS - 2.48	SAI	PWSCC-AXIAL	PLUG TUBE	
28	10	H04 +35.43	16	MFG FLAW	(2)	
30	83	C02 + 0.0	7	Cold Leg WASTAGE	(2)	
32	16	C01 + 0.08	28	Cold Leg WASTAGE	(1)	
32	68	H01 + 1.10	14	MFG FLAW	(2)	
34	43	AV2 + 0.0	26	AVB WEAR	(1)	
		AV3 + 0.0	26	AVB WEAR		
		AV4 + 0.0	23	AVB WEAR		
34	44	AV1 + 0.0	35	AVB WEAR		
		AV2 + 0.0	38	AVB WEAR		
		AV3 + 0.0	43	AVB WEAR	PLUG TUBE	
34	78	C01 - 0.14	29	Cold Leg WASTAGE	(1)	
35	77	C01 - 0.20	66	Cold Leg WASTAGE	PLUG TUBE	
36	77	C01 - 0.20	35	Cold Leg WASTAGE	PLUG TUBE	
44	36	C02 + 0.0	39	Cold Leg WASTAGE	PLUG TUBE	
		C01 + 0.0	44	Cold Leg WASTAGE		
45	36	C01 + 0.0	33	Cold Leg WASTAGE	(1)	

Steam Generator 3 Initial Sample Inspection results have been classified as C-2.

First Expansion Sample

30	25	HTS - 0.49	SAI	PWSCC-AXIAL	PLUG TUBE	415 BC
32	38	CTS + 3.82	18	MFG FLAW	(2)	1535 RPC-HTS

Steam Generator 3 First Expansion Inspection results have been classified as C-2.

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Table 6
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SEQUOYAH NUCLEAR PLANT UNIT 2
CYCLE 5 INSPECTION
APRIL 1992

INDICATIONS

S/G 3

(Continued)

<u>Row</u>	<u>Col</u>	<u>Location</u>	<u>% Thru-Wall</u>	<u>Characterization</u>	<u>Resolution</u>	<u>Exam Scope</u>
<u>Second Expansion Sample</u>						
No indications.						321 RPC-HTS
Steam Generator 3 Second Expansion Inspection results have been classified as C-1.						

Notes: (1) Reexamine during future inspections.
(2) None required.

Table 6
(Continued)

SEQUOYAH NUCLEAR PLANT UNIT 2
CYCLE 5 INSPECTION
APRIL 1992

INDICATIONS
S/G 4

<u>Row</u>	<u>Col</u>	<u>Location</u>	<u>% Thru-Wall</u>	<u>Characterization</u>	<u>Resolution</u>	<u>Exam Scope</u>
<u>Initial Sample</u>						
4	1	C01 + 0.0	45	Cold Leg WASTAGE	PLUG TUBE	978 BC
14	43	HTS + 1.12	15	ODI	(2)	1433 RPC-HTS
17	20	CTS +13.7	15	MFG FLAW	(2)	216 RPC-H01
38	22	C02 + 0.0	45	Cold Leg WASTAGE	PLUG TUBE	94 RPC-U/B
43	61	C02 - 0.27	33	Cold Leg WASTAGE	(1)	
44	61	C03 + 0.18	20	Cold Leg WASTAGE	(1)	
45	54	C02 + 0.0	24	Cold Leg WASTAGE	(1)	
45	56	C02 - 0.03	12	Cold Leg WASTAGE	(2)	
45	57	C02 - 0.15	17	Cold Leg WASTAGE	(2)	

Steam Generator 4 Initial Sample Inspection results have been classified as C-2.

First Expansion Sample

38	44	AV3 + 0.0	23	AVB WEAR	(1)	408 BC
38	49	AV3 + 0.0	19	AVB WEAR	(2)	
38	52	AV3 + 0.0	18	AVB WEAR	(2)	
38	65	AV2 + 0.0	17	AVB WEAR	(2)	

Steam Generator 4 First Expansion Inspection results have been classified as C-1.

Notes: (1) Reexamine during future inspections.
(2) None required.

Table 7

SEQUOYAH NUCLEAR PLANT UNIT 2
CYCLE 5 INSPECTION
APRIL 1992

PLUGGED TUBE SUMMARY

	<u>S/G 1</u>	<u>S/G 2</u>	<u>S/G 3</u>	<u>S/G 4</u>	Unit <u>TOTAL</u>
Previously Plugged Tubes	99	100	96	101	396
Tubes Plugged Cycle 5 by Damage Mechanism					
PWSCC HTS Axial	1	8	8	0	17
PWSCC HTS Circumferential	0	2	0	0	2
ODSCC/IGA TSP	0	1	0	0	1
AVB Wear	3	2	1	0	6
Cold Leg Wastage	<u>1</u>	<u>6</u>	<u>3</u>	<u>2</u>	<u>12</u>
Total Plugged Cycle 5 Outage	5	19	12	2	38
 Total Tubes Plugged	 104	 119	 108	 103	 434

NOTE: Tubes plugged due to eddy current indications are identified in Table 6.

Table 8

SEQUOYAH NUCLEAR PLANT UNIT 2
CYCLE 5 INSPECTION
APRIL 1992

NOMENCLATURE

Location Nomenclature for Sequoyah Nuclear Plant

<u>Notation</u>	<u>Description</u>
HTE	Tube end - hot leg
HTS	Top of tubesheet - hot leg
H01	First support plate - hot leg
H02	Second support plate - hot leg
H03	Third support plate - hot leg
H04	Fourth support plate - hot leg
H05	Fifth support plate - hot leg
H06	Sixth support plate - hot leg
H07	Seventh support plate - hot leg
AV1	First anti-vibration bar above H07
AV2	Second anti-vibration bar above H07
AV3	Second anti-vibration bar above C07
AV4	First anti-vibration bar above C07
C07	Seventh support plate - cold leg
C06	Sixth support plate - cold leg
C05	Fifth support plate - cold leg
C04	Fourth support plate - cold leg
C03	Third support plate - cold leg
C02	Second support plate - cold leg
C01	First support plate - cold leg
CTS	Top of tubesheet - cold leg
CTE	Tube end - cold leg

Indication locations are designated by an above listed major location and numeric values in inches above or below a major location. Positive inches indicate positive elevation (example - HTS + 1.0 is one inch above the hot leg top of tubesheet).

AVB	Anti-vibration Bar
COI	Circumferentially Oriented Indication
MAI	Multiple Axial Indications
MFG	Manufacturing
ODI	Outside Diameter Indication
ODSCC/IGA	Outside Diameter Stress Corrosion Cracking/Intergranular Attack
PWSCC	Primary Water Stress Corrosion Cracking
SAI	Single Axial Indication