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ULNRC-2757

Gentlemen:

**DOCKET NUMBER 50-483
CALLAWAY PLANT UNIT 1
FACILITY OPERATING LICENSE NPF-30
SPECIAL REPORT 92-03 (SOS 92-1293)
RESULTS OF THE SIXTH STEAM GENERATOR
TUBE INSERVICE INSPECTION**

Ref: ULNRC-2637, dated 5/13/92

The enclosed Special Report is submitted pursuant to the requirements of Callaway Technical Specification 4.4.5.5.b concerning the sixth Inservice Eddy Current Inspection of Steam Generators 'B' and 'C' performed in April 1992, during Callaway Plant's fifth refueling outage. This report documents the final Conam inspection results.

A handwritten signature in cursive script, reading "W. R. Campbell".

W. R. Campbell
Manager,
Callaway Plant

WRC/SES/MAH/lrj

Attachments: 1) Tables 1 & 2
2) Eddy Current Examination Conam Nuclear, Inc.

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EDDY CURRENT
EXAMINATION

UNION ELECTRIC COMPANY
CALLAWAY, UNIT 1

STEAM GENERATORS B & C

APRIL 1992

CONAM NUCLEAR, INC

SPECIAL REPORT 92-03
RESULTS OF SIXTH STEAM GENERATOR
TUBE INSERVICE INSPECTION

This report is submitted in accordance with Technical Specification (T/S) 4.4.5.5.b which states:

"The complete results of the steam generator tube inservice inspection shall be submitted to the Commission in a Special Report pursuant to Specification 6.9.2 within 12 months following the completion of the inspection.

This Special Report shall include:

- (1) Number and extent of tubes inspected,
- (2) Location and percent ^{rf} all-thickness penetration for each indication of an imperfection, and
- (3) Identification of tubes plugged."

In April 1992, with the plant in Mode 6 - Refueling for the fifth refueling outage, the sixth plant Steam Generator (S/G) Eddy Current Inservice Inspection was performed. S/G's 'B' and 'C' were inspected. The inspection was performed by Conam Nuclear, Inc. and their formal results are detailed in the Eddy Current Examination (ECE) which is submitted with this Special Report.

Although the Conam ECE provides details on the inspection, the results are summarized below and are numbered to correspond with the information requested by T/S 4.4.5.5.b:

- (1) Number/Extent of Inspected Tubes

- (a) Inspection Summary:

	<u>S/G 'B'</u>	<u>S/G 'C'</u>	<u>S/G 'D'</u>
Tubes Plugged (Refuel 5)	15	14	2
Tubes Previously Plugged	9	19	28
	-----	-----	-----
Total Tubes Plugged	24	33	30

	<u>S/G 'B'</u>	<u>S/G 'C'</u>
Tubes evaluated with standard bobbin coil	5617	5607
Tubes plugged previously	9	19
Total Tubes	5626	5626
Tubes further evaluated with MRPC probes:		
07H - 07C	0	244
03C - 02C	2	1
04C - 03C	0	2
01C - TSC	0	1
FBC - TSC	0	1
FBH - FBH	0	1
TSH - FBH	1	0
TSH - TSH	603	4
05C - 05C	1	0
01C - 01C	1	0
TSC - TSC	4	4
07C - 07C	0	1
01H - 01H	0	1
Tubes evaluated with probetype 8x1:		
07H - 07C	0	11

(b) Steam Generator 'B'

One hundred percent of the unplugged tubes or five thousand six hundred seventeen (5617) tubes were tested full length using the standard bobbin coil probe. In addition to the bobbin probe examination, 603 hot leg tube sheet interfaces were examined using a three-coil MRPC (motorized rotating pancake coil) probe. This probe utilizes one pancake coil, one coil sensitive to axial indications and one coil sensitive to circumferential indications. There were no indications reported at the tube sheet interface.

During this outage, there were eleven (11) tubes plugged in Steam Generator 'B' for anti-vibration bar (AVB) indications above 40 percent through wall depth. Union Electric elected to plug four (4) additional tubes with indications above 35%.

(c) Steam Generator 'C':

One hundred percent of the unplugged tubes or five thousand six hundred seven (5607) tubes were tested full length using the bobbin coil probe. In addition to the bobbin probe examination, all Row 1 and 2 U-bends were examined with a three-coil MRPC probe. Fourteen (14) tubes were plugged in Steam Generator 'C'. Seven (7) tubes were plugged when anti-vibration bar indications exceeded 40 percent. Union Electric elected to plug seven (7) additional tubes with indications of 29, 33, 36, 37, 38, 39 percent, and an undefined indication (UDI).

Tube, Row 2 Column 98, was reported as having an UDI 1-1/2 above the seventh cold leg support plate. As a result of this anomaly, this tube was included in the fourteen (14) removed from service. Another tube, Row 40 Column 106, was reported as having an indication at the fourth AVB that measured 79 percent through wall with a voltage response of 34 volts. This large volume indication prompted an 8x1 probe (8 surface-riding coils) examination of selected tubes with AVB wear indications to determine if the wear was on one or two sides of the tube. The results of this 8x1 examination showed that all AVB indications were on one side of the tube only.

- (2) Location/Percent of Wall-Thickness Penetration for Each Indication of Imperfection

See Tables 1 and 2

(Percent of wall-thickness penetrations are shown for indications $f \geq 15\%$.)

- (3) Identification of Tubes Plugged from the Sixth Inservice Inspection

Union Electric replaced all Westinghouse Inconel 600 mechanical tube plugs in the hot legs of all four (4) steam generators with Inconel 690 plugs.

Thirty-seven (37) plugs were replaced: 6 in S/G 'A', 6 in S/G 'B',

15 in S/G 'C', and 10 in S/G 'D'. All tubes plugged in the sixth inservice inspection used Inconel 690 plugs.

<u>STEAM GENERATOR 'B'</u>			<u>STEAM GENERATOR 'C'</u>		
<u>ROW</u>	<u>COLUMN</u>	<u>% INDI- CATION</u>	<u>ROW</u>	<u>COLUMN</u>	<u>% INDI- CATION</u>
30	9	35	32	10	38
41	19	44	41	19	39
41	20	49	44	22	51
41	22	38	43	23	44
49	28	41	44	23	33
51	32	44	45	24	29
51	69	39	45	34	53
23	70	39	12	56	41
47	73	48	41	64	51
51	73	48	2	98	UDI
32	81	47	44	101	57
47	84	46	41	104	37
51	93	42	40	105	36
44	101	56	40	106	79
32	113	44			

In addition, two tubes were plugged in S/G 'D' as a precautionary measure, using data from the fifth inservice inspection. These tubes were plugged since they were of a similar profile to a tube plugged in the 'C' S/G. The tubes are:

S/G 'D'

<u>Row</u>	<u>Column</u>
33	11
15	37

KEY - TABLES 1 AND 2

AV1, 2, 3, 4, 5, 6 - Anti-Vibration Bars

02H, 07H, 07C, etc. - Tube Support Plate Numbers/Cold Leg (C), Hot Leg (H)

TSH - Tubesheet Hot

SPECIAL REPORT
TABLE 1
TUBE IMPERFECTIONS - STEAM GENERATOR 'B'

ROW	COLUMN	INDICATION % WALL THINNING	LOCATION	INCH(+) FROM LOCATION
29	9	27	AV5	0.00
30	9	35	AV2	0.00
30	9	24	AV5	0.00
32	11	28	AV6	0.00
32	12	32	AV4	0.00
33	12	20	AV3	0.00
37	18	25	AV2	0.00
37	18	28	AV3	0.00
39	18	24	AV4	0.00
36	19	24	AV3	0.00
37	19	25	AV4	0.00
41	19	44	AV4	0.00
37	20	28	AV4	0.00
41	20	31	AV3	0.00
41	20	49	AV4	0.00
41	20	34	AV5	0.00
41	22	38	AV4	0.00
42	23	20	AV4	0.00
42	24	21	AV2	0.00
42	24	28	AV4	0.00
42	24	23	AV5	0.00
45	24	28	AV5	0.00
5	27	20	06H	2.71
49	28	26	AV2	0.00
49	28	33	AV3	0.00
49	28	37	AV4	0.00
49	28	41	AV5	0.00
49	28	24	AV6	0.00
50	28	26	AV5	0.00
49	31	25	AV5	0.00

SPECIAL REPORT
TABLE 1
TUBE IMPERFECTIONS - STEAM GENERATOR 'B'

ROW	COLUMN	INDICATION % WALL THINNING	LOCATION	INCH(+) FROM LOCATION
39	32	20	AV2	0.00
51	32	44	AV2	0.00
51	32	35	AV3	0.00
51	32	39	AV4	0.00
51	32	30	AV5	0.00
49	33	29	AV2	0.00
49	33	31	AV3	0.00
41	35	21	AV5	0.00
32	40	27	OH1	27.79
26	43	21	AV2	0.00
26	43	24	AV6	0.00
35	43	31	AV3	0.00
35	45	26	AV3	0.00
35	45	21	AV5	0.00
47	45	29	AV3	0.00
47	45	20	AV4	0.00
50	47	23	AV3	0.00
50	47	27	AV4	0.00
50	47	30	AV5	0.00
50	47	21	AV6	0.00
39	49	21	AV3	0.00
50	53	28	AV4	0.00
26	54	30	O1H	28.25
47	59	24	AV4	0.00
27	63	23	O6H	0.00
40	64	35	AV3	0.00
40	64	23	AV4	0.00
26	65	25	AV5	0.00
47	65	20	AV1	0.00

SPECIAL REPORT
TABLE 1
TUBE IMPERFECTIONS - STEAM GENERATOR 'B'

ROW	COLUMN	INDICATION % WALL THINNING	LOCATION	INCH(+) FROM LOCATION
47	65	20	AV3	0.00
47	65	37	AV4	0.00
46	66	27	AV4	0.00
47	66	25	AV2	0.00
54	67	25	AV4	0.00
42	68	33	AV2	0.00
42	68	24	AV3	0.00
42	68	25	AV4	0.00
42	68	23	AV6	0.00
47	69	26	AV2	0.00
51	69	31	AV2	0.00
51	69	34	AV3	0.00
51	69	39	AV4	0.00
51	69	38	AV5	0.00
12	70	24	O2C	27.90
23	70	39	AV6	0.00
55	71	24	AV4	0.00
55	71	24	AV5	0.00
55	71	23	AV6	0.00
50	72	22	AV3	0.00
47	73	39	AV3	0.00
47	73	48	AV4	0.00
51	73	30	AV3	0.00
51	73	48	AV4	0.00
51	73	32	AV5	0.00
51	73	24	AV6	0.00
41	74	35	AV4	0.00
41	74	37	AV5	0.00
37	76	32	AV4	0.00
37	76	23	AV5	0.00
32	81	30	AV1	0.00

SPECIAL REPORT
TABLE 1
TUBE IMPERFECTIONS - STEAM GENERATOR 'B'

ROW	COLUMN	INDICATION % WALL THINNING	LOCATION	INCH(+) FROM LOCATION
32	81	27	AV2	0.00
32	81	27	AV3	0.00
32	81	32	AV4	0.00
32	81	47	AV5	0.00
26	83	24	AV5	0.00
29	84	25	O4H	29.60
47	84	43	AV2	0.00
47	84	46	AV3	0.00
47	84	37	AV4	0.00
47	84	22	AV5	0.00
43	85	21	AV3	0.00
46	86	24	AV3	0.00
50	86	34	AV4	0.00
50	86	36	AV5	0.00
46	88	20	AV2	0.00
40	89	35	AV3	0.00
40	89	26	AV4	0.00
42	90	25	AV4	0.00
46	91	22	AV2	0.00
46	91	24	AV4	0.00
50	91	27	AV1	0.00
50	91	21	AV3	0.00
50	91	32	AV4	0.00
51	93	22	AV3	0.00
51	93	39	AV4	0.00
51	93	42	AV5	0.00
51	93	29	AV6	0.00
42	98	27	AV3	0.00
42	98	27	AV5	0.00
44	98	28	AV5	0.00
48	98	21	AV4	0.00

SPECIAL REPORT
TABLE 1
TUBE IMPERFECTIONS - STEAM GENERATOR 'B'

ROW	COLUMN	INDICATION % WALL THINNING	LOCATION	INCH(+) FROM LOCATION
40	100	22	AV3	0.00
41	100	22	AV5	0.00
44	101	39	AV2	0.00
44	101	33	AV4	0.00
44	101	56	AV5	0.00
44	101	25	AV6	0.00
34	110	25	AV3	0.00
32	112	22	AV5	0.00
30	113	21	AV5	0.00
32	113	25	AV2	0.00
32	113	41	AV5	0.00

SPECIAL REPORT
TABLE 2
TUBE IM'ERFECTIONS - STEAM GENERATOR 'C'

ROW	COLUMN	INDICATION % WALL THINNING	LOCATION	INCH(+) FROM LOCATION
28	8	31	AV1	0.00
29	9	20	AV5	0.00
32	10	38	AV2	0.00
32	10	32	AV5	0.00
34	15	20	AV2	0.00
37	18	25	AV3	0.00
37	19	20	AV3	0.00
41	19	39	AV2	0.00
41	19	31	AV3	0.00
41	19	25	AV4	0.00
40	20	22	AV4	0.00
44	22	51	AV4	0.00
44	22	48	AV5	0.00
43	23	44	AV5	0.00
44	23	22	AV4	0.00
44	23	33	AV5	0.00
45	24	29	AV5	0.00
50	28	24	AV5	0.00
50	28	22	AV6	0.00
45	34	22	AV3	0.00
45	34	53	AV4	0.00
46	35	22	AV4	0.00
40	37	27	AV3	0.00
40	37	25	AV4	0.00
46	37	27	AV4	0.00
27	39	25	AV5	0.00
50	45	21	AV2	0.00
50	45	22	AV3	0.00

SPECIAL REPORT
TABLE 2
TUBE IMPERFECTIONS - STEAM GENERATOR 'C'

ROW	COLUMN	INDICATION % WALL THINNING	LOCATION	INCH(+) FROM LOCATION
50	45	30	AV4	0.00
49	48	25	AV3	0.00
16	50	28	O4C	23.30
12	56	41	TSH	0.86
46	56	24	AV4	0.00
51	57	22	O7H-	0.57
47	58	21	AV4	0.00
18	63	21	AV5	0.00
54	63	36	AV3	0.00
54	63	34	AV4	0.00
54	63	30	AV6	0.00
41	64	51	AV2	0.00
41	64	20	AV3	0.00
41	64	20	AV5	0.00
38	71	39	O3C	29.01
44	71	32	AV4	0.00
44	71	34	AV5	0.00
7	77	21	TSH	25.30
41	81	23	AV3	0.00
53	90	31	AV5	0.00
47	91	31	AV4	0.00
47	93	24	AV5	0.00
49	93	24	AV5	0.00
43	94	24	AV4	0.00
49	95	26	AV4	0.00

SPECIAL REPORT
TABLE 2
TUBE IMPERFECTIONS - STEAM GENERATOR 'C'

ROW	COLUMN	INDICATION % WALL THINNING	LOCATION	INCH(+) FROM LOCATION
40	100	22	AV5	0.00
44	101	39	AV3	0.00
44	101	31	AV4	0.00
44	101	57	AV5	0.00
45	101	32	AV4	0.00
40	103	28	AV5	0.00
41	104	25	AV3	0.00
41	104	37	AV4	0.00
41	104	27	AV6	0.00
39	105	24	AV4	0.00
40	105	36	AV4	0.00
41	105	28	AV4	0.00
41	105	33	AV5	0.00
41	105	21	AV6	0.00
40	106	26	AV3	0.00
40	106	79	AV4	0.00
40	106	20	AV5	0.00
40	106	45	AV6	0.00
17	109	28	TSH	16.00
32	109	29	AV5	0.00
30	114	32	AV2	0.00
30	114	34	AV5	0.00