

ATTACHMENT A
SPECIAL REPORT
SR-93-002-00

STEAM GENERATOR EDDY CURRENT EXAMINATION
(5TH REFUELING)

INTRODUCTION

Inservice eddy current examination of Waterford 3 Steam Generator (S/G) tubing was completed by Conam Nuclear, Inc., a B & W Nuclear Service Company, on October 10, 1992. This report is submitted in accordance with Technical Specification 4.4.4.5, which requires the complete results of this inspection be submitted in a special report pursuant to Technical Specification 6.9.2, within 12 months following the inspection.

The eddy current testing included full length bobbin coil examinations of 3,780 tubes (40.4%) and 16 (0.6%) partial extents from the hot leg to the 5th and 7th cold leg supports in S/G #1. As for S/G #2, eddy current testing included full length bobbin coil examinations of 2,743 tubes (29%). In addition to the bobbin coil examinations, Waterford 3 examined 307 tubes (3.3%) in S/G #1 and 301 tubes (3.2%) in S/G #2 with a 3-coil Motorized Rotating Pancake Coil (MRPC) on the hot leg top of the tubesheet focused in the sludge pile region. The MRPC examination results identified No Detectable Degradation (NDD).

The initial bobbin coil examination for S/G #1 was 2,106 tubes (22.5%). As a result of identifying 1 greater than 40% thru wall indication in the original sample, Waterford 3 expanded to a C2 Category inspection of an additional 562 tubes (2S). During this expanded scope examination, another greater than 40% thru wall indication was identified which caused Waterford 3 to expand a second time. The second expansion was an additional 1124 tubes (4S). The total number of tubes examined was 41% in S/G #1. The two defective tubes identified were wear indications located at vertical support BW6.

The initial bobbin coil examination for S/G #2 was 2,164 tubes (23%). The eddy current data collected in the first sample revealed 5 indications that were greater than 40% thru wall. Four of the defective tube indications were located at the hot leg anti-vibration bar (BW1) and the fifth indication was identified at vertical support BW5 directly above the stay cylinder. This caused Waterford 3 to expand to a C2 Category inspection of an additional 562 tubes (2S). The total number of tubes examined was 29% in S/G #2. All five defective tubes identified were a result of wear indications.

All S/G tube examinations were conducted in accordance with USNRC Regulatory Guide 1.83 and ASME Section XI using Conam Nuclear, Inc. procedure 42-EC-227, "Multifrequency Eddy Current Procedure Steam Generator Tubing MIZ-18A Digital Eddy Current System Waterford 3." Additionally, Waterford 3 followed the EPRI NP-6201, "PWR Steam Generator Examination Guidelines" and elected to inspect a 20% full length bobbin coil sample and expand in accordance with Technical Specifications 3/4.4.4.

As a result of eddy current testing, S/G #1 and S/G #2 defective tubes were plugged in accordance with B&W Nuclear Service Company's "Field Procedure For Rolled Plugging," Drawing, 1211020A, R3. The S/G tube plugs were manufactured from thermally treated Inconel-690. Additionally, all tube locations were positively identified and video taped verifying correct tube locations.

RESULTS OF EXAMINATION

STEAM GENERATOR #1

The eddy current testing of 3,796 tubes in S/G #1 resulted in the following analysis of indications:

- 40 Tubes Less Than 20% Thru Wall
- 39 Tubes Greater Than or Equal to 20% But Less Than 40% Thru Wall
- 2 Tubes Greater Than 40% Thru Wall

The following tube listing identifies the indications as a result of examining 3,796 tubes (41%) in S/G #1:

<u>ROW</u>	<u>LINE</u>	<u>%THRU WALL</u>	<u>LOCATION</u>	<u>COMMENTS</u>
67	11	27%	BW3	
15	25	<20%	6H	
67	27	<20%	BW5	
69	27	<20%	BW5	

STEAM GENERATOR #1 (Cont'd)

<u>ROW</u>	<u>LINE</u>	<u>%THRU WALL</u>	<u>LOCATION</u>	<u>COMMENTS</u>
71	27	<20%	BW4	
77	27	23%	BW6	
43	29	<20	4C	
30	34	<20%	1C	
68	34	<20%	4C	
70	38	36%	TSC	
80	38	20%	BW6	
82	38	30%	BW6	
87	39	<20%	7H	
54	40	29%	5H	
70	40	<20%	BW8	
87	41	<20%	BW9	
69	45	<20%	BW5	
129	47	26%	1C	
73	51	<20%	BW6	
77	51	<20%	TSC	
84	52	<20%	BW3	
82	54	<20%	BW5	2 BW5 INDICATIONS
		<20%	BW5	@ -0.80" & +0.75"
131	55	<20%	9H	
69	59	<20%	BW5	

STEAM GENERATOR #1 (Cont'd)

<u>ROW</u>	<u>LINE</u>	<u>%THRU WALL</u>	<u>LOCATION</u>	<u>COMMENTS</u>
85	59	<20%	BW4	
31	61	<20%	BW5	
49	61	<20%	8H	
135	61	22%	BW5	
84	62	<20%	BW3	
41	65	<20% 31%	BW5 BW5	2 BW5 INDICATIONS @ -0.38" & +0.54" PLUGGED PREVENTIVE WITH B&W I-690 HT #BC93-3
79	69	38%	5H	
145	73	<20% <20%	BW1 BW1	2 BW1 INDICATIONS @ +0.61" & 0.76"
111	75	<20%	4H	
68	78	28% 27%	BW6 BW6	2 BW6 INDICATIONS @ +1.09" & +1.14"
70	78	<20%	BW6	
95	79	<20%	BW9	
146	80	34%	BW1	
76	84	21%	6H	
82	86	<20% <20%	BW9 BW9	2 BW9 INDICATIONS @ -0.79" @ -0.16"
55	87	<20%	BW4	
146	88	29% <20%	BW1 BW9	

STEAM GENERATOR #1 (Cont'd)

<u>ROW</u>	<u>LINE</u>	<u>%THRU WALL</u>	<u>LOCATION</u>	<u>COMMENTS</u>
147	89	27%	BW1	
146	90	38%	BW1	
147	91	23%	BW9	
54	92	<20%	8H	
147	93	26%	BW8	
		27%	BW9	
145	95	24%	BW9	
82	96	22%	BW5	
94	96	20%	BW3	
146	96	35%	BW9	EXTENT BW9-BW9
		38%	BW9	FLEX RPC @ -1.59"
				BOBBIN @ +1.72"
				PLUGGED PREVENTIVE
				WITH B&W I-690 HT
				#BC93-3
78	98	<20%	BW6	
146	98	<20%	BW4	
49	99	<20%	BW1	
78	100	23%	BW6	
146	100	25%	BW9	
145	101	25%	BW1	
		<20%	BW9	
48	102	26%	BW5	
144	102	<20%	BW9	

STEAM GENERATOR #1 (Cont'd)

<u>ROW</u>	<u>LINE</u>	<u>%THRU WALL</u>	<u>LOCATION</u>	<u>COMMENTS</u>
145	103	31%	BW1	
		<20%	BW2	
		<20%	BW7	EXTENT BW7-BW7 RPC
		20%	BW7	
		<20%	BW8	EXTENT BW8-BW8 RPC
		27%	BW8	
		<20%	BW9	EXTENT BW9-BW9 RPC
		28%	BW9	
20	108	<20%	BW1	
42	108	27%	BW5	
89	111	<20%	BW4	
77	113	20%	6C	
141	113	25%	BW9	BW9 @ +1.49"
		<20%	BW9	EXTENT BW9-BW9 RPC
		<20%	BW2	BW9 @ +2.10"
91	115	<20%	BW9	
		22%	6C	
75	117	23%	BW9	
76	128	<20%	BW6	
78	136	21%	BW5	EXTENT BW6-BW5 RPC
		27%	BW5	
		37%	BW6	EXTENT BW6-BW5 RPC
		47%	BW6	PLUGGED WITH B&W I-690 HT #BC93-3
86	136	<20%	BW7	
70	138	25%	BW4	2 BW4 INDICATIONS
		30%	BW4	@ -0.89" & +1.09"
		28%	BW5	
		28%	BW6	2 BW6 INDICATIONS
		31%	BW6	@ -0.81" & +0.92"

STEAM GENERATOR #1 (Cont'd)

<u>ROW</u>	<u>LINE</u>	<u>%THRU WALL</u>	<u>LOCATION</u>	<u>COMMENTS</u>
82	138	28%	BW6	
76	140	36%	BW6	
78	140	26%	BW4	PLUGGED WITH B&W I-690 HT #BC93-3
		25%	BW6	
		52%	BW6	
78	142	36%	BW5	
74	144	22%	BW5	
		29%	BW6	
78	144	31%	BW4	2 BW4 INDICATIONS @ -0.63" & +0.95"
		33%	BW4	
		31%	BW5	
		32%	BW6	
75	149	<20%	BW5	
83	149	20%	BW7	
81	159	<20%	BW9	
79	161	<20%	BW9	

STEAM GENERATOR #1 BOBBIN COIL PARTIAL EXTENTS (16 TUBES)

<u>ROW</u>	<u>LINE</u>	<u>%THRU WALL</u>	<u>LOCATION</u>	<u>COMMENTS</u>
2	64	NDD	---	TEH-5C
2	112	NDD	---	TEH-7C
1	113	NDD	---	TEH-7C
1	117	NDD	---	TEH-7C
2	124	NDD	---	TEH-7C

STEAM GENERATOR #1 (Cont'd)

<u>ROW</u>	<u>LINE</u>	<u>%THRU WALL</u>	<u>LOCATION</u>	<u>COMMENTS</u>
2	130	NDD	---	TEH-7C
2	136	NDD	---	TEH-7C
1	143	NDD	---	TEH-7C
1	149	NDD	---	TEH-7C
3	149	NDD	---	TEH-7C
2	154	NDD	---	TEH-7C
2	160	NDD	---	TEH-7C
1	165	NDD	---	TEH-7C
2	172	NDD	---	TEH-7C
2	174	NDD	---	TEH-7C
1	175	NDD	---	TEH-7C

STEAM GENERATOR #2

The eddy current testing of 2,743 tubes in S/G #2 resulted in the following analysis of indications:

- 25 Tubes Less Than 20% Thru Wall
- 29 Tubes Greater Than or Equal to 20% But Less Than 40% Thru Wall
- 5 Tubes Greater Than 40% Thru Wall

STEAM GENERATOR #2 (Cont'd)

The following tube listing identifies the indications as a result of examining 2,743 tubes (29%) in S/G #2:

<u>ROW</u>	<u>LINE</u>	<u>%THRU WALL</u>	<u>LOCATION</u>	<u>COMMENTS</u>
53	11	31%	4C	2 BW4 INDICATIONS
		31%	4C	@ +25.56" & 25.55"
44	16	29%	BW5	@ -0.99" & -0.79"
76	24	21%	BW4	
		<20%	BW5	
82	26	<20%	BW5	
		<20%	BW6	
78	28	<20%	BW6	
83	29	26%	BW4	PLUGGED WITH B&W
		43%	BW5	I-690 HT #BC93-3
		48%	BW5	EXTENT BW5-BW5 RPC
81	33	<20%	BW9	
83	35	<20%	BW5	
		<20%	BW7	
77	37	<20%	BW4	
		<20%	BW5	2 BW5 INDICATIONS
		26%	BW5	@ -1.09" & +0.59"
44	40	<20%	BW5	
94	40	<20%	BW6	
63	45	27%	2C	
44	50	<20%	BW5	
66	50	<20%	BW9	

STEAM GENERATOR #2 (Cont'd)

<u>ROW</u>	<u>LINE</u>	<u>%THRU WALL</u>	<u>LOCATION</u>	<u>COMMENTS</u>
107	55	21% <20%	BW5 BW6	
81	57	<20%	BW4	
77	61	22%	BW4	
133	61	27%	BW5	
20	68	<20%	BW5	
45	68	<20% 24%	BW5 BW5	2 BW5 INDICATIONS @ +0.76" & -0.75"
140	68	<20%	BW7	
43	69	23%	BW5	
59	69	<20%	BW5	
69	69	<20%	BW5	
141	75	<20%	BW1	
145	77	22%	BW8	
146	78	26%	BW9	
145	79	29% 44%	BW1 BW1	PLUGGED WITH B&W I-690 HT #BC93-3
146	80	<20%		
62	82	22%	TSH	TSH @ +15.13"
146	82	32% 34%	BW1 BW1	2 BW1 INDICATIONS @ +1.93" & +1.92"
145	83	28%	BW1	

STEAM GENERATOR #2 (Cont'd)

<u>ROW</u>	<u>LINE</u>	<u>%THRU WALL</u>	<u>LOCATION</u>	<u>COMMENTS</u>
147	83	37%	BW1	PLUGGED WITH B&W
		42%	BW1	I-690 HT #BC93-3
54	84	32%	BW1	2 BW1 INDICATIONS
		34%	BW1	@ -1.53" & -1.92"
146	84	24%	BW9	
145	85	28%	BW8	BW8 @ -0.80"
		29%	BW8	EXTENT TEC-10H
				BW8 @ -0.77"
		29%	BW8	BW8 @ +0.86"
		28%	BW8	EXTENT TEC-10H
				BW8 @ +0.88"
		34%	BW9	BW9 @ +1.23"
		33%	BW9	EXTENT TEC-10H
				BW9 @ +1.82"
147	85	21%	BW7	
54	86	43%	BW1	PLUGGED WITH B&W
		43%	BW1	I-690 HT #BC93-3
144	86	25%	BW1	
147	87	25%	BW2	BW2 @ -0.66"
		23%	BW2	EXTENT TEC-7H
				BW2 @ -0.64"
		<20%	BW7	BW7 @ -0.92"
		<20%	BW7	EXTENT TEC-7H
				BW7 @ -0.87"
		<20%	BW8	EXTENT TEC-7H
				BW8 @ -0.98"
		<20%	BW8	BW8 @ -0.97"
		33%	BW8	BW8 @ +0.03"
		30%	BW8	EXTENT TEC-7H
				BW8 @ +0.08"
113	89	<20%	BW3	

STEAM GENERATOR #2 (Cont'd)

<u>ROW</u>	<u>LINE</u>	<u>%THRU WALL</u>	<u>LOCATION</u>	<u>COMMENTS</u>
147	91	23%	BW8	BW8 @ -0.85"
		26%	BW8	BW8 @ -0.75"
		30%	BW8	BW8 @ +0.00"
		31%	BW8	BW8 @ +0.06"
		24%	BW8	BW8 @ +0.87"
		20%	BW8	BW8 @ +0.88"
145	95	24%	BW8	
106	96	29%	7C	
145	103	<20%	BW9	
144	106	23%	BW1	
135	113	<20%	BW8	
47	117	<20%	BW1	
133	117	<20%	BW3	
129	129	41%	BW1	PLUGGED WITH B&W
		45%	BW1	I-690 HT #BC93-3
28	130	<20%	BW5	
124	134	23%	7C	
		31%	6C	
45	143	37%	BW5	2 BW5 INDICATIONS
		37%	BW5	@ +0.87" & +0.77"
41	149	<20%	BW5	
49	149	25%	BW5	
2	160	20%	5H	2 5H INDICATIONS
		21%	5H	@ +33.12" & 32.83"
41	167	<20%	BW5	

STEAM GENERATOR #2 (Cont'd)

<u>ROW</u>	<u>LINE</u>	<u>%THRU WALL</u>	<u>LOCATION</u>	<u>COMMENTS</u>
48	170	<20%	8H	
11	175	<20%	BW1	

Plant Contact

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