



Entergy

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2CAN030601

March 16, 2006

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

Subject: Steam Generator Tube Inservice Inspection Report  
Arkansas Nuclear One – Unit 2  
Docket No. 50-368  
License No. NPF-6

Dear Sir or Madam:

Arkansas Nuclear One, Unit 2 (ANO-2) Technical Specification 6.6.7.b requires that the complete results of ANO-2 steam generator (SG) tubing in-service inspections be reported within 12 months following the completion of the inspection. Attached is the SG Tubing In-service Inspection Report which presents the results from ANO-2's scheduled refueling outage (2R17) inspection. These inspections were conducted during April 2005.

The 2R17 inspection performed on both SGs involved an initial full-length bobbin coil examination of 54%. The Rotating Pancake Coil (RPC) used consists of a plus-point coil. Initially, 20% of the hot leg top-of-tubesheet expansion transitions were tested. This was later expanded due to the identification of loose part damage. The plus-point was also utilized for confirmation of bobbin coil indications.

This submittal contains no commitments. Should you have any questions regarding this report, please contact Fred Van Buskirk of my staff at (479) 858-3155.

Sincerely,

Dale E. James  
Manager, Licensing

DEJ/fpv

Attachment

A047

cc: Dr. Bruce S. Mallett  
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**Attachment**

**2CAN030601**

**ARKANSAS NUCLEAR ONE, UNIT 2  
STEAM GENERATOR TUBING INSERVICE INSPECTION  
REPORT**

# ARKANSAS NUCLEAR ONE, UNIT 2 STEAM GENERATOR TUBING INSERVICE INSPECTION REPORT

## 1 INTRODUCTION

Arkansas Nuclear One, Unit 2 (ANO-2) Technical Specification (TS) 6.6.7.b requires Entergy Operations to submit a report to the NRC that provides the results of steam generator (SG) tubing in-service inspections. The report is to be submitted within 12 months following the completion of the inspection and shall include:

1. Number and extent of tubes inspected.
2. Location and percent of wall-thickness penetration for each indication of an imperfection.
3. Identification of tubes plugged or sleeved.

The operating period for this report includes one outage, a refueling inspection (2R17) in April 2005.

The unit developed a primary-to-secondary leak approximately three weeks prior to the scheduled start of the refueling outage. The plant was taken offline five days early due to the increasing trend of the leakage with a maximum value of 35 gallons per day from steam generator "A". The source of the leakage was later identified as a loose part that had caused wear on the adjacent tube (R70C169). All performance criteria were met.

## 2 DESIGN

The replacement steam generators for ANO-2 are Westinghouse (W) Model Delta 109's. They consist of Inconel 690 thermally-treated tubing that is 11/16" in diameter with a 0.040" wall thickness. The tubes are expanded full depth hydraulically in the tubesheet. The tube supports are constructed of stainless steel and are a broached trefoil-hole design. The upper bundle supports consist of five sets of staggered stainless steel anti-vibration bars (AVB's) that are numbered A01-A20.

### 3 REPORT REQUIREMENTS

#### 3.1 Number and Extent of Tubes Tested (2R17)

Table 3.1 lists the inspection scope of 2R17.

**Table 3.1**  
**2R17 Inspection Scope**

<b>SG "A"</b>			
<b>Examination Type</b>	<b>Inspections Conducted</b>	<b>% Scope</b>	<b>Extent Tested</b>
Bobbin Initial	5761	54	TEC to TEH
Hot Leg TTS Initial	2118	20	+/- 3 inches HLTT\$
Hot Leg TTS Expansion 1	2247	21	+/- 3 inches HLTT\$
Hot Leg TTS Expansion 2	1265	12	+/- 3 inches HLTT\$
Cold Leg TTS Expansion 1	3314	31	+/- 3 inches CLTT\$
Cold Leg TTS Expansion 2	1498	14	+/- 3 inches CLTT\$
Bobbin I-Codes	19	N/A	N/A

<b>SG "B"</b>			
<b>Examination Type</b>	<b>Inspections Conducted</b>	<b>% Scope</b>	<b>Expansion Req'd</b>
Bobbin Initial	5748	54	TEC to TEH
Hot Leg TTS Initial	2128	20	+/- 3 inches HLTT\$
Hot Leg TTS Expansion 1	2350	21	+/- 3 inches HLTT\$
Hot Leg TTS Expansion 2	300	N/A	+/- 3 inches HLTT\$
Cold Leg TTS Expansion 1	3289	31	+/- 3 inches CLTT\$
Cold Leg TTS Expansion 2	300	N/A	+/- 3 inches CLTT\$
Bobbin I-Codes	19	N/A	N/A

**3.2 Location and Percent of Wall-Thickness Penetration for each Indication of an Imperfection.**

This topic is addressed in Table 3.2.1 for SG "A" and Table 3.2.2 for SG "B" below.

**TABLE 3.2.1  
SG "A" INDICATION LIST FOR 2R17**

Item No.	Row	Column	Percent Through-Wall	Location	Mechanism
1	59	60	13	A07	AVB Wear
2	62	13	14	A05	AVB Wear
3	63	46	11	A14	AVB Wear
4	70	169	100	TSH	Loose Part Wear
5	70	169	86	TSH	Loose Part Wear
6	71	170	57	TSH	Loose Part Wear
7	72	169	46	TSH	Loose Part Wear
8	72	169	54	TSH	Loose Part Wear
9	74	15	16	A18	AVB Wear
10	87	108	17	A09	AVB Wear
11	119	76	19	A09	AVB Wear
12	121	86	21	A09	AVB Wear
13	135	78	16	TSC	Loose Part Wear
14	135	102	15	A09	AVB Wear
15	135	102	14	A15	AVB Wear
16	142	119	5	TSH	Loose Part Wear
17	142	119	10	TSH	Loose Part Wear
18	144	119	7	TSH	Loose Part Wear
19	146	113	10	TSH	Loose Part Wear
20	146	115	4	TSH	Loose Part Wear
21	146	115	6	TSH	Loose Part Wear

**Legend:**

AVB – Anti-Vibration Bar  
TSH – Tubesheet Hot  
TSC – Tubesheet Cold  
A01- A20 – Anti-Vibration Bar Nomenclature

**TABLE 3.2.2  
SG "B" INDICATION LIST FOR 2R17**

Item No.	Row	Column	Percent Through-Wall	Location	Mechanism
1	52	109	7	A07	AVB Wear
2	100	25	16	TSC	Loose Part Wear
3	102	25	4	TSC	Loose Part Wear
4	109	92	26	A11	AVB Wear
5	112	149	10	A12	AVB Wear
6	112	149	14	A18	AVB Wear
7	113	92	15	A14	AVB Wear
8	113	92	7	A17	AVB Wear
9	116	99	14	A09	AVB Wear
10	116	99	13	A12	AVB Wear
11	124	129	11	TSH	Loose Part Wear
12	125	92	14	A15	AVB Wear
13	133	48	13	A13	AVB Wear
14	133	48	17	A15	AVB Wear
15	133	48	8	A17	AVB Wear
16	133	48	5	A19	AVB Wear
17	138	119	8	TSH	Loose Part Wear
18	138	119	10	TSH	Loose Part Wear
19	139	120	43	TSH	Loose Part Wear

Legend:

AVB – Anti-Vibration Bar  
TSH – Tubesheet Hot  
TSC – Tubesheet Cold  
A01- A20 – Anti-Vibration Bar Nomenclature

### 3.3 Identification of Tubes Plugged or Sleeved.

There were no sleeves installed during 2R17. There were four tubes in SG "A" and seven tubes in SG "B" repaired by mechanical plugging during 2R17 due to loose part damage. These are listed in Tables 3.3.1 and 3.3.2:

**Table 3.3.1  
Steam Generator A Plugged Tubes**

	<u>ROW</u>	<u>LINE</u>	<u>IND</u>	<u>LOCATION</u>
1	70	169	SVI	TSH + 0.25
2	72	169	SVI	TSH + 0.87
3	71	170	SVI	TSH + 0.92
4	135	78	SVI	TSC + 0.04

**Table 3.3.2  
Steam Generator B Plugged Tubes**

	<u>ROW</u>	<u>LINE</u>	<u>IND</u>	<u>LOCATION</u>
1	6	97	PLP	TSC + 0.19
2	5	98	PLP	TSC + 0.13
3	7	98	PLP	TSC + 0.15
4	20	173	PLP	TSH + 0.11
5	21	172	PLP	TSH + 0.13
6	22	173	PLP	TSH + 0.09
7	139	120	SVI	TSH + 0.10

The cumulative number and percent plugged and sleeved following 2R17 is listed in Table 3.3.3:

**Table 3.3.3  
Cumulative Plugs and Sleeves in Service**

	<b>SG "A"</b>	<b>SG "B"</b>
Pre-service Sleeves	0	0
2R17 Sleeves Installed	0	0
Total Sleeves Installed	0	0
Pre-service I-690 Welded	0	1
2R17 Plugs Installed	4	7
Total Plugged	4	8
Percent Plugged	0.0376 %	0.0752 %