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the southern electric system

J. D. Woodard
Vice President
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November 19, 1992

Docket No. 50-348

U. S. Nuclear Regulatory Commission
ATTN: Document Control Desk
Washington, DC 20555

Joseph M. Farley Nuclear Plant - Unit 1
Licensee Event Report No. LER 92-005-00

Gentlemen:

Joseph M. Farley Nuclear Plant, Unit 1, Licensee Event Report No. 92-005-00 is being submitted in accordance with Technical Specification 4.4.6.5.a and c.

If you have any questions, please advise.

Respectfully submitted,

J. D. Woodard

JDW/EFB:map 2582

Enclosure

cc: Mr. S. D. Ebneter
Mr. G. F. Maxwell

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NRC Form 366 (6-89) U.S. NUCLEAR REGULATORY COMMISSION

APPROVED OMB NO. 3150-0104 EXPIRES: 4/30/92

LICENSEE EVENT REPORT (LER)

FACILITY NAME (1)	DOCKET NUMBER (2)	PAGE (3)
Joseph M. Farley Nuclear Plant - Unit 1	0 5 0 0 0 3 4 8	1 OF 5

TITLE (4)
Steam Generator Tube Degradation

EVENT DATE (5)			LER NUMBER (6)			REPORT DATE (7)			OTHER FACILITIES INVOLVED (8)	
MONTH	DAY	YEAR	YEAR	SEQ NUM	REV	MONTH	DAY	YEAR	FACILITY NAMES	DOCKET NUMBER(S)
										0 5 0 0 0
1 1	1 2	9 2	9 2	0 0 5	0 0	1 1	1 9	9 2		0 5 0 0 0

OPERATING MODE (9)	6	THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR (11)			
POWER LEVEL	0	20.402(b)	20.405(c)	50.73(a)(2)(iv)	73.71(b)
		20.405(a)(1)(i)	50.36(c)(1)	50.73(a)(2)(v)	73.71(c)
		20.405(a)(1)(ii)	50.36(c)(2)	50.73(a)(2)(vii)	X OTHER (Specify in Abstract below)
		20.405(a)(1)(iii)	50.73(a)(2)(i)	50.73(a)(2)(viii)(A)	Tech. Spec.
		20.405(a)(1)(iv)	50.73(a)(2)(ii)	50.73(a)(2)(viii)(B)	4.4.6.5.a & c.
		20.405(a)(1)(v)	50.73(a)(2)(iii)	50.73(a)(2)(x)	

LICENSEE CONTACT FOR THIS LER (12)

NAME	TELEPHONE NUMBER	
	AREA CODE	
R. D. Hill, General Manager - Nuclear Plant	205	899-5156

COMPLETE ONE LINE FOR EACH FAILURE DESCRIBED IN THIS REPORT (13)

CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORT TO NPRDS		CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORT TO NPRDS	

SUPPLEMENTAL REPORT EXPECTED (14)		EXPECTED SUBMISSION DATE (15)	MONTH	DAY	YEAR
YES(If yes, complete EXPECTED SUBMISSION DATE)	X NO				

ABSTRACT (16)

The following report is being submitted in accordance with Technical Specification 4.4.6.5.a and c.

During the Unit 1 Eleventh Refueling Outage (U1RF11), eddy current inspections were performed on 100 percent of the available tubes in all three steam generators (SGs). As a result of this inspection a total of 169 tubes previously in service (1.72 percent of the total number of tubes inspected) were found to be defective which requires inspection results to be classified as Category C-3. These tubes were either plugged or sleeved. Following these actions, the current plugging equivalent in each SG is 4.62 percent, 2.6 percent, and 3.53 percent in SGs 1A, 1B, and 1C, respectively.

In addition to the required tube plugging and sleeving, several actions have been taken or are ongoing to reduce the probability of future tube degradation.

Plant and System Identification

Westinghouse - Pressurized Water Reactor
Energy Industry Identification System codes are identified in the text as [XX].

Summary of Event

During the Unit 1 Eleventh Refueling Outage (U1RF11), eddy current inspections were performed on 100 percent of the available tubes [AB] in all three steam generators (SGs). As a result of this inspection a total of 169 tubes previously in service (1.72 percent of the total number of tubes inspected were found to be defective which requires inspection results to be classified as Category C-3. These tubes were either plugged or sleeved. Following these actions, the current plugging equivalent in each SG is 4.62 percent, 2.6 percent, and 3.53 percent in SGs 1A, 1B, and 1C, respectively.

Description of Event

Prior to the U1RF11, Southern Nuclear Operating Company developed an eddy current inspection plan to inspect all non-plugged tubes in all three SGs. The eddy current inspection plan included: 100 percent full length bobbin probe inspection of all available tubes (except Row 1 and Row 2 U-bends), 100 percent rotating pancake (RPC) probe inspection of the hot leg transition zone of the Wextex expansion area (±3 inches at the top of the tubesheet) of all available tubes, RPC inspection of Row 1 and Row 2 U-bends, RPC inspection of all distorted indications. In addition, as part of a 1.0 volt interim plugging criteria, a RPC inspection of all support plate indications greater than 1.0 volt by bobbin, and an Augmented 3-coil RPC support plate inspection program of all dents greater than 5.0 volts by bobbin and a random sample of residuals and unusual phase angles was performed.

The following is a summary of the tube status for each individual SG:

	SG 1A	SG 1B	SG 1C
Tubes plugged prior to U1RF11	143	77	105
Tubes determined defective during U1RF11	49	34	86
Total in-service sleeved tubes after U1RF11	37	24	73
Total plugged tubes after U1RF11	155	87	116
Percent plugging equivalent after U1RF11	4.62	2.60	3.53

There were three major degradation mechanisms for the tubes found defective during this inspection: Primary Water Stress Corrosion Cracking (PWSCC) in the Wextex expansion area, Outer Diameter Stress Corrosion Cracking (OD SCC) above the top of the tubesheet in the sludge pile area, and OD SCC at support plates.

Wextex Expansion Area

There were 19 defective indications in the Wextex expansion area (which includes the tubesheet and transition zone): 6 in SG 1A, 4 in SG 1B and 9 in SG 1C. Circumferential cracks in the transition zone were identified in 3 tubes in SG 1A, 1 tube in SG 1B, and 3 tubes in SG 1C. None of these tubes required stabilizers. The transition zone was inspected by a 100 percent bobbin inspection and 100 percent RPC inspection (± 3 inches at the top of the tubesheet).

Above the Top of the Tubesheet

There were 36 defective indications above the top of the tubesheet in the sludge pile area: 9 in SG 1A, 12 in SG 1B, and 15 in SG 1C.

Tube Support Plate

There were 131 defective indications at support plate intersections: 39 in SG 1A, 21 in SG 1B, and 71 in SG 1C.

Cause of Event

Investigation and evaluations performed identified three areas where tube defects were observed: PWSCC in the Wextex expansion area, OD SCC above the top of the tubesheet within the sludge pile area, and OD SCC at support plates.

Reportability Analysis and Safety Assessment

This event is being reported in accordance with Technical Specification 4.4.6.5.a and c.

The health and safety of the public was not affected.

TEXT

Corrective Action

Tubes have been plugged or sleeved as required. In addition, the following actions have been taken in order to reduce the probability of future tube degradation:

1. A program of boric acid addition is being continued to reduce potential for OD SCC.

2. A program of morpholine addition is being continued to reduce the potential for sludge accumulation.

3. The Westinghouse pressure pulse cleaning process was used in all three SGs to remove contaminants from the crevices between the tubes and support plates.

4. During the Unit 1 Tenth Refueling Outage, the Westinghouse U-bend heat treat process was completed on all Row 1 and Row 2 tubes in service to reduce the potential of U-bend SCC.

5. During the Unit 1 Fifth and Sixth Refueling Outages, many of the secondary components containing copper were replaced with components containing stainless steel.

6. During the Unit 1 Eighth Refueling Outage, tube lane blocking devices were removed.

Additional Information

Similar events were reported in Unit 1 LER 91-003-00, and Unit 2 LERs 86-004-00, 87-004-02, and 90-005-01.

No components failed during this event.

TABLE 1

	SG 1A	SG 1B	SG 1C
Number of Tubes Probed	3245	3311	3283
Number of Defective Tubes	49	34	86
Number of Defective Indications in the Wextex Expansion Area - Tubesheet Zone	1	3	0
Number of Defective Indications in the Wextex Expansion Area - Transition Zone	5	1	9
Number of Defective Indications above Tubesheet in Sludge Pile Area	9	12	15
Number of Defective Indications at Support Plates	39	21	71

Note: The sum of the number of defective indications at the different locations does not equal the number of defective tubes since some tubes had multiple indications.