NRC Form 366 (9-83)

U.S. NUCLEAR REGULATORY COMMISSION
APPROVED OMB NO. 3150-0104
EXPIRES 8/31/85

LICENSEE EVENT REPORT (LER)

FACILITY NAME (1)	DOCKET NUMBER (2)	PAGE (3)
Joseph M. Farley - Unit 2	0 5 0 0 0 3 6 4	1 OF 0 4

TITLE (4)
Failed Containment Tendon Field Anchors

EVENT DATE (5)			LER NUMBER (6)			REPORT DATE (7)			OTHER FACILITIES INVOLVED (8)	
MONTH	DAY	YEAR	YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	MONTH	DAY	YEAR	FACILITY NAMES	DOCKET NUMBER(S)
0 1	2 7	8 5	8 5	— 0 0 5	— 0 0	0 3	0 5	8 5		0 5 0 0 0
										0 5 0 0 0

OPERATING MODE (9)	5	THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: (Check one or more of the following) (11)			
POWER LEVEL (10)	0 0 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 and in Text, NRC Form 366A)
		20.405(a)(1)(iii)	50.73(a)(2)(i)	50.73(a)(2)(viii)(A)	Voluntary Report
		20.405(a)(1)(iv)	50.73(a)(2)(ii)	50.73(a)(2)(viii)(B)	
		20.405(a)(1)(v)	50.73(a)(2)(iii)	50.73(a)(2)(x)	

LICENSEE CONTACT FOR THIS LER (12)

NAME	TELEPHONE NUMBER
J. D. Woodard	AREA CODE 2 0 5 — 8 9 9 - 5 2 5 6

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

CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO NPRDS		CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO NPRDS	
B	N H	S P T	I 0 8 0	N							

SUPPLEMENTAL REPORT EXPECTED (14)

		EXPECTED SUBMISSION DATE (15)	MONTH	DAY	YEAR
X YES (If yes, complete EXPECTED SUBMISSION DATE)	NO		0 7	0 1	8 5

ABSTRACT (Limit to 1400 spaces, i.e., approximately fifteen single-space typewritten lines) (16)

During an inspection prior to Integrated Leak Rate Testing (ILRT) of containment during cold shutdown for a refueling outage, it was discovered that the cover for the shop end of containment vertical tendon V17 was deformed. It was determined that the field anchor for containment tendon V17 had broken allowing the tendon to detension completely. A rigorous inspection program was implemented to locate failures, identify deficiencies and to determine the cause of the failures. Laboratory results of the failed field anchor assemblies revealed that hydrogen stress cracking resulted in the failures. The A/E has evaluated the effect of these failures on the structural integrity of containment. The result of this evaluation is that the structural integrity of containment has been and is currently adequate to meet the functional requirements.

The ILRT has been completed successfully. Alabama Power Company is implementing an expanded inspection and repair program that was developed as a result of the field inspections and laboratory analysis results. It is expected that the first phase of this program will be completed within approximately three months.

Health/Safety of the public was not affected.

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TEXT (If more space is required, use additional NRC Form 366A's) (17)

During an inspection prior to the scheduled Integrated Leak Rate Testing (ILRT) of Unit 2 containment it was discovered that the cover for the shop end of containment vertical tendon V17 was deformed. The cover for the field end was removed at 1400 on 1/27/85 and it was determined that the field anchor (NH,SPT) for V17 had broken allowing the tendon to detension completely. The unit was in cold shutdown for a refueling outage at the time of this discovery.

A program was initiated to inspect all remaining covers visually for both field and shop tendon ends. No deformed covers were found. The architect/engineer (A/E) then recommended a random sample visual inspection program for field anchor heads which would establish a 95% probability with a 95% confidence level that no other field anchors were failed. The fifth field anchor inspected during this program was found to have cracks but appeared to be carrying full load. Since this (degraded) field anchor was of the same material heat as the first, the program was modified to replace all field anchors of that heat (49 total) and to perform a 95% probability with a 95% confidence level visual inspection program for cracked anchors of different material heats.

The two degraded anchors and the first four non-degraded anchors of the same heat number were removed and sent for laboratory testing. This testing included chemical and physical properties as well as scanning electron microscopy. These four non-degraded anchors were also magnetic particle and load tested. These four were successfully tested to 140% guaranteed ultimate tensile strength. Grease and wire samples were analyzed. Additionally, a non-degraded field anchor of the same heat number was sent to the NRC.

By approximately 2/24/85, all field anchors of the affected heat had been visually inspected, as had the random sample of non-affected heats, with no failed field anchors found. Approximately one-half of the affected anchors had been replaced while the visual inspections were being conducted.

Preliminary laboratory results concluded that the problem was not related to a specific material heat and that temper embrittlement was not the primary cause. Since discussions with laboratory personnel indicated that the presence of moisture may be a contributing factor, a decision was made to inspect visually all vertical and all below-ground horizontal tendon field ends for anchor cracks and evidence of moisture. Additionally, based on the magnetic particle laboratory testing, a decision was made to magnetic particle test the anchor heads which were removed during the replacement process. As of 2/28/85, 24 field anchors had been magnetic particle tested and 8 were found to have cracks as follows:

5 had 1 cracked ligament
1 had 2 cracked ligaments
1 had 3 cracked ligaments
1 had 6 cracked ligaments

During this expanded visual inspection program, a third field anchor was found in the failed condition. This anchor was on a vertical tendon and was of a different material heat than the first two degraded field anchors. By 2/28/85, all vertical tendon field anchors had been inspected visually with no cracks found, other than noted above. Moisture was found in approximately half of the vertical tendon field anchor enclosures. As of 3/1/85, no cracks had been found on the 61 of 135 horizontal and 24 of 93 dome field anchors inspected. Detectable moisture was found in approximately 8% of the horizontal and 4% of the dome tendon field anchor enclosures.

On 2/28/85, the laboratories (Inland and Battelle) performing analyses on various degraded and non-degraded field anchors concluded that the problem affecting field anchors is due to hydrogen stress cracking.

The A/E has evaluated the structural integrity of the containment, both prior and subsequent to this event, and has concluded that the containment is structurally adequate to meet all functional requirements. An ILRT was successfully completed on 3/3/85. Plant start up activities are in progress with the expectation of entering Mode 4 on 3/5/85.

The following Unit 2 plan is being pursued:

1. Regrease all anchors which have been replaced using a new greasing procedure.
2. Remove, magnetic particle test and replace all remaining vertical tendon field anchors and any anchors on horizontal and dome tendons which have significant moisture.
3. Perform a visual inspection for moisture and cracks on a random sample of dome and horizontal tendons to establish a 95% probability with a 95% confidence level for no cracked anchors in each group.

The A/E has specified the combination of tendons that may be out of service at any time without affecting containment structural integrity. It is expected that the above plan will be completed within approximately three months.

A visual inspection will be performed on all tendon anchors which are replaced for moisture after one year and three years of completion of the above program. Also, within three years 100% of dome and horizontal tendon anchors will be inspected for moisture and cracks. This program is subject to change based on results of ongoing testing, inspection and analyses.

Meetings were held on 2/7/85 and 3/1/85 to brief the NRC on program status and proposed plans. Copies of final laboratory results will be forwarded to the NRC.

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After Unit 1 is shut down for the Cycle 6-7 refueling outage (scheduled for April 1985), all vertical and a random sample of horizontal and dome tendon field anchors will be inspected for cracks and moisture. The results of this program will be used to formulate a full Unit 1 plan including removal, magnetic particle testing and replacement of vertical tendon field anchors with observable moisture. Horizontal and dome tendon anchors with significant moisture will be removed, magnetic particle inspected and replaced. This plan is based on:

No tendon failures in 10 years (2 years older than Unit 2)

Three satisfactory ILRTs have been conducted the last of which was performed in April 1984.

Four previous sets of visual and lift-off surveillance tests have indicated a smaller number of tendons containing observable moisture than observed in Unit 2.

No observable moisture in the last 21 tendons on which visual and lift-off surveillance was done.

Covers were inspected visually after the Unit 2 failure was found. No deformations were noted.

A subsequent report will be provided.

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R. P. McDonald
Senior Vice President
Flintridge Building

Alabama Power
the southern electric system

March 5, 1985

Docket No. 364

Document Control Desk
U. S. Nuclear Regulatory Commission
Washington, D.C. 20555

Dear Sir:

Joseph M. Farley Nuclear Plant, Unit 2, Licensee Event Report No. LER 85-005-00 is being voluntarily submitted.

If you have any questions, please advise.

Yours very truly,

R. P. McDonald

RPM/DSM:sam

Enclosure

xc: IE, Region II

IE22
1/1