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ACCESSION NBR:9301220281 DOC.DATE: 93/01/15 NOTARIZED: NO DOCKET #
 FACIL:50-400 Shearon Harris Nuclear Power Plant, Unit 1, Carolina 05000400
 AUTH.NAME AUTHOR AFFILIATION
 VERRILLI,M. Carolina Power & Light Co.
 HINNANT,C.S. Carolina Power & Light Co.
 RECIP.NAME RECIPIENT AFFILIATION

SUBJECT: LER 92-014-01:on 921013,pipe wall thinning identified in AFW & MFW sys.Caused by flow accelerated corrosion.Affected piping replaced.Addl matl upgrades or sys configuration changes will be considered.W/930115 ltr.

DISTRIBUTION CODE: IE22T COPIES RECEIVED:LTR 1 ENCL 1 SIZE: 4
 TITLE: 50.73/50.9 Licensee Event Report (LER), Incident Rpt, etc.

NOTES:Application for permit renewal filed. 05000400

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Carolina Power & Light Company

P.O. Box 165 • New Hill, N.C. 27562

C. S. HINNANT
General Manager - Harris Plant

JAN 15 1993

Letter Number: HO-930009

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

SHEARON HARRIS NUCLEAR POWER PLANT UNIT 1
DOCKET NO. 50-400
LICENSE NO. NPF-63
LICENSEE EVENT REPORT 92-014-01

Gentlemen:

In accordance with Title 10 to the Code of Federal Regulations, the enclosed Licensee Event Report is submitted. The original report fulfilled the requirement for a written report within thirty (30) days of a reportable occurrence and was in accordance with the format set forth in NUREG-1022, September 1983.

This revision is being submitted to provide additional information related to the cause of pipe wall thinning discovered in the Main and Auxiliary Feedwater Systems.

Very truly yours

C. S. Hinnant
General Manager
Harris Nuclear Project

210123

MV:dmw

Enclosure

cc: Mr. S. D. Ebnetter (NRC - RII)
Mr. N. B. Le (NRC - PM/NRR)
Mr. J. E. Tedrow (NRC - SHNPP)
Mr. G. E. Vaughn

MEM/LER93-014.1/1/OS1

9301220281 930115
PDR ADDCK 05000400
S PDR

Jedrow 1/1

LICENSEE EVENT REPORT (LER)

(See reverse for required number of digits/characters for each block)

ESTIMATED BURDEN PER RESPONSE TO COMPLY WITH THIS INFORMATION COLLECTION REQUEST: 50.0 HRS. FORWARD COMMENTS REGARDING BURDEN ESTIMATE TO THE INFORMATION AND RECORDS MANAGEMENT BRANCH (MNB 7714), U.S. NUCLEAR REGULATORY COMMISSION, WASHINGTON, DC 20555-0001, AND TO THE PAPERWORK REDUCTION PROJECT (3150-0104), OFFICE OF MANAGEMENT AND BUDGET, WASHINGTON, DC 20503.

FACILITY NAME (1) Shearon Harris Nuclear Power Plant - Unit #1 DOCKET NUMBER (2) 05000/400 PAGE (3) 1 OF 3

TITLE (4) Voluntary LER - Identified pipe wall thinning in the Aux. Feedwater and Main Feedwater systems caused by Flow Accelerated Corrosion.

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 NAME	DOCKET NUMBER
10	13	92	92	-- 014 --	01	1	15	92	FACILITY NAME	DOCKET NUMBER 05000
									FACILITY NAME	DOCKET NUMBER 05000

OPERATING MODE (9)	d	THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: (Check one or more) (11)								
POWER LEVEL (10)	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					
		20.405(a)(1)(iii)	50.73(a)(2)(i)	50.73(a)(2)(viii)(A)	(Specify in Abstract below and in Text, NRC Form 366A)					
		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 Michael Verrilli TELEPHONE NUMBER (Include Area Code) (919) 362-2303

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

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

ABSTRACT (Limit to 1400 spaces, i.e., approximately 15 single-spaced typewritten lines) (16)
 On October 13, 1992, during Refueling Outage #4, ultrasonic testing revealed several indications of excessive pipe wall thinning in portions of the Main Feedwater (MF) and Auxiliary Feedwater (AFW) System. This testing was being conducted as part of the Harris Plant Flow Accelerated Corrosion (FAC) Program. In accordance with the FAC program, when any pipe wall thinning is identified, the examined area is expanded until adjacent thinning is located. Final results were obtained and evaluated by October 16, 1992 at which time the decision was made to replace the defective sections of pipe. The root cause for the wall thinning identified in the AFW/MF system was determined to be a combination of flow accelerated corrosion and less than nominal pipe wall thickness that existed at installation. Immediate corrective actions included replacing sections of AFW/MF piping that exhibited excessive wall thinning. Long term corrective actions such as additional material upgrades or system configuration changes will be considered. Based on preliminary operability conclusions, this condition did not meet the reporting requirements of 10CFR50.73. This was subsequently validated by calculations performed by CP&L Engineering personnel. However, due to the significant impact of a potential AFW failure and the high level of industry interest that this situation has created, this condition was submitted as a voluntary LER.

LICENSEE EVENT REPORT (LER)
TEXT CONTINUATION

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FACILITY NAME (1)	DOCKET NUMBER (2)	LER NUMBER (6)			PAGE (3)
		YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	
Shearon Harris Nuclear Plant Unit #1	05000/400	92	014	01	2 OF 3

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

EVENT DESCRIPTION:

On October 13, 1992, the plant was shut down for Refueling Outage #4 with the reactor vessel defueled. As specified by the Harris Plant Flow Accelerated Corrosion (FAC) Program, nondestructive examination testing was being conducted on various plant piping to detect possible wall thinning. This testing utilizes an ultrasonic sound wave process to determine pipe wall thickness. One aspect that is factored into the FAC Program to help determine plant systems that are most susceptible to flow accelerated corrosion, is reviewing industry operating experience. NRC Information Notice 92-07 was issued on January 9, 1992 and documented a pipe wall thinning condition at Catawba Unit #2. As a result of IN 92-07, Auxiliary Feedwater System (AFW) and Main Feedwater System (MF) piping was modelled for inclusion into the Harris FAC Program and was scheduled to be included in RFO #4. These tests revealed indications of wall thinning in a portion of the AFW and MF Systems. In accordance with the FAC program, when any pipe wall thinning is identified, the examined area is expanded until adjacent thinning is located. By October 16, 1992, results of this expanded testing were compiled and reviewed. Utilizing a nominal wall thickness, plus 12% for milling tolerances as a baseline, a maximum thinning rate was determined. While the majority of wall thinning identified did not result in a wall thickness less than minimum design standards, continued thinning at this rate would potentially exceed design requirements prior to the next outage. The decision was made to replace approximately 280 feet of the six inch AFW/MF piping prior to plant startup. This represents approximately 1/4 of the AFW system piping.

The original design for the AFW system did not include the flow path from the 16" MF line. This section of six inch piping was originally designed to provide an AFW flow path inside containment to the steam generators. However, during plant construction a modification to the original design was provided by Westinghouse to minimize vibration in the steam generator (S/G) preheater section. This modification diverts 16% to 21% of normal Main Feed flow from the sixteen inch Main Feed header, through the six inch AFW piping mentioned above. This flow path then injects the feedwater into the S/G above the preheater section and thereby reduces preheater vibration.

CAUSE:

The root cause for the thinning of AFW/MF preheater bypass piping was determined to be a combination of flow accelerated corrosion and less than nominal pipe wall thickness that existed at the time of installation. This conclusion was based on the results of analyses performed by the Electric Power Research Institute (EPRI), CP&L's Metallurgical Services Unit and evaluation by on-site engineering personnel.

LICENSEE EVENT REPORT (LER)
TEXT CONTINUATION

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FACILITY NAME (1)	DOCKET NUMBER (2)	LER NUMBER (6)			PAGE (3)
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TEXT (If more space is required, use additional copies of NRC Form 366A) (17)

CAUSE: (cont.)

Conditions such as very high flow velocity, structural geometries, low pH, and very low dissolved oxygen concentration were present in the AFW/MF piping that could collectively contribute to excessive wall loss. Initial installation of piping with wall thickness less than nominal was also indicated during EPRI's data evaluation. They indicated that this condition is not inconsistent with industry experience due to manufacturing tolerances allowing a $\pm 12.5\%$ margin in pipe wall thickness and that many plants have found even higher variances.

SAFETY SIGNIFICANCE:

Preliminary engineering evaluations indicated that the AFW system was capable of performing its design function during a design basis accident and was therefore operable during the previous cycle. This was validated by subsequent calculations performed by CP&L Engineering personnel that verified adequate AFW pipe wall thickness required for system operability and by the successful performance of required surveillance testing during cycle #4.

This condition did not meet the reporting requirements of 10CFR50.73 since the AFW system remained operable. However, due to the significant impact of a potential AFW failure and the high level of industry interest that this situation created, this condition was submitted as a voluntary LER.

CORRECTIVE ACTIONS:

1. Piping that exhibited extensive flow accelerated corrosion was replaced prior to plant startup following RFO #4. The sections of Main Feed piping outside the containment building that were originally schedule 120 carbon steel pipe, were upgraded to chrome-moly pipe. The sections of Auxiliary Feedwater both outside and inside containment, that were schedule 80 carbon steel pipe were replaced with like material.
2. Per CP&L's request, the Electrical Power Research Institute (EPRI) performed a review of this incident to help determine the cause of the pipe wall thinning and review the utilization and adequacy of the CHECMATE[®] computerized pipe wall thinning program.
3. An analysis of this event was also performed by CP&L's Metallurgical Services Section to determine the cause of the pipe wall thinning.
4. Evaluation to determine the need for further corrective actions such as additional material upgrades, system configuration or system water chemistry changes will be performed.