REGULATORY INFORMATION DISTRIBUTION SYSTEM (RIDS)

ACCESSION NBR: 8705280172 DOC. DATE: 87/05/21 NOTARIZED: NO DOCKET #
FACIL: 50-400 Shearon Harris Nuclear Power Plant, Unit 1, Carolina 05000400
AUTH. NAME AUTHOR AFFILIATION
SCHWABENBAUER Carolina Power & Light Co.
RECIP. NAME RECIPIENT AFFILIATION

SUBJECT: LER 87-024-00: on 870421, heater drain pumps A & B tripped due to low differential pressure & automatic turbine runback initiated. Caused by oscillating feedwater heater levels. Steam generator water levels restored. W/870521 ltr.

DISTRIBUTION CODE: IE22D COPIES RECEIVED: LTR 1 ENCL 1 SIZE: 4
TITLE: 50.73 Licensee Event Report (LER), Incident Rpt, etc.

NOTES: Application for permit renewal filed. 05000400

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	AEOD/DOA	1	1	AEOD/DSP/ROAB	2	2
	AEOD/DSP/TPAB	1	1	DEDRO	1	1
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	NRR/PMAS/PTSB	1	1	REG FILE 02	1	1
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EXTERNAL:	EG&G GROH, M	5	5	H ST LOBBY WARD	1	1
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NRC Form 366
(9-83)

U.S. NUCLEAR REGULATORY COMMISSION
APPROVED OMB NO. 3150-0104
EXPIRES: 8/31/88

LICENSEE EVENT REPORT (LER)

FACILITY NAME (1)	DOCKET NUMBER (2)	PAGE (3)
SHEARON HARRIS PLANT UNIT 1	0 5 0 0 0 4 0 0	1 OF 0 3

TITLE (4)
REACTOR TRIP - LOSS OF HEATER DRAIN PUMP B

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 4	2 1	8 7	8 7	— 0 2 4	— 0 0	0 5	2 1	8 7		0 5 0 0 0
										0 5 0 0 0

OPERATING MODE (9)	THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: (Check one or more of the following) (11)			
1	20.402(b)	20.405(c)	X 50.73(a)(2)(iv)	73.71(b)
POWER LEVEL (10) 1 0 0	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)	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)	
	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
RICHARD SCHWABENBAUER - REGULATORY COMPLIANCE	AREA CODE 9 1 9 — 3 6 2 — 2 6 6 9

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

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

The plant was operating at approximately 100 percent reactor power and 882 MWe on April 21, 1987 in normal plant line-up, with the Main Feedwater Control Valves in manual control.

At 0450 hours, 'B' Heater Drain Pump tripped due to low differential pressure. The plant operator then started a manual turbine power reduction in order to stabilize plant power. 'A' Heater Drain Pump then tripped at 0451 hours, also due to low differential pressure, which initiated an automatic turbine runback.

During the turbine runback, operators began to manually control feedwater flow, and the plant steam dump system activated due to the large load reduction. While turbine runback was still in progress, 'A' Main Feedwater Pump tripped at 0453 hours due to low suction pressure and was immediately followed by 'B' Main Feedwater Pump tripping for the same reason. With both Main Feedwater Pumps tripped, 'A' and 'B' Condensate Booster Pumps tripped due to high discharge pressure.

With both feedwater trains tripped and steam generator water levels decreasing, a manual reactor trip was initiated at 0453 hours. The plant was then stabilized in Mode 3 at 557°F (normal no load Tavg) and normal operating pressure with steam generator water levels restored with the Auxiliary Feedwater System.

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Description

Prior to the event, the plant was operating at approximately 100 percent reactor power. The Main Feedwater Control Valves were in manual control. Other feedwater system components were in their normal configuration.

At 0450 hours, a low pump differential pressure signal tripped the 'B' Heater Drain Pump. The trip was caused by erratic and unstable Heater Drain Pump flow and Heater 4 level. Plant operators initiated a manual turbine runback. The operators initiated the runback in response to a partial loss of feed flow and in anticipation of increasing reactor power due to the loss of secondary plant efficiency. At 0451 hours, a low pump differential pressure signal tripped the 'A' Heater Drain Pump. The loss of both Heater Drain Pumps automatically initiated a turbine runback.

During the turbine runback, operators began to manually control feedwater flow. The turbine runback caused the steam dump system to actuate due to a Tave-Tref mismatch.

As a result, the Main Feedwater Pumps went to run out and low suction pressure tripped both the 'A' and 'B' Main Feedwater Pumps. The loss of the Main Feedwater Pumps caused the Condensate Booster Pumps to go to near shutoff head which tripped both of the Condensate Booster Pumps on high discharge pressure. With both feedwater trains tripped and steam generator water levels decreasing, a manual plant trip was initiated at 0453 hours.

The plant was then stabilized in Mode 3 at 557°F (normal no load Tavg) and normal operating pressure. Auxiliary feedwater was actuated automatically on the loss of both Main Feedwater Pumps and was used to restore Steam Generator water levels.

Cause

The trips of the Heater Drain Pumps were caused by oscillating Feedwater Heater levels and were the initiating event for a turbine runback. The low reactivity worth of Control Bank D and the turbine runback rate resulted in actuation of Condenser dump valves due to Tref-Tave deviation.

A review of archived data indicated erratic and unstable Heater Drain Pump flow and Feedwater Heater #4 level. Both 'A' and 'B' trains had similar behavior, but the fluctuations in 'B' train were more severe.

FSAR Figure 10.1.0-5 illustrates the flow paths leading to each Heater Drain Pump. In summary, the suction source for each Heater Drain Pump is the shell side of the respective #4 Feedwater Heater. The major flow paths to the #4 Feedwater Heater are extraction steam (7th stage), moisture separator drain tank drain, and drains from the shell side of the #5 Feedwater Heater. The major flow paths to the #5 Feedwater Heater are extraction steam (4th stage), moisture separator reheater drain tank drain, and moisture separator reheater vent. The Heater Drain Pumps discharge to the suction of the respective Main Feedwater Pump.

FACILITY NAME (1)	DOCKET NUMBER (2)	LER NUMBER (6)			PAGE (3)
		YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	
SHEARON HARRIS PLANT UNIT 1	0 5 0 0 0 4 0 0	8 7	— 0 2 4	— 0 0	0 3 OF 0 3

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

Cause (continued)

The data indicates that the Feedwater Heater #4 level control system was the source of the problem.

The trip of the Heater Drain Pumps lead to a pressure transient at the Main Feed Pump Suction, a turbine runback, and manual action to adjust feedwater flow. The Condensate Booster Pump has a variable speed coupling which automatically controls the speed based on the pumps discharge pressure. The Condensate Booster Pump automatically compensates for the loss of a Heater Drain Pump, but in this event, the suction pressure of the Main Feedwater Pump was not maintained above the trip setpoint during the transient.

Analysis

There were no safety consequences resulting from this event. The Reactor Protection System and Auxiliary Feedwater System responded as required. Normal recovery followed the reactor trip.

This event is reportable under 10CFR50.73(a)(2)(iv) as an actuation of the Engineered Safeguards Features and Reactor Protection Systems.

Corrective Actions

As a result of a previous event associated with the Heater Drain Pumps (LER-87-019-00), the following corrective actions were implemented to improve their reliability: trips on high discharge pressure, delta pressure, and Moisture Separator Reheater pressure were deleted.

Due to this event, further evaluation into the reliability of the Heater Drain System was conducted with the following additional changes being implemented:

1) The low-level trip setpoint for the Heater Drain Pumps in the Number 4 Feedwater Heater was lowered 12 inches to provide a margin for trips on level oscillations.

2) The Main Feeder Pump low suction pressure trip time delay has been increased from 5 seconds to 15 seconds to provide more time to stabilize after a loss of a Heater Drain pump transient.

CP&L
Carolina Power & Light Company

HARRIS NUCLEAR PROJECT
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MAY 21 1987

File Number: SHF/10-13510C
Letter Number: HO-870434 (O)

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 87-024-00

Gentlemen:

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

Very truly yours,

R. A. Watson
Vice President
Harris Nuclear Project

RAW:sdg

Enclosure

cc: Dr. J. Nelson Grace (NRC - RII)
Mr. B. Buckley (NRR)
Mr. G. Maxwell (NRC - SHNPP)

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