

CATEGORY 1

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 FACIL: 50-400 Shearon Harris Nuclear Power Plant, Unit 1, Carolina
 AUTH. NAME AUTHOR AFFILIATION
 VERRILLI, M. Carolina Power & Light Co.
 DONAHUE, J.W. Carolina Power & Light Co.
 RECIP. NAME RECIPIENT AFFILIATION

SUBJECT: LER 98-004-00: on 980313, design deficiency related to inadequate runout protection for turbine driven AFW pump was identified. Caused by inadequate original AFW sys design. Evaluation (ESR 98-00100) will be completed. W/980409 ltr.

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 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
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APR - 9 1998

U.S. Nuclear Regulatory Commission
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Serial: HNP-98-050
10CFR50.73

SHEARON HARRIS NUCLEAR POWER PLANT UNIT 1
DOCKET NO. 50-400
LICENSE NO. NPF-63
LICENSEE EVENT REPORT 98-004:00

Sir or Madam:

In accordance with 10CFR50.73, the enclosed Licensee Event Report (LER) is submitted. This LER describes a design deficiency related to a potential runout condition occurring with the Turbine Driven Auxiliary Feedwater Pump during certain accident scenarios.

Sincerely,

J. W. Donahue
Director of Site Operations
Harris Plant

MV
Enclosure

c: Mr. J. B. Brady (HNP Senior NRC Resident)
Mr. L. A. Reyes (NRC Regional Administrator, Region II)
Mr. S. C. Flanders (NRC - NRR Project Manager)

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5413 Shearon Harris Road New Hill NC

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LICENSEE EVENT REPORT (LER)

(See reverse for required number of
digits/characters for each block)ESTIMATED BURDEN PER RESPONSE TO COMPLY WITH THIS MANDATORY
INFORMATION COLLECTION REQUEST: 50.0 HRS. REPORTED LESSONS LEARNED ARE
INCORPORATED INTO THE LICENSING PROCESS AND FED BACK TO INDUSTRY.
FORWARD COMMENTS REGARDING BURDEN ESTIMATE TO THE INFORMATION AND
RECORDS MANAGEMENT BRANCH (T-6 F33), 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)

Harris Nuclear Plant Unit-1

DOCKET NUMBER (2)

50-400

PAGE (3)

1 OF 3

TITLE (4)

Design deficiency related to inadequate runout protection for the Turbine Driven AFW Pump.

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
3	13	98	98	-- 004	-- 00	4	13	98		
OPERATING MODE (9)		1		THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR 5: (Check one or more) (11)						
POWER LEVEL (10)		100%		20.2201(b)		20.2203(a)(2)(v)		50.73(a)(2)(i)		50.73(a)(2)(viii)
				20.2203(a)(1)		20.2203(a)(3)(i)		X 50.73(a)(2)(ii)		50.73(a)(2)(x)
				20.2203(a)(2)(i)		20.2203(a)(3)(ii)		50.73(a)(2)(iii)		73.71
				20.2203(a)(2)(ii)		20.2203(a)(4)		50.73(a)(2)(iv)		OTHER .
				20.2203(a)(2)(iii)		50.36(c)(1)		50.73(a)(2)(v)		Specify in Abstract below or in NRC Form 366A
				20.2203(a)(2)(iv)		50.36(c)(2)		50.73(a)(2)(vii)		

LICENSEE CONTACT FOR THIS LER (12)

NAME

Michael Verrilli Sr. Analyst - Licensing

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 NPDOS		CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO NPDOS

SUPPLEMENTAL REPORT EXPECTED (14)

X	YES	NO	EXPECTED SUBMISSION DATE (15)	MONTH	DAY	YEAR
	(If yes, complete EXPECTED SUBMISSION DATE).			6	30	98

ABSTRACT (Limit to 1400 spaces, i.e., approximately 15 single-spaced typewritten lines) (16)

On March 13, 1998, with the plant operating at 100% power in Mode 1, a design deficiency related to potential runout of the Turbine Driven Auxiliary Feedwater Pump (TDAFWP) was identified and determined to be reportable as operation outside the design basis of the plant. Specifically, a scenario exists during a main steam line break accident or main feed line break accident where the TDAFW pump could potentially operate at runout for a design maximum of 41 seconds and result in pump failure. The Harris Nuclear Plant (HNP) Final Safety Analysis Report (FSAR) states that the TDAFW pump will be available to mitigate the consequences of these postulated accidents. This condition was reported to the NRC via the emergency notification system per 10CFR50.72 on March 13, 1998 at 1155 hours.

The cause of this condition is inadequate original AFW system design. The AFW system design did not consider the possibility of the scenario described in this LER and therefore, did not include adequate runout protection for the TDAFW pump speed control mechanism.

Corrective actions included performing an immediate operability evaluation, which determined that the AFW system would remain capable of performing its safety function following the loss of the TDAFW pump caused by runout. Additional Engineering analysis will be performed to determine the appropriate long-term solution. A revision to this LER will be submitted upon completion of this engineering analysis.

LICENSEE EVENT REPORT (LER)
TEXT CONTINUATION

FACILITY NAME (1)	DOCKET	LER NUMBER (6)			PAGE (3)
		YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	
Shearon Harris Nuclear Plant - Unit #1	50-400	98	004	00	2 OF 3

TEXT (If more space is required, use additional copies of NRC Form 368A) (17)

EVENT DESCRIPTION:

On March 13, 1998, with the plant operating at 100% power in Mode 1, a design deficiency related to potential runout of the Turbine Driven Auxiliary Feedwater Pump (TDAFWP) was identified and determined to be reportable as operation outside the design basis of the plant. Specifically, a scenario exists during a main steam line break (MSLB) or main feed line break (MFLB) accident where the TDAFWP could potentially operate at runout for a design maximum of 41 seconds and result in pump failure.

The TDAFWP is designed to be protected from runout by its variable speed - differential pressure controller. This differential pressure controller will control turbine speed between 2300 and 4100 rpm to maintain a 28 psig differential between the TDAFWP discharge pressure and the turbine steam inlet pressure. When Steam Generator (S/G) pressures are low, the main steam pressure at the turbine inlet drops and the pressure differential controller will demand a drop in turbine speed to decrease discharge head and maintain the set differential pressure. Therefore, TDAFWP discharge pressure will increase and decrease as S/G pressure increases and decreases respectively. The maximum design speed that the TDAFW speed controller will allow the turbine to operate is 4125 rpm. If a failure occurs in the speed controller system, a mechanical overspeed trip set at 125% of rated speed will trip the turbine by unlatching the trip and throttle valve and shutting off the steam supply.

During a MSLB or MFLB accident scenario, it appears that the speed controller will not prevent the TDAFWP from going into a runout condition. Both a MSLB and MFLB will initially depressurize all three S/G's. As the S/G's depressurize, the turbine speed controller will lower pump speed to maintain the required setpoint. However, once the Main Steam Isolation Valves (MSIVs) close, steam will be isolated from the faulted S/G and the two intact S/G's re-pressurize causing turbine steam inlet pressure to follow the intact S/G pressures. AFW flow isolation will not automatically occur for a design maximum of 41 seconds after the MSIVs are closed and during this period the majority of AFW flow will follow the path of least resistance to the faulted S/G. Therefore, the TDAFWP discharge pressure will remain at essentially zero (that of the faulted S/G) and the pump discharge pressure will fall below the steam inlet pressure. This will cause the turbine speed control system to go to maximum speed and place the pump in a runout condition. For a maximum of 41 seconds the pump will be turning at 4125 rpm and pumping unlimited flow at zero discharge pressure with no protection.

The HNP Final Safety Analysis Report (FSAR) does not specifically address this condition and states that the TDAFW pump will be available to mitigate the consequences of these postulated accidents.

This condition was reported to the NRC via the emergency notification system per 10CFR50.72 on March 13, 1998 at 1155 hours.

LICENSEE EVENT REPORT (LER)
TEXT CONTINUATION

FACILITY NAME (1)	DOCKET	LER NUMBER (5)			PAGE (3)
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TEXT (if more space is required, use additional copies of NRC Form 366A) (17)

CAUSE:

The cause of this condition is inadequate original AFW system design. The AFW system design did not consider the possibility of the scenario described in this LER and therefore, did not include adequate runout protection for the TDAFW pump speed control mechanism.

SAFETY SIGNIFICANCE:

There were no actual safety consequences. This LER documents a potential failure scenario associated with the loss of the TDAFWP during a MSLB or MFLB accident.

The AFW system is designed and operated to include design margins and engineering margins of safety. The AFW system design is such that no initiating failure and assumed single failure will render all three AFW pumps and associated train unavailable in providing the necessary coolant flow to the S/Gs. With no specific runout protection, it is conservative to assume a consequential TDAFWP failure for a MSLB or MFLB accident as described in this LER. However, the consequential loss of the TDAFWP will not prevent the AFW system from performing its design basis safety function of providing a flowrate of 400 gpm flow to the S/Gs. This is based on the continued availability of the remaining motor driven AFW pump.

PREVIOUS SIMILAR EVENTS:

There have been no previous conditions identified or reported related to a potential TDAFWP runout and consequential failure during a MSLB or MFLB accident scenario.

CORRECTIVE ACTIONS COMPLETED:

1. An operability evaluation (ESR 98-00100) was completed on March 13, 1998, which determined that the AFW system would remain capable of performing its safety function following the loss of the TDAFW pump caused by runout.

CORRECTIVE ACTIONS PLANNED:

1. Additional Engineering analysis will be performed to determine the appropriate long-term solution for the potential TDAFWP runout condition and consequential pump failure. A supplement to this LER will be issued to the NRC upon completion of this analysis.