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

Perry Nuclear Power Plant
Docket No. 50-440
LER 94-005-00

Gentlemen:

Enclosed is Licensee Event Report 94-005-00 concerning Loss of Both Trains of Control Room Emergency Recirculation Due to Low Emergency Closed Cooling Temperature.

If you have questions or require additional information, please contact Henry Hegrat - Regulatory Affairs at (216) 280-5606.

Very truly yours,

RAS:DHL:sc

Enclosure: LER 94-005-00

cc: NRC Project Manager
NRC Resident Inspector Office
NRC Region III

210079

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NRC FORM 366 (5-92) U.S. NUCLEAR REGULATORY COMMISSION

APPROVED BY OMB NO. 3150-0104
EXPIRES 5/31/95

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 (MNBB 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.

LICENSEE EVENT REPORT (LER)

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

FACILITY NAME (1)	DOCKET NUMBER (2)	PAGE (3)
Perry Nuclear Power Plant, Unit 1	05000 440	1 OF 5

TITLE (4) Loss of Both Trains of Control Room Emergency Recirculation Due to Low Emergency Closed Cooling Temperature

EVENT DATE (5)			LER NUMBER (6)			REPORT NUMBER (7)			OTHER FACILITIES INVOLVED (8)	
MONTH	DAY	YEAR	YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	MONTH	DAY	YEAR	FACILITY NAME	DOCKET NUMBER
										05000
02	09	94	94	-- 005 --	00	03	11	94	FACILITY NAME	DOCKET NUMBER 05000

OPERATING MODE (9)	4	THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: (Check one or more) (11)							
			20.402(b)		20.405(c)		50.73(a)(2)(iv)		73.71(b)
POWER LEVEL (10)	0		20.405(a)(1)(i)		50.36(c)(1)	X	50.73(a)(2)(v)		73.71(c)
			20.405(a)(1)(ii)		50.36(c)(2)		50.73(a)(2)(vii)		OTHER
			20.405(a)(1)(iii)	X	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	TELEPHONE NUMBER (Include Area Code)
David H. Lockwood, Compliance Engineer Extension 7539	(216) 259-3737

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 15 single-spaced typewritten lines) (16)

During preparation for Residual Heat Removal (RHR) heat exchanger testing on February 5, 1994 Emergency Closed Cooling (ECC) system division 1 temperature was observed to be below 55 °F. Design of the Control Complex Chillers requires inlet condensing water temperature from ECC to be greater than 55 °F. At temperatures below 55 °F the Control Complex Chillers may trip on low refrigerant temperature causing the associated train of Control Room Heating, Ventilation and Air Conditioning (CRHVAC) Emergency Recirculation mode to be inoperable.

A review was performed to determine if this condition could have existed at any time where both trains of ECC were affected. It was determined on February 9, 1994 that between January 28 and January 29, 1994 for approximately 10 hours and 47 minutes that both trains of ECC were affected. Therefore, during this time period both trains of the CRHVAC Emergency Recirculation mode would be inoperable.

Immediate corrective actions were to revise appropriate system operating procedures to maintain ECC temperature above 55 °F.

I. Introduction

During preparation for Residual Heat Removal (RHR) heat exchanger [HX] testing on February 5, 1994 Emergency Closed Cooling (ECC) [CC] system division 1 temperature was observed to be below 55 °F. Design of the Control Complex Chillers [CHU] requires inlet condensing water temperature from ECC to be greater than 55 °F. At temperatures below 55 °F the Control Complex Chillers may trip on low refrigerant temperature causing the associated Control Room Heating, Ventilation and Air Conditioning (CRHVAC) [KM] Emergency Recirculation mode to be inoperable.

A review was performed to determine if this condition could have existed at any time where both trains of ECC [CC] were affected. On February 9, 1994 it was determined that between January 28 and January 29, 1994 for approximately 10 hours and 47 minutes that both trains of ECC were affected. Therefore, during this time period both trains of the CRHVAC Emergency Recirculation mode would have been inoperable. During this time period the plant was in operational condition 3, Hot Shutdown. However, Technical Specification 3.0.3 was not entered as required.

At the time of this determination the plant was in Operational Condition 4 (Cold Shutdown) with reactor temperature of approximately 117 °F. Notification was made in accordance with 10CFR50.72(b)(2)(iii)(d). This event is being reported under the requirements of 10CFR50.73(a)(2)(i) and 10CFR50.73 (a)(2)(v)(d).

II. Description of Event

The ECC division 1 and 2 systems are designed to provide a safety related cooling water source to safety related components during accident conditions and certain modes of system operation. Each division of ECC provides cooling to their respective Emergency Core Cooling System (ECCS) and Reactor Core Isolation Cooling (RCIC) system pump room coolers, Control Complex Chiller, ECCS pump seals and Hydrogen Analyzer. Each ECC system heat exchanger (HX) [HX] is cooled by a division of the Emergency Service Water (ESW) [BI] system. The ESW system water supply is Lake Erie. When lake water temperature is below 55 °F ESW system flow to the ECC HX is transferred from a 14 inch supply line to a 3 inch supply line. This assures that ECC water temperature does not go below 55 °F during accident conditions. The Control Complex Chillers provide chilled water to the cooling coils of their respective CRHVAC trains. Normal cooling water to the Control Complex Chillers is supplied by the Nuclear Closed Cooling (NCC) [CC] system. During accident conditions cooling water supply to the Control Complex Chillers is transferred from the NCC system to the ECC system and the CRHVAC transfers from normal operation to emergency recirculation mode. Control Complex Chillers are approximately 90% of the ECC system load during accident conditions.

During preparations for RHR heat exchanger testing on February 5, 1994 ECC system division 1 was manually aligned to provide cooling for Control Complex Chiller A. This action was taken in response to a caution in the test procedure which stated that the associated Control Complex Chiller should be declared inoperable if ECC temperature fell below 55 °F. It was felt that the Control Complex Chiller heat load with the RHR pump room cooler and pump seal water heat load would be sufficient to maintain ECC temperature above 55 °F. Shortly after completing the alignment Control room Operators noted that ECC division 1 temperature was below 55 °F. Cooling to Control Complex Chiller A was returned to NCC and heat exchanger testing suspended.

An engineering review was initiated and determined that with minimum heat loads (e.g. RHR pump being operated for surveillance testing) and ESW temperature below 55 °F, ECC temperature would decrease below 55 °F. In this condition of operation an emergency start and load of the Control Complex Chillers could be prevented by the low refrigerant temperature trip.

A review of the plant logs indicated that for approximately 10 hours and 47 minutes on January 28 to January 29, 1994 ECC division 1 and 2 were operated concurrently with minimum heat loads and system temperature could have decreased to below 55 °F due to ESW temperature being below 55 °F. This determination was completed on February 9, 1994.

A review of the ECC design calculations revealed that a similar condition had been identified in 1986. Corrective action for this condition was to initiate a design change to install the 3 inch ESW outlet from ECC HX bypass line for use during conditions where ESW temperature was below 55 °F. However, the calculations and procedural modifications to support this design change only considered accident heat loads for ECC and not conditions where ECC would be supporting minimum heat loads with ESW temperature below 55° F.

The control room was given direction to declare inoperable the CRHVAC Emergency Recirculation mode associated with an ECC division operating to support minimum heat loads. This policy remained in affect until adequate procedural guidance was provided to throttle ESW flow to maintain ECC temperature above 55 °F.

III. Cause of Event

The cause of this event is inadequate design. When a similar problem was identified in 1986 corrective action considered only the ECC accident heat loads and did not consider minimum loads with ESW temperature below 55 °F. Contributing to this event was inadequate procedural guidance for maintaining ECC temperature above 55 °F. Cautions regarding ECC temperature were stated in the Control Complex Chiller system operation manual and in the RHR heat exchanger test instruction but clear guidance on actions to be taken was not available.

IV. Safety Analysis

The CRHVAC system provides cooling, heating, ventilation, and when required, smoke removal for the control room, and equipment areas during normal plant operation, and during periods of emergency (LOCA, LOOP or high radiation condition). The Emergency Recirculation mode provides the necessary supplementary particulate and gaseous filtration of the air supplied to the control room areas during emergency conditions and other abnormal conditions, to reduce the radiation dose for personnel protection. Technical Specification 3.7.2 requires two independent control room emergency recirculation subsystems be operable in all operational conditions. In operational conditions 1, 2, and 3 actions are provided for one system inoperable, but inoperability of both systems is not addressed and entry into Technical Specification 3.0.3 is required.

While the time which both trains of the CRHVAC Emergency Recirculation were inoperable did not exceed Technical Specification 3.0.3 action requirements to place the plant in operational condition 4 from operational condition 3, if a Loss of Coolant Accident (LOCA) or a Loss of Offsite Power (LOOP) accident had occurred during the January 28 to January 29, 1994 time period the Emergency Recirculation mode of CRHVAC would not have operated as required. While the Recirculation mode of the CRHVAC would not have tripped due to the Control Complex Chiller low refrigerant temperature, cooling to the recirculated air would have been lost. Further, since the completion of the design change to install the 3 inch ESW outlet from ECC HX bypass line in 1986, the potential existed that conditions similar to the January 28 to January 29, 1994 condition could have occurred. As a result this event is considered to be safety significant.

V. Similar Events

LER's 90-006, 90-012, 90-020, 90-035, 90-035 revision 1 and 91-008 document conditions which caused both trains of CRHVAC Emergency Recirculation to be inoperable: however, none of them were caused by low ECC temperature.

VI. Corrective Actions

Immediate corrective action was to realign Control Complex Chiller A cooling to NCC and suspend the heat exchanger testing. The associated CRHVAC Emergency Recirculation mode was declared inoperable when ECC was used to support non-accident loads until appropriate procedures were revised to provide for throttling of ESW flow.

A design change, DCP 94-0027, is being prepared to install a temperature control valve in the 3 inch ESW outlet from ECC HX bypass line to maintain ECC temperature above 55 °F during operation with minimum heat loads. This design change will be implemented by November 1994.

The system operating procedures for the ECC and ESW systems were revised to include instructions for throttling ESW to maintain ECC temperature above 55 °F. Specific alarm response instructions were also revised to provide instruction for throttling ESW flow. Engineering is reviewing heat load calculations for accident and minimum loads to establish the required ESW flow to maintain ECC temperature above 55 °F. This review will be completed prior to entering Mode 2 after the current refueling outage. This information will be utilized to provide additional procedural guidance for maintaining ECC temperature above 55 °F until the design change is implemented.

No further corrective actions are required.