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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 94-002-00

Gentlemen:

Enclosed is Licensee Event Report 94-002-00 concerning a Manual Reactor Scram Following Reactor Recirculation Pumps Automatic Downshift.

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

Very truly yours,

Robert A. Stratman

RAS:DAH:sc

Enclosure: LER 94-002-00

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

040062

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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 4

TITLE (4)
Manual Reactor Scram Following Reactor Recirculation Pump Automatic Downshift

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
01	28	94	94	-- 002 --	00	02	28	94	FACILITY NAME	DOCKET NUMBER 05000

OPERATING MODE (9)	1
POWER LEVEL (10)	100

THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: (Check one or more) (11)

	20.402(b)		20.405(c)	X 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)	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	TELEPHONE NUMBER (Include Area Code)
Denzel A. Housley, Compliance Engineer	(216) 280-5520

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
X	JB	RLY	B045	N						

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)

On January 28, 1994 at 1944, both Reactor Recirculation system pumps automatically downshifted from fast speed to slow speed. Due to the decrease in core flow, reactor parameters entered the region of potential instability on the power to flow map. In accordance with plant procedures, the control room operator initiated a manual scram at 1945 with reactor power level at 47 percent. No power oscillations indicating core power instability were observed while within the instability region of the power to flow map.

The cause of this event was an equipment failure. A relay on alarm card 1C34-K618B failed open causing the low feedwater flow relays to initiate a recirculation pump downshift. The cause of the relay failure could not be determined. A review of the failure history for this model card did not identify any generic concerns or adverse failure trends. As a result of this event, the alarm card with the failed relay and the alarm card in the redundant trip system were replaced. Two other alarm cards of the same model that could cause a recirculation pump downshift were also replaced.

I. Introduction

On January 28, 1994 at 1945, a manual reactor scram was initiated in accordance with plant procedures following an automatic downshift of both Reactor Recirculation system [AD] pumps from fast to slow speed. Prior to the downshift of the recirculation pumps, the plant was in Operational Condition 1 at 100% rated thermal power. The reactor vessel pressure was approximately 1020 psig. On January 28 at 2142, notification was made to the NRC as required by 10CFR50.72(b)(2)(ii). This event is being reported under the requirement of 10CFR50.73(a)(2)(iv).

II. Description of Event

On January 28, 1994 at 1944, both Reactor Recirculation system pumps automatically downshifted from fast speed to low speed. Control room operators entered Off Normal Instruction (ONI) B33-2, "Loss of One or Both Recirculation Pumps." Due to the decrease in core flow, reactor parameters entered the region of potential instability on the power to flow map. In accordance with the immediate actions of ONI-B33-2, the control room operator initiated a manual Reactor Protection System (RPS) trip signal (scram) at 1945 with reactor power level at 47 percent. No power oscillations indicating core power instability were observed while within the instability region of the power to flow map.

Following the scram, reactor water level momentarily dropped below Level 3 (177.7 inches above the top of active fuel) due to void collapse and was recovered automatically by the feedwater system. The lowest reactor vessel water level reached during this transient was 147 inches above the top of active fuel. The RPS trip signal was reset at 2008. Plant shutdown was then continued in accordance with normal operating instructions.

On January 29, 1994 during the performance of control rod maximum scram insertion time data collection during the scram, two control rods were identified with scram insertion times to notch position '43' greater than the limits specified by Technical Specification 3.1.3.2. Reactor vessel pressure at the time of the scram was one psig less than the 950 psig minimum required to validate the test results; however, corrective actions were initiated based upon the slow times. The scram pilot solenoid valves for the two control rods with slow scram insertion times were replaced as a result of the evaluation of the insertion times. During the subsequent reactor startup, the two control rods were retested satisfactorily.

Investigation of the recirculation pump downshift began by reviewing data from a time events recorder. The time events recorder had been installed following a recirculation pump downshift event on July 9, 1993 (see Similar Events) to monitor all relays which could cause a recirculation pump downshift. This data indicated that the downshift signal was initiated by the relays for the low feedwater flow recirculation pump downshift trips. Review of the feedwater flow instrumentation during the event determined that an actual low feedwater flow had not existed. The cause of the downshift trip was isolated as a failed relay coil (K1) [RLY] on alarm card 1C34-K618B (Manufacturer: Bailey Meter, Model 745 dual alarm card) in the Feedwater Control system [JB]. This alarm card along with the associated alarm card in the redundant trip system (1C34-K618A) were replaced and successfully retested prior to reactor restart. Additionally, alarms cards 1C34-K626A & B which initiate a recirculation pump downshift on low reactor water level were replaced. These cards were the same model as the failed card and a failure on one card could cause a recirculation pump downshift.

Plant startup was commenced on January 30, 1994 and Operational Mode 2 (Startup) was entered at 0507.

III. Cause of Event

The cause of this event was an equipment failure. The K1 relay on alarm card 1C34-K618B failed open causing the low feedwater flow relays to initiate a recirculation pump downshift. The cause of the relay failure could not be determined. A review of the failure history for this model card did not identify any generic concerns or adverse failure trends.

IV. Safety Analysis

The Reactor Recirculation system consists of two parallel recirculation pump loops external to the reactor vessel. These loops provide the piping path for the driving flow of water to the reactor vessel jet pumps. Control interlocks are provided for the recirculation pumps to automatically downshift the pump from fast to slow speed. These controls are provided to prevent cavitation in reactor recirculation system components and mitigate the effects of various operational transients on reactor water level and reactivity.

At the time of the reactor recirculation pump downshift in this event, actual feedwater flow was above the low flow setpoint. With the reactor at full power initially, the decrease in core flow due to the recirculation pump downshift brought the reactor into the region of potential instability of the power to flow map. No indication of power oscillation or other instability

was identified during this event. The reactor was manually tripped to exit the region of potential instability of the power to flow map in accordance with plant procedures and the plant shutdown was completed. This event is not considered to be safety significant.

V. Similar Events

LER 93-015 documents a previous manual RPS trip on July 9, 1993 following the downshift of the recirculation pumps. During this event, both recirculation pumps unexpectedly downshifted to slow speed and the reactor was manually scrammed after reactor parameters entered the region of potential instability of the power to flow map. Investigation of this event determined that the most probable cause was a failure of both Reactor Recirculation system pump suction temperature resistance temperature detectors (RTD). As part of the corrective actions for the event, a time events analyzer was installed to monitor the downshift circuitry. Following this most recent event, the July 9 downshift event was re-evaluated to determine if the alarm card relay failure had caused or contributed to that event. Because the low feed flow circuit had been functionally checked following the July 9 event and since the recent event was due to a complete failure of the alarm card, it was concluded that the cause of the two events were unrelated.

VI. Corrective Actions

As a result of this event, the following corrective actions were performed.

1. The alarm card with the failed relay (1C34-K618B) and the alarm card in the redundant trip system (1C34-K618A) were replaced. Two other alarm cards of the same model that could cause a recirculation pump downshift were also replaced.

2. The scram pilot solenoid valves for the two control rods with slow scram insertion times were replaced and the scram insertion times were retested satisfactorily during reactor startup.

No further corrective actions are planned.

Energy Industry Identification System (EIIS) codes are identified in the text as [XX].