



**CENTERIOR
ENERGY**

PERRY NUCLEAR POWER PLANT

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R. A. Stratman

VICE PRESIDENT - NUCLEAR

December 18, 1992
PY-CEI/NRR-1592 L

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

Perry Nuclear Power Plant
Docket No. 50-440
LER 92-024

Dear Sir:

Enclosed is Licensee Event Report 92-024 for the Perry Nuclear Power Plant.

Sincerely,


Robert A. Stratman

RAS:DWC:ss

Enclosure: LER 92-024

cc: NRC Project Manager
NRC Resident Inspector
NRC Region III

290003

Operating Companies
Cleveland Electric Illuminating
Toledo Edison

9212300168 921219
PDR ADOCK 05000440
S PDR

JE 77

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 20545-0001, AND TO THE PAPERWORK REDUCTION PROJECT (3150-0104), OFFICE OF MANAGEMENT AND BUDGET, WASHINGTON, DC 20503.

FACILITY NAME (1)

Perry Nuclear Power Plant, Unit 1

DOCKET NUMBER (2)

05000 440

PAGE (3)

1 OF 5

TITLE (4) Two Safety Relief Valves (SRVs) Unexpectedly Opened Then Closed Causing Reactor Thermal Power to Increase to 102.6%

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	
11	21	92	92	024	00	12	18	92	FACILITY NAME	DOCKET NUMBER	
										05000	
OPERATING MODE (9)			THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: (Check one or more) (11)								
1			20.402(b)			20.405(c)			X	50.73(a)(2)(iv)	73.71(b)
POWER LEVEL (10)			20.405(a)(1)(i)			50.36(c)(1)				50.73(a)(2)(v)	73.71(c)
99%			20.405(a)(1)(ii)			50.36(c)(2)				50.73(a)(2)(vii)	X
			20.405(a)(1)(iii)			50.73(a)(2)(i)				50.73(a)(2)(viii)(A)	(Specify in Abstract below and in Ter. NRC Form 366A) Of
			20.405(a)(1)(iv)			50.73(a)(2)(ii)				50.73(a)(2)(viii)(B)	Section 2.F
			20.405(a)(1)(v)			50.73(a)(2)(iii)				50.73(a)(2)(x)	

LICENSEE CONTACT FOR THIS LER (12)

NAME

Derek W. Conran, Compliance Engineer

Ext. 5274

TELEPHONE NUMBER (Include Area Code)

(216) 259-3737

COMPLETE ONE LINE FOR EACH COMPONENT FAILURE DESCRIBED IN THIS REPORT (13)

CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO NRC	CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO NRC
B	B	PS	R369	Yes					

SUPPLEMENTAL REPORT EXPECTED (14)

YES (If yes, complete EXPECTED SUBMISSION DATE)	X	NO	EXPECTED SUBMISSION DATE (15)	MONTH	DAY	YEAR
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ABSTRACT (Limit to 1400 spaces, i.e., approximately 15 single-spaced typewritten lines) (16)

On November 21, 1992 at 0357, two Safety Relief Valves (SRVs) unexpectedly opened during a maintenance/surveillance activity. Closure of the two SRVs, approximately 90 seconds later, introduced a pressure transient which caused reactor thermal power to increase to 102.6%.

The specific equipment malfunction which caused this event could not be determined, as troubleshooting could not recreate the phenomenon experienced during this transient. It is believed that the likely cause of this event was electrical perturbations which affected the "B" and "F" SRV Pressure Actuation subchannels. However, the source of these perturbations could not be verified.

To prevent recurrence, two slave trip units and the calibration unit were replaced due to their possible susceptibility to electronic noise. Additionally, SRV Pressure Actuation Channel B Functional Tests were re-performed for the "B" and "F" channels on November 25, 1992, with no problems being identified. The slave trip units will be sent to the vendor where a failure analysis will be performed. The affected instruction will be revised to add a requirement to lower reactor power prior to closing unexpectedly opened SRVs. As part of the established requalification training program, all plant licensed operators will be trained to this event.

LICENSEE EVENT REPORT (LER)
TEXT CONTINUATION

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 (MHB9 7714), U.S. NUCLEAR REGULATORY COMMISSION, WASHINGTON, DC 20555-0091, AND TO THE PAPERWORK REDUCTION PROJECT (D150-0104), OFFICE OF MANAGEMENT AND BUDGET, WASHINGTON, DC 20503.

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TEXT (If more space is required, use add-on form copies of NRC Form 366A) (17)

I. Introduction

On November 21, 1992 at 0357, two Safety Relief Valves (SRVs) unexpectedly opened during a maintenance/surveillance activity. Closure of the two SRVs, approximately 90 seconds later introduced a pressure transient which caused reactor thermal power to increase to 102.6%. At the time of the event, the plant was in Operation Condition 1 (Power Operation) at 99 percent of rated thermal power, with the Reactor Pressure Vessel [RPV] at saturated conditions. The NRC Operations Center was informed of the event via the Emergency Notification System at 0702 on November 21, 1992, pursuant to notification requirements identified in 10CFR50.72(b)(2)(ii). This event is being reported under both the requirements of 10CFR50.73(a)(2)(iv) and Perry's Operating License Section 2.F (Maximum Power Level).

II. Event Description

On November 21, 1992, control room personnel identified two Rosemount Slave Trip Units, which are part of the Low-Low Set Pressure Actuation Channel Logic, in the tripped condition. The trip units were declared inoperable, and an investigation was initiated to determine why these units had tripped. Operations and Engineering personnel determined that surveillance instruction SVI-B21-T0369B, "SRV Pressure Actuation Channel B Functional for 1B21-N668B", should be utilized as part of this troubleshooting effort. During performance of this SVI, at approximately 0357, an I&C Technician placed his hand on the calibration/select command switch to verify that it was in the "OUT" position, as required by the instruction, and noticed that a number of Rosemount slave trip units spiked. The "B" and "F" subchannels, which are required to complete SRV Channel "B" Low-Low set logic, were fulfilled; two SRVs unexpectedly lifted.

Control room personnel immediately identified that two SRVs had opened. Accordingly, Off Normal Instruction ONI B21-1, "SRV Inadvertent Opening/Stuck Open (Unit 1)", was entered. During this time, the feedwater control system responded as designed to maintain RPV water level. When control room personnel reset the SRV logic function, the two SRVs closed. Closure of the two SRVs caused a pressure transient to be initiated which resulted in a slight decrease in reactor level as the voids collapsed. Additionally, measured steam flow increased as flow through the SRV's was shut off. The combined effect caused the feedwater control system to increase feed flow, and reactor level increased to approximately 211 inches. The feedwater control system sensed the increasing level, reduced feed flow, and restored RPV water level to its setpoint.

LICENSEE EVENT REPORT (LER) TEXT CONTINUATION

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 (MNRB 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.

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TEXT (If more space is required, use additional copies of NRC Form 365A) (17)

The positive reactivity associated with the temporary increase in feedwater flow resulted in an increase in reactor power. Control room personnel immediately reduced reactor power by decreasing reactor recirculation flow, and terminated SVI-B21-T0369B until the cause of this transient was fully understood. Reactor Engineers later determined that reactor thermal power had increased to 102.6% following closure of the two SRVs.

III. Cause Analysis

The SRV instrument channel manufacturer (Rosemount, Inc.) was contacted for assistance, and the following troubleshooting was performed:

1. The two Rosemount Slave Trip Units (1B21-N0617B, 1B21-N0618B) were placed in trip to recreate the same conditions prior to this event.
2. The calibration/select command switch was cycled, pulled and torqued in all directions. No problems were identified.
3. The power supply voltage was monitored for approximately 20 hours. No anomalies were identified.
4. As found trip and reset values were taken for all slave trip units in the instrument rack. All trip and reset values were within acceptable values.
5. Both Master Trip Units (MTU) 1B21-N668B and 1B21-N668F input and analog output were monitored and compared. Voltage readings were satisfactory for plant pressure, and the MTU analog output agreed with its input.
6. All rack backplane connections were checked for tightness. One terminal (signal common) could be tightened approximately one fourth of a turn. However, testing results before and after discovery of this loose screw provided identical results.
7. All slave trip unit cards were removed from the instrument racks and visually inspected. No discrepancies were noted. However, Slave Trip Unit 1B21-N618B was observed to cause other slave trip unit lights to momentarily illuminate when removed and inserted in different unit files.
8. The rack backplane chassis ground to power return difference in potential was monitored as requested by the vendor; the vendor stated that potential differences between chassis ground and power supply ground can sometime cause noise on the instrument racks. No problems were identified.

LICENSEE EVENT REPORT (LER)
TEXT CONTINUATION

ESTIMATED BURDEN PER RESPONSE TO COMPLY WITH THIS INFORMATION COLLECTION REQUEST: 30.0 HRS. FORWARD COMMENTS REGARDING BURDEN ESTIMATE TO THE INFORMATION AND RECORDS MANAGEMENT BRANCH (MNB 7714), U.S. NUCLEAR REGULATORY COMMISSION, WASHINGTON, DC 20545-0001, AND TO THE PAPERWORK REDUCTION PROJECT (3150-0104), OFFICE OF MANAGEMENT AND BUDGET, WASHINGTON, DC 20503.

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

9. The rack backplane was verified to be straight with all slave trip units seated properly; the vendor stated that problems have been encountered with bowed backplanes.
10. It was determined that no personnel were in containment at the time of this event. Therefore, radio interference at the transmitter instrument rack is not suspected.

The specific equipment malfunction which caused this event could not be determined, as troubleshooting could not recreate the phenomenon experienced during this transient. It is believed that the likely cause of this event was electrical perturbations which affected first the "B", then the "E" SRV Pressure Actuation subchannels. However, the source of these perturbations could not be verified.

The Off Normal Instruction utilized during this event, did not provide guidance to lower power prior to SRV closure. This guidance would have prevented reactor thermal power from exceeding the Operating License limit.

IV. Safety Analysis

Nineteen Safety Relief Valves (SRVs) provide overpressure protection to the Reactor Pressure Vessel. Eight of the nineteen SRVs are associated with the Automatic Depressurization System (ADS). To assure that no more than one relief valve reopens following a reactor isolation event, two safety/relief valves are provided with lower opening and closing setpoints and four valves are provided with lower closing setpoints. These setpoints override the normal setpoints following the initial opening of the relief valves and act to hold open these valves longer, thus preventing more than a single valve from reopening subsequently. This system logic is referred to as the low-low set relief logic and functions to ensure that the containment design basis of one safety/relief valve operating on subsequent actuations is met.

The low-low set relief functions is armed whenever any safety/relief valves are called upon to open in the relief mode by pressure instruments. Thus, the low-low set valves will not actuate during normal plant operation even though the reopening setpoints of one of the valves is in the normal operating pressure range. This arming method results in the low-low set safety/relief valves opening initially during an overpressure transient at the normal relief opening setpoint.

LICENSEE EVENT REPORT (LER)
TEXT CONTINUATION

ESTIMATED BURDEN PER RESPONSE TO COMPLY WITH THIS INFORMATION COLLECTION REQUEST: 500 HRS. FORWARD COMMENTS REGARDING BURDEN ESTIMATE TO THE INFORMATION AND RECORDS MANAGEMENT BRANCH (RM/BB 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.

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TEXT (if more space is required, use additional copies of NRC Form 365A) (7)

USAR Appendix 3B, Containment Loads, documents analysis of dynamic phenomena on the containment system and other structures within the Reactor Building during a LOCA and events such as SRV actuation. The analysis includes opening of several SRVs, and therefore bounds the transient described in this report. Furthermore, this event will not contribute to the Cumulative Fatigue Damage Factor.

Fuel thermal limits were not challenged at any time as calculated by Reactor Engineering personnel. In addition, the Reactor Protection System (JE) was fully operable throughout this transient in case it would have become necessary to automatically insert control rods to reduce reactor power. Therefore, this event is not considered to be safety significant.

V. Corrective Action

To prevent recurrence, Slave Trip Units 1B21-N617B and 1B21-N618B and the calibration unit were replaced due to their possible susceptibility to noise. Additionally, SRV Pressure Actuation Channel B Functional Tests were re-performed for the "B" and "F" channels on November 25, 1992, with no problems being identified. The slave trip units will be sent to the vendor where a failure analysis will be performed. ONI 821-1 will be revised to add a requirement to lower reactor power prior to closing unexpectedly opened SRVs. As part of the established requalification training program, all plant licensed operators will be trained to this event.

Energy Industry Identification System Codes are identified in the text as [XX].