CENTERIOR ENERGY

PERRY NUCLEAR POWER PLANT
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Michael D. Lyster
Vice President - Nuclear

December 7, 1990
PY-CEI/NRR-1278 L

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

Perry Nuclear Power Plant
Docket No. 50-440
LER 90-029/01

Dear Sir:

Enclosed is Licensee Event Report 90-029/01 for the Perry Nuclear Power Plant.

Sincerely,

M. D. Lyster

Michael D. Lyster

MDL:CRE:njc

Enclosure: LER 90-029/01

cc: NRR Project Manager
NRC Resident Office

U.S. Nuclear Regulatory Commission
799 Roosevelt Road
Glen Ellyn, Illinois 60137

IE22
1/1

NRC FORM 366 (6-89)

U.S. NUCLEAR REGULATORY COMMISSION

APPROVED OMB NO. 3150-0104
EXPIRES: 4/30/92

ESTIMATED BURDEN PER RESPONSE TO COMPLY WITH THIS INFORMATION COLLECTION REQUEST: 50.0 HRS. FORWARD COMMENTS REGARDING BURDEN ESTIMATE TO THE RECORDS AND REPORTS MANAGEMENT BRANCH (P-530), U.S. NUCLEAR REGULATORY COMMISSION, WASHINGTON, DC 20555, AND TO THE PAPERWORK REDUCTION PROJECT (3150-0104), OFFICE OF MANAGEMENT AND BUDGET, WASHINGTON, DC 20503.

LICENSEE EVENT REPORT (LER)

FACILITY NAME (1)	DOCKET NUMBER (2)	PAGE (3)
Perry Nuclear Power Plant, Unit 1	0 5 0 0 0 4 4 0	1 OF 0 5

TITLE (4) Loss of Reactor Protection System Bus Due to Trip of Electrical Protection Assemblies Results in a Division 2 Balance of Plant Isolation.

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)
1 0	1 0	9 0	9 0	— 0 2 9 —	0 1	1 2	0 7	9 0		0 5 0 0 0
										0 5 0 0 0

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

OPERATING MODE (9): 5

POWER LEVEL (10): 0 0 0

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 (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
Henry L. Hegrat, Compliance Engineer, Extension 6855	AREA CODE 2 1 6 2 5 9 - 3 7 3 7

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
C4	J M	R L Y	A 3 4 8	No					

SUPPLEMENTAL REPORT EXPECTED (14)

YES (If yes, complete EXPECTED SUBMISSION DATE)   X NO

EXPECTED SUBMISSION DATE (15): MONTH DAY YEAR

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

On October 10, 1990, at 2050, two Electrical Protection Assemblies (EPA's) tripped unexpectedly causing the loss of Reactor Protection System (RPS) Bus "B" which resulted in a Nuclear Steam Supply Shutoff System Division 2 Balance of Plant Isolation and a Residual Heat Removal "A" shutdown cooling system isolation. Additionally, during the event response it was noted that the Drywell Equipment Drain Line Inboard Isolation Valve did not automatically isolate.

The cause of the unexpected loss of RPS Bus "B" is indeterminate. Both EPAs were tested and found to be operating properly with no adjustment required. The failure of the Drywell Equipment Drain Line Inboard Isolation Valve to isolate was caused by a defective relay (Agastat Model EGPI-002) in the valve's control circuitry that had malfunctioned due to age related degradation. Age related failures of Agastat relays had been identified in NRC IN 84-20. Review of the 1990 events shows the actions taken in 1984 to be inadequate.

To prevent recurrence, the spike suppressor is being replaced in the Motor Generator set control circuitry to eliminate potential sources of noise that might cause unnecessary EPA trips. Additionally, design modifications to enhance monitoring of RPS busses are also being evaluated. To prevent recurrence of the valve not automatically isolating, the defective relay was replaced, and an aggressive program for replacement of similar relays was initiated. Functions performed by those relays not replaced in the current refueling outage will be monitored by Control Room Operators using an approved temporary instruction. The incomplete review of IN 84-20 is being evaluated to determine whether any generic problems exist with the review process.

On October 10, 1990, at 2050, two Electrical Protection Assemblies (EPAs) tripped unexpectedly causing the loss of Reactor Protection System [JC] (RPS) Bus "B" which resulted in a Nuclear Steam Supply Shutoff System [JM] (NSSS) Division 2 Balance of Plant (BOP) isolation and a Residual Heat Removal [BO] (RHR) "A" shutdown cooling system isolation. At the time of the event, the plant was in Operational Condition 5 (Refueling) with fuel movement in progress. Reactor coolant temperature was approximately 75 degrees Fahrenheit with reactor vessel [RPV] pressure approximately 0 psig.

On October 10, 1990, at 2050, with RPS Bus "A" aligned to its alternate power supply and RPS Bus "B" aligned to its MG set, control room operators received several annunciator alarms indicating a loss of power to RPS Bus "B". The loss of power to the RPS Bus resulted in an RPS Channel B and D half scram, an NSSS System Division 2 BOP isolation, and an isolation of the shutdown cooling system. Operators responded in accordance with Off-Normal Instruction (ONI-C71-2) "Loss of One RPS Bus (Unit 1)", System Operating Instruction (SOI-C71) "RPS Power Supply Distribution (Unit 1)", and Off-Normal Instruction (ONI-E12-2) "Loss of Shutdown Cooling (Unit 1)" and reactor coolant temperature remained at approximately 75 degrees Fahrenheit throughout the event. Inspection of the EPAs and RPS "B" MG set for the EPAs showed no apparent reason for the trip. The EPA's were reset and all required systems were returned to service in accordance with plant instructions at approximately 2111 on October 10, 1990.

Additionally, during the event response it was noted that the Drywell Equipment Drain Line Inboard Isolation Valve did not automatically isolate. This valve was manually closed by the control room operator using the control switch. Investigation of the valve's failure to automatically isolate revealed that this problem had previously occurred during a reactor scram and subsequent level transient on January 7, 1990. Based on discussions with the operator who responded to the January 7 event, it was believed at that time that the valve had actually isolated as required and that a malfunction had occurred in the Emergency Response Information System (ERIS) position indication circuitry. After the failure of the valve to isolate on October 10 was identified as a repeat failure, the associated isolation logic system was declared inoperable and core alterations were suspended at 1007 on October 11, 1990. Troubleshooting identified the cause of the failure to be a defective control system relay (Agastat, Model EGPI-002). The relay was replaced and the valve and relay tested satisfactorily at 1540 and core alterations were resumed at 2140 on October 11, 1990.

The cause of the unexpected loss of RPS Bus "B" is indeterminate. Both EPAs were tested and found to be operating properly with no adjustments required. A review of ERIS data for RPS Bus "B" revealed no information that would indicate the reason for the trip of the EPAs.

The RPS monitors reactor plant parameters to verify safe operating conditions. The RPS MG sets provide a stable single phase voltage for use by the RPS and other loads supplied by the RPS bus. Two EPAs in series monitor voltage and frequency from the MG set. If voltage or frequency deviates beyond set limits, the EPA trips open causing a loss of power to the respective RPS Bus in order to protect the scram solenoids and Main Steam Isolation Valve solenoids. Additionally, each MG set is equipped with an output breaker that also trips open if voltage or frequency deviates beyond set limits, but these limits are less restrictive than those for the EPAs. For this event, the MG set output breaker did not trip. Plant operators and systems, with the exception of the Drywell Equipment Drain Line Inboard Isolation Valve, responded to the event as expected and the RPS Bus "B" was promptly returned to service. Had this spurious EPA trip occurred during normal plant power operations, half scram signals and half MSIV isolation signals would have been generated by the RPS and NSSS systems, respectively. Additionally, RWCU and BOP outboard isolations would have been initiated. Approved off-normal and alarm response instructions are in place for these events, and plant operators are thoroughly trained in their use. With no additional complication, no additional safety systems would have responded, and the plant would not have had to be shutdown. Accordingly, this event is not considered safety significant.

Three previous LERs have been written in which equipment problems have caused EPAs to trip unexpectedly, resulting in the loss of an RPS Bus. LER 86-44 documents an event in which failing capacitors on an EPA electronic process control board caused an unexpected EPA trip. A repetitive task was established for the periodic replacement of the control boards. LER 86-72 documented events in which a design deficiency in the alternate supply caused EPAs to trip. As a result, regulating transformers were installed in the RPS bus alternate power supplies. LER 87-70 documents an event in which a confirmed overvoltage condition resulted in a trip of the RPS MG set EPA's. A repetitive task for RPS MG sets was enhanced to ensure proper cleaning and adjustment of the output voltage rheostat. None of the causes or the prior events has been determined to be the cause of the October 10, 1990 event, and the corrective actions taken could not have been expected to prevent this event.

To prevent recurrence, the EPAs were tested and found to be operating properly with no troubles noted. During the current refueling outage, the spike suppressor is being replaced in the MG set control circuitry to eliminate potential sources of electrical noise that might cause the EPAs to trip without a valid trip signal. Engineering personnel are evaluating a design modification that would allow indication of the reasons for the EPA trip to be locked into alarm logic. Additionally a design change to the ERIS system is being considered to provide a more precise indication of RPS Bus voltage.

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

The failure of the Drywell Equipment Drain Line Inboard Isolation Valve to isolate was caused by failure of a relay (Agastat, Model EGPI-002), in the valve's control circuitry. The relay, which is normally energized at 120 VAC, failed to change states when deenergized during the loss of RPS bus voltage. Failure analysis identified binding of the armature caused by thermal degradation of the relay coil bobbin. A 4.5 year service life was identified for relays in the normally energized state in IN 84-20, as an additional issue to a post mold shrinkage problem for pre-1977 relays. This Information Notice was reviewed at Perry, and actions were implemented to replace Agastat relays manufactured prior to 1977. However, no repetitive tasks were established, as the existing maintenance and surveillance programs were relied upon to adequately test and track the operability of the relays. This approach was in accordance with Equipment Qualification Program and Standard Review Plan (SRP) requirements for mild environment equipment. The review of IN 84-20 did not fully address all issues identified in the report, such as the adequacy of the surveillance frequency as compared to the stated service life.

Plant design currently utilizes approximately 750, normally energized safety-related Agastat EGP relays at various voltage levels. Most have been installed since 1985, when relays were replaced in response to IEN 84-20. Through a review of equipment performance and maintenance records, only two similar failures have been identified. Both of these relays were also 120 VAC normally energized devices. Analysis of regularly scheduled surveillance testing and previous operational events determined that all devices have operated as required, and all systems are considered operable. Therefore, by itself, this event is not considered to be safety significant.

During the current refueling outage, all normally energized, safety-related Agastat relays used for system control functions are being replaced. Relays to be replaced during the current outage also include all indication and alarm relays for which logic system functional tests are scheduled to be performed, and those considered to be essential for plant operations. The remaining normally energized indication and alarm relays will be replaced by July 1, 1991, in accordance with the quarterly maintenance schedule. Additionally, periodic replacement of Agastat EGP relays, both normally energized and normally deenergized, will be evaluated and implemented as appropriate.

The relays which will not be replaced prior to startup following the current refueling outage have been evaluated to ensure that none of the associated functions are required to maintain system operability. The majority of these relays perform monitoring functions, to provide indication and/or alarm to the control room if control or logic power is interrupted, or if instrumentation channel cards are removed from instrument racks. The inability to automatically indicate such a condition does not affect the functional capabilities of the associated safety system. Until such time that these functions can be ensured by relay replacement, the following monitoring program will be implemented during Operational Conditions 1 and 2:

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

1. Routine monitoring of Control Room panels will be performed each shift as a part of shift turnover. Such monitoring would identify loss of valve position indication, loss of power to instrumentation, or instrumentation channels with failed indication. Documented performance of channel checks required by Technical Specifications would also provide an additional verification of proper operation of those channels covered by Technical Specifications.

2. In addition to the routine monitoring of Control Room indications as described above, a temporary instruction will be implemented to document the availability of control/instrument power to each component monitored by a suspect relay. This temporary instruction will also require verification that all instrument cards monitored by suspect relays are installed in the instrument racks, with the calibration bar locked in place. This temporary instruction will be performed daily. As relay replacement activities are completed, this temporary instruction will be modified periodically.

3. The above listed activities will be monitored and verified to be completed through Quality Assurance surveillance activities.

The current process for Operational Experience Review (OER) is procedurally controlled and requires reviews of such notices by all appropriate disciplines in the plant organization. Each review is approved by the responsible section manager, and all reviews are collectively reviewed by a multi-diciplined OER Review Group prior to final approval. The incomplete review of IN 84-20 is considered to be an isolated case; however, a representative sample of OER reviews will be reviewed by the OER Review Group, to determine if any generic problems exist.

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