



# PECO NUCLEAR

A Unit of PECO Energy

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10CFR 50.73

April 15, 1996  
Docket Nos. 50-352  
50-353  
License Nos. NPF-39  
NPF-85

U.S. Nuclear Regulatory Commission  
Attn: Document Control Desk  
Washington, DC 20555

SUBJECT: Licensee Event Report  
Limerick Generating Station - Units 1 & 2

This LER reports automatic actuations of the Unit 2 Primary Containment and Reactor Vessel Isolation Control System, an Engineered Safety Feature, and other Unit 1 and Unit 2 system actuations due to a loss of power to the '2B' Reactor Protection System/Uninterruptible Power Supply power distribution panel. The most probable cause of this event was personnel error resulting in an inadvertent actuation of an underfrequency relay.

Reference:	Docket Nos. 50-352 50-353
Report Number:	2-96-002
Revision Number:	00
Event Date:	March 15, 1996
Report Date:	April 15, 1996
Facility:	Limerick Generating Station P.O. Box 2300, Sanatoga, PA 19464-2300

This LER is being submitted pursuant to the requirements of 10 CFR 50.73(a)(2)(iv).

Very truly yours,

DMS:cah

cc: T. T. Martin, Administrator Region I, USNRC  
N. S. Perry, USNRC Senior Resident Inspector, LGS

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PDR ADOCK 05000353  
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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 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 20555-0001, AND TO THE PAPERWORK  
REDUCTION PROJECT (3150-0104), OFFICE OF  
MANAGEMENT AND BUDGET, WASHINGTON, DC 20503.

FACILITY NAME (1)

Limerick Generating Station, Unit 2

DOCKET NUMBER (2)

05000353

PAGE (3)

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TITLE (4) Engineered Safety Feature Actuation Due to a Loss of Power to an RPS/UPS Power  
Distribution Panel Caused by an Inadvertent Actuation of an Underfrequency Relay.

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
03	15	96	96	-- 002 --	0	04	15	96	Limerick, Unit 1	05000352
									FACILITY NAME	DOCKET NUMBER
										05000
OPERATING MODE (9)		1	THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: (Check one or more) (11)							
POWER LEVEL (10)		100%	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)			50.35(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)

J. L. Kantner, Manager - Experience Assessment

(610) 718-3400

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

CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO NPROS	CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO NPROS
X	EE	81	G080	Y					

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 03/15/96, a spurious actuation of an underfrequency relay resulted in a trip of the '2B' Reactor Protection System/Uninterruptible Power Supply (RPS/UPS) inverter output series circuit breaker which caused a loss of power to the RPS/UPS power distribution panel 2B-Y160. This loss of power resulted in automatic actuations of the Unit 2 Primary Containment and Reactor Vessel Isolation Control System, an Engineered Safety Feature. Following an investigation, Operations personnel reset the underfrequency relay and reclosed the breaker thereby restoring power to panel 2B-Y160. The isolations were bypassed or reset in accordance with plant procedures and the affected systems were restored. The most probable cause of this event was personnel error resulting in an inadvertent actuation of an underfrequency relay during cleaning activities in the Unit 2 RPS/UPS Inverter Room. The Units 1 and 2 RPS/UPS Inverters and their associated relay panels are currently flagged as exclusion areas. Contributing factors involve housekeeping program implementation and include: less than adequate pre-job briefing and a lack of an equipment exclusion list. An additional contributing factor is the design and application of the currently installed relay, which has a history of actuation due to vibration. Corrective actions have been initiated to evaluate and correct the above factors.

LICENSEE EVENT REPORT (LER)  
TEXT CONTINUATION

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

Unit Conditions Prior to the Event:

Units 1 and 2 were in Operational Conditions 1 (Power Operation) at 100% power levels.

There were no structures, systems or components out of service on either unit that contributed to this event.

On March 15, 1996, a station 'Housekeeping Day' commenced at 0815 hours. During this day, station personnel were assigned to teams to support overall station clean-up activities. Each team had designated areas, both inside and outside of the station's protected area. The team leaders were familiar with the assigned areas, including equipment and their operation, along with various types of watch areas and radiological concerns. A pre-job briefing was conducted and a three man team started cleaning in the Unit 2 Inverter Room 453 at approximately 0840 hours.

Description of the Event:

On March 15, 1996 at 0912 hours, an inadvertent actuation of underfrequency relay 81-BY24801 resulted in a trip of the '2B' RPS/UPS inverter output series circuit breaker 52-BY24801. This caused a loss of power to the '2B' RPS/UPS power distribution panel 2B-Y160. Annunciators alarmed in the Main Control Room (MCR) to alert Operations personnel of the actuation. This loss of power resulted in automatic actuations of the Primary Containment and Reactor Vessel Isolation Control System (PCRVICS; EIIS:JM), an Engineered Safety Feature (ESF), causing isolations of the following Unit 2 systems or subsystems by closing their outboard primary containment isolation valves:

- Drywell Chilled Water (DWCW; EIIS:KM),
- Reactor Enclosure Cooling Water (RECW; EIIS:CC), and
- Primary Containment Instrument Gas (PCIG; EIIS:LK).

The following system lines received isolation signals but no valve motion occurred since the associated valves were in the normally closed position:

- Unit 2 Shutdown Cooling Mode of the Residual Heat Removal (RHR) system (EIIS:BO),

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- Unit 2 RHR Heat Exchanger Sample Drains and RHR Drain to Radwaste lines,
- Unit 2 RHR Heat Exchanger Vacuum Breaker (EIIS:VACB) lines,
- Unit 1 and Unit 2 Primary Containment Nitrogen Inerting,
- Unit 1 and Unit 2 Primary Containment Purge Supply and Exhaust,
- Unit 1 and Unit 2 Primary Containment Exhaust to Reactor Enclosure Equipment.

A 'B' channel half scram signal was generated as designed due to the loss of power to the RPS/UPS power distribution panel.

In addition, the following exempted systems received initiation/isolation signals and are included in this report for information purposes: Units 1 and 2 Reactor Enclosure Ventilation Systems, Units 1 and 2 Reactor Enclosure Recirculation Systems, Units 1 and 2 Refuel Floor Ventilation Systems, common plant Standby Gas Treatment System, Unit 2 Reactor Water Cleanup System, and the Units 1 and 2 Secondary Containment Vent and Purge Systems. All systems functioned as designed.

Event procedure E-2BY160, "Loss of 2E RPS and UPS Power," was entered by Operations personnel. Operations personnel verified all appropriate automatic isolations occurred. Trip Procedure T-103, "Secondary Containment Control," was entered and later exited, when no emergency condition existed. Off-Normal procedure ON-113, "Loss of RECW," was entered and the appropriate steps were taken.

An immediate inspection concluded that the inadvertent actuation potentially occurred as a result of station personnel performing housekeeping activities in the immediate area of the RPS/UPS underfrequency relay panel. All housekeeping activities were suspended following the actuation, and caution flags were positioned by Operations personnel around the Units 1 and 2 RPS/UPS Inverters to establish an exclusion area.

Station personnel verified that an actual underfrequency condition did not exist, and the operation of the relay was tested satisfactorily. The underfrequency relay trip flags were reset as required, system voltages and frequencies were verified to be within specifications, and the proper operation of the series feeder breaker was verified. The series feeder breaker was reclosed and the distribution panel 2B-Y160 was reenergized. The 'B' half scram signal and PCRVICES isolations were



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reset by 1045 hours on March 15, 1996.

A four hour notification was made to the NRC at 1148 hours on March 15, 1996, in accordance with the requirements of 10CFR50.72(b)(2)(ii), since this event resulted in automatic ESF actuations. This report is being submitted in accordance with the requirements of 10CFR50.73(a)(2)(iv).

Analysis of the Event:

The isolations were bypassed or reset in accordance with plant procedures and the systems were expeditiously restored by operations personnel, thereby preventing additional challenges to plant operations. All systems responded as designed during the loss of power to the RPS/UPS power distribution panel. There was no release of radioactive material to the environment as a result of this event.

If licensed MCR operations personnel had not responded expeditiously, the potential exists that this event could have resulted in securing of the Reactor Recirculation Pumps due to a lack of pump and motor cooling, followed by a plant shutdown. Plant shutdown could have also been required due to Drywell temperature and pressure increases as a result of the isolation of the DWCW system and the resultant loss of Drywell cooling. Additionally, if the PCIG system remained isolated for an extended period of time, the Main Steam Isolation Valves (MSIVs) could have drifted closed, resulting in a reactor trip and subsequent challenges to safety-related systems.

Immediate and follow-up actions for this type of event, loss of power to an RPS/UPS power distribution panel, are provided in procedures E-1(2)BY160, ON-113, and General Plant procedure GP-8, "Primary and Secondary Containment Station Verification and Reset." Licensed MCR operators receive requalification training to review and practice responses to simulated plant transients of this type. This training reinforces immediate operator actions, minimizing the time that systems are isolated, and reducing the impact on the plant. As a result of this adequate procedural guidance, training, and prompt operator actions, the consequences of this type of event are minimized.

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Cause of the Event:

The most probable cause of this event was personnel error resulting in an inadvertent actuation of the underfrequency relay 81-BY24801. An investigation concluded that the underfrequency relay 81-BY24801 actuated due to inadvertent contact with either the relay itself, or the relay panel 2B-C248, during the housekeeping activities. Contributing factors included a less than adequate pre-job briefing prior to the start of the Unit 2 Inverter Room 453 cleaning activities, and the lack of equipment exclusion lists. Exclusion lists would have alerted team leaders to sensitive equipment that needed to be excluded from cleaning activities.

An additional contributing factor to this event was ineffective corrective actions for previous events. The underfrequency relay has a history of actuation due to vibration or inadvertent jarring/bumping. Previous evaluations have not identified effective actions to address the potential design and application problem of this relay.

Corrective Actions:

1. Create as necessary, additional physical barriers around the Units 1 and 2 RPS/UPS Inverters and their associated Inverter Relay Panels by September 1, 1996.
2. Complete the following actions prior to the next station housekeeping day:
  - Identify equipment at the Limerick Generating Station (LGS) that is sensitive to a man-machine interface and could potentially initiate a station transient if disturbed. Determine the need to perform housekeeping activities on and around this equipment, based upon plant operating status. An assessment of the adequacy of the physical barriers surrounding this equipment will also be performed.
  - Ensure the above identified equipment and potential station transients are emphasized in each team leader's pre-job briefing for their designated housekeeping area.

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3. Assess the underfrequency relay design, application and installation. This action is expected to be completed by September 1, 1996.

Previous Similar Occurrences:

LGS LERs 1-89-037, 2-90-005, 1-91-019, 1-91-023, 1-93-001, and 1-96-003 reported similar ESF actuations as a result of the inadvertent actuation of an RPS/UPS underfrequency relay. The corrective actions for these previous events were ineffective, and therefore, were unable to prevent this event being reported from occurring. As stated above, an assessment of the design and application of this underfrequency relay is currently in progress.

All 8 Unit 1 and Unit 2 RPS/UPS underfrequency relays are General Electric model 12SFF31C1A, type SFF31C.