

LICENSEE EVENT REPORT (LER)

FACILITY NAME (1) Limerick Generating Station Unit 1	DOCKET NUMBER (2) 0 5 0 0 0 3 5 2	PAGE (3) 1 OF 0 4
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TITLE (4)
Engineered Safety Feature Due to Station Battery Charger Failure

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)
06	11	87	87	023	03	05	12	88			0 5 0 0 0

OPERATING MODE (9) 5	THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR § (Check one or more of the following) (11)									
	20.402(b)			<input checked="" type="checkbox"/> 20.405(c)			50.73(a)(2)(iv)			73.71(b)
	20.405(a)(1)(i)			50.36(e)(1)			50.73(a)(2)(v)			73.71(e)
	20.405(a)(1)(ii)			50.36(e)(2)			50.73(a)(2)(vii)			OTHER (Specify in Abstract below and in Text, NRC Form 365A)
	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)			

LICENSEE CONTACT FOR THIS LER (12)							TELEPHONE NUMBER				
NAME Charles A. Mengers, Senior Engineer, Licensing Section							AREA CODE 2 1 5		8 4 1 - 5 1 8 4		

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	E1D	E1C1D	C1173	Y						
B	J1C	I1L1Y	B1455	Y						

SUPPLEMENTAL REPORT EXPECTED (14)							EXPECTED SUBMISSION DATE (15)		MONTH	DAY	YEAR
<input type="checkbox"/> YES (If yes, complete EXPECTED SUBMISSION DATE)							<input checked="" type="checkbox"/> NO				

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

Abstract: 87-023, Rev. 3
On June 11, 1987, the Standby Gas Treatment and Reactor Enclosure Recirculation systems (Engineered Safety Features) initiated as a consequence of actions taken due to failure of the 1A1D103 Station Battery Charger. The 125 VDC Station Batteries (1A1) were disconnected from the bus at the time of the event to accommodate maintenance work. The battery charger failure is believed to be a result of an integrated circuit controller card failure which resulted in DC voltage fluctuation. However, when the card manufacturer performed a failure analysis, no defect could be found. The consequences of this event were minimal because the engineered safety features initiated as designed and the unit was shutdown with the core offloaded at the time of the event. A Temporary Circuit Alteration (TCA) was installed to provide an alternate power supply to the de-energized bus. During re-energization of the bus, a Reactor Protection System series breaker tripped due to a spurious undervoltage relay trip signal. Brown Boveri, the undervoltage relay manufacturer, has filed a Part 21 Report regarding the relay false actuation. The affected undervoltage relays in Unit 1 were replaced with relays modified by Brown Boveri. One of the modified relays produced false actuations during post-installation testing and has been returned to Brown Boveri for further analysis. The unmodified relay currently installed will be replaced during a future outage.

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

Unit Conditions Prior to the Event:

Refueling Outage in Progress

Reactor Power 0%; Core Offloaded

Description of the Event:

On June 11, 1987, the 1A1D103 Battery Charger failed during the performance of maintenance work on the 1A1 125 VDC Station Battery. At the time, the battery was disconnected from the bus and the battery charger, which normally supplies power to various safety related circuits and charges the batteries, was supplying the loads. Failure of a voltage regulator/current limiter card in the battery charger circuitry caused the DC output voltage to oscillate. The 'A' DC safeguard bus loads were manually shed and the bus de-energized. The Reactor Enclosure and Refueling Floor HVAC systems isolated as a result of the de-energization of their logic circuits and the Standby Gas Treatment and Reactor Enclosure Recirculation systems initiated as designed.

A Temporary Circuit Alteration (TCA) was installed in order to provide an alternate power supply to the de-energized bus. When the bus was re-energized, the 'A' channel Reactor Protection System (RPS) series breaker tripped on a shunt trip signal from its associated undervoltage relays, causing the inboard Instrument Gas valve to close (Channel 'A' battery supplies control power to the channel 'A' RPS relays).

The Nuclear Steam Supply Shutoff System isolations were verified and reset in accordance with general procedure GP-8 within 15 minutes of the event. The Reactor Enclosure and Refueling Floor HVAC systems were restored to service by 0520 hours on June 11. The controller card was replaced and the TCA terminated on June 12, 1987.

Consequences of the Event:

The consequences of this event were minimal. The required engineered safety features initiated as designed. The unit was shutdown for a refueling outage with the core offloaded at the time of the event. If this event occurred during power operation, the consequences would remain minimal because the station batteries would not be disconnected for maintenance and

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would be available to power the bus loads in the event of a charger failure.

Cause of the Event:

The 1A1D103 Battery Charger failure is believed to be due to failure of an integrated circuit controller card which functions to regulate voltage, limit current, and provide controlled startup of the charger. The failure mode of the controller card has not been determined. The card (Model No. MYC 1970E) was sent to the manufacturer, C and D Power Systems, Inc., in July, 1987 for failure analysis but no operational abnormality was discovered.

The cause for the undervoltage relay shunt trip signals to the RPS series breaker during re-energization of the safeguard bus has been determined to be a design deficiency in the Input Protection Diode Circuitry of the undervoltage relays, 27 N Undervoltage Relay Catalogue #211T4175-HF, manufactured by Brown Boveri. This deficiency does not affect the safety function of the undervoltage relay. The deficiency causes the relay to trip more than necessary and only when applying control power. Once power is applied, the relay functions normally.

Corrective Actions:

The Nuclear Steam Supply Shutoff System isolations were verified and reset in accordance with general procedure GP-8 within 15 minutes of the event. The Reactor Enclosure and Refueling Floor HVAC systems were restored to service by 0520 hours on June 11. The controller card was replaced and the TCA terminated on June 12, 1987.

Actions Taken to Prevent Recurrence:

A Part 21 Report regarding the false actuation of the subject undervoltage relays was filed by Brown Boveri on December 22, 1987. The undervoltage relays for Unit 2 (under construction) have been modified by Brown Boveri to correct their Input Protection Diode Circuitry. The undervoltage relays in Unit 1 have been replaced with the modified relays. During post-installation testing one of the modified relays was found to produce actuations. The faulty relay has been returned to Brown Boveri for further analysis. The unmodified relay currently

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installed will be replaced with a successfully tested relay during a future outage.

Previous Similar Occurrences:

Previous Limerick LERs have reported NSSSS isolations resulting from a loss of RPS/UPS power supply due to different causes.

Tracking Code: B17, Deficient Equipment.

EIIS Codes:

The EIIS codes for the affected systems are ED (Low Voltage Power System), VA (Standby Gas Treatment and Reactor Enclosure Recirculation), and JC (Reactor Protection System). The EIIS code for the controller card (Model No. MYC 1970E) is ECBD and the code for the undervoltage relays is RLY.

PHILADELPHIA ELECTRIC COMPANY

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May 12, 1988

Docket No. 50-352

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Washington, DC 20555

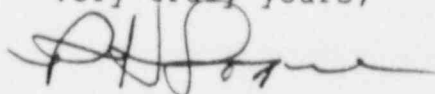
SUBJECT: Licensee Event Report
Limerick Generating Station - Unit 1

This revised LER reports actuations of Engineered Safety Features as a result of a Station Battery Charger failure. Revision of this LER is necessary to provide supplemental information for the corrective actions. The revisions are indicated by vertical bars in the margin.

Reference: Docket No. 50-352
Report Number: 87-023
Revision Number: 03
Event Date: June 11, 1987
Report Date: May 12, 1988
Facility: Limerick Generating Station
P.O. Box A, Sanatoga, PA 19464

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

Very truly yours,



R. H. Logue
Assistant to the Manager
Nuclear Support Division

cc: W. T. Russell, Administrator, Region I, USNRC
T. J. Kenny, USNRC Senior Resident Inspector

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