NRC Form 366
(9-83)

U.S. NUCLEAR REGULATORY COMMISSION
APPROVED OMB NO. 3150-0104
EXPIRES 8/31/85

LICENSEE EVENT REPORT (LER)

FACILITY NAME (1)	DOCKET NUMBER (2)	PAGE (3)
Limerick Generating Station Unit 1	0 5 0 0 0 3 5 2	1 OF 0 4

TITLE (4): Isolation of the Reactor Water Cleanup System due to Deficient Design of Differential Temperature Switch

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)
0 2	2 5	8 5	8 5	—	0 2 7	— 0 1	0 4	0 6	8 8		0 5 0 0 0
											0 5 0 0 0

OPERATING MODE (9)	2	THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: (Check one or more of the following) (11)			
POWER LEVEL (10)	0 0 3	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
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 NPRDS		CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO NPRDS	
B	C E	T D S R 2 7 8		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 fifteen single-space typewritten lines) (16)

Abstract: 85-027 Rev. 1

On February 25, 1985, at 12:43 a.m., during performance of the daily surveillance log, a spurious isolation of the Reactor Water Cleanup (RWCU) system occurred. The isolation was reset and the RWCU system was returned to service. There were no adverse consequences as a result of this occurrence. At that time it was believed that a momentary change in state of the contacts in the RWCU isolation logic caused the event. Test equipment was installed to monitor the status of the contacts within the isolation logic to pinpoint which device was responsible for generating the isolation signal. As a result of this investigation, the cause of the event has been determined to be a trip signal generated by a momentary voltage spike that occurred when the Riley Differential Temperature Switch Point Module READ/SET switch was placed in the "READ" position. A modification which added a resistor to 109 similar temperature switches to suppress the momentary voltage transient was completed in December 1985. Only one similar event (September 1987) has been reported since completion of this modification.

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(9-83)

FACILITY NAME (1)	DOCKET NUMBER (2)	LER NUMBER (6)			PAGE (3)
		YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	
Limerick Generating Station Unit 1	0 5 0 0 0 3 5 2	85	— 0 2 7	— 0 1	0 2 OF 0 4

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

Unit Conditions Prior to the Event:

Operating Mode 2 (Startup)
Reactor Power- 2.9%

Description of the Event:

On February 25, 1985, at 12:43 a.m., during performance of the daily surveillance log, a spurious isolation of the Reactor Water Cleanup (RWCU) system occurred. The isolation was reset and the RWCU system was returned to service. It was initially believed that the isolation occurred while a reactor operator was reading the ambient temperatures in the RWCU system. The operator retraced the steps of the surveillance log in an attempt to repeat the isolation. No subsequent isolation occurred. Various RWCU temperature switches were placed in their "READ" position numerous times in an attempt to repeat the isolation; however, no subsequent isolations occurred.

Consequences of the Event:

The reactor water chemistry, because of the short duration of the isolation, was not adversely affected. There were no adverse consequences as a result of this occurrence. The RWCU system isolated as designed when the temperature modules received the apparent trip signals.

Cause of the Event:

The isolation could not be repeated during several subsequent attempts by placing the RWCU ambient temperature switches to their "READ" position. The entire RWCU isolation logic chain was inspected for possible loose connections, but none were found. It was believed that the isolation was the result of a momentary change in state of one of the sets of contacts in the isolation logic which immediately returned to its normal operating state. When investigated, all contacts appeared to be in their normal state and the device which generated the isolation signal could not be determined at that time.

Test equipment was installed in April 1985 to monitor the status of the contacts within the isolation logic to pinpoint which device was responsible for generating the isolation signal. In April 1985 it was determined that when a Riley Differential Temperature Switch (Point Module Assembly: Modules B21B-21 and B21B-24) READ/SET switch was placed in the "READ" position to display the point module input on a local meter module a trip signal is sometimes generated causing isolation of RWCU valves HV-44-1F001 and HV-44-1F004. This condition results due to each point module assembly and meter module assembly having its own D.C. power supply and therefore slight differences in D.C. level and A.C. noise exist between point modules and their corresponding meter module. Consequently, when the READ/SET switch is placed in the "READ" position, the modules are electronically connected sometimes causing a momentary voltage spike at the point module's comparator input.

Corrective Actions:

The RWCU isolation was reset and the RWCU system was returned to service.

Actions Taken to Prevent Recurrence:

A disturbance analyzer was installed in April 1985 to monitor the change in status of the contacts within the RWCU system isolation logic in order to pinpoint which device is responsible for generating the isolation signal. The monitoring equipment allowed identification of Riley supplied Differential Temperature Switch Point Modules B21B-21 and B21B-24 as the source of the isolation signals. This is a generic problem and commonly applies to all similar Riley supplied temperature switch point modules which are presently used for various Nuclear Steam Supply Shutoff systems namely HPCI, RCIC, and MSIV isolations. A modification (85-0328) which added a 5.9 kilo-ohm resistor at the "T" Terminal of each of the 109 temperature switches was completed in December 1985. The resistor eliminates the momentary voltage spikes to the comparator circuit by suppressing the switching transient. Since completion of this modification, only one similar event (September 1987) has occurred during numerous performances of the applicable surveillance tests.

EIIS Codes:

The EIIS code for the affected system, RWCU, is CE. The codes for the other systems mentioned are BJ (HPCI), BN (RCIC) and SB (Main Steam). The code for the defective component, differential temperature switch, is TDS.

Previous Similar Occurrences:

LGS LERs: 84-012, 84-026, 84-034, 84-035, 84-036, 85-001, and 85-025 have reported similar events.

Tracking Codes: B16, Design does not facilitate testing.

PHILADELPHIA ELECTRIC COMPANY

2301 MARKET STREET

P.O. BOX 8699

PHILADELPHIA, PA. 19101

(215) 841-4000

April 6, 1988

Docket No. 50-352

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

SUBJECT: Licensee Event Report - Revision
Limerick Generating Station - Unit 1

This revised LER reports an isolation of the Reactor Water Cleanup (RWCU) system, an Engineered Safety Feature, which resulted from a deficient component design. Revision of this LER is necessary to provide supplemental information regarding the actions taken to prevent recurrence of the event. The revisions are indicated by vertical bars in the margin.

Reference:	Docket No. 50-352
Report Number:	85-027
Revision Number:	01
Event Date:	February 25, 1985
Report Date:	April 6, 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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