



# PECO NUCLEAR

A Unit of PECO Energy

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10CFR50.73

February 7, 2000  
Docket No. 50-353  
License No. NPF-85

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

**SUBJECT:** Licensee Event Report  
Limerick Generating Station (LGS) - Unit 2

This LER concerns a ground on an alarm circuit in a Balance of Plant(BOP) DC 222 transformer which resulted in a generator lockout/turbine trip and subsequent reactor scram.

Reference:	Docket No. 50-353
Report Number:	2-00-001
Revision Number:	00
Event Date:	January 8, 2000
Report Date:	February 7, 2000
Facility:	Limerick Generating Station P.O. Box 2300, Sanatoga, PA. 19464-2300

This LER is being submitted pursuant to the requirements of 10CFR50.73(a)(2)(iv).

Very truly yours,

lwh  
cc:

H. J. Miller, Administrator Region I, USNRC  
A. L. Burritt, USNRC Senior Resident Inspector, LGS

JE22

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**LICENSEE EVENT REPORT (LER)**

(See reverse for required number of digits/characters for each block)

APPROVED BY OMB NO. 3150-0104 EXPIRES 06/30/2001

Estimated burden per response to comply with this mandatory information collection request: 50 hrs. Reported lessons learned are incorporated into the licensing process and fed back to industry. Forward comments regarding burden estimate to the Records Management Branch (T-6 F33), 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. If an information collection does not display a currently valid OMB control number, the NRC may not conduct or sponsor, and a person is not required to respond to, the information collection.

<b>FACILITY NAME (1)</b> Limerick Generating Station, Unit 2	<b>DOCKET NUMBER (2)</b> 05000353	<b>PAGE (3)</b> 1 OF 3
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**TITLE (4)**  
Generator Lockout and SCRAM due to a Ground on the BOP DC 222 Bus

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
01	08	2000	2000	-- 001	-- 00	02	07	2000	FACILITY NAME	DOCKET NUMBER 05000
									FACILITY NAME	DOCKET NUMBER 05000

  

<b>OPERATING MODE (9)</b> 1	<b>THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: (Check one or more) (11)</b>			
	20.2201(b)	20.2203(a)(2)(v)	50.73(a)(2)(i)	50.73(a)(2)(viii)
<b>POWER LEVEL (10)</b> 100	20.2203(a)(1)	20.2203(a)(3)(i)	50.73(a)(2)(ii)	50.73(a)(2)(x)
	20.2203(a)(2)(i)	20.2203(a)(3)(iii)	50.73(a)(2)(iii)	73.71
	20.2203(a)(2)(ii)	20.2203(a)(4)	X 50.73(a)(2)(iv)	OTHER
	20.2203(a)(2)(iii)	50.36(c)(1)	50.73(a)(2)(v)	Specify in Abstract below or in NRC Form 366A
	20.2203(a)(2)(iv)	50.36(c)(2)	50.73(a)(2)(vii)	

**LICENSEE CONTACT FOR THIS LER (12)**

<b>NAME</b> K. P. Bersticker, Manager - Experience Assessment	<b>TELEPHONE NUMBER (Include Area Code)</b> (610) 718-3400
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**COMPLETE ONE LINE FOR EACH COMPONENT FAILURE DESCRIBED IN THIS REPORT (13)**

CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO EPIX	CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO EPIX
A	EI	RLY	G080	N					

<b>SUPPLEMENTAL REPORT EXPECTED (14)</b>		<b>EXPECTED SUBMISSION DATE (15)</b>	<b>MONTH</b>	<b>DAY</b>	<b>YEAR</b>
YES (If yes, complete EXPECTED SUBMISSION DATE).	X NO				

**ABSTRACT (Limit to 1400 spaces, i.e., approximately 15 single-spaced typewritten lines) (16)**

At approximately 16:30 hours on January 8, 2000 Unit 2 scrambled on a main generator lockout/turbine trip from a positive ground on the Balance of Plant(BOP) 222 plant services transformer alarm circuit. The shutdown was normal with all rods in and the reactor was stabilized. The trip was determined to be caused by a voltage transient as a result of a ground on the non-safeguard DC distribution system resulting from closure of a knife switch while investigating a ground on the BOP DC System. The ground was caused by an exposed spare wire on the transformer low liquid level switch. The voltage transient caused the failure of two main generator differential relays. Additionally, a controlled process was not used in the search for the ground which has been addressed by management directives. The unit was returned to service on January 10, 2000.

**LICENSEE EVENT REPORT (LER)  
TEXT CONTINUATION**

FACILITY NAME (1)	DOCKET (2)	LER NUMBER (6)			PAGE (3)
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	-353	2000	001	00	3

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

**BACKGROUND**

At the time of the event Unit 1 and Unit 2 were in Operational Condition (OPCON 1) at 100% power. At the time of the event a 222-Bus outage was in progress and investigation of grounds was being conducted at Unit 2. No other major evolutions were underway and no structures, systems or components were out of service which contributed to the event.

**EVENT DESCRIPTION**

At approximately 14:00 hours on January 8, 2000, Unit 2 received an intermittent balance of plant(BOP) battery ground. At approximately 15:00 hours Unit 2 received a constant ground on BOP DC(EIIS:EI). During the search for grounds the established procedure(a routine test for ground detection) was not used. Instead the operators chose to attempt to correct the problem by isolating the transformer fault instead of detecting the source of the ground. Operations personnel determined that the ground was located in the 222 transformer alarm circuit based on the review of work that was performed at the time the BOP ground alarm was received. A decision was made to isolate the ground by opening up switches on the alarm circuit that are used to determine the cause of the trouble alarm.

At approximately 16:25 hours the equipment operator in conjunction with the control room opened the first knife switch [RS-1] (222 transformer low liquid level alarm), and the ground alarm cleared in the control room. In order to verify that the knife switch opening had cleared the ground, the control room directed that the knife switch be reclosed. When the knife switch was reclosed, a subsequent voltage transient caused the actuation of the Unit 2 main generator lockout and then turbine trip. The Reactor Pump Trip(RPT) breakers(EIIS:JC) tripped as anticipated upon the turbine trip.

The unit was shutdown with all rods in and the reactor stabilized.

A 4 hour notification was made to NRC on 1/8/00 at 19:58 hours, for ESF/RPS actuation per 10CFR50.72(b)(2)(ii). This event was determined to be reportable under the requirements of 10CFR50.73(a)(2)(iv).

**CAUSE OF THE EVENT**

At the time of the event there was a pre-existing small negative ground below the alarm setpoint. While searching for the alarm the opening and subsequent reclosing of the alarm knife switch associated with the transformer alarm caused a DC short circuit which was promulgated to the DC bus through the circuit as a voltage transient. This voltage transient passed through the main generator A & B phase differential relays (587-G101) resulting in their failure and activated the 386G(generator lockout), 386GX and the 346G relays leading to a turbine trip and unit scram. The 587G, 386GX and 346G are static relays which are sensitive to power supply transients as documented in various GE Service Advisory Letters(SAL).

The ground which led to opening of the alarm knife switch was from the 222-bus transformer low liquid level switch. This switch has 3 wires one of which(spare) had insulation which was cracked and frayed. This spare wire was exposed from initial construction. During testing of the level switch the spare wire was probably disturbed and made contact with the conduit resulting in a short to ground.

Additionally, at the time of the event the operators, who were searching for the grounds, were not using a controlled process. Based on interviews, it was determined that although the operators recognized that the work was important, they were familiar with the equipment and the activity(opening the knife switch) was considered a low jeopardy.

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**CONSEQUENCES OF THE EVENT**

The actual safety consequences of the event were minimal. The transformer protective relay actuations, the main turbine trip and the Reactor Protection System(RPS) all occurred per design and all control rods fully inserted. The reactor was stabilized. No release of radioactive material occurred and no Emergency Core Cooling System(ECCS) actuations occurred as a result of the event.

The potential safety consequences of the event were also minimal since the plant is designed for Generator Load Rejection.

**CORRECTIVE ACTION COMPLETED**

The ground on the 222-bus transformer low liquid level alarm switch was repaired.  
The two differential relays (587-G101 A & B) were replaced.

-An intervention all hands Operations supervisory standdown was held to discuss procedural compliance expectation. Procedural compliance expectations were then communicated to each operator.

-All DC ground alarm(10) annunciator response cards were revised to include instructions to stop work on related DC equipment.

-A Quality Assurance independent monitoring program and assessment was conducted on procedural use.

**CORRECTIVE ACTION PLANNED**

-An investigation of similar equipment(4 transformers with 3-wire switches with one wire unused) with potential ground wiring issues will be conducted with respect to this event by June 30, 2001.

-Expectations on procedure use will be clarified, communicated and reinforced through improvements to existing Procedure Use Standards and Guidelines for Operations by March 1, 2000.

-Additional teamwork training will be provided to all control room teams by December 31, 2000.

**PREVIOUS SIMILAR OCCURRENCES**

None

**COMPONENT FAILURE DATA**

Static Relay  
Manufacturer-General Electric  
Model-SGC12A