



# PECO NUCLEAR

A Unit of PECO Energy

Michael P. Gallagher, P.E.  
Plant Manager  
Limerick Generating Station

PECO Energy Company  
Limerick Generating Station  
PO Box 2300  
Sanatoga, PA 19464-0920  
610 718 2000

10CFR50.73

May 30, 2000

Docket No. 50-352

License No. NPF-39

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

SUBJECT: Licensee Event Report  
Limerick Generating Station (LGS) - Unit 1

This LER reports an Engineered Safety Feature (ESF) and Reactor Protection System (RPS) automatic actuation in that a Unit 1 generator lockout, turbine trip and reactor scram occurred as a result of a phase-to-phase fault caused by a failed 220 kV main transformer connection at the main bus conductor. This was due to inadequate administrative controls for assembly of the connection following maintenance on the main transformer.

Reference:	Docket No. 50-352
Report Number:	1-00-002
Revision Number:	00
Event Date:	May 1, 2000
Report Date:	May 30, 2000
Facility:	Limerick Generating Station P.O. Box 2300, Sanatoga, PA 19464

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

Sincerely,

M. P. Gallagher, Plant Manager

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

RGN 001

IE22

<b>NRC FORM 366 U.S. NUCLEAR REGULATORY COMMISSION</b> (6-1998)	<b>APPROVED BY OMB NO. 3150-0104 EXPIRES 06/30/2001</b> 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>LICENSEE EVENT REPORT (LER)</b>  (See reverse for required number of digits/characters for each block)	

<b>FACILITY NAME (1)</b> Limerick Generating Station, Unit 1	<b>DOCKET NUMBER (2)</b> 05000352	<b>PAGE (3)</b> 1 OF 4
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**TITLE (4)**  
 Scram due to generator lockout following failure of a main transformer bushing connection

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
05	01	2000	2000	-- 002	-- 00	05	30	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>	092	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)(ii)		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
E	EL	CON	Lapp	Y					

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

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

On May 1, 2000 at 03:07 hours, an automatic scram occurred on Unit 1 due to a phase-to-phase fault which caused a generator lockout and resultant turbine trip. This automatic shutdown was the result of a faulty electrical connection at the 220 kV main transformer "C" phase bushing. This was due to inadequate administrative controls for assembly of the connection following maintenance on the main transformer. Standards and procedures will be created to ensure proper assembly, independent verification, and post maintenance testing of the electrical connection.

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

**Unit Conditions Prior to the Event**

LGS Unit 1 was in Operational Condition (OPCON) 1 (Power Operation) at 92% power at the time of this event. There were no other systems, structures, or components inoperable that contributed to the event.

**Description of the Event**

On May 1, 2000 at 03:07 hours, an automatic actuation of the Reactor Protection System (RPS) occurred on Unit 1 due to a phase-to-phase fault which caused a generator (EIS:GEN) lockout and resultant turbine (EIS:TRB) trip. This fault was the result of a faulty electrical connection at the 220 kV connection on the main transformer (EIS:XFMR) "C" phase bushing. Unit 1 generator phase differential relays (EIS:87) actuated as designed upon sensing the fault. In addition, several automatic actuations of Engineered Safety Features (ESF) occurred as discussed below. No Emergency Core Cooling System (ECCS) actuations occurred.

All control rods fully inserted as a result of the automatic scram. The 1A and 1B Reactor Recirculation Pump Trip (RPT) breakers (EIS:52) tripped as expected due to the turbine trip at greater than 30% power. Both Unit Auxiliary 13.2 kV buses (EIS:BU) (11 Bus and 12 Bus) automatically transferred to the offsite sources, as designed.

Reactor pressure peaked to 1123 psig following the turbine trip. This value is above the 1096 psig scram setpoint and less than the 1170 psig Main Steam Relief Valve (MSRV) (EIS:RV) lift setpoint. No MSRV actuations occurred.

Reactor level dropped to -4 inches, below the +12.5 inch low level RPS setpoint and the +12.5 inch low level Group 2A and Group 2B Residual Heat Removal (RHR) isolation setpoint. The Group 2A isolation was present prior to the scram as expected per plant design. The Group 2B RHR isolation valves (EIS:ISV) were in the closed position prior to the isolation signal. Following the scram, the main control room operators entered trip procedure T-101 Reactor Control on an entry condition of reactor level less than +12.5 inches and successfully stabilized reactor parameters.

Reactor pressure vessel (RPV) (EIS:RPV) "ringing" resulted in two reactor level instruments sensing a short duration (false) -38 inch low reactor level signal. This resulted in Group 1B, 3, 6A, 6B, 8B and Reactor Enclosure heating, ventilation, and air conditioning (HVAC) isolations on divisions 1 and 2. This issue had been entered into the corrective action program prior to this event.

The failure of the 220 kV connection was due to a less than adequate electrical connection that occurred during reassembly following transformer maintenance and installation of new surge arrestors (EIS:LAR). The failure occurred after a planned reduction in power that reduced current on the connection. This may have caused the connection to loosen due to differences in thermal expansion rates among the stainless steel bolts, the aluminum bus bar and the copper Doble link connector.

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The less than adequate connection resulted from a misalignment between the copper Doble plate and aluminum bus bar that was not corrected by proper bolting of the connection. Specifications and procedures were not available in the work package to ensure proper assembly, independent verification and adequate post maintenance testing.

An NRC ENS notification was completed on 5/1/00 at 06:55 hours per 10CFR50.72(b)(2)(ii) for an ESF actuation. This followup report is being submitted per the requirements of 10CFR50.73(a)(2)(iv).

**Analysis**

The actual consequences of this event were minimal. There was no release of radioactive material to the environment. The potential consequences of this event were also minimal. This deficiency resulted in an uncomplicated reactor scram. No decrease in the effectiveness of accident mitigating systems occurred. The effectiveness of plant barriers to prevent release of radioactive material was not degraded.

**Cause of the Event**

A less than adequate electrical connection on the "C" phase of the main step-up transformer at the Doble link was identified. The insufficient electrical connection resulted from the Transmission and Substation (T&S) administrative controls that did not ensure the electrical connection on the "C" phase of the main step-up transformer at the Doble link had appropriate torque, was independently verified and tested.

**Completed Corrective Actions**

The main transformer "C" phase connection was repaired.

The main transformer "A" and "B" phase connections were verified to be properly aligned and tightened.

Thermography was performed during power ascension that verified adequate electrical conductance at the connections.

A recurring predictive maintenance task has been created to perform thermography on the main transformer Doble link connections during power ascension.

**Planned Corrective Actions**

A T&S standard will be developed to ensure the electrical connections on the main step-up transformers are independently verified and tested following maintenance. This action will be complete by August 1, 2000.

Station procedures will be generated to ensure the T&S standard is applied during maintenance activities on the main transformer, generator output breakers, and interconnecting equipment. This action will be complete by August 1, 2000.

Training will be conducted on the new standard and procedure prior to the next Unit 2 refueling outage scheduled in April 2001.

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The effectiveness of these actions will be assessed following the next Unit 1 refueling outage.

The site maintenance organization will provide oversight of T&S maintenance activities on the main transformers, generator output breakers, and interconnecting equipment. This will ensure station standards for conduct of maintenance are being utilized by T&S personnel.

Previous Similar Occurrences:

There are no similar occurrences to report.

Failed Component Data:

Manufacturer: Lapp  
Model number: B63037-70