

10CFR50.73

December 8, 2005

U. S. Nuclear Regulatory Commission  
ATTN: Document Control Desk  
Washington, DC 20555-0001

Limerick Generating Station, Unit 2  
Facility Operating License No. NPF-85  
NRC Docket No. 50-353

Subject: LER 2-05-004, Reactor Scram Due To An EHC Malfunction

This Licensee Event Report (LER) addresses an automatic actuation of the reactor protection system when the reactor was critical. This event was due to a malfunction of the Electro-Hydraulic Control (EHC) system. The most likely cause was a transient malfunction of a circuit card.

Report Number: 2-05-004  
Revision: 00  
Event Date: October 12, 2005  
Discovered Date: October 12, 2005  
Report Date: December 8, 2005

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

If you have any questions or require additional information, please do not hesitate to contact us.

Sincerely,

Original signed by Chris Mudrick for

Ron J. DeGregorio  
Vice President – Limerick  
Exelon Generation Company, LLC

cc: S. J. Collins, Administrator Region I, USNRC  
S. L. Hansell, USNRC Senior Resident Inspector, LGS

SUMMARY OF EXELON NUCLEAR COMMITMENTS  
LS-AA-117-1003 Rev.2

The following table identifies commitments made in this document. (Any other actions discussed in the submittal represent intended or planned actions. They are described to the NRC for the NRC's information and are not regulatory commitments.)

Commitment #1	Committed date (or "outage"): NA
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None	
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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 mandatory collection request: 50 hours. Reported lessons learned are incorporated into the licensing process and fed back to industry. Send comments regarding burden estimate to the Records and FOIA/Privacy Service Branch (T-5 F52), U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001, or by internet e-mail to [infocollects@nrc.gov](mailto:infocollects@nrc.gov), and to the Desk Officer, Office of Information and Regulatory Affairs, NEOF-10202, (3150-0104), Office of Management and Budget, Washington, DC 20503. If a means used to impose 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.

**1. FACILITY NAME**

Limerick Generating Station, Unit 2

**2. DOCKET NUMBER**

05000353

**3. PAGE**

1 OF 4

**4. TITLE**

Automatic Scram Due To EHC Malfunction That Closed The Main Turbine Control Valves

5. EVENT DATE			6. LER NUMBER			7. REPORT DATE			8. OTHER FACILITIES INVOLVED	
MONTH	DAY	YEAR	YEAR	SEQUENTIAL NUMBER	REV NO.	MONTH	DAY	YEAR	FACILITY NAME	DOCKET NUMBER
10	12	2005	2005	- 004 -	0	12	8	2005		05000
9. OPERATING MODE  1			11. THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR§: (Check all that apply)							
			<input type="checkbox"/> 20.2201(b) <input type="checkbox"/> 20.2201(d) <input type="checkbox"/> 20.2203(a)(1) <input type="checkbox"/> 20.2203(a)(2)(i) <input type="checkbox"/> 20.2203(a)(2)(ii) <input type="checkbox"/> 20.2203(a)(2)(iii) <input type="checkbox"/> 20.2203(a)(2)(iv) <input type="checkbox"/> 20.2203(a)(2)(v) <input type="checkbox"/> 20.2203(a)(2)(vi)	<input type="checkbox"/> 20.2203(a)(3)(i) <input type="checkbox"/> 20.2203(a)(3)(ii) <input type="checkbox"/> 20.2203(a)(4) <input type="checkbox"/> 50.36(c)(1)(i)(A) <input type="checkbox"/> 50.36(c)(1)(ii)(A) <input type="checkbox"/> 50.36(c)(2) <input type="checkbox"/> 50.46(a)(3)(ii) <input type="checkbox"/> 50.73(a)(2)(i)(A) <input type="checkbox"/> 50.73(a)(2)(i)(B)	<input type="checkbox"/> 50.73(a)(2)(i)(C) <input type="checkbox"/> 50.73(a)(2)(ii)(A) <input type="checkbox"/> 50.73(a)(2)(ii)(B) <input type="checkbox"/> 50.73(a)(2)(iii) <input checked="" type="checkbox"/> 50.73(a)(2)(iv)(A) <input type="checkbox"/> 50.73(a)(2)(v)(A) <input type="checkbox"/> 50.73(a)(2)(v)(B) <input type="checkbox"/> 50.73(a)(2)(v)(C) <input type="checkbox"/> 50.73(a)(2)(v)(D)	<input type="checkbox"/> 50.73(a)(2)(vii) <input type="checkbox"/> 50.73(a)(2)(viii)(A) <input type="checkbox"/> 50.73(a)(2)(viii)(B) <input type="checkbox"/> 50.73(a)(2)(ix)(A) <input type="checkbox"/> 50.73(a)(2)(x) <input type="checkbox"/> 73.71(a)(4) <input type="checkbox"/> 73.71(a)(5) <input type="checkbox"/> OTHER				
10. POWER LEVEL  100			Specify in Abstract below or in NRC Form 366A							

**12. LICENSEE CONTACT FOR THIS LER**

FACILITY NAME

Robert E. Kreider, Manager- Regulatory Assurance

TELEPHONE NUMBER (Include Area Code)

610-718-3400

**13. COMPLETE ONE LINE FOR EACH COMPONENT FAILURE DESCRIBED IN THIS REPORT**

CAUSE	SYSTEM	COMPONENT	MANU-FACTURER	REPORTABLE TO EPIX	CAUSE	SYSTEM	COMPONENT	MANU-FACTURER	REPORTABLE TO EPIX
B	JJ	CBD	G080	Y					

**14. SUPPLEMENTAL REPORT EXPECTED**☐ YES (If yes, complete 15. EXPECTED SUBMISSION DATE)☒ NO**15. EXPECTED SUBMISSION DATE**

MONTH	DAY	YEAR

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

A valid automatic actuation of the reactor protection system was initiated by a malfunction of the Electro-Hydraulic Control (EHC) system that closed the main turbine control valves at power. The most likely cause was a transient malfunction of a circuit card. The four circuit cards that most likely caused the malfunction were replaced and tested.

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

Unit Conditions Prior to the Event

Unit 2 was in Operational Condition (OPCON) 1 (Power Operation) at approximately 100% power. There were no structures, systems or components out of service that contributed to this event.

Description of the Event

On Wednesday October 12, 2005 Limerick Unit 2 was operating at 100% power. At 22:24 hours an automatic actuation of the reactor protection system (RPS) occurred as a result of a malfunction of the Electro-Hydraulic Control (EHC) system (EIIS:JJ) that closed the main turbine control valves (EIIS:V) at power. The reactor scrambled when the average power range monitor (APRM) flux exceeded the high flux setpoint of 118.3%. The maximum indicated flux was 121.3%. The operators entered the trip procedure for reactor pressure vessel (RPV) control (T-101) and stabilized reactor parameters. The operators verified that all control rods were fully inserted.

Reactor level initially increased and then decreased to a minimum of -37 inches and increased to a maximum of +58 inches (wide-range) then stabilized at +20 inches during level recovery. The +54 inch high-level turbine trip setpoint was exceeded resulting in tripping of the reactor feed pumps. Reactor pressure increased to a maximum of approximately 1136 psig, which is less than the lowest safety relief valve (SRV) setpoint of 1170 psig; no SRVs actuated. The reactor high pressure scram setpoint of 1096 psig was exceeded but RPS had previously initiated due to high APRM flux. The redundant reactivity control system (RRCS) setpoint of 1149 psig was not exceeded. The main steam bypass valves opened as designed to control pressure post scram.

Both reactor recirculation (EIIS:AD) motor-generator (M-G) set drive motor breakers tripped as a result of the manual main turbine trip and resultant main generator lockout as expected. Approximately 28 seconds prior to the main turbine trip the main turbine first stage pressure decreased to less than the RPS bypass setpoint due to the control valve closure, which was caused by the invalid EHC signal. As a result, the end-of-cycle recirculation pump trip (EOC-RPT) on turbine control

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

valve fast closure at greater than 30 percent power was bypassed prior to the main turbine trip. The reactor recirculation pump low limit speed runback (28% pump speed) actuated on low reactor level (+12.5 inches) prior to the reactor recirculation M-G set trip.

A 4-hour NRC ENS notification is required by 10CFR50.72(b)(2)(iv)(B) for an actuation of RPS when the reactor was critical. An 8-hour NRC ENS notification is required by 10CFR50.72(b)(3)(iv)(A) for a valid actuation of RPS. The ENS notification (#42054) was completed on Wednesday October 12, 2005 at 23:55 EDT. This event involved an automatic actuation of RPS. Therefore, this LER is being submitted pursuant to the requirements of 10CFR50.73(a)(2)(iv)(A).

### Analysis of the Event

There were no actual safety consequences associated with this event. The potential safety consequences of this event were minimal. A turbine trip with bypass transient is categorized as an incident of moderate frequency per UFSAR section 15.2.3, "Turbine Trip". The plant equipment performed as designed during the transient and the operators effectively stabilized reactor parameters.

The initial investigation determined that the control valves closed due to a spurious demand signal. The resultant increase in reactor pressure caused neutron flux to exceed the APRM scram setpoint. Further investigation was performed but no defect was found and the initiator of the EHC circuit card failure could not be identified or reproduced. Therefore, the four circuit cards that were most likely the cause of the transient were replaced and laboratory analysis was performed. The failure did not recur during the laboratory analysis. All the cards performed satisfactorily during two weeks of testing.

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

#### Cause of the Event

The event was caused by a malfunction of the EHC system. The most likely cause was a transient malfunction of a circuit card.

#### Corrective Action Completed

The four suspect circuit cards that most likely caused the transient were replaced and tested.

#### Corrective Action Planned

A modification is being evaluated which would upgrade both units to Digital EHC.

#### Previous Similar Occurrences

Several previous similar occurrences were identified. LER 1-86-011 reported a scram that occurred following an unexpected closure of the main turbine control valves due to a ground in an EHC circuit. LER 2-93-001 reported a scram on high pressure due to an EHC malfunction that occurred coincident with a BOP battery ground alarm. LER 2-95-010 reported a scram due to high pressure due to an EHC malfunction. LER 1-96-016 reported a scram initiated by an EHC malfunction. LER 2-97-005 reported a violation of maximum thermal power limit due to a pressure transient caused by an EHC malfunction.

#### Component data:

System:	JJ (Turbine Supervisory Control System)
Component:	CBD (Board, Control)
Manufacturer:	G080 (General Electric)
Part#:	125D5788G0003
	125D5788G0001
	118D1516G0003
	114D6003G0007