



10CFR50.73

September 17, 2012

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

Limerick Generating Station, Unit 1  
Facility Operating License No. NPF-39  
NRC Docket No. 50-352

Subject: LER 2012-005-00, Valid Actuation of the Reactor Protection System with the Reactor Critical and Unusual Event Declaration Due to a Failed Transformer

This Licensee Event Report (LER) addresses a valid actuation of the reactor protection system when the reactor was critical. The event was due to a failure of a 13 kV/480VAC transformer connection that resulted in a loss of the main generator stator cooling water system. The loss of stator cooling water resulted in an automatic trip of both reactor recirculation pumps which required a manual actuation of the reactor protection system. An Unusual Event was declared due to flash-over damage on the failed transformer air termination cabinet which was classified as an explosion within the protected area boundary.

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

There are no commitments contained in this letter.

If you have any questions, please contact Robert B. Dickinson at (610) 718-3400.

Respectfully,

Original signed by

Thomas J. Dougherty  
Vice President – Limerick  
Exelon Generation Company, LLC

cc: Administrator Region I, USNRC  
USNRC Senior Resident Inspector, LGS

# 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: 80 hours. Reported lessons learned are incorporated into the licensing process and fed back to industry. Send comments regarding burden estimate to the FOIA/Privacy Section (T-5 F53), U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001, or by internet e-mail to infocollects.resource@nrc.gov, and to the Desk Officer, Office of Information and Regulatory Affairs, NEOB-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.

|  |                                     |                          |
|--|-------------------------------------|--------------------------|
| <b>1. FACILITY NAME</b><br>Limerick Generating Station, Unit 1 | <b>2. DOCKET NUMBER</b><br>05000352 | <b>3. PAGE</b><br>1 OF 4 |
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**4. TITLE**  
Valid Actuation of the Reactor Protection System With the Reactor Critical and Unusual Event Declared

| 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 |
| 07            | 18  | 2012 | 2012          | 005               | 00      | 09             | 17  | 2012 | FACILITY NAME                | DOCKET NUMBER |
|               |     |      |               |                   |         |                |     |      |                              | 05000         |
|               |     |      |               |                   |         |                |     |      |                              | 05000         |

|                          |   |   |  |   |  |  |  |  |  |  |
|--------------------------|---|---|--|---|--|--|--|--|--|--|
| <b>9. OPERATING MODE</b> | <b>11. THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §:</b> <i>(Check all that apply)</i> |   |  |   |  |  |  |  |  |  |
| 1                        | <input type="checkbox"/> 20.2201(b)   | <input type="checkbox"/> 20.2203(a)(3)(i)   | <input type="checkbox"/> 50.73(a)(2)(i)(C)             | <input type="checkbox"/> 50.73(a)(2)(vii)     |  |  |  |  |  |  |
|                          | <input type="checkbox"/> 20.2201(d)   | <input type="checkbox"/> 20.2203(a)(3)(ii)  | <input type="checkbox"/> 50.73(a)(2)(ii)(A)            | <input type="checkbox"/> 50.73(a)(2)(viii)(A) |  |  |  |  |  |  |
|                          | <input type="checkbox"/> 20.2203(a)(1)  | <input type="checkbox"/> 20.2203(a)(4)      | <input type="checkbox"/> 50.73(a)(2)(ii)(B)            | <input type="checkbox"/> 50.73(a)(2)(viii)(B) |  |  |  |  |  |  |
|                          | <input type="checkbox"/> 20.2203(a)(2)(i)   | <input type="checkbox"/> 50.36(c)(1)(i)(A)  | <input type="checkbox"/> 50.73(a)(2)(iii)              | <input type="checkbox"/> 50.73(a)(2)(ix)(A)   |  |  |  |  |  |  |
| <b>10. POWER LEVEL</b>   | <input type="checkbox"/> 20.2203(a)(2)(ii)  | <input type="checkbox"/> 50.36(c)(1)(ii)(A) | <input checked="" type="checkbox"/> 50.73(a)(2)(iv)(A) | <input type="checkbox"/> 50.73(a)(2)(x)       |  |  |  |  |  |  |
| 100                      | <input type="checkbox"/> 20.2203(a)(2)(iii)   | <input type="checkbox"/> 50.36(c)(2)        | <input type="checkbox"/> 50.73(a)(2)(v)(A)             | <input type="checkbox"/> 73.71(a)(4)          |  |  |  |  |  |  |
|                          | <input type="checkbox"/> 20.2203(a)(2)(iv)  | <input type="checkbox"/> 50.46(a)(3)(ii)    | <input type="checkbox"/> 50.73(a)(2)(v)(B)             | <input type="checkbox"/> 73.71(a)(5)          |  |  |  |  |  |  |
|                          | <input type="checkbox"/> 20.2203(a)(2)(v)   | <input type="checkbox"/> 50.73(a)(2)(i)(A)  | <input type="checkbox"/> 50.73(a)(2)(v)(C)             | <input type="checkbox"/> OTHER                |  |  |  |  |  |  |
|                          | <input type="checkbox"/> 20.2203(a)(2)(vi)  | <input type="checkbox"/> 50.73(a)(2)(i)(B)  | <input type="checkbox"/> 50.73(a)(2)(v)(D)             | Specify in Abstract below or in NRC Form 366A |  |  |  |  |  |  |

**12. LICENSEE CONTACT FOR THIS LER**

|   |   |
|---|---|
| NAME<br>Robert B. Dickinson, Manager – Regulatory Assurance | TELEPHONE NUMBER <i>(Include Area Code)</i><br>610-718-3400 |
|---|---|

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

| CAUSE | SYSTEM | COMPONENT | MANUFACTURER | REPORTABLE TO EPIX | CAUSE | SYSTEM | COMPONENT | MANUFACTURER | REPORTABLE TO EPIX |
|-------|--------|-----------|--------------|--------------------|-------|--------|-----------|--------------|--------------------|
| B     | EA     | XFMR      | 258A         | Y                  |       |        |           |              |                    |

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

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

A valid manual actuation of the reactor protection system was initiated due to an automatic trip of both reactor recirculation pumps. The reactor recirculation pumps tripped due to a loss of stator cooling water following a failure of a connection in a 13 kV/480 VAC non-safeguard load center air termination cabinet. An Unusual Event was declared due to flash-over damage on the failed transformer air termination cabinet which was classified as an explosion within the protected area boundary. The cause of the failed transformer was a high voltage connection clamp that was larger than the 13 kV cable size and the cable was not installed properly. The cable in use was a solid conductor and the clamp used was designed for stranded cable. This resulted in overheating and subsequent failure of the connection which damaged the cable and the load center transformer. The investigation determined that this connection is not disturbed during routine maintenance. Therefore, this is believed to be a manufacturing issue. The 124A load center transformer supply cable was upgraded to a stranded cable with a crimped lug connection. The faulted 124A load center transformer was replaced and returned to service. Similar load center transformers will be upgraded to stranded cable with crimped lug connections.

| 1. FACILITY NAME                    | 2. DOCKET | 6. LER NUMBER |                   |         | 3. PAGE      |
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| Limerick Generating Station, Unit 1 | 05000352  | YEAR          | SEQUENTIAL NUMBER | REV NO. | 2    OF    4 |
|                                     |           | 2012          | - 005             | - 00    |              |

**NARRATIVE**

Unit Conditions Prior to the Event

Unit 1 was in Operational Condition (OPCON) 1 (Power Operation) at approximately 100% power. The 114A Load Center Transformer (LCT) (EIIS:XFMR) was de-energized and the 114A Load Center (LC) loads were being supplied through the 114A/124A LC tie breaker. There were no other structures, systems or components out of service that contributed to this event.

Description of the Event

On Wednesday July 18, 2012, Limerick Unit 1 was operating at 100% power. At 0816 hours, a valid manual actuation of the reactor protection system (RPS) (EIIS:JC) was initiated as directed by the Recirculation Pump Trip procedure (OT-112) due to an automatic trip of both reactor recirculation pumps (RRPs) (EIIS:AD) following a loss of main generator stator cooling water. The event was initiated by a fault on the 124A Generator Area LCT 13 kV cable connection (EIIS:CON). 124A LCT is a 13 kV/480 VAC non-safeguard LCT.

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 decreased to a minimum of -11 inches and increased to a maximum of +41 inches. The +54 inch high-level turbine trip setpoint was not exceeded. The reactor level of less than +12.5 inches resulted in an isolation signal to the closed Group IIB valves as expected.

Reactor pressure initially was 1041 psig and decreased to approximately 966 psig, then stabilized. Reactor pressure remained less than the lowest safety relief valve (SRV) setpoint of 1170 psig; therefore, no SRVs actuated. The main steam bypass valves opened as designed to control pressure.

At 0832 hours, an Operations supervisor identified flash-over damage on the 124A LCT and emergency action level (EAL) HU3 threshold #2 was met for an explosion within the protected area boundary affecting a Table H2 area. The affected Table H2 area was the control enclosure. At 0839 hours, an Unusual Event (UE) was declared. At 0947 hours, the UE was terminated.

The loss of 124A LC de-energized the power supply to the operating (1B) and standby (1A) stator cooling water pumps. Since 114A LCT was out-of-service the 114A/124A LC tie breaker was closed with both 114A

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

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**NARRATIVE**

LC and 124A LC supplied by 124A LCT. The 1A and 1B RRP's tripped on the stator cooling water runback as designed.

The post-scrum troubleshooting identified a fault on the 124A LCT 13 kV cable. The faulted cable and 124A transformer were replaced. The 124A and 114A LCTs were returned to service.

During the investigation extent of condition (EOC) review, thermography was performed on 11 similar transformer air termination cabinets (ATC) and no hot connections were identified.

A one-hour NRC ENS notification was required by 10CFR50.72(a)(1)(i) for declaration of an Unusual Event. A 4-hour NRC ENS notification was required by 10CFR50.72(b)(2)(iv)(B) for an actuation of RPS when the reactor was critical. The ENS notification (#48117) was completed on Wednesday July 18, 2012, at 0933 EDT. A follow-up ENS notification was made at 1022 hours due to the UE termination.

This event involved a manual actuation of RPS. Therefore, this LER is being submitted pursuant to the requirements of 10CFR 50.73(a)(2)(iv)(A).

**Analysis of the Event**

There was no actual safety consequence associated with this event. The potential safety consequences of this event were minimal. A loss of both recirculation pumps transient is categorized as an incident of moderate frequency per the Updated Final Safety Analysis Report (UFSAR) section 15.3.1 Recirculation Pump Trip, subsection 15.3.1.1.2.2. The plant equipment performed as designed during the transient. The operators effectively stabilized reactor parameters.

Both RRP's tripped on the loss of stator cooling water runback. The operators initiated a manual actuation of RPS which inserted all control rods.

**Cause of the Event**

The cause of the failed transformer was a high voltage connection clamp that was larger than the 13 kV cable size and the cable was not installed properly. The cable in use was a solid conductor and the clamp used was designed for stranded cable. This resulted in overheating and subsequent failure of the connection which damaged the cable and the LCT. The investigation determined that this connection is not disturbed during routine maintenance. Therefore, this is believed to be a manufacturing issue.

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**NARRATIVE**

Corrective Action Completed

The 124A LCT supply cable was upgraded to a stranded cable with a crimped lug connection.

The faulted 124A LCT was replaced and returned to service.

Corrective Action Planned

Similar LCTs will be upgraded to stranded cable with crimped lug connections.

Previous Similar Occurrences

There were four recent previous similar occurrences of reactor recirculation pump trips that resulted in manual actuations of RPS.

1) Unit 1 LER 2010-001-00 reported a failure of a 13 kV cable that resulted in a loss of stator cooling water and a trip of both reactor recirculation pumps which resulted in a manual actuation of RPS.

2) Unit 2 LER 2011-002-00 reported a stator cooling water high temperature actuation that resulted in a loss of stator cooling water and a trip of both reactor recirculation pumps which resulted in a manual actuation of RPS.

3) Unit 2 LER 2011-005-00 reported a main turbine first stage pressure instrument failure that tripped both reactor recirculation pumps which resulted in a manual actuation of RPS with all control rods inserted.

4) Unit 1 LER 2012-002-01 reported a failure of a transformer that resulted in a loss of stator cooling water and a trip of both reactor recirculation pumps which resulted in a manual actuation of RPS.

Component data:

System:            13 KV System  
 Component: 124A Transformer, Generator Area  
 Manufacturer:    258A ASEA, Brown Boveri  
 Model number:    DWG OLV-C-1874  
 Serial number:    24-35156-05