



10 CFR 50.73

LG-17-009  
January 27, 2017

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

Limerick Generating Station, Units 1 and 2  
Renewed Facility Operating License No. NPF-39 and NPF-85  
NRC Docket Nos. 50-352 and 50-353

Subject: LER 2017-001-00, Condition Prohibited by TS due to Parts Quality Issue

This Licensee Event Report (LER) addresses a condition prohibited by Technical Specifications (TS) at Limerick Generating Station (LGS) Units 1 and 2 when the Main Control Room (MCR) HVAC system return and supply fans failed to start on multiple occurrences, causing an unplanned TS entry and inoperability of the associated Control Room Emergency Fresh Air Supply (CREFAS) system. This LER is being submitted pursuant to the requirements of 50.73(a)(2)(i)(B) for an Operation or Condition Prohibited by TS.

There are no commitments contained in this letter.

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

Respectfully,

A handwritten signature in blue ink that reads "R. Libra" with "FOR R. LIBRA" written in smaller blue ink below it.

Richard W. Libra  
Vice President – Limerick Generating Station  
Exelon Generation Company, LLC

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



**LICENSEE EVENT REPORT (LER)**  
(See Page 2 for required number of digits/characters for each block)

(See NUREG-1022, R.3 for instruction and guidance for completing this form  
<http://www.nrc.gov/reading-rm/doc-collections/nuregs/staff/sr1022/r3/>)

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 and Information Collections Branch (T-5 F53), U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001, or by e-mail to [Infocollects.Resource@nrc.gov](mailto: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> Limerick Generating Station, Units 1 and 2	<b>2. DOCKET NUMBER</b> 05000352 & 05000353	<b>3. PAGE</b> 1 OF 3
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**4. TITLE**  
Condition Prohibited by TS due to Parts Quality Issue

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
11	29	16	2017	- 001	- 00	01	27	17	FACILITY NAME	DOCKET NUMBER
										05000

<b>9. OPERATING MODE</b>	<b>11. THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: (Check all that apply)</b>			
1	<input type="checkbox"/> 20.2201(b)	<input type="checkbox"/> 20.2203(a)(3)(i)	<input type="checkbox"/> 50.73(a)(2)(ii)(A)	<input type="checkbox"/> 50.73(a)(2)(viii)(A)
	<input type="checkbox"/> 20.2201(d)	<input type="checkbox"/> 20.2203(a)(3)(ii)	<input type="checkbox"/> 50.73(a)(2)(ii)(B)	<input type="checkbox"/> 50.73(a)(2)(viii)(B)
	<input type="checkbox"/> 20.2203(a)(1)	<input type="checkbox"/> 20.2203(a)(4)	<input type="checkbox"/> 50.73(a)(2)(iii)	<input type="checkbox"/> 50.73(a)(2)(ix)(A)
	<input type="checkbox"/> 20.2203(a)(2)(i)	<input type="checkbox"/> 50.36(c)(1)(i)(A)	<input type="checkbox"/> 50.73(a)(2)(iv)(A)	<input type="checkbox"/> 50.73(a)(2)(x)
10. POWER LEVEL	<input type="checkbox"/> 20.2203(a)(2)(ii)	<input type="checkbox"/> 50.36(c)(1)(ii)(A)	<input type="checkbox"/> 50.73(a)(2)(v)(A)	<input type="checkbox"/> 73.71(a)(4)
	<input type="checkbox"/> 20.2203(a)(2)(iii)	<input type="checkbox"/> 50.36(c)(2)	<input type="checkbox"/> 50.73(a)(2)(v)(B)	<input type="checkbox"/> 73.71(a)(5)
	<input type="checkbox"/> 20.2203(a)(2)(iv)	<input type="checkbox"/> 50.46(a)(3)(ii)	<input type="checkbox"/> 50.73(a)(2)(v)(C)	<input type="checkbox"/> 73.77(a)(1)
	<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)(D)	<input type="checkbox"/> 73.77(a)(2)(i)
	<input type="checkbox"/> 20.2203(a)(2)(vi)	<input checked="" type="checkbox"/> 50.73(a)(2)(ii)(B)	<input type="checkbox"/> 50.73(a)(2)(vii)	<input type="checkbox"/> 73.77(a)(2)(ii)
	<input type="checkbox"/> 50.73(a)(2)(i)(C)	<input type="checkbox"/> OTHER	Specify in Abstract below or in NRC Form 366A	

**12. LICENSEE CONTACT FOR THIS LER**

LICENSEE CONTACT Robert B. Dickinson, Manager – Regulatory Assurance	TELEPHONE NUMBER (Include Area Code) (610) 718-3400
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**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	VI	RLY	T351	Y					

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

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

Over a period of approximately one month, the 0B Main Control Room (MCR) Heating, Ventilating and Air Conditioning (HVAC) system experienced four failures. Troubleshooting was completed for each of the failures and for three of the failures the cause was determined to be an intermittent dropout or chattering of the Loss of Offsite Power (LOOP) start relay for two fans (0B-V116 MCR Supply and 0B-V121 MCR Return Fans). The fourth failure was due to a contactor in the Motor Control Center (MCC) for the 0B-V116 MCR Supply Fan. On 11/29/16 the second failure occurred on the LOOP start relay for the 0B-V116 MCR Supply fan. The investigation identified a manufacturing defect of the Agastat/Tyco ETR Relays in the lot of relays used for the recent preventative maintenance (PM) relay replacements. The relays were determined to be unreliable since the initial PM replacement on 10/19/16 until 12/5/16, when the quality issue was identified and relays from a different lot were installed. The B train of MCR HVAC was determined to be inoperable due to the relay issue for a period of 47 days, which is greater than the allowable Limiting Condition for Operation (LCO) action window of 7 days (per TS 3.7.2.a.1) for an inoperable Control Room Emergency Fresh Air System (CREFAS) train. Therefore, this was a condition prohibited by Technical Specifications (TS).



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

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1. FACILITY NAME	2. DOCKET NUMBER	3. LER NUMBER		
		YEAR	SEQUENTIAL NUMBER	REV NO.
Limerick Generating Station, Units 1 and 2	05000352 & 05000353	2017	- 001	- 00

**NARRATIVE**

**I. Unit Conditions Prior to the Event**

Limerick Generating Station (LGS) Units 1 and 2 were both operating in Operational Condition (OPCON) 1 at 100 percent power at the time of the event. There were no other structures, systems, or components inoperable at the time of the event that contributed to the event.

**II. Description of the Event**

Over a period of approximately one month, the Main Control Room (MCR) Heating, Ventilating and Air Conditioning (HVAC) system experienced four failures. Three of the failures were caused by an intermittent dropout, or chattering of the LOOP start relay for two fans (0B-V116 MCR Supply and 0B-V121 MCR Return Fans). The fourth failure was due to a contactor in the MCC for the 0B-V116 MCR Supply Fan. Each of these events caused an unplanned Limiting Condition for Operation (LCO) entry and inoperability of the Control Room Emergency Fresh Air Supply (CREFAS) system. A timeline of events is as follows:

10/19/16 - KS-078-326B and KS-078-359B relays replaced for Preventative Maintenance (PM). Post Maintenance Testing (PMT) was performed by running the 0B MCR HVAC train.

11/13/2016 - To support chiller swaps the 0A MCR HVAC train was secured and Operations attempted to start the 0B train. This was the first start attempt since the PMT performance on 10/19/16. When the supply fan handswitch was placed in RUN, the fan did not start. Relay replacements were performed for KS-078-026B, which was found failed, and KS-078-326B, which was found chattering. Following replacements, the supply fan was started successfully. When Operations attempted to start the 0B return fan by placing the handswitch in RUN, it did not start. The KS-078-359B relay was found chattering, thereby preventing the return fan from starting.

11/20/16 - After running the 0B train of MCR HVAC for a period of one week, the supply fan tripped. The contactor was observed to be chattering. Breaker maintenance was performed and the contactors were replaced. Additionally, new wiring was installed internal to the breaker cubicle. During troubleshooting, the KS-078-326B and KS-078-026B relays were removed from the field and bench tested satisfactorily.

11/29/16 - To support a MCR chiller swap, the 0A MCR fans were secured and Operations attempted to start the 0B train. When the supply fan handswitch was placed in RUN, the fan did not start. The cause was determined to be a failed KS-078-326B relay.

12/5/16 - The 'B' MCR Return fan tripped and the 'A' MCR return fan auto-started. Troubleshooting efforts identified a chattering KS-078-359B relay in the field.

On 11/29/16, the site believed that the relay failure was not an infantile failure and that there may be a common condition that was causing these failures. The relay was sent for testing and evaluation, and on 12/15/16, the station received the analysis which identified a manufacturing issue had caused the relay failures.



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**NARRATIVE**

III. Analysis of the Event  
 The identified relay failures were all determined to be attributed to intermittent drop out, or chattering of the installed Agastat/Tyco model ETR14I3D004 (ETR TDPU series) relay coil. These relays were all installed as normally energized, power monitoring/ Loss of Offsite Power (LOOP) start relays. They are installed to allow a 35-second time delay before the fan restarts on re-energization of the associated load center during a LOOP.

The testing determined that the relays were not reliable and failure of the relays could not be predicted. The 0B MCR HVAC train was determined to be unreliable since the initial relay replacement on 10/19/16 until when the relays were replaced with relays from a different lot on 12/05/16. The B train of MCR HVAC was conservatively determined to be inoperable for a period of 47 days, which is greater than the allowable LCO action window of 7 days (per TS 3.7.2.a.1) for an inoperable CREFAS train, and therefore was deemed to be a condition prohibited by TS.

IV. Cause of the Event  
 Bench tests were performed on-site on the removed relays in addition to failure analysis by an offsite testing facility. This testing determined the cause of the relay chattering to be an incorrectly installed capacitor on the internal timing circuit board.

V. Corrective Actions Completed/Planned  
 Extent of condition actions were taken to replace all of the Agastat 2016 ETR relays installed at Limerick. A total of two additional relays, from the same lot, were identified to be installed in the plant and both these relays were proactively replaced.

A Part 21 was generated by TE Connectivity for the manufacturing issue. (ML17006A011)

VI. Previous Similar Occurrences  
 There were no previous similar occurrences in the last five years of MCR Supply fan and Return fan trips due to defective relays.

VII. Component data:  
 System: V Central Control Complex Env. Ctrl. Sys.  
 Component: RLY Relay, Time- Delay Starting or Closing  
 Component number: KS-078-326B & KS-078-359B  
 Manufacturer: T351 Tyco Instrument DIV  
 Model number: ETR14I3D004