



10 CFR 50.73

LG-18-007
February 22, 2018

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

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

Subject: LER 2017-008-01, EDG Inoperable for Greater Than 30 Days Resulting in a Condition Prohibited by Technical Specifications

Reference: R. Libra (Exelon), letter to NRC (Document Control Desk), "LER 2017-008-00, EDG Inoperable for Greater than 30 Days Resulting in a Condition Prohibited by Technical Specifications," dated December 11, 2017. (ML17345A521)

Enclosed is a supplemental Licensee Event Report (LER), 2017-008-01, for Limerick Generating Station, Unit 2, for LER-2017-008-00, as referenced. This report concludes a different cause as well as additional corrective actions, from what was submitted in the original referenced document.

This LER is being submitted pursuant to the requirements of 10 CFR 50.73(a)(2)(i)(B), 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 black ink that reads "Rick Libra".

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

cc: Administrator Region I, USNRC
USNRC Senior Resident Inspector, Limerick Generating Station

**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/nureqs/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 Information Services Branch (T-2 F43), U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001, or by 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.

1. FACILITY NAME

Limerick Generating Station, Unit 2

2. DOCKET NUMBER

05000353

3. PAGE

1 OF 4

4. TITLE

EDG Inoperable for Greater than 30 Days Resulting in Condition Prohibited by TS

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	11	17	2017	- 008	- 01	02	22	18	FACILITY NAME	DOCKET NUMBER		
9. OPERATING MODE			11. THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: (Check all that apply)									
005			<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)(i)(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

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	EK	PSF	N/A	Y	N/A	N/A	N/A	N/A	N/A

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)

On October 11, 2017, during the performance of the D22 Emergency Diesel Generator (EDG) monthly slow start test, a previously identified lube oil leak was identified to have increased to 0.5 cups per minute. The D22 EDG was declared inoperable due to the increased leak rate. A past operability review determined that the identified lube oil leak would have prevented the D22 EDG from operating for its design basis mission time from the time when the leak was first identified (September 7, 2017) to the time when the leak was repaired and the EDG declared available (October 15, 2017). **The apparent cause was identified to be age related cyclic fatigue induced by engine vibration.**

The D22 EDG was determined to be inoperable for a period of greater than 30 days and the Limiting Condition for Operation (LCO) 3.8.1.1.a actions were not completed in the required time frames provided in Technical Specifications (TS). Therefore, an Operation or Condition Prohibited by TS occurred, which is reportable under 10 CFR 50.73(a)(2)(i)(B).

**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, Unit 2	05000353	2017	- 008	- 01

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

Limerick Generating Station (LGS), Unit 2 was shutdown in Operational Condition (OPCON) 5 at 0 percent power, for a maintenance outage, at the time of the D22 Emergency Diesel Generator (EDG) [EIS: EK] was declared inoperable. There were no other structures, systems, or components inoperable that contributed to the event.

II. Description of the Event

On September 7, 2017, during the performance of the D22 EDG monthly slow start Surveillance Test (ST), a lube oil leak of 2-3 drops per minute (dpm) was discovered after the engine was started. The leak was from a pipe nipple [EIS: PSF] between the lube oil filter and the vent valve. Based on the lube oil leakage rate, the engine was considered operable, as the capacity of the lube oil make-up tank well exceeded the small leakage from the threaded connection.

On October 11, 2017, during the next D22 EDG monthly slow start ST, the previously identified leak was identified to have increased to 0.5 cups per minute. The D22 EDG was declared inoperable due to the increased leak rate and inability to meet the engine's seven-day mission time.

On October 15, 2017, after repair, a Post Maintenance Test (PMT) was run successfully with no leakage, allowing the D22 EDG to be declared operable.

On November 3, 2017, a past operability review determined that the increased leakage on October 11, 2017 would have resulted in D22 EDG not having the capability of performing its design function for the seven-day mission time.

The D22 EDG was inoperable from September 7, 2017 (the last time D22 was tested) to October 15, 2017, a period of greater than 30 days, and the LCO 3.8.1.1.a actions were not completed in the required time frames provided in Technical Specifications (TS). Therefore, an Operation or Condition Prohibited by TS occurred. This LER is being submitted in accordance with 10 CFR 50.73(a)(2)(i)(B).

III. Analysis of the Event

On October 11, 2017, during the D22 EDG slow start operability test run, a 0.5 cups per minute lube oil leak was identified from a 0.5-inch pipe nipple between the lube oil filter and the filter vent valve. The D22 EDG was declared inoperable due to the increased leak rate. The leak at this location was originally identified on September 7, 2017 during a previous slow start operability test run. The lube oil leak at that time was identified to be 2-3 drops per minute and did not worsen during the run. Based on the identified lube oil leakage rate, the engine was considered operable, as the capacity of the lube oil make-up tank well exceeded the small leakage coming from the threaded connection.

The apparent cause was identified to be age related cyclic fatigue induced by engine vibration.

IV. Safety Significance

The EDG and Auxiliary Systems are safety related standby emergency power systems and consist of four diesel generator sets per Unit. The operability of the A.C. power sources and associated distribution systems during operation ensures that sufficient power will be available to supply the safety-related equipment required for (1) the safe shutdown of the facility and (2) the mitigation and

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NARRATIVE

control of accident conditions within the facility. The TS action requirements specified for the levels of degradation of the power sources provide restriction upon continued facility operation commensurate with the level of degradation.

The D22 EDG was inoperable from September 7, 2017 to October 15, 2017; therefore, the TS 3.8.1.1.a action to restore the diesel within 30 days was not met. There were minimal safety consequences associated with the condition since there were no events during this time period which required the D22 EDG. Further, although D22 was inoperable, it was available and would have been capable of running for greater than 24 hours, with no operator action. The remaining LGS Unit 2 EDGs were only inoperable for their monthly surveillance tests during this period with the exception of the D24 EDG, which was declared inoperable on September 28, 2017 at 18:07 due to lube oil temperature below the alarm setpoint of 105 degrees Fahrenheit. The D24 EDG was restored to operable on September 28, 2017 at 21:39. Although low temperature could have impacted the speed at which the EDG started, it is expected that the D24 EDG would have started and functioned correctly for both manual and automatic starts. In all cases mentioned, the amount of time in which two EDGs were inoperable concurrently was within the Action time for TS Action 3.8.1.1.b.

V. Cause of the Event

The apparent cause was identified to be age related cyclic fatigue induced by engine vibration, primarily during engine starts. A contributing cause of the failure were stresses to the pipe nipple during repairs for the previous leak events in 2010 and 2012.

VI. Corrective Actions Completed/Planned

The failed lube oil pipe nipple located between the lube oil filter housing and vent valve on the D22 EDG was replaced. A PMT run was performed **and the D22 EDG was restored** to operable. Additionally, Engineering walked down the seven other EDGs that support LGS Unit 1 and Unit 2, and identified no evidence of active leakage.

The other seven EDGs at LGS have a similar pipe nipple potentially subject to this failure. Therefore, this pipe nipple will be replaced on all other EDGs at LGS. Additionally, the equipment data for all EDG pipe nipples and related equipment will be revised to state that pipe nipples should be replaced, not repaired, if a leak is detected.

VII. Previous Similar Occurrences

Two similar leaks occurred in this location for D22 in 2010 and 2012. In both of these events the pipe nipple was removed and inspected, verifying no apparent thread cracks. The pipe nipple was then reinstalled with thread sealant, which stopped the leak. Similar events have occurred on the other EDGs in recent years, as detailed below.

On April 27, 2013 (IR 01507365), a crack in a 0.25-inch pipe nipple resulted in leakage of approximately 140 dpm from the D24 EDG lube oil system. The apparent cause was failure of the pipe nipple due to high cycle fatigue resulting from vibrations during engine starts. Additionally, a missing grommet from the downstream tubing support allowed increased tubing movement downstream of the root valve attached to a failed pipe fitting, which increased loading and moment on the failed fitting. As part of the extent of condition review, all pipe nipples for instrumentation on all

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EDGs at Limerick were inspected by engineering. This inspection confirmed there was no evidence of leakage on any pipe nipple. Additionally, the D24 grommet was replaced and a walkdown was performed on all EDGs at Limerick to identify missing/ degraded grommet material, loose/ missing supports and clamps and any tubing damage. No issues were identified that jeopardized the functionality of the instrument tubing.

On December 12, 2016 (IR 03951889), during performance of the Fast Start Operability Test Run for LGS Unit 1 D11 EDG, a lube oil leak was discovered on the lube oil piping beneath the turbocharger. A visual inspection performed by maintenance personnel found that the source of the leakage was a crack in the threads of a 0.25-inch pipe nipple between a valve and the 4-inch lube oil header piping. The apparent cause was determined to be due to manipulation of the valve in conjunction with historic cyclic fatigue. These pipe nipples have been replaced on all EDGs for both LGS Unit 1 and Unit 2.

None of the above events were reportable. The pipe nipple failure that occurred between September 7, 2017 and October 11, 2017 differs from the previous EDG pipe nipple failures because the previous failures were on 0.25-inch piping and this failure was on 0.5-inch piping. Further, the location of the most recent pipe nipple failure is different than the most previous occurrences. The location of the most recent failure has not had a history of oil leaks that have challenged the capacity of the lube oil make-up tank. Lastly, the piping connected to the recently failed pipe nipple is adequately supported.

VIII. Component data

System:	EK	Emergency Onsite Power Supply System
Component:	PSF	Pipe Fittings
Manufacturer:	N/A	