



10 CFR 50.73

LG-17-162
December 4, 2017

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

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

Subject: LER 2017-004-00, Core Spray Pump Failed to Start Resulting in Condition
Prohibited by TS

Enclosed is a Licensee Event Report (LER) which addresses a Core Spray pump failing to start during performance of a surveillance test at Limerick Generating Station (LGS) Unit 1.

This LER is being submitted pursuant to the requirements of 10 CFR 50.73(a)(2)(i)(B), Operation or Condition Prohibited by Technical Specifications.

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, appearing to read "R. Libra", written over a horizontal line.

for 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 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 1	2. DOCKET NUMBER 05000352	3. PAGE 1 OF 4
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4. TITLE Core Spray Failed to Start 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	05	17	2017	- 004	- 00	12	04	17	FACILITY NAME	DOCKET NUMBER

9. OPERATING MODE	11. THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: (Check all that apply)			
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 100	<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	MANUFACTURER	REPORTABLE TO EPIX	CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO EPIX
B	BM	BKR	A576	Y	N/A	N/A	N/A	N/A	N/A

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

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

On October 5, 2017, when the 1C Core Spray pump breaker hand switch was placed in start, the breaker failed to close. The 1C Core Spray Pump was declared inoperable and Limiting Condition for Operation (LCO) Action 3.5.1.a.1 was entered. The investigation identified that the breaker limit switch which energizes the closing springs charging motor became dislodged inside the control device. With the contact unable to complete the circuit, the charging motor could not energize to charge the closing springs. This condition existed since the last time the 1C Core Spray Pump was in service, July 17, 2017, until the discovery on October 5, 2017. Although this event was not considered to be within the Station's ability to foresee and correct, the LCO Actions were not completed in the required time frames provided in Technical Specification (TS). Therefore, an Operation or Condition Prohibited by TS existed and is reportable under 10 CFR 50.73(a)(2)(i)(B).

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

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		YEAR	SEQUENTIAL NUMBER	REV NO.
Limerick Generating Station, Unit 1	05000352	2017	- 004	- 00

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

Limerick Generating Station (LGS) Unit 1 was 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 that contributed to the event.

II. Description of the Event

On October 5, 2017 at 03:45, LGS, Unit 1 commenced a Pump Valve and Flow (PV&F) test for 1A Core Spray [BM] in accordance with Technical Specifications (TS) Surveillance Requirement 4.5.1.b.1.

On October 5, 2017 at 04:00, when the 1C Core Spray pump breaker hand switch was placed in start, the breaker failed to close. Investigation at the breaker [BKR] showed that the closing springs on 1C Core Spray Pump did not indicate as charged. Therefore, the 1C Core Spray Pump was declared inoperable due to failure to start when demanded from the Main Control Room (MCR) hand switch and Limiting Condition for Operation (LCO) Action 3.5.1.a.1 was entered due to one Core Spray Subsystem (CSS) being inoperable.

On October 5, 2017 at 23:00 the LCO was exited when 1C Core Spray breaker was repaired and the PV&F test was completed.

Investigation of the 4KV breaker identified that the breaker closing springs were not fully charged which prevented the breaker from closing. A faulty control device was determined to be the cause and the device was replaced.

The 1C Core Spray pump was last in service on July 17, 2017 to support motor testing. It was determined that the 1C Core Spray pump had been inoperable from July 17, 2017 to the time of discovery of this condition on October 5, 2017. The control device and failed limit switch contact have been shipped to Exelon Power Labs for further analysis.

Although this event was not considered to be within the Station's ability to foresee and correct, the LCO Actions were not completed in the required time frames provided in TS. Therefore, an Operation or Condition Prohibited by TS existed and is reportable under 10 CFR 50.73(a)(2)(i)(B).

III. Analysis of the Event

When the breaker is initially racked into the switchgear, the closing springs will be discharged. As the breaker reaches the test position, 125 VDC is applied to the breaker control device and the closing springs charging motor will energize due to the closing springs limit switch being closed. After the closing springs are charged, the limit switch will open to de-energize the charging motor. The closing springs remain charged as the breaker is racked into the connected position. With the closing springs charged, the breaker is capable of closing on demand.

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2017	- 004	- 00

NARRATIVE

Any time the breaker is closed, the closing springs will discharge and as a result, the closing springs limit switch will re-close to energize the charging motor. This ensures the breaker is ready for a subsequent close signal after each breaker closing operation. In this event, the closing springs limit switch was not able to be made up and the charging motor was de-energized with the closing springs not fully charged thereby rendering the breaker unable to close.

The same control device on the failed 4KV breaker is used on all 2.3 KV, 4 KV and 13.2 KV breakers on site. These breakers are susceptible to the same failure as the 1C Core Spray breaker, which could result in the unavailability of any load powered from one of these sources. The available method to determine if the closing springs are charged on any of these breakers is to inspect the closing spring tabs on the front of the breaker. The tabs will extend from the front of the breaker as the closing springs are charged. For the 1C Core Spray Pump breaker, the closing springs tabs were not fully extended when observed in comparison to other breakers. The closing spring tabs for the 2.3 KV, 4 KV and 13.2 KV switchgear have been inspected and are all in the proper condition; therefore, there is not an immediate concern that other breakers have encountered the same failure.

IV. Safety Significance

The CSS is a primary source of emergency core cooling after the reactor vessel is depressurized and a source for flooding of the core in case of accidental draining. The CSS, together with Low Pressure Coolant Injection (LPCI) mode of Residual Heat Removal (RHR) System, is provided to assure that the core is adequately cooled following a loss of coolant accident and provides adequate core cooling capacity for all break sizes up to and including the double ended reactor recirculation line break, and for smaller breaks following depressurization by the Automatic Depressurization (ADS) System.

TS Action 3.5.1.a.1 states, "With one CSS subsystem inoperable, provided that at least two LPCI subsystems are OPERABLE, restore the inoperable CSS subsystem to OPERABLE status within 7 days or be in at least HOT SHUTDOWN within the next 12 hours and in COLD SHUTDOWN within the following 24 hours."

Since 1C Core Spray was inoperable from July 17, 2017 – October 5, 2017, the above TS action to restore within 7 days was not met. There were minimal safety consequences associated with the condition since there were no events during this time period which required CSS. Additionally, at least two LPCI subsystems were operable at all times during this time period.

During this period of time the other CSS subsystem was operable for a majority of the time period. The only time that the other CSS subsystem was inoperable was when 1B and 1D Core Spray were each separately inoperable for approximately 2 hours each to conduct PV&F tests. This is within the Action times for TS Action 3.5.1.a.2. which specifies that, with both CSS subsystems inoperable, be in at least HOT SHUTDOWN within 12 hours and in COLD SHUTDOWN within the next 24 hours.

V. Cause of the Event

The cause of the breaker's failure to close was due to the breaker closing springs being less than fully charged. With the closing springs not fully charged, the breaker logic will prevent breaker closure.

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NARRATIVE

When the event occurred, the breaker was racked out of the switchgear and transported to the maintenance shop for further investigation. When the control device was disassembled for inspection, the charging motor limit switch was determined to be misoriented which prevented the switch from closing to energize the charging motor with the closing springs not fully charged. The spring, which holds the limit switch in place, had become dislodged from the moving contact.

The control device and failed limit switch contact have been shipped to Exelon Power Labs for further analysis.

VI. Corrective Actions Completed/Planned

The immediate action taken was to replace the 4KV Breaker control device and return the breaker to service. Additionally, the 2.3 KV, 4 KV and 13.2 KV switchgear breaker spring tabs have been inspected to verify tabs are fully extended as expected and have been verified to be in the proper condition

Maintenance procedures will be revised regarding '2.3 KV and 4 KV power circuit breaker overhaul' and '13.2 KV and 2.3 KV switchgear maintenance' to inspect contacts for deformation and replace as necessary.

Additional Corrective Actions may be identified, pending results provided by the Exelon Power Labs investigation. This LER will be revised if significant additional causes of the event are identified.

VII. Previous Similar Occurrences

There have been no previous similar occurrences in the last 5 years of ECCS systems being inoperable for longer than the TS allowable times without following TS required actions. Additionally, there have not been any control device failures due to a misoriented limit switch in the last 5 years.

VIII. Component data

System: BM Low Pressure Core Spray System
Component: BKR Breaker
Component number: D13-BUS-06
Manufacturer: A576 ABB ATOM AB/ABB SWEDEN
Model number: 5HK250