



# Exelon Generation®

March 6, 2015

10 CFR 50.73

SVP-15-014

U. S. Nuclear Regulatory Commission  
ATTN: Document Control Desk  
Washington, D.C. 20555

Quad Cities Nuclear Power Station, Units 1 and 2  
Renewed Facility Operating License Nos. DPR-29 and DPR-30  
NRC Docket Nos. 50-254 and 50-265

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**Subject:** Licensee Event Report 254/2015-001-00, "Unit 0 Fuel-Oil Transfer Pump Feed Breaker Found Tripped."

Enclosed is Licensee Event Report (LER) 254/2015-001-00, "Unit 0 Fuel Oil Transfer Pump Feed Breaker Found Tripped," for Quad Cities Nuclear Power Station, Unit 1.

This report is submitted in accordance with 10 CFR 50.73 (a)(2)(i)(B) which requires the reporting of any operation or condition which was prohibited by the plant's Technical Specifications.

There are no regulatory commitments contained in this letter.

Should you have any questions concerning this report, please contact Mr. W. J. Beck at (309) 227-2800.

Respectfully,

Scott Darin  
Site Vice President  
Quad Cities Nuclear Power Station

cc: Regional Administrator – NRC Region III  
NRC Senior Resident Inspector – Quad Cities Nuclear Power Station

LEAD  
NRR



**LICENSEE EVENT REPORT (LER)**

(See Page 2 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 and Information Collections Branch (T-5 F53), U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001, or by internet 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> Quad Cities Nuclear Power Station Unit 1	<b>2. DOCKET NUMBER</b> 05000254	<b>3. PAGE</b> 1 OF 5
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**4. TITLE**  
Unit 0 Fuel Oil Transfer Pump Feed Breaker Found Tripped

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
01	06	2015	2015	001	00	03	06	2015	Quad Cities Nuclear Power Station Unit 2	05000265
									FACILITY NAME	DOCKET NUMBER
									N/A	N/A

<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)(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)
	<input type="checkbox"/> 20.2203(a)(2)(II)	<input type="checkbox"/> 50.36(c)(1)(II)(A)	<input 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 checked="" 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**

LICENSEE CONTACT Brian Cushman, Regulatory Assurance	TELEPHONE NUMBER (Include Area Code) (309) 227-2810
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**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
E	DE	RLY	G080	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)

On January 6, 2015, Electrical Maintenance was preparing for planned maintenance activities at a 480V Motor Control Center (MCC). One of the technicians identified that the breaker in cubicle A1 was in the tripped position. Breaker A1 is the Unit 2 power supply breaker to the Unit 0 Fuel Oil Transfer Pump (FOTP) for the Unit 0 Emergency Diesel Generator (EDG).

Troubleshooting identified the cause of the breaker trip was due to high resistance contacts on the HGA power transfer relay. This relay was replaced and tested satisfactory on January 8, 2015.

This breaker most likely tripped under load, which would have occurred during the Unit 0 EDG 24 hour endurance run when the EDG was loaded to Unit 2 on December 30, 2014. Since planned maintenance occurred on the Unit 0 EDG prior to the endurance run, the time of inoperability of the Unit 0 EDG started on December 29, 2014 and ended when the failed relay was replaced and tested satisfactory on January 8, 2015, for a total of 10 days. This exceeded the allowed outage time of Technical Specifications 3.8.1 for one EDG inoperable. Therefore, this Licensee Event Report is being submitted in accordance with 10 CFR 50.73 (a)(2)(i)(B) for a condition prohibited by Technical Specifications.



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

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 Internet e-mail to [infocollections.Resource@nrc.gov](mailto:infocollections.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.

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**NARRATIVE**

**PLANT AND SYSTEM IDENTIFICATION**

General Electric – Boiling Water Reactor, 2957 Megawatts Thermal Rated Core Power

Energy Industry Identification System (EIS) codes are identified in the text as [XX].

**EVENT IDENTIFICATION**

Unit 0 Fuel Oil Transfer Pump Feed Breaker Found Tripped

**A. CONDITION PRIOR TO EVENT**

Unit: 1 / 2	Event Date: January 6, 2015	Event Time: 1151
Reactor Mode: 1 / 1	Mode Name: Power Operation / Power Operation	Power Level: 100% / 100%

**B. DESCRIPTION OF EVENT**

On January 6, 2015, at 1151, Electrical Maintenance was for preparing planned maintenance activities at Motor Control Center (MCC) 28-1A [SWGR] cubicle A4 [52] and identified that the breaker in cubicle A1 [52] was tripped. This breaker is the Unit 2 power supply to the Unit 0 Fuel Oil Transfer Pump (FOTP) [P]. Operations declared the Unit 0 Emergency Diesel Generator (EDG) [DG] inoperable to Unit 2. Resistance checks of the breaker and Unit 0 FOTP motor [MO] were performed with no abnormalities.

On January 7, Electrical Maintenance instrumented the Unit 2 feed breaker to the Unit 0 FOTP in troubleshooting the breaker had trip. During the course of troubleshooting, the Unit 1 feed breaker [52] to the Unit 0 FOTP tripped. Because there appeared to be an issue with the common logic circuitry that caused the two breaker trips, the Unit 0 EDG was declared inoperable to Unit 1.

Troubleshooting identified that due to high resistance contacts on the HGA power transfer relay [83], the applied voltage at the main motor contactor [CNTR] would be low enough to cause the contactor to pick up and drop out multiple times (chatter) during operation. This chatter of the contactor causes the motor field to collapse and reform which would result in a mismatch of phases and an instantaneous overcurrent trip of the feed breaker.

A review of Unit 0 EDG operating logs determined the last time the Unit 0 FOTP was powered from Unit 2 was when the Unit 0 EDG was loaded to Unit 2 on December 30, 2014. The tripped supply breaker was not identified at that time because the Unit 0 day tank [TK] level was at the normal standby level which is above the low level alarm setpoint.

If the fuel oil level in the tank had reached the low level alarm, operators would have responded in accordance with approved response procedures to take actions to ensure sufficient fuel was supplied to the day tank. Also, the day tank would have been replenished when the power supply for the Unit 0 FOTP swapped back to the Unit 1 feed breaker when the Unit 0 EDG was unloaded from Unit 2 on December 30, 2014.

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**NARRATIVE**

The timeline to determine the length of inoperability for the Unit 0 EDG is as follows:

December 29 (0500)	Unit 0 EDG declared inoperable for a clearance order to support planned maintenance.
December 29 (1700)	Unit 0 EDG declared available upon clearance removal.
December 29 (1940)	Unit 0 EDG loaded to Unit 1 for 24 hour endurance run.
December 30 (1955-2100)	Unit 0 EDG loaded to Unit 2 as part of planned surveillances. This is the most likely time the Unit 2 FOTP power supply breaker would have tripped.
December 30 (2132)	Unit 0 EDG declared operable after endurance run surveillances.
January 6 (1151)	Unit 0 FOTP power supply breaker from Unit 2 found tripped. Unit 0 EDG declared inoperable.
January 8 (0450)	Unit 0 EDG declared operable following power transfer relay replacement and testing.

The duration that the Unit 0 EDG was inoperable was 10 days (0500, December 29, 2014, through 0450, January 8, 2015). This exceeds the allowed outage time of Technical Specifications 3.8.1 Condition B, one required EDG inoperable, and the subsequent entry into Condition F, to be in MODE 3. This resulted in a condition prohibited by Technical Specifications. In this instance, there were missed opportunities to identify the tripped breaker between December 30, 2014 and January 6, 2015. A power available light is located in the Unit 0 EDG room to indicate if power is available from the Unit 1 and Unit 2 power supply breakers for the Unit 0 EDG auxiliaries. These lights are checked daily on operator rounds. However, the operator rounds did not provide enough detail for the operator to identify when a deficient condition existed that would require further investigation. There was sufficient indication available for this condition to have been identified and corrected in a timeframe allowed by Technical Specifications.

**C. CAUSE OF EVENT**

The cause of the Unit 2 power supply breaker to the Unit 0 FOTP tripping was due to high resistance contacts of the HGA power transfer relay. The high resistance contacts resulted in main motor contactor chatter because of reduced voltage at the contactor coil and subsequent power supply breaker trip on instantaneous overcurrent due to back electromotive force (EMF) from the motor field collapsing and reforming as the contactor opened and closed on the chatter.

**D. SAFETY ANALYSIS**

**System Design**

The EDG fuel oil system provides an immediate source of clean fuel oil to the engine at proper pressure and also provides a means of transferring oil to the diesel from storage in the event of sustained operation. Each fuel oil system consists of a day tank, an underground fuel oil storage tank, an electric fuel priming pump, an engine-driven fuel pump, a fuel oil transfer pump, filters, strainers, and associated piping and instrumentation.

Since the Unit 0 EDG is common to both units, by design the Unit 0 EDG auxiliaries (cooling water pump, ventilation fan, etc.) have the capability to receive power from either Unit 1 or Unit 2. Normally, the Unit 0 FOTP receives power from Unit 1. If the Unit 0 EDG fuel oil day tank level drops to the point where the FOTP needs to run to restore level, the FOTP is energized from the Unit 1 power feed under normal conditions. The FOTP will run until the day tank level is restored.

The logic in the FOTP circuit provides for an alternate power supply from Unit 2 if: 1) the Unit 1 power feed is lost, 2) the output breaker from the Unit 0 EDG to Unit 2 is closed, or 3) Unit 2 receives a safety injection signal. This transfer of power is accomplished via contacts from a HGA relay. There are interlock contacts in line with the motor contactors to ensure that simultaneous energization of the Unit 0 FOTP motor does not occur from the Unit 1 and Unit 2 power supplies.

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**NARRATIVE**

**Safety Impact**

During the time the Unit 0 EDG was inoperable, the redundant Unit 1 and Unit 2 EDGs were operable except for a short period of time on January 2, 2015. On January 2, 2015 the Unit 2 EDG was declared inoperable from 0940-1330 for planned maintenance activities on the Unit 2 EDG fire protection system. This configuration exceeded the allowed two hours Allowed Outage Time (AOT) for TS 3.8.1 Condition E, two required diesels inoperable, but did not exceed the subsequent Mode 3 transition time of 12 hours required by TS 3.8.1 Condition F. Therefore, this was not an additional condition prohibited by Technical Specifications. During this four hour period, the Unit 2 EDG was inoperable solely due to an impaired fire protection system. The Unit 2 EDG was available and would have responded as expected for all design-basis events requiring emergency AC power. All supported redundant equipment (Core Spray, Standby Gas Treatment, etc.) was operable during the time the Unit 0 EDG was inoperable. Therefore, the emergency AC function was met while the Unit 0 EDG was inoperable from December 29, 2014 to January 8, 2015.

An engineering analysis was performed that demonstrated this event did not constitute a Safety System Functional Failure. (Reference NEI 99-02, Revision 7, Regulatory Assessment Performance Indicator Guideline, Section 2.2, Mitigating Systems Cornerstone, Safety System Functional Failures, Clarifying Notes, Engineering analyses.) As such, this event will not be reported in the NRC Performance Indicator (PI) for safety system functional failures since an engineering analysis was performed which determined that the system was capable of performing its safety function with the identified degraded condition.

**Risk Insights**

The Unit 0 EDG was available from 1700 December 29, 2014 to January 8, 2015. The Unit 0 EDG Fuel Oil Day Tank low level alarm is annunciated in the control room. Proceduralized operator response actions can be credited in the Probabilistic Risk Assessment (PRA) to maintain availability of equipment. Therefore, using the plant PRA, risk is unaffected since the Unit 0 EDG was maintained available and there was no unavailable equipment. As a result, there is no change in Core Damage Frequency (CDF) due to the degraded relay in the transfer logic of the Unit 0 FOTP.

**E. CORRECTIVE ACTIONS**

Immediate:

- The HGA power transfer relay was replaced.

Follow-up:

- Establish preventive maintenance tasks for periodic maintenance on the power transfer relay.
- Provide enhancements to daily operator rounds.

**F. PREVIOUS OCCURRENCES**

The station events database, LERs, and INPO Consolidated Event System (ICES) were reviewed for similar events at Quad Cities Nuclear Power Station. This event was caused by high resistance relay contacts. Based on causes of this event, the events listed below are similar events that could have contributed to preventing this event. In an attempt to make the actions from previous events be focused and specific, the organization missed opportunities to address the issues involved in a more comprehensive manner that may have prevented future issues from occurring in a similar fashion. Actions to address these types of missed opportunities have been developed as part of the causal analysis performed for this failure.

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**NARRATIVE**

- Station Issue Report (IR) 1445181: 13A-K29 Relay Did Not Energize, November 28, 2012 - During a logic functional test, the Reactor Core Isolation Cooling (RCIC) Auto Isolation Circuit relay did not energize as expected. The apparent cause was high resistance contacts on the relay. This investigation concluded that functional testing on a two year interval was sufficient to detect a degraded component prior to loss of function. The extent of condition from this event was focused on relays in RCIC and in the Primary Containment Isolation System (PCIS) protective relays. The extent of condition from this event could have assessed similar relays in other safety related applications.
- Station Issue Report (IR) 1611255: Unit 2 EDG Start Failure Relay Failure During Surveillance, January 23, 2014 - During the performance of, "U2 Emergency Diesel Generator Start Failure Logic Test," it was suspected that the TD-2 relay did not time out as expected. After pressing the EDG start pushbutton, the stop pushbutton was depressed when it was apparent the start cycle was continuing. The relay contacts were mechanically closed but did not have any continuity. This event was a relay failure in the EDG start logic circuitry due to high resistance contacts and no preventative maintenance task for periodic replacement. The corrective actions from this investigation could have identified the HGA relay in the Unit 0 EDG FOTP power transfer logic as having no preventative maintenance.
- LERs – A review of LERs at Quad Cities Nuclear Power Station did not identify any events that were associated with this type of event.

**G. COMPONENT FAILURE DATA**

Failed Equipment: Relay  
 Component Manufacturer: General Electric  
 Component Model Number: 12HGA11H70  
 Component Part Number: N/A

This event has been reported to ICES as Failure Report No. 315121.