

Exelon Generation Company, LLC  
Quad Cities Nuclear Power Station  
22710 206th Avenue North  
Cordova, IL 61242-9740

www.exeloncorp.com

June 1, 2012

10 CFR 50.73

SVP-12-051

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

Quad Cities Nuclear Power Station, Unit 1  
Renewed Facility Operating License No. DPR-29  
NRC Docket No. 50-254

Subject: Licensee Event Report 254/2012-002-00, "Standby Gas Treatment System Loss of Safety Function Due to Loss of Emergency Power"

Enclosed is Licensee Event Report (LER) 254/2012-002-00, "Standby Gas Treatment System Loss of Safety Function Due to Loss of Emergency Power," for Quad Cities Nuclear Power Station, Unit 1.

This report is submitted in accordance with 10 CFR 50.73 (a)(2)(v)(C), and (a)(2)(v)(D), which requires the reporting of any event or condition that could have prevented the fulfillment of the safety function of structures or systems that are needed to: control the release of radioactive material, and mitigate the consequences of an accident.

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,



Tim Hanley  
Site Vice President  
Quad Cities Nuclear Power Station

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

JE22  
NRC

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.

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

<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
---	-------------------------------------	--------------------------

**4. TITLE**  
Standby Gas Treatment System Loss of Safety Function Due to Loss of Emergency Power

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
04	02	2012	2012	- 002	- 00	06	01	2012	N/A	N/A
									FACILITY NAME	DOCKET NUMBER
									N/A	N/A

<b>9. OPERATING MODE</b>  1	<b>11. THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §:</b> (Check all that apply)											
	<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)								
<b>10. POWER LEVEL</b>  100%	<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)								
	<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 checked="" 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 checked="" type="checkbox"/> 50.73(a)(2)(v)(D)	Specify in Abstract below or in NRC Form 366A									

**12. LICENSEE CONTACT FOR THIS LER**

FACILITY NAME Tom Petersen – Regulatory Assurance	TELEPHONE NUMBER (Include Area Code) (309) 227-2825
--	--

**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	EK	MO	B076	Y					

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

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

On April 2, 2012, at 1452 hrs, Unit 1 received an Emergency Diesel Generator (EDG) trouble alarm. Equipment Operators were dispatched and the Unit 1 EDG was found running unloaded, without a generator field flash, and no auto start signal had been received. Troubleshooting identified that a 125 VDC ground had caused the Unit 1 EDG to start. As a result, the Unit 1 EDG was declared inoperable.

At that time Unit 2 was in refueling outage Q2R21 and the Unit 2 EDG was previously inoperable for repairs. Due to the inoperability of the Unit 1 and Unit 2 EDGs, at 1652 hrs, Technical Specifications (TS) 3.8.1.F was entered, and Unit 1 commenced actions for a reactor shutdown.

Since the EDGs supply emergency power to both Unit 1 and Unit 2 Standby Gas Treatment Systems (SBGTS), emergency power was unavailable to SBGTS; however, the normal power supply remained available.

At 2151 hrs, the Unit 1 EDG was declared operable following repairs and successful operability testing. TS 3.8.1.F was exited and Unit 1 load increase to full power achieved at 2300 hrs.

Corrective actions included replacement of the Unit 1 EDG governor oil booster pump motor. Future corrective actions include replacement of remaining EDG governor oil booster pump motors, and development of improved related work instructions.

The safety significance of this event was minimal. Given the impact on the SBGTS, this report is submitted in accordance with the requirements of 10 CFR 50.73 (a)(2)(v)(C), and (a)(2)(v)(D), which requires the reporting of any event or condition that could have prevented the fulfillment of the safety function of structures or systems that are needed to: control the release of radioactive material, and mitigate the consequences of an accident.

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

1. FACILITY NAME	2. DOCKET	6. LER NUMBER			3. PAGE
Quad Cities Nuclear Power Station Unit 1	05000254	YEAR	SEQUENTIAL NUMBER	REV NO.	2 OF 5
		2012	- 002	- 00	

**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**

Standby Gas Treatment System Loss of Safety Function Due to Loss of Emergency Power

**A. CONDITION PRIOR TO EVENT**

Unit: 1                      Event Date: April 2, 2012                      Event Time: 1452 hours  
 Reactor Mode: 1            Mode Name: Power Operation                      Power Level: 100%

**B. DESCRIPTION OF EVENT**

On 04/02/12 at 1441 hrs, while Unit 2 was in refuel outage Q2R21, Operations received a Unit 2 125 VDC battery [EJ] ground alarm. An Equipment Operator (EO) was dispatched, and identified 125 VDC ground recorder readings of +0 and -128.8 volts (corresponding to a Level III (hard) ground).

At 1452 hrs, received Unit 1 Emergency Diesel Generator (EDG) [EK] trouble alarm, and an EO was dispatched. Due to the Unit 1 EDG trouble, it was declared inoperable, and since the Unit 2 EDG was previously inoperable for repairs during refuel outage Q2R21, TS 3.8.1.B and E were entered.

At 1458 hrs, the Unit 1 EDG was observed to be running. The EO identified no indicating lights, nor indication of a generator field flash.

At 1507 hrs, the Unit 1/2B SBGTS [BH] train was started (on normal power) due to loss of annunciator [ANN] power.

At 1600 hrs, after initial troubleshooting had revealed Unit 1 had not entered an event requiring EDG operation, Operators subsequently secured the Unit 1 EDG safely in accordance with procedures and training, and without complications.

At 1624 hrs, the Unit 1/2B SBGTS train was also secured and shut down.

At 1637 hrs, troubleshooting revealed the Unit 1 EDG governor [65] oil booster pump [P] motor [MO] had a one (1) ohm measured resistance to ground, and the ground was isolated to the Unit 1 EDG since the ground cleared when the Unit 1 EDG control power breaker [BKR] was opened (the control power is supplied by the Unit 2 Turbine Building [NM] 125 VDC safety related battery [BTRY]).

At 1652 hrs, TS 3.8.1.F was entered, and Unit 1 commenced actions for reactor [AC] shutdown.

At 2151 hrs, after the governor oil booster pump motor was replaced, and the Unit 1 EDG successfully tested, the Unit 1 EDG was returned to operable status and TS 3.8.1.B, E, and F were exited for Unit 1. Unit 1 load increase to full

1. FACILITY NAME	2. DOCKET	6. LER NUMBER			3. PAGE		
Quad Cities Nuclear Power Station Unit 1	05000254	YEAR	SEQUENTIAL NUMBER	REV NO.	3	OF	5
		2012	-	002			

**NARRATIVE**

power was then initiated, and full power was achieved at 2300 hrs. The Unit 2 125 VDC battery grounds were restored, and the Unit 2 125 VDC battery remained operable.

Given the impact on the SBGTS (loss of all emergency power), this report is submitted in accordance with the requirements of 10 CFR 50.73 (a)(2)(v)(C), and (a)(2)(v)(D), which requires the reporting of any event or condition that could have prevented the fulfillment of the safety function of structures or systems that are needed to: control the release of radioactive material, and mitigate the consequences of an accident.

**C. CAUSE OF EVENT**

The cause of the hard 125 VDC ground on the Unit 1 EDG governor oil booster pump motor and unplanned start of the Unit 1 EDG was investigated. Based on the as-found conditions, troubleshooting performed by Electrical Maintenance, and failure analysis performed by Exelon Power Labs, the apparent cause for the hard ground found on Unit 1 EDG governor oil booster pump motor was a breach in the insulated sleeve of the brush holder due to previously drilled and tapped holes for fasteners used to secure the motor connection box. These drilled holes allowed the use of long fasteners to penetrate the insulated sleeve of the brush holder and leave an area of the brass brush holder exposed inside the brush holder bore. This led to electrical arcing and creation of a 125 VDC short to station ground.

The 125 VDC short to station ground caused the Unit 1 EDG to start due to actuation of the magnetic air start solenoid valve [FSV] which is parallel with the circuit for the governor oil booster pump motor. The Unit 1 EDG start was an unloaded start and was determined to be from an invalid start signal.

The EDG governor oil booster pump motor is designed to incorporate the mounting of the motor connection box to the back of the motor. Holes pre-drilled on the back of the motor are in-line with the brush holders internal to the motor. If the holes are drilled too deep, or fasteners are used that are too long, a breach could potentially occur in the insulated sleeve of the brush holder. Applicable work instructions were not provided, nor notification from the motor supplier to adequately identify the potential to ground the motor.

The extent of condition of this event is limited to the Unit 2 and Unit 1/2 EDGs which utilize the same generator governor oil booster pump motor as on the Unit 1 EDG. The motors will be replaced and the length of motor connection box fasteners will be verified prior to motor installation. The Unit 2 motor replacement and verification of motor connection box fasteners length has been completed. The Unit 1/2 motor replacement work and fastener length verification is planned for the next available work window. At the time of replacement of the motor on the Unit 1 EDG, the failure analysis was not complete and hence the proper length of the motor connection box fasteners was not verified for proper length at that time. The verification of the proper length of the motor connection box fasteners on the Unit 1 EDG is planned for the next available work window.

The extent of cause of this condition is limited to EDGs with governor oil booster pump motor connection boxes installed with long fasteners. The Quad Cities Unit 1, Unit 2, and Unit 1/2 EDGs utilize the same motors. If long fasteners are installed, the potential exists where the brush holder could be breached, leaving an area of the brass brush holder exposed inside the brush holder bore. This condition could then lead to electrical arcing and the establishment of an electrical ground.

1. FACILITY NAME	2. DOCKET	6. LER NUMBER			3. PAGE		
Quad Cities Nuclear Power Station Unit 1	05000254	YEAR	SEQUENTIAL NUMBER	REV NO.	4	OF	5
		2012	- 002	- 00			

**NARRATIVE**

**D. SAFETY ANALYSIS**

**System Design**

The SBGTS is designed to maintain the reactor building [NH] (common to both Units 1 and 2) at a negative pressure and to filter the exhaust of radioactive matter from reactor building spaces to the environment (by particulate filtration and halogen adsorption) in the unlikely event of a Design Basis Accident (DBA), including the Loss of Coolant Accident (LOCA) and the refueling accident. It is also instrumental in maintaining the integrity of secondary containment during a primary to secondary containment instrument line break. Two parallel trains are provided, each of which is capable of producing greater than 0.25 inches water negative pressure required in the reactor building while processing 4000 cubic ft /min of exhaust air. The control room habitability analysis also assumed one SBGTS train was operating.

The system is designed to automatically start a single SBGTS train or start both trains simultaneously. The selector switches for the individual SBGTS trains are arranged so that each train may be placed in the Primary, Standby, Manual Start, or Off positions. Normal operation has the 1/2B SBGTS train (powered from Unit 1) selected as primary, and the 1/2A SBGTS train (powered from Unit 2) as standby. Maintaining the 1/2B SBGTS train as primary, and the 1/2A SBGTS train as standby, ensures the SBGTS meets single failure criteria. Since the 1/2B SBGTS train, and the Unit 1 Primary Containment Isolation (PCI) [JM] and Process Radiation Monitoring (PRM) [IL] circuits are both supplied from Bus 19, a loss of Bus 19 with the 1/2B SBGTS selected as standby and the 1/2A SBGTS train selected as primary, will prevent the 1/2B SBGTS train from starting, and will inhibit automatic and manual starting of the 1/2A SBGTS train. Therefore, the 1/2B SBGTS train is normally selected as primary. If the selector switches are in the normal operation positions, and the primary train does not start on an initiation signal within a predetermined time, then the train selected as the standby train will start automatically. Similarly, if the operating SBGTS train should fail, the backup SBGTS train will automatically start. This design will ensure that building negative pressure is maintained.

The emergency power supplies for SBGTS are as follows: 1/2B SBGTS train is aligned to the Unit 1 EDG (Division II) via Motor Control Center (MCC) 19-4; while the 1/2A SBGTS train is aligned to the Unit 2 EDG (Division II) via MCC 29-4. If a Unit 1 or Unit 2 EDG fails, power from the common Unit 1/2 EDG (Division I) must be manually aligned.

**Safety Impact**

Since both trains of SBGTS had lost their emergency power supplies during this 125 VDC ground event (Unit 1 EDG unavailable due to the 125 VDC ground, and Unit 2 EDG unavailable due to repairs during refuel outage Q2R21), had a simultaneous DBA (LOCA/Loss of Offsite Power) occurred, all normal power would have also been lost to the SBGTS, and hence, without normal or emergency power available, this would have resulted in preventing the fulfillment of the safety function of the SBGTS to control the release of radioactive material, and mitigate the consequences of an accident.

**Risk Insights**

During this event, the SBGTS system filtration capability was not lost, and normal off-site power remained available. In addition, manual transfer of power supply capability from the 1/2 EDG remained available during this event. This condition did not create any actual plant or safety consequences since the Unit was not in an accident or transient condition requiring use of SBGTS during this period of time.

Considering the impact of this condition on the Plant Probabilistic Risk Assessment (PRA), the 7 hour time frame in which both EDGs were unavailable resulted in a change in Core Damage Frequency (CDF) of less than 4E-09/year.

1. FACILITY NAME	2. DOCKET	6. LER NUMBER			3. PAGE	
Quad Cities Nuclear Power Station Unit 1	05000254	YEAR	SEQUENTIAL NUMBER	REV NO.	5	OF 5
		2012	- 002	- 00		

**NARRATIVE**

This change in CDF is not a significant impact on quantitative plant risk, and is considered negligible. In conclusion, the safety significance of this event was minimal.

**E. CORRECTIVE ACTIONS**

Immediate:

1. The Unit 1 EDG governor oil booster pump motor was replaced. The removed motor was sent off-site for failure analysis.

Follow-up:

1. The Unit 2 EDG governor oil booster pump motor has been replaced, and verification of motor connection box fasteners length has been completed.
2. The verification of the proper length of the governor oil booster pump motor connection box fasteners on the Unit 1 EDG is planned for the next available work window.
3. The Unit 1/2 EDG governor oil booster pump motor replacement, and fastener length verification are planned for the next available work window.
4. To reduce the potential to ground the motor caused by long motor connection box fasteners, work instructions will be developed for use when replacing governor oil booster pump motors to ensure the proper method for measuring mounting fasteners is provided to reduce the potential of breaching the insulated brush holders.

**F. PREVIOUS OCCURRENCES**

The station events database, LERs, EPIX, and NPRDS were reviewed for similar events at Quad Cities Nuclear Power Station. This event was a hard 125 VDC ground on the Unit 1 EDG governor oil booster pump motor and unplanned start of the Unit 1 EDG, caused by a breach in the insulated sleeve of the motor brush holder due to previously drilled and tapped holes for fasteners used to secure the motor connection box. There were no previous similar occurrences identified at Quad Cities Nuclear Power Station within the previous 10 years that involved a cause of this type.

**G. COMPONENT FAILURE DATA**

The failed component was the Unit 1 EDG governor oil booster pump motor, which is a 115 Volt, John S. Barnes 3/ 4 H/P motor, Part Number GC684, SN # 8M14779UO.

This event has been reported to EPIX as Failure Report No. 1151.