

Exelon Generation Company, LLC
Braidwood Station
35100 South Route 53, Suite 84
Braceville, IL 60407-9619

www.exeloncorp.com

10 CFR 50.73

May 3, 2011
BW110047

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

Braidwood Station, Unit 1
Facility Operating License No. NPF-72
NRC Docket No. STN 50-456

Subject: Licensee Event Report 2011-002-00 – Loss of Unit 1 Train A Bus 141 Degraded
Undervoltage Function

The enclosed Licensee Event Report (LER) is being submitted in accordance with 10 CFR 50.73, "Licensee event report system," paragraph (a)(2)(i)(B), any operation or condition which is prohibited by the plant's Technical Specifications. The LER involves a relay out of tolerance issue that may have existed for a longer period of time than allowed by the Technical Specifications. 10 CFR 50.73(a) requires an LER to be submitted within 60 days following discovery of the event. Therefore, this report is being submitted by May 3, 2011.

There are no regulatory commitments contained in this letter. Should you have any questions concerning this submittal, please contact Mr. Chris VanDenburgh, Regulatory Assurance Manager, at (815) 417-2800.

Respectfully,



Daniel J. Enright
Site Vice President
Braidwood Station

Enclosure: LER 2011-002-00

cc: NRR Project Manager – Braidwood Station
Illinois Emergency Management Agency – Division of Nuclear Safety
US NRC Regional Administrator, Region III
US NRC Senior Resident Inspector (Braidwood Station)
Illinois Emergency Management Agency - Braidwood Rep

LICENSEE EVENT REPORT (LER)

(See reverse 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 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.

1. FACILITY NAME Braidwood Station, Unit 1	2. DOCKET NUMBER 05000456	3. PAGE 1 of 3
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4. TITLE
Loss of Unit 1 Train A Bus 141 Degraded Undervoltage Function

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
03	04	2011	2011	002	00	05	03	2011	N/A	N/A
									FACILITY NAME	DOCKET NUMBER
									N/A	N/A

9. OPERATING MODE 1	11. THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: (Check all that apply)			
10. POWER LEVEL 100	<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)
	<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

FACILITY NAME Chris VanDenburgh, Regulatory Assurance Manager	TELEPHONE NUMBER (Include Area Code) (815) 417-2800
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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
B	EA	27	ABB	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 N/A	DAY N/A	YEAR N/A
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ABSTRACT (Limit to 1400 spaces, i.e., approximately 15 single-spaced typewritten lines)

On October 11, 2010, during execution of an undervoltage relay surveillance on Train A of the 4.16 kV Engineered Safety Feature bus 141, the as-found trip values of the A-to-B phase degraded voltage relay were found out of tolerance. The relay was replaced.

An evaluation identified that the undervoltage relay had a manufacturing defect. A polarity sensitive capacitor was incorrectly installed with the polarity reversed.

On March 4, 2011, a review of this evaluation was initiated to identify when the instrument out of tolerance occurred. Based on a review of this event against known conditions and trends, there was insufficient evidence to predict when the relay failure would have occurred, and no past surveillance history would indicate degraded conditions prior to the out of tolerance condition. Therefore the relay out of tolerance issue may have existed for a longer period of time than is allowed by the plant's Technical Specifications.

Corrective actions included replacement of the degraded voltage relay.

There were no actual safety consequences impacting plant or public safety as a result of the event.

This event is reportable under 10 CFR 50.73(a)(2)(i)(B), any operation or condition which is prohibited by the plant's Technical Specifications.

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NARRATIVE

A. Plant Operating Conditions Before the Event:

Event Date: March 4, 2011

Unit: 1 MODE: 1 Reactor Power: 100 percent

Unit 1 Reactor Coolant System [AB]: Normal operating temperature and pressure

B. Description of Event:

No structures, systems or components were inoperable at the start of this event that contributed to the event.

On October 11, 2010, during execution of an undervoltage relay surveillance on Train A of the 4.16kV Engineered Safety Feature (ESF) bus 141 (AP) [EA], the as-found trip values of the A-to-B phase degraded voltage relay were found out of tolerance greater than the Technical Specifications (TS) allowable value. The relay was replaced.

An evaluation was performed to determine the cause of the relay failure. Evaluation results identified that the undervoltage relay had a manufacturing defect. A polarity sensitive capacitor was incorrectly installed with the polarity reversed. The normal failure mode of this capacitor, installed in reverse, is increasing leakage current. The leaking capacitor could load the power supply and cause voltage to dip. Any significant dip in voltage will potentially cause a gradual drift in calibration.

On March 4, 2011, a review of this evaluation was initiated to identify when the instrument out of tolerance occurred. Based on a review of this event against known conditions and trends, there was insufficient evidence to predict when the relay failure would have occurred, and no past surveillance history would indicate degraded conditions prior to the out of tolerance condition. TS Limiting Condition for Operation (LCO) 3.3.5, "Loss of Power (LOP) Diesel Generator (DG) Start Instrumentation," Condition A, "One or more Functions with one channel on one or more busses inoperable" requires placing the channel in trip within one hour. The relay out of tolerance issue may have existed for a longer period of time than is allowed by LCO 3.3.5 Condition A. Therefore, this condition is reportable under 10 CFR 50.73(a)(2)(i)(B), any operation or condition prohibited by the plant's Technical Specifications.

C. Cause of Event

The apparent cause of the loss of bus 141 degraded voltage function is an undervoltage relay manufacturing defect.

The out of tolerance of the undervoltage relay was due to an incorrectly installed capacitor (capacitor C115) on the harmonic filter printed circuit module of the relay. This polarity sensitive capacitor was installed with the polarity reversed. Failure analysis of the relay demonstrated that after the capacitor was removed and reinstalled with the correct polarity and setpoint adjustments were made, the relay performed acceptably.

D. Safety Consequences:

There were no actual safety consequences impacting plant or public safety as a result of this event.

The emergency diesel generators (DGs) [EK] provide a source of emergency power when offsite power is either unavailable or is insufficiently stable to allow safe unit operation. Undervoltage protection will generate an LOP start of the DGs if a loss of voltage or degraded voltage condition occurs. There are two LOP start signals for each 4.16 kV ESF bus. Two undervoltage relays are provided on each 4.16 kV ESF bus for detecting a sustained

LICENSEE EVENT REPORT (LER)
CONTINUATION SHEET

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NARRATIVE

degraded voltage condition, and two additional undervoltage relays are provided for detecting a loss of bus voltage. Each pair of relays are combined in a two-out-of-two logic to generate an LOP signal if the voltage is below the loss of voltage (first level undervoltage) condition for a short time, or below the degraded voltage (second level undervoltage) condition for a period that exceeds the time delay for the plant condition. Accident analyses credit the loading of the DG based on the loss of offsite power during a loss of coolant accident.

The degraded voltage logic was implemented to address concerns with degraded grid conditions following a unit trip that could adversely impact operation of safety related equipment. Exelon Energy Delivery (EED) Bulk Power Operations uses two computer programs, the State Estimator and Contingency Analysis, which automatically obtain real time data from the operating transmission system to determine the actual transmission system power flow. This is then used to run numerous different contingency studies every ten minutes to predict switchyard voltage including the predicted voltage in the Braidwood switchyard. If the contingency analysis shows that the predicted voltage at the Braidwood switchyard falls below the minimum required voltage, and EED cannot correct the issue, EED will contact the Exelon Nuclear Duty Officer (NDO). EED will inform the NDO of the predicted low switchyard voltage value, the NDO will then contact Braidwood and, if the condition is based on a unit trip at Braidwood, the plant operators will have to evaluate whether the switchyard voltage is adequate and the off-site sources are operable. If necessary, the operators would declare the offsite source unavailable and enter the appropriate LCOs until grid conditions are restored. A review performed since the last calibration of this relay (April 10, 2009), which would bound the period the bus 141 degraded voltage relay may have been out of tolerance indicates there have been no notifications to Braidwood that the State Estimator was in alarm. Therefore, in an accident condition, the degraded voltage protection would not have been challenged.

In an accident condition, the risk to the plant due to this event was low. Although the 4.16 kV ESF Train A (bus 141) degraded voltage protection was unavailable, the bus 141 loss of voltage protection was available. Additionally, Train B (bus 142) had both the degraded and loss of voltage protections available. Therefore, this event did not result in a safety system functional failure.

During the period the Bus 141 degraded voltage relay was out of tolerance, there were no State Estimator alarms.

E. Corrective Actions:

Corrective actions include:

- Replacement of the degraded voltage relay – completed.
- Perform inspections of the degraded voltage relays on Units 1 and 2 to verify proper orientation of the C115 capacitor on the harmonic filter printed circuit module.

F. Previous Occurrences:

There have been no previous, similar Licensee Event Reports identified at the Braidwood Station.

G. Component Failure Data:

This event has been reported to EPIX as Failure Report No. 997.

<u>Manufacturer</u>	<u>Nomenclature</u>	<u>Model</u>	<u>Mfg. Part Number</u>
ABB Power T&D Company, Inc.	Undervoltage Relay	ITE-27N	N/A