



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

10 CFR 50.73

October 19, 2015  
BW150098

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

Braidwood Station, Units 1 and 2  
Facility Operating License Nos. NPF-72 and NPF-77  
NRC Docket Nos. STN 50-456 and STN 50-457

Subject: Licensee Event Report 2015-003-00 – Unanalyzed Condition due to a Design Deficiency with Pressurizer Power Operated Relief Valve Circuitry that Could Prevent Valve Manual Closure to Mitigate Spurious Operation

The enclosed Licensee Event Report (LER) is being submitted in accordance with 10 CFR 50.73, "Licensee Event Report System."

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

Respectfully,

A handwritten signature in black ink, appearing to read "Mark Kanavos", written over a horizontal line.

Mark Kanavos  
Site Vice President  
Braidwood Station

Enclosure: LER 2015-003-00

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 Representative

**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, 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 4

**4. TITLE**

Unanalyzed Condition due to a Design Deficiency with Pressurizer Power Operated Relief Valve Circuitry that Could Prevent Valve Manual Closure to Mitigate Spurious Operation

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
08	20	2015	2015	003	00	10	19	2015	Braidwood Station, Unit 2	05000457
									FACILITY NAME	DOCKET NUMBER
									N/A	N/A

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)(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 checked="" 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)
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)(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 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

Phillip J. Raush, Regulatory Assurance Manager

## TELEPHONE NUMBER (Include Area Code)

(815) 417-2800

**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
N/A	N/A	N/A	N/A	N/A	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
N/A	N/A	N/A

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

On August 20, 2015, a design deficiency associated with the pressurizer power operated relief valve (PORV) block valve control circuitry was confirmed, in which a design basis fire in the main control room or cable spreading rooms could prevent the credited fire safe shutdown action (i.e., locally close pressurizer PORV block valve) mitigating a spurious pressurizer PORV opening.

On September 2, 2015, during an extent of condition review, an additional design deficiency was confirmed in which credited fire safe shutdown action (i.e., removing control power fuses) mitigating a spurious opening of the pressurizer PORVs during a design basis fire, does not adequately mitigate a design basis fire induced hot short.

The causes of these design deficiencies are legacy design errors made during original construction.

Corrective actions include plant configuration changes correcting the specific design deficiencies.

This condition is being reported in accordance with 10CFR50.73(a)(2)(ii)(B), any event or condition that results in the nuclear power plant being in an unanalyzed condition that significantly degrades plant safety.

**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 [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.

1. FACILITY NAME	2. DOCKET	6. LER NUMBER			3. PAGE
		YEAR	SEQUENTIAL NUMBER	REV NO.	
Braidwood Station, Unit 1	05000456	2015	- 003	- 00	2 OF 4

**NARRATIVE****A. Plant Operating Conditions Before the Event:**

Event Date: August 20, 2015

Unit: 1	Mode: 1	Reactor Power: 100 percent
Unit: 2	Mode: 1	Reactor Power: 100 percent

Unit 1 Reactor Coolant System [AB]:	Normal operating temperature and pressure
Unit 2 Reactor Coolant System:	Normal operating temperature and pressure

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

**System Background**

The pressurizer power operated relief valves (PORVs) are DC solenoid controlled air operated valves. These valves provide the primary overpressure protection of the reactor coolant system (RCS) during most modes of operation. Each PORV line has a normally open motor operated block valve immediately upstream of the PORV itself. The pressurizer PORVs and associated block valves are considered a high-low pressure interface between the RCS and the low pressure pressurizer relief tank (PRT). A "remote/local" isolation switch and local control switch are provided for each pressurizer PORV block valve at their associated motor control centers (MCCs). The block valves can be locally closed by placing their "remote/local" isolation switch in "Local" and then closing the valve with the local control switch.

Components forming high-low pressure interface must consider the following credible design basis fire induced circuit failures: multiple open circuits, short circuits, shorts to ground, and multiple hot shorts within the control circuit. In addition, three-phase AC power circuit cable-to-cable proper phase sequence faults and two-wire ungrounded DC circuit cable-to-cable proper polarity faults are considered to be credible, and must be evaluated.

**B. Description of Event:**

On August 20, 2015 at 1710, while responding to an NRC Triennial Fire Protection Inspection question, a design deficiency associated with the pressurizer PORV block valve control circuitry was confirmed. Specifically, the circuit deficiency for which a design basis fire in the main control room (MCR) or cable spreading rooms (CSRs) could prevent the pressurizer PORV block valves from being locally closed at their local control switch. The design failed to isolate all energized conductors within the control circuit thereby allowing a short to ground to clear the associated control power fuses. Consequently, a design basis fire induced short to ground in the MCR or CSR could clear the associated control power fuses preventing the block valves from operating at the local control switch.

This identified pressurized PORV block valve circuit deficiency prevents the credited fire safe shutdown action of locally closing the block valves to mitigate the spurious operation of a pressurizer PORV.

Fire watches of the affected MCR and CSR fire zones were immediately implemented. In addition, the MCR is continuously staffed and the affected CSR fire zones are equipped with fire detection and automatic and manual fire suppression systems.

LICENSEE EVENT REPORT (LER)  
CONTINUATION SHEET

1. FACILITY NAME	2. DOCKET	6. LER NUMBER			3. PAGE
Braidwood Station, Unit 1	05000456	YEAR	SEQUENTIAL NUMBER	REV NO.	3 OF 4
		2015	- 003	- 00	

## NARRATIVE

On September 2, 2015, during an extent of condition review, an additional design deficiency associated with the pressurizer PORV and pressurizer PORV block valves was confirmed. Specifically, the current fire safe shutdown mitigating strategy for removing pressurizer PORV control power fuses does not adequately prevent a pressurizer PORV from spuriously opening due to a fire induced hot short. Furthermore, local actions to close the associated pressurizer PORV block valve at the MCC are not effective because the MCC would not have electrical power during the all design basis fires. Therefore, the credited safe shutdown action to remove the pressurizer PORV control power fuses does not prevent the pressurizer PORV from spuriously opening during design basis fires in some of the CSR fire zones. The affected Fire Zones were in the same CSRs previously identified on August 20, 2015, and fire watches of the affected areas remained in place.

This condition is being reported in accordance with 10CFR50.73(a)(2)(ii)(B), any event or condition that results in the nuclear power plant being in an unanalyzed condition that significantly degrades plant safety. This LER is being submitted in follow-up to NRC Event Notification (ENS) 51334 made on August 20, 2015, followed by a supplemental ENS call on September 2, 2015, under the same ENS 51334.

**C. Cause of Event**

The cause of this condition is legacy design errors introduced during original plant design / construction and fire safe shutdown strategy changes introduced during resolution of NRC Information Notice (IN) 92-18 – Potential for Loss of Remote Shutdown Capability during a Control Room Fire. Several missed opportunities to identify these design errors included: implementation of IN 92-18 actions; during the corrective actions resolving IN 92-18 implementation inadequacies; and most recently during the multiple spurious operation project.

**D. Safety Consequences:**

This condition had no actual safety consequences impacting plant or public safety because a fire did not occur and damage credited safe shutdown equipment.

The issue affects compliance with the fire protection licensing requirements, and does not affect the PORV and or associated block valve from performing their specified safety functions required by Technical Specifications. The Fire Protection program provides pre-evaluated compensatory actions in the event that one of the credited features (i.e., suppression/detection/barrier) is degraded or unavailable. In this case, with the absence of a fire rated barrier, spurious operation or loss of control of the PORVs and block valves is possible if a fire of sufficient size were to occur.

The current circuit configuration would not prohibit control of the PORV block valve from the MCR or locally from the MCCs in the event of any UFSAR Chapter 15 accident. Therefore, there was no loss of safety function for this event.

Furthermore, the affected MCR and CSR are either continuously staffed or have fire detection and automatic and manual fire suppression systems. Therefore considering the Fire Protection Program defense in depth strategy, these design errors do not significantly degrade plant safety.

**E. Corrective Actions:**

- Immediate Actions Taken – Established fire watches in the affected areas - MCR and affected CSRs.
- Corrective Action Completed - Implemented plant configuration changes rewiring the affected pressurizer PORV block valve control circuits to fully isolate all remote conductors thereby ensuring the local control functions remain available to mitigate consequences of design basis fires in the MCR and CSR.
- Corrective Actions planned - Implement plant configuration changes to install design features defeating design basis fire induced hot shorts from spuriously opening the pressurizer PORVs.

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

1. FACILITY NAME	2. DOCKET	6. LER NUMBER			3. PAGE
Braidwood Station, Unit 1	05000456	YEAR	SEQUENTIAL NUMBER	REV NO.	4    OF    4
		2015	-    003	-    00	

**NARRATIVE**

**F. Previous Occurrences:**

There have been no previous Licensee Event Reports at Braidwood on this issue.

**G. Component Failure Data:**

<u>Manufacturer</u>	<u>Nomenclature</u>	<u>Model</u>	<u>Mfg. Part Number</u>
N/A	N/A	N/A	N/A