



Exelon Generation

July 17, 2014

10 CFR 50.73

SVP-14-054

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 No. DPR-29 and 30
NRC Docket No. 50-254 and 50-265**

Subject: Licensee Event Report 254/2014-003-00, "HPCI Interlock Door Opened Simultaneously Cause Loss of Secondary Containment"

Enclosed is Licensee Event Report (LER) 254/2014-003-00, "HPCI Interlock Door Opened Simultaneously Cause Loss of Secondary Containment," for Quad Cities Nuclear Power Station, Unit 1.

This report is submitted in accordance with 10 CFR 50.73 (a)(2)(v)(C) 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.

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

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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

Quad Cities Nuclear Power Station Unit 1

2. DOCKET NUMBER

05000254

3. PAGE

1 OF 5

4. TITLE

HPCI Interlock Doors Opened Simultaneously Cause Loss of Secondary Containment

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
05	22	2014	2014	003	00	07	17	2014	Quad Cities Nuclear Power Station Unit 2	05000265
									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 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 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 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
B	NG	DR	N/A	Y					

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
		N/A	N/A	N/A

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

On May 22, 2014, at 2150 hours, a mechanic notified the Main Control Room that both doors [DR] in the secondary containment [NG] interlock [IEL] to the High Pressure Coolant Injection (HPCI) room from the Turbine Building (TB) [NM] were opened simultaneously. The failure of this interlock caused a loss of secondary containment per Technical Specification (TS) 3.6.4.1, Condition A. The doors were immediately reclosed, and the secondary containment boundary was reestablished. Operators verified the Reactor Building (RB) (secondary containment) differential pressure was maintained operable at greater than 0.10 inch of vacuum water gauge.

Secondary containment remained available and functional during the event since the secondary containment interlock was immediately restored by closing the doors and since the RB differential pressure was maintained during the event. No RB low differential pressure alarms were received during this event. The RB is a common volume to both Units 1 and 2. An interlock failure can impact the secondary containment for both units.

The cause of the interlock failure was due to a bent locking bolt resulting in misalignment of the interlock plungers on the TB-side door. The mechanical interlock device could be defeated inadvertently in this condition.

Corrective actions included replacing the bent locking bolt and realigning the TB-side doors.

The safety significance of this event was minimal. Given the impact on the secondary containment, this report is submitted (for Units 1 and 2) in accordance with the requirements of 10 CFR 50.73 (a)(2)(v)(C), 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.



**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, 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	
Quad Cities Nuclear Power Station Unit 1	05000254	YEAR	SEQUENTIAL NUMBER	REV NO.	2 OF 5	
		2014	- 003	- 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

Both doors in the secondary containment interlock between the Unit 1 High Pressure Coolant Injection room and the adjoining tunnel in the Turbine Building were opened simultaneously and caused a loss of secondary containment.

A. CONDITION PRIOR TO EVENT

Unit: 1 / 2 Event Date: May 22, 2014 Event Time: 2150 hours
 Reactor Mode: 1 / 1 Mode Name: Power Operation / Power Operation Power Level: 100% / 100%

B. DESCRIPTION OF EVENT

On May 22, 2014, at 2150, Mechanical Maintenance notified the main control room (MCR) that both Unit 1 High Pressure Coolant Injection (HPCI) secondary containment interlock doors were open at the same time. The failure of this interlock caused a loss of secondary containment per Technical Specification (TS) 3.6.4.1, Condition A. The doors were immediately reclosed, and the secondary containment boundary was reestablished. Operators verified the Reactor Building (secondary containment) differential pressure was maintained operable at greater than 0.10 inch of vacuum water gauge.

The Operations Field Supervisor was then dispatched to the HPCI tunnel to investigate the condition. It was determined that the condition could be recreated. Operators staged signage and ropes to administratively control the interlock closed until repairs could be performed.

Secondary containment remained available and functional during the event since the secondary containment interlock was immediately restored and the RB differential pressure was maintained during the event. A review of the Station Event Recorder (SER) verified that RB low differential pressure alarms were not received during this event. The RB is a common volume to both Units 1 and 2, and an interlock failure can impact the secondary containment for both units.

On May 23, 2014, at 0101 hours, ENS #50132 was made to the NRC under 10 CFR 50.72(b)(3)(v)(C), to report this event as an event or condition that could have prevented the fulfillment of a safety function.

Prior to the event on May 22, mechanics were transferring scaffold material through the interlocks on carts from the HPCI room into the tunnel. Two mechanics had opened the door to the Unit 1 HPCI room to transport a cart of scaffold material to the tunnel. While this door was open, a third mechanic inside the HPCI tunnel proceeded to open the tunnel-side door. He stated that he looked at the indicator light near the door and that it appeared to be off before he opened the door. Upon seeing the HPCI room door open, the third mechanic closed the tunnel door immediately to reestablish secondary containment.

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Following notification of the MCR, the Operations Field Supervisor investigated the doors. It was identified that the indicator light inside of the HPCI tunnel was very dim and is barely noticeable without very close examination. In addition, the light is very small and located near a bright ceiling light, adding to the visibility issues.

It was also identified that the plungers for the TB-side door would not engage fully to keep the door from opening while the interlock was energized. The locking bolt that secures the passive door into the floor was bent such that the doors were not closed completely tight against the threshold. The result was that the plungers did not align with the slot in the door to lock the door closed.

On May 23, 2014, the TB passive door locking bolt was replaced and the doors were properly aligned with the plungers. The interlock then functioned normally.

Given the impact on the secondary containment, this report is submitted (for Units 1 and 2) in accordance with the requirements of 10 CFR 50.73 (a)(2)(v)(C), 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.

C. CAUSE OF EVENT

The apparent cause of the event on May 22, 2014, was the bent locking bolt on the passive TB-side door. Since the bolt was not effectively holding the passive door, and subsequently the active door, the doors were not closed tightly to the threshold. Also, the plungers were not aligned with the slots on the door. Since the plungers were not aligned, they did not lock into the slots when the logic was activated by the other door. Without the plungers locking the doors closed, the mechanic was able to open the door.

The contributing cause of the event was the degraded indication light in the HPCI tunnel. Had the indication been clearly visible, the mechanic would have known the other door was open and would not have challenged the door.

D. SAFETY ANALYSIS

System Design

The function of the secondary containment is to contain, dilute, and hold up fission products that may leak from primary containment following a Design Basis Accident (DBA). In conjunction with operation of the Standby Gas Treatment System (SBGTS) [BH] and closure of certain valves [V] whose lines penetrate the secondary containment, the secondary containment is designed to reduce the activity level of the fission products prior to release to the environment, and to isolate and contain fission products that are released during certain operations that take place inside primary containment, when primary containment is not required to be operable, or that take place outside primary containment.

Updated Final Safety Analysis Report (UFSAR) Section 6.2.3.1 provides that the safety objective of the secondary containment system, in conjunction with other engineered safeguards and nuclear safety systems, is to limit the release of radioactive materials so that offsite doses resulting from a postulated DBA will remain below 10 CFR 100 guideline values.

The secondary containment interlocks are designed to provide personnel access to the RB from the TB while maintaining a negative differential pressure in the RB. The Unit 1 HPCI interlock doors are normally secured closed by mechanical latches. Each door is operated manually with a door knob, and interlock logic is activated to actuate plungers that lock closed the opposite door in the interlock. The doors are designed with relay logic so that only one door can be opened at a time. A red light near each door illuminates when one of the doors is open.

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Safety Impact

Both Units 1 and 2 share a common RB (secondary containment). When both HPCI interlock doors were opened simultaneously, this caused a momentary loss of secondary containment.

TS 3.6.4.1, Condition A, requires restoration of secondary containment to operable status within four hours. This four hour Completion Time provides a period of time to correct the problem that is commensurate with the importance of maintaining secondary containment during Modes 1, 2, and 3, since the probability of an accident occurring during this short period is minimal.

The primary purpose of the secondary containment is to minimize the ground level release of airborne radioactive materials and to provide a controlled, elevated release of the building atmosphere under accident conditions. An engineering analysis was performed to demonstrate that during the short (momentary) time that both doors of the corresponding interlock were simultaneously opened, the doors were not open sufficiently long enough to cause a RB low differential pressure alarm, hence no loss of secondary containment differential pressure occurred. Secondary containment would have sufficiently contained radioactive materials during a LOCA such that all current dose limits would remain to be met. As a result, the system safety function of secondary containment would have been maintained throughout the event. Therefore, the dose consequence from postulated releases from the RB during this short duration would remain to be bounded by the existing design basis LOCA dose analysis. The safety significance of this event was minimal.

The engineering analysis that was performed demonstrated this event did not constitute a Safety System Functional Failure (SSFF). (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 during this event when both doors of the secondary containment interlock were momentarily simultaneously opened.

Risk Insights

The plant Probabilistic Risk Assessment (PRA) model gives no credit to the secondary containment and does not include it in the model. Therefore, the as-found conditions did not contribute to an increase in risk. In addition, the physical integrity of the secondary containment structure was never compromised and the primary containment function was never lost.

Although secondary containment was momentarily inoperable per TS 3.6.4.1, Condition A, when the Unit 1 HPCI interlock doors were opened simultaneously due to a malfunction, there was no Design Based Accident condition in progress, and secondary containment function was restored immediately when one of the doors was closed. RB differential pressure was maintained during the event.

In conclusion, the overall safety significance and impact on risk of this event were minimal.

E. CORRECTIVE ACTIONS

Immediate:

1. Operators staged signage and ropes to administratively control access through the HPCI interlock until repairs could be performed.
2. Replaced the bent locking bolt on the TB passive door with a new bolt, and realigned the doors.

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Follow-up:

1. Add steps to the preventive maintenance procedure to inspect door hardware annually.
2. Upgrade the door indication lights to LEDs to improve reliability and visibility.

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 a failure of a secondary containment interlock door bolt which caused two interlock doors to be open simultaneously. Based on the conditions of this event, causes, and associated corrective actions, the events listed below, although similar in topic, are not considered significant station experiences that would have directly contributed to preventing this event.

- Station Issue Report (IR) 1345004, Reactor Building Interlock Door Opened with Other Door Open (3/23/12) - The RB and TB doors in the Unit 2 RFP interlock had been opened simultaneously. Later when the doors were inspected, the magnets and logic were found to be functioning normally. It was suspected that the RB door actuator had overheated from excessive use the previous day resulting in the malfunction. The condition could not be replicated, so the true cause could not be identified. The current LER did not identify a failed actuator as the cause. Therefore, this past interlock failure event is not directly applicable to the event of the current LER.
- LER 254/2012-004-00, 11/05/12, Breach in Secondary Containment (09/06/12) - Two doors in the Unit 2 RFP interlock had been opened simultaneously. The HRSS-side door opened unexpectedly while the RB-side door was open due to a malfunctioning door latch. The HRSS door was immediately shut. The apparent cause was the HRSS-side door latching mechanism was not fully engaged while coupled with its crash bar may have been bumped. Since the HRSS door has a different style of latch than the interlock doors of the current LER, this previous event is not directly applicable to the current LER.
- Station Issue Report (IR) 1641747, Both U2 RB 595 RFP to RB Interlock Doors Open Simultaneously (4/1/14) - Both doors in the secondary containment interlock on the 595 foot elevation from the Unit 2 Reactor Feed Pump (RFP) room to the Reactor Building (RB) were open simultaneously. The doors were immediately closed and secondary containment was reestablished. The cause of the secondary containment event was due to a failed interlock door actuator that caused both doors to open simultaneously. The design of this interlock is different from the HPCI interlock. Therefore, this previous interlock actuator failure is not directly applicable to the current LER.

G. COMPONENT FAILURE DATA

Failed Equipment: Locking Bolt
 Component Manufacturer: N/A
 Component Model Number: N/A
 Component Part Number: N/A

This event has been reported to ICES as Failure Report No. 312012.