



# Exelon Generation®

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10 CFR 50.73

June 11, 2012  
BW120055

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 2012-001-00 – Two Main Steam Safety Valves Failed  
Pre-outage Setpoint Testing Due to Abnormal Spring Geometry

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. Chris VanDenburgh, Regulatory Assurance Manager, at (815) 417-2800.

Respectfully,

Daniel J. Enright  
Site Vice President  
Braidwood Station

Enclosure: LER 2012-001-00

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](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**

Braidwood Station, Unit 1

**2. DOCKET NUMBER**

05000456

**3. PAGE**

1 of 4

**4. TITLE**

Two Main Steam Safety Valves Failed Pre-outage Setpoint Testing Due to Abnormal Spring Geometry

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	12	2012	2012	- 001 - 00		06	11	2012	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 checked="" 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)
10. POWER LEVEL	<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

**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
X	SB	RV	D245	N	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 April 11, 2012, pre-outage testing was initiated for the main steam safety valves for their setpoint verification per Technical Specification (TS) 3.7.1, Main Steam Safety Valves. During the testing, two of the valves (1MS015D on April 11, 2012 and 1MS014D on April 12, 2012) failed to meet the as-found set pressure acceptance criteria. When each valve (1MS015D and 1MS014D) was identified as outside the acceptance criteria, the appropriate Limiting Condition for Operation (LCO) was entered, the valve was returned to its operable status by returning the setpoints within the TS surveillance requirements, and the LCO was exited.

The apparent cause of the 1MS015D and 1MS014D valves failing their performance tests was determined to be abnormal spring geometry. Contributing causes were determined to be spindle wear and steam leakage across the disc seat area. Corrective actions included refurbishing the 1MS015D and 1MS014D valves.

This event is reportable in accordance with 10 CFR 50.73(a)(2)(i)(B), any operation or condition prohibited by the plant's Technical Specifications. This event is also being reported in accordance with 10 CFR 50.73(a)(2)(vii) for any event where a single cause or condition caused at least two independent trains or channels to become inoperable in a single system designed to mitigate the consequences of an accident.

LICENSEE EVENT REPORT (LER)  
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## NARRATIVE

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

Event Date: April 12, 2012

Unit: 1                      MODE: 1                      Reactor Power: 94 percent

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

**Description of Event:**

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

On April 11, 2012, pre-outage testing was initiated for the main steam safety valves (MSSVs) [SB] for their setpoint verification per Technical Specification (TS) 3.7.1, Main Steam Safety Valves. During the testing, two of the MSSVs (1MS015D on April 11, 2012 and 1MS014D on April 12, 2012) failed to meet the as-found set pressure acceptance criteria of +/- three percent, and one MSSV (1MS016D on April 12, 2012) tested in tolerance within the evaluation range. When each valve (1MS015D and 1MS014D) was identified as outside the acceptance criteria, the appropriate Limiting Condition for Operation (LCO) was entered, the valve was returned to its operable status by returning the setpoints within the TS surveillance requirements, and the LCO was exited. For the 1MS016D valve, subsequent evaluation determined the valve met the as-found setpoint requirements.

Discrepancies found in TS surveillance tests are normally assumed to occur at the time of the test unless there is firm evidence, based on a review of relevant information that the discrepancy occurred earlier. However, on April 12, 2012, multiple valves (1MS015D and 1MS014D) were found to lift with setpoints outside of TS limits, which is an indication that the discrepancies may have arisen over a period of time. It is reasonable to assume the condition existed during plant operation in excess of TS LCO completion times. Therefore, on April 12, 2012, with the identification of the second valve outside of TS limits, this event was determined to be reportable in accordance with 10 CFR 50.73(a)(2)(i)(B), any operation or condition prohibited by the plant's Technical Specifications.

Additionally, because the discrepancies affected multiple valves being inoperable, this event is reportable in accordance with 10 CFR 50.73(a)(2)(vii), any event where a single cause or condition caused two independent trains or channels to become inoperable in a single system designed to mitigate the consequences of an accident.

**B. Cause of Event**

The apparent cause of the 1MS015D and 1MS014D valves failing their as found performance tests was determined to be abnormal spring geometry.

The 1MS014D and 1MS015D MSSVs contained their original springs. The 1MS015D spring had a much thinner coil cross section on the top coil than the bottom coil which is significant and can impact valve performance because of off-center loading of the spindle and disc. The 1MS014D spring had a gap between the top coil of the spring that was wider than recommended based on a statistical evaluation of the Byron and Braidwood MSSV springs over a 10-year history. The spring as-measured top gap between the inactive and active coil was 0.150 inches which indicates abnormal spring squareness.

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**NARRATIVE**

Contributing causes were determined to be spindle wear and steam leakage across the disc seat area. The 1MS015D valve spindle showed significant vibration fretting damage from main steam system flow resonance. Additionally, the Inconel disc showed eight separate leak paths across the surface, which lowers the lift setpoint because it increases the huddling chamber pressure which provides lifting force during valve actuation. The 1MS014D valve Inconel disc showed two locations of significant steam leakage across the seat area in two areas 180 degrees apart which can lower the lift setpoint.

**D. Safety Consequences:**

There were no actual safety consequences impacting plant or public safety as a result of this event. This event captures a setpoint discrepancy, and not an actual demand for the 1MS015D and 1MS014D valves to lift.

From the surveillance testing:

- 1MS015D - Lifted low at 1143.79 psig (-5.08 %)
- 1MS014D - Lifted low at 1179.64 psig (-3.31 %)

The MSSVs are credited in the UFSAR Chapter 15 analyses for overpressure protection and small break loss of coolant accidents (SBLOCA). For the overpressure protection cases, the MSSVs are modeled with a +4 percent tolerance, and a +5 percent tolerance is used for SBLOCA – the analyses assume the MSSVs lift at pressures higher than the nominal setpoint. Lower MSSV lift pressure will be beneficial (that is gain margin to the acceptance criteria) for overpressure and the SBLOCA analyses. Since both the 1MS015D and 1MS014D lifted below their nominal setpoints, there is no impact on the overpressure and SBLOCA events.

The MSSVs are also modeled in the UFSAR Chapter 15 analyses as a release path for radiological releases. From this event, the most limiting as-found setpoint was the 1MS015D valve which lifted at 1143.79 psig. Adding a bounding instrument uncertainty of -6.2 psig, the resultant lift pressure is 1137.59 psig ( $1143.79 - 6.2 = 1137.59$  psig). For the steam generator tube rupture (SGTR) event, the steam generator power operated relief valves (PORVs) as well as the MSSVs are modeled in this analysis. The majority of the release from this event is through the steam generator PORV, which is assumed to be stuck open for 20 minutes. A depressurization occurs as the steam generator PORV becomes stuck open. The steam generator PORV is modeled to open at a pressure of 1099.7 psia. Since this is below the 1MS015D as-found lift pressure, the MSSV will not lift and there is no impact on this accident.

Dose calculations for releases other than SGTRs assume MSSVs as a release path. The current calculation assumes all 20 MSSVs remain open at a pressure of 1022.2 psig. The MSSV test results for 1MS015D show a lift pressure of 1137.59 ( $1143.79 - 6.2$ ) psig. Assuming 10 % blowdown, this one valve would stay open at a pressure of  $1137.59 \times 0.9 = 1023.83$  psig. This value is higher than the value of 1022.2 psig assumed in the analysis, therefore, there is no impact on this accident.

Based on the discussion above, the safety function of the MSSVs was not lost. Therefore, there was no safety system functional failure due to this event.

**E. Corrective Actions:**

Corrective actions included refurbishing the 1MS015D and 1MS014D valves (this action is complete).

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**NARRATIVE**

**F. Previous Occurrences:**

No previous, similar Licensee Event Reports were identified at the Braidwood Station:

**G. Component Failure Data:**

Manufacturer  
Dresser

Nomenclature  
Main Steam Safety Relief Valves

Model  
3707R

Mfg. Part Number  
N/A