

Commonwealth Edison Company  
Braidwood Generating Station  
Route #1, Box 84  
Braceville, IL 60407-9619  
Tel 815-458-2801



April 13, 2000  
BW000042

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: Submittal of Licensee Event Report Number 2000-002-00

10 CFR 50.73(a) requires a Licensee Event Report (LER) to be submitted within 30 days after discovery of the event. The purpose of this letter is to provide the subject LER in accordance with 10 CFR 50.73(a)(2)(iv) by the required April 14, 2000 submittal date.

Should you have any questions concerning this letter, please contact Mr. T. W. Simpkin, Regulatory Assurance Manager, at (815) 458-2801, extension 2980.

Respectfully,



Timothy J. Tulon  
Site Vice President  
Braidwood Station

Attachment: Braidwood Station, Unit 1 LER Number 2000-002-00

cc: Regional Administrator - NRC Region III  
NRC Senior Resident Inspector - Braidwood Station



**LICENSEE EVENT REPORT (LER)**

ESTIMATED BURDEN PER RESPONSE TO COMPLY WITH THIS INFORMATION COLLECTION REQUEST: 50.0 HRS. REPORTED LESSONS LEARNED ARE INCORPORATED INTO THE LICENSING PROCESS AND FED BACK TO INDUSTRY. FORWARD COMMENTS REGARDING BURDEN ESTIMATE TO THE INFORMATION AND RECORDS MANAGEMENT BRANCH (MNBB 7714), U.S. NUCLEAR REGULATORY COMMISSION, WASHINGTON, DC 20555-0001, AND TO THE PAPERWORK REDUCTION PROJECT

FACILITY NAME (1): **Braidwood Unit 1** DOCKET NUMBER (2) **05000456** PAGE (3) **1 of 5**

TITLE (4) **Main Steam Safety Valves (MSSVs) tested in excess of required setpoint due to bonding between the disc and nozzle seat.**

EVENT DATE (5)			LER NUMBER (6)			REPORT DATE (7)			OTHER FACILITIES INVOLVED (8)	
MONTH	DAY	YEAR	YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	MONTH	DAY	YEAR	FACILITY NAME	DOCKET NUMBER
03	15	2000	2000	-- 002	-- 00	04	13	2000	FACILITY NAME	DOCKET NUMBER

OPERATING MODE (9) POWER LEVEL (10)	MODE 1	<b>THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: (Check one or more) (11)</b>									
		<input type="checkbox"/> 20.2201(b)	<input type="checkbox"/> 20.2203(a)(3)(i)	<input type="checkbox"/> 50.73(a)(2)(iii)	<input type="checkbox"/> 73.71(b)						
		<input type="checkbox"/> 20.2203(a)(1)	<input type="checkbox"/> 20.2203(a)(3)(ii)	<input type="checkbox"/> 50.73(a)(2)(iv)	<input type="checkbox"/> 73.71(c)						
		<input type="checkbox"/> 20.2203(a)(2)(i)	<input type="checkbox"/> 20.2203(a)(4)	<input type="checkbox"/> 50.73(a)(2)(v)	<input type="checkbox"/> OTHER						
		<input type="checkbox"/> 20.2203(a)(2)(ii)	<input type="checkbox"/> 50.36(c)(1)	<input type="checkbox"/> 50.73(a)(2)(vii)	(Specify in Abstract below and in Text, NRC Form 366A)						
		<input type="checkbox"/> 20.2203(a)(2)(iii)	<input type="checkbox"/> 50.36(c)(2)	<input type="checkbox"/> 50.73(a)(2)(viii)(A)							
		<input type="checkbox"/> 20.2203(a)(2)(iv)	<input checked="" type="checkbox"/> 50.73(a)(2)(i)(B)	<input type="checkbox"/> 50.73(a)(2)(viii)(B)							
		<input type="checkbox"/> 20.2203(a)(2)(v)	<input type="checkbox"/> 50.73(a)(2)(ii)	<input type="checkbox"/> 50.73(a)(2)(x)							

**LICENSEE CONTACT FOR THIS LER (12)**

NAME (Include Position Title) **Jim Kuchenbecker, System Engineering Manager** TELEPHONE NUMBER (Include Area Code) **(815) 458-2801 Extension 2243**

**COMPLETE ONE LINE FOR EACH COMPONENT FAILURE DESCRIBED IN THIS REPORT (13)**

CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO NPRDS	CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO NPRDS
X	HBC	Valve	C568	Yes					

**SUPPLEMENTAL REPORT EXPECTED (14)**

YES (If yes, complete EXPECTED SUBMISSION DATE)	X	NO	EXPECTED SUBMISSION DATE (15)	MONTH	DAY	YEAR
--	---	----	-------------------------------	-------	-----	------

ABSTRACT (Limit to 1400 spaces, i.e., approximately fifteen single-space typewritten lines 16)

During setpoint verification testing of Unit One Main Steam Safety Valves (MSSVs), 8 valves lifted in excess of their setpoints by greater than the 3% Technical Specification (TS) tolerance. For each case where the MSSV lifted greater than the 3% tolerance, the appropriate TS Condition was entered. The valves were tested sequentially, so only one valve was known to be inoperable at any time. The valves were adjusted as necessary and retested to place them in the required tolerance range prior to exiting the TS Condition.

The root cause for 7 of the 8 MSSV test failures was bonding between the disc and nozzle seats. The cause of the failure of the other MSSV was setpoint drift.

Corrective actions included replacement of the discs and refurbishing the nozzle seating surfaces in the 7 MSSVs exhibiting bonding. An evaluation of the safety consequences concluded that the acceptance criteria for the applicable Updated Final Safety Analysis Report (UFSAR) accident scenarios were not exceeded.

This event is being reported pursuant to 10CFR50.73(a)(2)(i)(B).

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

ESTIMATED BURDEN PER RESPONSE TO COMPLY WITH THIS INFORMATION COLLECTION REQUEST: 50.0 HRS. REPORTED LESSONS LEARNED ARE INCORPORATED INTO THE LICENSING PROCESS AND FED BACK TO INDUSTRY. FORWARD COMMENTS REGARDING BURDEN ESTIMATE TO THE INFORMATION AND RECORDS MANAGEMENT BRANCH (T-6 F33), U.S. NUCLEAR REGULATORY COMMISSION, WASHINGTON, DC 20555-0001, AND TO THE PAPERWORK REDUCTION PROJECT

FACILITY NAME (1)	DOCKET NUMBER (2)	LER NUMBER (6)			PAGE (3)
		YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	
Braidwood, Unit 1	STN 05000456	2000	-- 002	-- 00	2 of 5

(If more space is required, use additional copies of NRC Form 366A)(17)

**A. PLANT CONDITIONS PRIOR TO EVENT:**

Unit: Unit 1	Event Date: 3/15/00	Event Time: 0930
MODE: MODE 1	Reactor Power: 68.2 percent	RCS [AB] Temperature: 570 degrees F. RCS [AB] Pressure: 2235 psig

**B. DESCRIPTION OF EVENT:**

There were no systems or components inoperable at the beginning of this event that contributed to the severity of the event.

On March 15, 2000, setpoint verification testing (Trevitesting) of 20 Unit 1 Main Steam (SB) Safety Valves (MSSVs) was initiated. The MSSVs are tested during each cycle as part of the Station's In-Service Testing (IST) Program. The IST Program requires all 20 valves to be tested every 5 years or 7 valves per refuel outage. However, Braidwood Station routinely tests all 20 valves each refuel outage. The test verifies that the actual MSSV lift setting is in accordance with Table 3.7.1-2 of Technical Specification 3.7.1, "Main Steam Safety Valves (MSSVs)." The Technical Specification allows a +/- 3% tolerance on the as found lift setting, but requires all tested valves to be set to +/- 1% in the as left condition. The test determines each valve's actual lift setting using normal system pressure with assistance from a hydraulic testing device.

Results from the Trevitesting revealed that 8 out of 20 valves lifted in excess of their setpoints by greater than the 3% Technical Specification tolerance. The specific valves and the amount the valves lifted in excess of the setpoint are: 1MS014B (+5.82%), 1MS014D (+6.3%), 1MS015D (+12.8%), 1MS016B (+4.71%), 1MS016C (+7.66%), 1MS017A (3.06%), 1MS017B (+4.77%), and 1MS017D (+17.02%).

Following the identification of a valve test failure, the Technical Specification (TS) Condition was entered for TS 3.7.1 for the associated MSSV. Second lift tests were performed on each valve prior to performing any adjustments and all lifted within the 3% Technical Specification tolerance. The valves were subsequently adjusted as needed and additional lift tests were performed until the requirements stated in Braidwood Station procedure, BwMP 3305-107, "Main Steam Safety Valves Lift Point Verification Using the Furmanite Trevitest System," were satisfied (two consecutive lift tests within +/- 1% of the required setpoint). Following the successful execution of the testing, the TS Condition was exited for each valve. The valves were tested sequentially, so only one valve was known to be inoperable at any time.

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

ESTIMATED BURDEN PER RESPONSE TO COMPLY WITH THIS INFORMATION COLLECTION REQUEST: 50.0 HRS. REPORTED LESSONS LEARNED ARE INCORPORATED INTO THE LICENSING PROCESS AND FED BACK TO INDUSTRY. FORWARD COMMENTS REGARDING BURDEN ESTIMATE TO THE INFORMATION AND RECORDS MANAGEMENT BRANCH (T-6 F33), U.S. NUCLEAR REGULATORY COMMISSION, WASHINGTON, DC 20555-0001, AND TO THE PAPERWORK REDUCTION PROJECT

FACILITY NAME (1)	DOCKET NUMBER (2)	LER NUMBER (6)			PAGE (3)
		YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	
Braidwood, Unit 1	STN 05000456	2000	-- 002	-- 00	3 of 5

(If more space is required, use additional copies of NRC Form 366A)(17)

**C. CAUSE OF EVENT:**

The cause of the failure of 7 of the 8 valves was bonding between the disc and nozzle seating surfaces. Industry investigations have shown evidence of a mechanical transfer of material from the nozzle to the disc, which can be observed by patterns of radial scars on the disc surface. The scars indicate a significant radial displacement between the disc and the nozzle seat during heat-up and cooldown with the primary cause of displacement being the difference in thermal expansion coefficients of the disc and nozzle. The transfer of material from the nozzle to the disc is a result of a sticking mechanism between the disc and nozzle. Candidate mechanisms include galling and oxide locking. The problem is characterized by a high initial as-found setpoint followed by a second lift within or nearly within tolerance. The cause of the failure of the 8<sup>th</sup> valve (1MS017A) was setpoint drift. All 8 valves were adjusted as necessary and retested to place them in the required +/- 1% tolerance range.

**D. ASSESSMENT OF SAFETY CONSEQUENCES:**

The primary purpose of the MSSVs is to provide overpressure protection for the secondary system. These valves also provide protection against over-pressurizing the reactor coolant pressure boundary by providing a heat sink for the removal of energy from the Reactor Coolant System (RCS) if the preferred heat sink, provided by the Condenser (SD) and Circulating Water (KE) System, is not available.

The design basis for the MSSVs is to limit the secondary system pressure to <math>\leq 110\%</math> of design pressure for any Anticipated Operational Occurrence (AOO), or accident considered in the Design Basis Accident and transient analysis. The events that challenge the relieving capacity of the MSSVs, and thus RCS pressure, are those characterized as decreased heat removal events, which are presented in the Updated Final Safety Analysis Report (UFSAR), Section 15.2, "Decrease in Heat Removal by the Secondary System." Of these, the Loss of Load/Turbine Trip (LOL/TT) event is the limiting AOO with respect to secondary system pressure.

The LOCA Analyses and the Non-LOCA and Containment Analyses were evaluated by ComEd's Nuclear Fuels Management (NFM) group utilizing A1R08 Trevitest data. The LOL/TT event is one of the analyses contained in the Non-LOCA and Containment Analyses. For the LOL/TT event, a detailed evaluation was performed utilizing certain cycle specific parameters, uncertainty values, and instrument response times in place of the conservative analysis of record assumptions. The evaluations indicated that the acceptance criteria for each of these events were not exceeded.

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

ESTIMATED BURDEN PER RESPONSE TO COMPLY WITH THIS INFORMATION COLLECTION REQUEST: 50.0 HRS. REPORTED LESSONS LEARNED ARE INCORPORATED INTO THE LICENSING PROCESS AND FED BACK TO INDUSTRY. FORWARD COMMENTS REGARDING BURDEN ESTIMATE TO THE INFORMATION AND RECORDS MANAGEMENT BRANCH (T-6 F33), U.S. NUCLEAR REGULATORY COMMISSION, WASHINGTON, DC 20555-0001, AND TO THE PAPERWORK REDUCTION PROJECT

FACILITY NAME (1)	DOCKET NUMBER (2)	LER NUMBER (6)			PAGE (3)
		YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	
Braidwood, Unit 1	STN 05000456	2000	-- 002	-- 00	4 of 5

(If more space is required, use additional copies of NRC Form 366A)(17)

**E. CORRECTIVE ACTIONS:**

A detailed evaluation of the Trevitest data was performed by Nuclear Fuels Management. This evaluation concluded that the acceptance criteria for the applicable UFSAR accident scenarios were not exceeded.

After a failure was identified, each valve was verified to be within the +/- 1% tolerance on 2 consecutive tests or was adjusted to within this tolerance and verified within the tolerance on 2 subsequent consecutive tests.

The seven valves that exhibited bonding, which caused initial valve lifts above the 3% criterion, were rebuilt during the recently completed Unit 1 refuel outage (A1R08). For each of these valves, the disc was replaced with one made of X-750 material and a "gray" finish was applied to the nozzle seating surfaces. A study by EPRI and 5 member utilities has shown that problems associated with bonding can be eliminated by:

- Use of pre-oxidized X-750 disc material
- Use of "gray" finish on the seating surface rather than a mirror finish
- Performance based maintenance rather than time based maintenance

An on-site representative from Consolidated Dresser, Incorporated, the valve manufacturer, performed the lapping of the valve surfaces during Braidwood Unit 1 refuel outage A1R08 to ensure they were reconditioned as required.

The following corrective actions will be taken in response to this event:

- Trevitest data from the next Braidwood Unit 2 refuel outage (A2R08) will be evaluated to determine if the 4 MSSVs previously rebuilt with X-750 disc material during Braidwood refuel outage A2R07 show signs of bonding. No Unit 2 MSSVs exceeded the 3% tolerance when tested for A2R07.
- As each of the remaining MSSVs are refurbished, the disc material will be changed to X-750 and a "gray" finish will be applied to the nozzle seating surface.
- An effectiveness review of the corrective actions taken will be conducted.

**F. PREVIOUS OCCURRENCES:**

Test failures were encountered during previous outages at Braidwood Station. In Braidwood Unit 1 refuel outage A1R07, 5 MSSVs exceeded their lift setpoint by more than 3% due to bonding between the disc and nozzle seat. This resulted in LER 1998-004 for Unit 1.

Following the identification of these failures, all of the valves were successfully set to within +/- 1% of the Technical Specification requirements.

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

ESTIMATED BURDEN PER RESPONSE TO COMPLY WITH THIS INFORMATION COLLECTION REQUEST: 50.0 HRS. REPORTED LESSONS LEARNED ARE INCORPORATED INTO THE LICENSING PROCESS AND FED BACK TO INDUSTRY. FORWARD COMMENTS REGARDING BURDEN ESTIMATE TO THE INFORMATION AND RECORDS MANAGEMENT BRANCH (T-6 F33), U.S. NUCLEAR REGULATORY COMMISSION, WASHINGTON, DC 20555-0001, AND TO THE PAPERWORK REDUCTION PROJECT

FACILITY NAME (1)	DOCKET NUMBER (2)	LER NUMBER (6)			PAGE (3)
		YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	
Braidwood, Unit 1	STN 05000456	2000	-- 002	-- 00	5 of 5

(If more space is required, use additional copies of NRC Form 366A)(17)

**G. COMPONENT FAILURE DATA:**

<u>MANUFACTURER</u>	<u>-----NOMENCLATURE</u>	<u>MODEL</u>	<u>MFG. PART NO.</u>
Dresser	-----Main Steam Safety Valve (MSSV)	3707R	N/A