

Exelon Generation Company, LLC
Byron Station
4450 North German Church Road
Byron, IL 61010-9794

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10 CFR 50.73

June 1, 2001

LTR: BYRON 2001-0081
File: 3.03.0800

United States Nuclear Regulatory Commission
Attention: Document Control Desk
Washington, DC 20555-0001

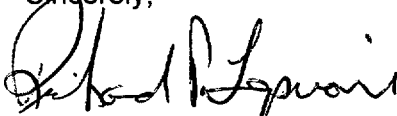
Byron Station, Unit 2
Facility Operating License No. NPF-66
NRC Docket No. STN 50-455

Subject: Licensee Event Report (LER) 455-2001-001-00

Enclosed is an LER involving multiple Main Steam Safety Valves on Unit 2 exceeding acceptance criteria for their Inservice Testing relief test. This is reportable in accordance with 10 CFR 50.73 (a)(2)(i)(B). Attachment A to this letter contains a summary of commitments made in this LER.

If you need any additional information concerning this report, please contact P. Reister, Regulatory Assurance Manager, at (815) 234-5441, extension 2280.

Sincerely,



Richard P. Lopriore
Site Vice President
Byron Generating Station

RPL/JL/dpk

Enclosures: Attachment A, "Regulatory Commitment"
LER 455-2001-001-00

cc: Regional Administrator – NRC Region III
NRC Senior Resident Inspector – Byron Station
NRC Project Manager – NRR – Byron Station
Office of Nuclear Facility Safety – Illinois Dept. of Nuclear Safety

JE22

Attachment A
Regulatory Commitment

Exelon Generation Company (EGC), LLC, is committing to the following action. Any other actions discussed in this submittal represent intended or planned actions by EGC. They are described to the NRC for the NRC's information and are not regulatory commitments.

<i>Regulatory Commitment(s)</i>	<i>Tracking Number</i>
Byron Station will refurbish all remaining Main Steam Safety Valves on Unit 1 and Unit 2 with X-750 Inconel material at their next refurbishment.	Action Request No. 49595-24

NRC FORM 366 (6-1998)						U.S. NUCLEAR REGULATORY COMMISSION						APPROVED BY OMB NO. 3150-0104 EXPIRES 06/30/2001 Estimated burden per response to comply with this mandatory information collection request: 50 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 (3150-0104), Office Of Management And Budget, Washington, DC 20503. If 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.					
LICENSEE EVENT REPORT (LER)																	
FACILITY NAME (1) Byron, Unit 2									DOCKET NUMBER (2) 05000455						PAGE (3) 1 of 6		
TITLE (4) Multiple Main Steam Safety Valve Relief Tests Exceeded Required Tolerance Due to Disk to Nozzle Metallic Bonding																	
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 STN		
04	02	2001	2001- 001 -00			06	01	01	FACILITY NAME						DOCKET NUMBER		
OPERATING MODE (9)		MODE 1		THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: (Check one or more) (11)													
POWER LEVEL (10)		92															
				<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 or in 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)			<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 Penny Reister, Regulatory Assurance Manager									TELEPHONE NUMBER (Include Area Code) (815) 234-5441 X2280								
COMPLETE ONE LINE FOR EACH COMPONENT FAILURE DESCRIBED IN THIS REPORT (13)																	
CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO EPIX				CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO EPIX					
X	SB	SV	C568	YES													
SUPPLEMENTAL REPORT EXPECTED (14)												EXPECTED SUBMISSION DATE (15)		MONTH	DAY	YEAR	
<input type="checkbox"/> YES (If yes, complete EXPECTED SUBMISSION DATE)				<input checked="" type="checkbox"/> NO													

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

During setpoint testing of the Unit 2 Main Steam Safety Valves (MSSVs) on April 2 and 3, 2001, six of 20 MSSVs failed to meet Technical Specification surveillance requirements. Operations entered the applicable Technical Specification Action Condition until each valve was tested satisfactorily. Because the MSSVs were tested sequentially, only one valve was inoperable at any one time. The cause of five of the failures has been determined to be a form of metallic bonding between the disk and the nozzle resulting in an increase in the valve's setpoint. This phenomenon is characterized by MSSVs experiencing a high initial lift setting followed by satisfactory subsequent lift setting, with no intervening adjustments, as occurred in this event. The cause of the out of tolerance setpoint for one MSSV was indeterminate. All out of tolerance MSSVs were refurbished with X-750 Inconel valve disks. This material is less susceptible to this phenomenon. An engineering analysis concluded that the multiple out of tolerance condition was still bounded by design basis analyses. This condition is reportable in accordance with 10 CFR 50.73(a)(2)(i)(B).

NRC FORM 366A (6-1998)		U.S. NUCLEAR REGULATORY COMMISSION		APPROVED BY OMB NO. 3150-0104 EXPIRES 06/30/2001	
LICENSEE EVENT REPORT (LER) TEXT CONTINUATION				Estimated burden per response to comply with this mandatory information collection request: 50 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 (3150-0104), Office Of Management And Budget, Washington, DC 20503. If 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.	
FACILITY NAME (1)		DOCKET NUMBER (2)		LER NUMBER (6)	
Byron, Unit 2		STN 05000455		YEAR 2001	SEQUENTIAL NUMBER 001
				REVISION NUMBER 00	
				2 of 6	

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

A. Plant Conditions Prior to Event:

Event Date/Time: April 2, 2001 / 2000 hours

Unit 2 - Mode 1 - Power Operation, Reactor Power - 92%

Reactor Coolant System [AB]: Normal Operating temperature and pressure

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

B. Description of Event:

Byron Station, Unit 2 is configured with four steam generators each with five Main Steam Safety Valves [SB] (MSSV) which provide overpressure protection. Technical Specification Surveillance Requirement (SR) 3.7.1.1 requires the MSSVs to be tested in accordance with the American Society of Mechanical Engineers In-Service Testing (IST) program.

The IST program requires a safety valve relief test for each MSSV on a five-year frequency. Consequently, each refuel cycle, approximately 30% of the MSSVs are scheduled to be tested such that all 20 are tested within a five-year period. In accordance with IST program, if a MSSV failure occurs during this relief testing then the testing scope of valves must be expanded. Consequently, with six failures, all 20 MSSVs on Byron Station Unit 2 were tested this refuel outage.

The MSSV relief test verifies that the as-found and as-left MSSV lift settings are in accordance with Technical Specification 3.7.1, Table 3.7.1-2, "Main Steam Safety Valve Lift Settings." The Technical Specification allows a plus or minus 3% tolerance on the as-found lift setting and requires the as-left setting of all tested valves to be within plus or minus 1% of their lift setpoint. The relief test determines each valve's actual lift setting using normal system pressure with assistance from a hydraulic testing device. The MSSV relief testing is performed in accordance with procedure BMP 3114-15, "Main Steam Safety Valve Verification of Lift Point Using Furmanite's Trevitest Equipment." The procedure's acceptance criteria require two consecutive lift tests with acceptable test results (i.e., within 1% of the valve's required lift setpoint) with no adjustments performed between these tests.

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Byron, Unit 2		STN 05000455		YEAR 2001	SEQUENTIAL NUMBER 001
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B. Description of Event, cont.:

The MSSV relief tests were initiated on April 2, 2001, and completed on April 3, 2001. The relief tests, and any required valve adjustments, were performed on only one MSSV at a time. MSSVs not meeting acceptance criteria were adjusted (if required) and satisfactorily tested before proceeding to the next MSSV.

The initial as-found lift tests performed on six of the 20 MSSVs exceeded the plus or minus 3% tolerance acceptance criteria. The failed lift test results ranged from 3.2% to 6.7% high. However, the second lift test performed on five out of these six valves, prior to performing any adjustments, were all within the 3% tolerance band. Maintenance personnel had to adjust three valves to restore them to within the 1% as-left tolerance band.

During the MSSV testing, if the as-found setpoint is outside the 3% tolerance band then the Operations Shift Manager is notified and Technical Specification 3.7.1 Action Condition A for one or more MSSVs inoperable and Technical Specification 3.6.3, "Containment Isolation Valves," Action Condition C is entered until a successful test is accomplished. The table below summarizes the MSSVs found outside the as-found tolerance and the Technical Specifications Action Condition entry and exit times.

Valve	Action Condition Entry	Action Condition Exit
2MS013A	04/03/01 at 21:52	04/03/01 at 22:09
2MS015B	04/03/01 at 08:15	04/03/01 at 09:39
2MS016A	04/03/01 at 02:20	04/03/01 at 02:51
2MS016C	04/03/01 at 15:24	04/03/01 at 16:07
2MS016D	04/02/01 at 22:07	04/02/01 at 22:38
2MS017B	04/03/01 at 11:08	04/03/01 at 12:11

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				2001	001
				00	
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B. Description of Event, cont.:

The specified lift, initial, and as-left settings for each of the failed valves and the 1% and 3% Technical Specification limits were as follows:

Valve	Tech Spec Setpoint (psig)	3% Tech Spec Limits (psig)	Initial Lift (psig)	% Diff.	As-Left Lift (psig)	1% Acc. Crit Limits (psig)
2MS013A	1235	1198-1272	1289	+4.4%	1224	1223-1247
2MS015B	1205	1169-1241	1248	+3.6%	1193	1193-1217
2MS016A	1190	1154-1226	1270	+6.7%	1195	1178-1202
2MS016C	1190	1154-1226	1257	+5.6%	1201	1178-1202
2MS016D	1190	1154-1226	1228	+3.2%	1187	1178-1202
2MS017B	1175	1140-1210	1216	+3.5%	1172	1163-1187

This condition of multiple MSSVs being outside of their required lift setting tolerance band is reportable in accordance with CFR 50.73(a)(2)(i)(B), "Any operation or condition prohibited by the plant's Technical Specification."

C. Cause of Event:

The failure characteristics of the Byron Unit 2 MSSVs are very similar to a phenomenon seen throughout the industry involving the Dresser Industries Safety Valves.

The cause of the excessive setpoint drift on five of the MSSVs (i.e., 2MS013A, 2MS015B, 2MS016A, 2MS016C, and 2MS017B) was determined to be relative radial motion between the valve disk and the valve nozzle during heatup due to differences in thermal expansion coefficients of the valves components. This relative motion causes micro galling of the surfaces, which in effect removes metallic oxides and cleans the metallic surfaces. A bonding phenomenon occurs when smooth clean metal surfaces are mated over extended periods of time at high temperatures. The result of this phenomenon is characterized by an initial lift test being high outside the tolerance band, and the subsequent test lift setting, without adjustments, within the tolerance band.

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C. Cause of Event, cont.:

The cause of the 2MS016D failure was caused by minor damage to the nozzle seat. The origin of this damage is indeterminate.

Five of these valves (i.e., 2MS015B, 2MS016A, 2MS016C, 2MS016D, and 2MS017B) also failed their initial lift test during the last scheduled testing in the fall of 1999. This occurred just prior to the Unit 2 fall refuel outage (i.e., B2R08) (see section F). These five valves were last refurbished in the Unit 2 spring 1998 refuel outage (i.e., B2R07). Based on best industry knowledge of the phenomenon in the fall of 1999, we concluded that once the bonds have been broken by a lift test, the valves were less likely to continue to experience disk bonding, provided they did not undergo any further refurbishment. Consequently, the decision was made to allow these valves to remain inservice and upgrade these and the other valves with the new Inconel 750 material at their next scheduled refurbishment. The 2MS013A valve, which successfully passed its lift test in fall of 1999, but failed the current test, was also refurbished in B2R07.

It appears some activity related to the B2R07 refurbishments of MSSVs 2MS013A, 2MS015B, 2MS016A, 2MS016C, and 2MS017B contributed to their susceptibility of this bonding phenomenon. The specific activity that caused this susceptibility is unknown.

D. Safety Analysis:

The primary purpose of the MSSVs is to provide overpressure protection for the secondary system. The MSSVs also provide protection against overpressurizing the reactor coolant pressure boundary by providing a heat sink for the removal of energy from the reactor coolant system if the preferred heat sink, provided by the condenser and circulating water system, is not available. The MSSVs also serve as containment isolation valves.

An engineering analysis was conducted to determine the effect of the MSSV out of tolerance condition on the Chapter 15, "Accident Analyses," transients in the Updated Final Safety Analysis Report. This analysis concluded that considering the as-found MSSV setpoints, the conclusions of Chapter 15 still remain valid. Therefore, the overall impact on plant safety due to the identified condition was minimal.

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E. Corrective Actions:

Maintenance personnel immediately notified Operations after each initial MSSV lift test that exceeded the 3% Technical Specification limit. All valves were tested satisfactorily to a 1% tolerance band.

All six MSSVs that failed the current lift test, which includes all MSSVs refurbished in B2R07, were upgraded to X-750 Inconel disks. This material is known to be less susceptible to the metallic bonding phenomenon.

All remaining MSSVs will be refurbished with X-750 Inconel disks at their next refurbishment.

F. Previous Occurrence:

455-1999-001-00	Byron 2	11/16/99	Six of 20 Main Steam Safety Valve Relief Tests Exceeded Required Tolerance Due to Disk to Nozzle Metallic Bonding
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G. Component Failure Data:

<u>Manufacturer</u>	<u>Nomenclature</u>	<u>Model</u>
Dresser	Main Steam Safety Valves	3707R