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October 17, 2001

LTR: BYRON 2001-0138  
File: 2.01.0700

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

Subject: Licensee Event Report (LER) 455-2001-003-00

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

Enclosed is an LER involving the August 18, 2001, event involving a Technical Specification (TS) non-compliance of TS 3.6.3, "Containment Isolation Valves," for the Hydrogen Monitor System. This event is reportable to the NRC in accordance with 10 CFR 50.73 (a)(2)(i)(b). Attachment A to this letter contains a summary of commitments made in the LER.

Should you have any questions concerning this matter, please contact Mr. William Grundmann, Regulatory Assurance Manager, at (815) 234-5441, extension 2800.

Respectfully,



Richard P. Loppre  
Site Vice President  
Byron Nuclear Generating Station

RPL/JL/dpk

Enclosures: LER 455-2001-003-00  
Attachment A, "Regulatory Commitment"

cc: Regional Administrator, Region III, NRC  
NRC Senior Resident Inspector- Byron Station  
NRC Project Manager - NRR - Byron Station  
Office of Nuclear Facility Safety - Illinois Department of Nuclear Safety

JE22

**Attachment A**  
**Regulatory Commitment**

Exelon Generation Company (EGC), LLC, is committing to the following actions. 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>
1. The Operations department is developing an Operations Gap Analysis and Excellence Plan. This plan will identify areas where personnel performance is not meeting expectations. Following the completion of the plan, implementation of actions necessary to achieve performance improvement will be undertaken.	743281601
2. An assessment of Operations Shift Management personnel is in progress. The purpose of this assessment is to identify personal strengths and weaknesses in order to make each operating shift stronger.	743281602

Estimated burden per response to comply with this mandatory information collection request: 50 hours. Reported lessons learned are incorporated into the licensing process and fed back to industry. Send comments regarding burden estimate to the Records Management Branch (T-6 E6), U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001, or by internet e-mail to bjs1@nrc.gov, and to the Desk Officer, Office of Information and Regulatory Affairs, NE0B-10202 (3150-0104), Office of Management and Budget, Washington, DC 20503. If a means used to impose 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)**

<b>1. FACILITY NAME</b> Byron Station, Unit 2	<b>2. DOCKET NUMBER</b> 05000455	<b>3. PAGE</b> 1 OF 7
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**4. TITLE** Improper Technical Specification Action Condition Application for Process Sampling Containment Isolation Valve Due to Human Performance Error.

5. EVENT DATE			6. LER NUMBER			7. REPORT DATE			8. OTHER FACILITIES INVOLVED	
MO	DAY	YEAR	YEAR	SEQUENTIAL NUMBER	REV NO	MO	DAY	YEAR	FACILITY NAME	DOCKET NUMBER
08	17	2001	2001	003	00	10	17	2001		05000
									FACILITY NAME	DOCKET NUMBER
										05000

<b>9. OPERATING MODE</b> 1	<b>11. THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: (Check all that apply)</b>									
<b>10. POWER LEVEL</b> 99	20.2201(b)		20.2203(a)(3)(ii)		50.73(a)(2)(ii)(B)		50.73(a)(2)(ix)(A)			
	20.2201(d)		20.2203(a)(4)		50.73(a)(2)(iii)		50.73(a)(2)(x)			
	20.2203(a)(1)		50.36(c)(1)(i)(A)		50.73(a)(2)(iv)(A)		73.71(a)(4)			
	20.2203(a)(2)(i)		50.36(c)(1)(ii)(A)		50.73(a)(2)(v)(A)		73.71(a)(5)			
	20.2203(a)(2)(ii)		50.36(c)(2)		50.73(a)(2)(v)(B)		OTHER			
	20.2203(a)(2)(iii)		50.46(a)(3)(ii)		50.73(a)(2)(v)(C)		Specify in Abstract below or in NRC Form 366A			
	20.2203(a)(2)(iv)		50.73(a)(2)(i)(A)		50.73(a)(2)(v)(D)					
	20.2203(a)(2)(v)		✓ 50.73(a)(2)(i)(B)		50.73(a)(2)(vii)					
20.2203(a)(2)(vi)		50.73(a)(2)(i)(C)		50.73(a)(2)(viii)(A)						
20.2203(a)(3)(i)		50.73(a)(2)(ii)(A)		50.73(a)(2)(viii)(B)						

**12. LICENSEE CONTACT FOR THIS LER**

<b>NAME</b> William Grundmann, Regulatory Assurance Manager	<b>TELEPHONE NUMBER (Include Area Code)</b> (815) 234-5441, X2800
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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>14. SUPPLEMENTAL REPORT EXPECTED</b>				<b>15. EXPECTED SUBMISSION DATE</b>		
YES (If yes, complete EXPECTED SUBMISSION DATE)	✓	NO		MONTH	DAY	YEAR

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

On August 17, 2001, a human performance error occurred on Unit 2, leading to Technical Specification (TS) 3.6.3, Containment Isolation Valves (CIV) non-compliance. A Unit 2 'A' train CIV for the Hydrogen Monitor System was mistakenly identified and used as the isolation boundary for the 'B' train Hydrogen Monitor. In addition to the wrong train, the valve selected was a "fail open" valve and would not isolate the penetration upon being de-activated. Because of this error, the Station failed to correctly isolate the correct containment penetration for the 2B Hydrogen Monitor. In addition the containment penetration for the 'A' Hydrogen Monitor was also rendered inoperable since the 'A' train CIV failed open when power was removed and would not have closed upon receipt of a containment isolation signal. Neither penetration was isolated within the required four hours of the occurrence as required by TS. The error was discovered and rectified approximately 22 hours later. The root cause of this event was determined to be a failure of the licensed operators to follow standard operating practices in determining and implementing equipment isolation boundaries as expressed in departmental procedures and policies. The Operations department is currently developing an Operations Gap Analysis and Excellence Plan. This plan will identify areas where personnel performance is not meeting expectations. Following completion of the plan, implementation of actions necessary to achieve performance improvement will be undertaken. There were no safety consequences impacting plant or public safety as a result of this event. The Hydrogen Monitors and their associated CIVs do not impact core damage frequency. This event is reportable to the NRC in accordance with 10 CFR 50.73 (a)(2)(i)(b).

NRC FORM 366A (7-2001)		U.S. NUCLEAR REGULATORY COMMISSION		APPROVED BY OMB NO. 3150-0104 EXPIRES 07/31/2004		
<b>LICENSEE EVENT REPORT (LER)</b> 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.		
<b>FACILITY NAME (1)</b>		<b>DOCKET NUMBER (2)</b>		<b>LER NUMBER (6)</b>		<b>PAGE (3)</b>
Byron Station, Unit 2		STN 05000455		YEAR	SEQUENTIAL NUMBER	REVISION NUMBER
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(If more space is required, use additional copies of NRC Form 366A)(17)

**A. Plant Conditions Prior to Event:**

Event Date / Time: August 17, 2001 / 1353 hours

Unit 2 – Mode 1 – Power Operations, Reactor Power – 99%

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:**

On August 8, 2001, the Unit 2 Train B (2B) Hydrogen Monitor [IP] (PS) Containment Isolation Valve (CIV) (i.e., 2PS229B) failed to provide proper position indication during a required stroke time test. With this deficiency, 2PS229B was still considered operable but degraded and accordingly, logged on the degraded equipment list. A work request was written to address the degraded condition. On August 16, 2001, the non-licensed electrical technician received permission from the licensed Unit 2 Unit Supervisor (US) to begin troubleshooting the 2PS229B valve. The troubleshooting efforts concluded that the cause was most likely due to a misadjusted limit switch on the valve. The licensed Shift Manager (SM) agreed to allow the repair on August 17, 2001. This would require the 2PS229B valve to be declared inoperable. Consequently, the appropriate Technical Specifications (TS) Action Conditions for the 2B Hydrogen Monitor and the CIV would need to be entered.

The TS required action for one train of Hydrogen Monitor inoperable is to restore the train to operability in 30 days and the TS required action for 2PS229B as a containment isolation valve is to isolate the affected penetration flowpath within four hours by use of at least one closed and deactivated automatic or remote manual valve, closed manual valve, blind flange or check valve with flow through the valve secured.

This work would also require a Clearance Order (C/O) for control of the isolation boundary needed to comply with TS requirements. In preparation for the C/O, the Unit 2 US reviewed the appropriate mechanical drawing for the U2 Hydrogen Monitors and erroneously selected an opposite train CIV (i.e., 2PS229A) vice 2PS232B, and 2PS260B as the correct isolation boundary valves for 2PS229B. In addition to choosing a valve on the wrong train of Hydrogen Monitor, the 2PS229A valve fails open when deactivated.

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

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**B. Description of Event (continued):**

The Unit 2 US also reviewed TS Bases Table 3.6.3-1, "Primary Containment Isolation Valves," however, the self-check was ineffective, as the Unit 2 US still believed 2PS229A would provide the required isolation of 2PS229B. The Unit 2 US then requested the licensed Unit 1 US to perform a peer check of the TS action condition paperwork (i.e., 2BOL 6.3). The Unit 1 US reviewed 2BOL 6.3 and concurred that the correct action condition was chosen; however, the specific isolation method to comply with the required action was not part of that review. Current revisions of 2BOL 6.3 do not require documentation of the methodology used for compliance of required action steps. Therefore, a peer check of the method of isolation was not performed during the review of 2BOL 6.3 by the Unit 1 US. During this peer check, the Unit 2 and Unit 1 US did not discuss use of 2PS229A as the selected isolation boundary to meet the requirements of 2BOL 6.3. The error remained undetected.

At 1105 hours, the Unit 2 US entered 2BOL 6.3 to begin work on 2PS229B. He requested that another peer check be performed by the current Unit 1 US, who had relieved the previous Unit 1 US. This peer check of 2BOL 6.3 also verified the correct TS action condition had been entered but again did not include a review of the method used for isolation of the affected flow path since it is not part of the documentation required by 2BOL 6.3. Therefore, the second peer check of 2BOL 6.3 failed to catch the error of using 2PS229A as the isolation boundary.

After entering the applicable action condition for 2PS229B, the Unit 2 US initiated the C/O to control the isolation boundary needed for TS compliance. The work description entry for the C/O was "Admin OOS for LCOAR," and the special instructions directed taking 2PS229A administratively out of service closed and deactivated. The licensed Unit 2 Assist Nuclear Station Operator (NSO) prepared the "First Hang" checklist for the C/O. During this preparation, the Unit 2 Assist NSO did not reference any plant drawings. He also did not attach any marked up drawing showing the isolation boundary for the described work. The Unit 2 Assist NSO gave the C/O package to the Unit 1 Assist NSO for approval of the "First Hang" checklist. The Unit 1 Assist NSO did not question the lack of a marked up drawing and also did not reference any drawing to ensure the isolation boundary was adequate.

The Unit 1 and Unit 2 Assist NSOs did not follow normal work practices during the preparation of this C/O. They both assumed the Unit 2 US was correct in selecting 2PS229A as the isolation boundary for 2PS229B. During the entire C/O preparation process, none of the individuals involved searched for associated previous C/O's for 2PS229B. The search would have shown C/O 2317, approved 10 days earlier, provided the required isolation of 2PS229B by closing manual isolation valves 2PS232B and 2PS260B.

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

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**B. Description of Event (continued):**

The Unit 2 US and the Unit 1 and Unit 2 Assist NSOs held a pre-job briefing for placement of the C/O. During the pre-job briefing, the work scope was discussed as limit switch adjustment on 2B Hydrogen Monitor CIV, 2PS229B. None of the three participants noticed the C/O paperwork described 2PS229A as a CIV for the 2A Hydrogen Monitor. None of the participants questioned the lack of a marked up drawing showing the isolation boundary, a document that is included in the majority of C/O packages. During the concurrent verification identification of the 2PS229A main control room control switch, both Assist NSOs read the equipment part number for 2PS229A on the component placard but not all the unique identifiers as required by Nuclear Station Procedure (NSP) HU-AA-101, "Human Performance Tools and Verification Techniques."

The component placard for 2PS229A identified it as an outside CIV for the 2A Hydrogen Monitor. The Unit 1 Assist NSO removed the fuses for 2PS229A while the Unit 2 Assist NSO provided concurrent verification. When the fuses were removed, 2PS229A failed open. However, both the open and closed position indication lights for 2PS229A on the main control room panel were dark since power was removed when the fuses were removed. Therefore, it was not readily apparent that 2PS229A was in a failed open position.

On August 17, 2001, at 1353 hours, when the C/O "First Hang" check list was completed, the Unit 2 US signed the 2BOL 6.3 paperwork for meeting the required TS action requirements. Actual limit switch adjustments on 2PS229B were completed within 30 minutes of 2BOL 6.3 entry. However, Unit 2 would remain in the TS condition for 2PS229B until a post maintenance test could be performed verifying that 2PS229B was actually fully closed. Due to the design of the reed switch arrangement on the solenoid operated 2PS229B, an air leakage test would need to be performed to verify full closure of the valve.

On August 18, 2001, at 1143 hours, the work execution center licensed senior reactor operator (SRO) performed a main control board walkdown and discovered that 2PS229A had a C/O information card while the 2PS229B had a work request sticker. The SRO recognized that 2PS229A was associated with the 2A Hydrogen Monitor and failed to adequately isolate 2PS229B. He also realized that 2PS229A failed open upon loss of power. The SRO immediately informed the SM and Unit 2 US of the error. The Unit 2 US immediately made an unplanned entry into TS action condition for 2PS229A. The original C/O was "final cleared" and fuses reinstalled for 2PS229A. At 1207 hours on August 18, 2001, the TS action condition for 2PS229A was exited. 2PS229A had been deactivated and open for 22 hours and 14 minutes before being restored. A new C/O was initiated and placed at 1306 hours to meet the required TS action condition for 2PS229B. 2PS229B had been inoperable and the penetration not isolated per requirements of TS for 25 hours and one minute.

Failing to comply with TS action condition for CIV's 2PS229B and 2PS229A is a condition prohibited by TS and reportable to the NRC in accordance with 10 CFR 50.73 (a)(2)(i)(b).

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**C. Cause of Event:**

The root cause of this event was determined to be a failure of the Unit 1 and Unit 2 US's and Assist NSO's to follow standard operating practices as expressed in procedures and policies. The individuals involved understood their responsibilities but did not fully meet those requirements. During the entire sequence of events leading up to the incident, the original error remained undetected as each successive barrier failed to discover the error. The individuals involved allowed themselves to justify deviating from normal work practices and not adequately applying required verification techniques.

**D. Safety Analysis:**

There were no safety consequences impacting plant or public safety as a result of this event. A risk review has determined that there is no increase in core damage frequency (CDF) or large early release frequency (LERF) from the inadequate isolation of the PS penetrations, and therefore, there is no risk impact.

Review of the Byron Probability Risk Assessment (PRA) initiating event analysis verified that failure of the PS system does not result in an initiating event. Review of the Byron PRA event tree analysis verified that the PS system is not required to mitigate core damage. Therefore, inadequate isolation of the PS penetrations do not result in an increase in CDF.

LERF can be the result of containment failure, or containment bypass. Review of the Byron LERF analysis, and supporting documents verified that the PS system is not required to prevent containment failure. The Byron PRA containment isolation analysis contains criteria to use for screening containment penetrations and associated equipment. Criteria #1 states that:

"Containment penetrations less than or equal to two inches in diameter are not considered significant sources of leakage, unless the penetration serves as a containment sump line."

Review of appropriate drawings shows that the penetration lines in question are 1/2" diameter lines. Since these are not containment sump lines, Criteria #1 is met, and the lines are excluded as a containment bypass source. In conclusion, since the system does not affect containment failure, or containment bypass, inadequate isolation of the PS penetrations do not result in an increase in LERF.

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**E. Corrective Actions:**

**Immediate and Interim Corrective Actions:**

- The Unit 2 US and Unit 1 and U2 Assist NSOs were relieved from performing licensed duties pending investigation.
- A stand down meeting was held with on-shift Operations personnel describing the event.
- An Operations Supervisor Meeting was held to discuss the details of this event, management expectations and lessons learned.
- Senior Corporate and Site Executives and Operations Manager met with Shift Managers to communicate expectations, the significance of the event, and need for rigor in standards.

**Corrective Actions to Prevent Recurrence:**

The Operations department is developing an Operations Gap Analysis and Excellence Plan. This plan will identify areas where personnel performance is not meeting expectations. Following the completion of the plan, implementation of actions necessary to achieve performance improvement will be undertaken.

An assessment of Operations Shift Management personnel is in progress. The purpose of this assessment is to identify personal strengths and weaknesses in order to make each operating shift stronger.

The Unit Supervisor involved in this event was removed from performing licensed duties to participate in the investigation process and was counseled on fundamentals, standards, and expectations.

Both NSOs were removed from performing licensed duties to participate in the investigation process and were counseled on fundamentals, standards, and expectations.

**Additional Corrective Actions:**

The Unit Supervisor participated in a Human Performance Improvement workshop facilitated by the Site Human Performance Expert.

Both NSOs participated in a Human Performance Improvement workshop facilitated by the Site Human Performance expert.

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

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**E. Corrective Actions (continued):**

Procedure 1(2)BOL 6.3, will be revised to require documentation of the specific valves that will be used to meet the action condition requirements.

Other procedures implementing TS action conditions will be reviewed to determine if similar revisions need to be performed.

**F. Previous Occurrences: (LER events within past two years involving operators failing to follow expectations)**

<u>LER #</u>	<u>Date</u>	<u>Title</u>
455-2001-002	6/26/01	Manual Reactor Trip Due to a Decreasing Steam Generator Level Caused by a Failed Positioner on an Air Operated Feedwater Regulating Valve.
454-2000-002	6/15/00	Acceptance Criteria for Control Room Ventilation System Train Monthly Surveillance Not Met Due to Human Performance Error.
454-2000-003	10/08/00	Unintentional Violation of Low Temperature Over Pressure Protection System Technical Specification Due to Operator Error.