

Exelon Generation
Byron Generating Station
4450 North German Church Road
Byron, IL 61010-9794
Tel 815-234-5441

www.exeloncorp.com

October 30, 2001

LTR: BYRON 2001-0148
File: 2.01.0700

United States Nuclear Regulatory Commission
ATTN: 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) 455-2001-004-00

Enclosed is an LER involving the August 31, 2001, event involving a Technical Specification (TS) non-compliance of TS 3.3.6, "Containment Ventilation Isolation Instrumentation." 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 Lopriore
Site Vice President
Byron Nuclear Generating Station

Enclosures LER 455-2001-004-00
Attachment A

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

IE22

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. Byron instrument surveillance requirement procedure 3.6.6.200 will be revised to include a functional check that is adequate to demonstrate fuel handling incident area radiation monitors operability	AR 7421324
2. Training will be provided to operations and instrument maintenance department personnel to increase knowledge level of the operation of the radiation monitors and Solid State Protection System expected reset response.	AR 7421325

LICENSEE EVENT REPORT (LER)

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, NEOB-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.

1. FACILITY NAME

Byron Station, Unit 2

2. DOCKET NUMBER

05000455

3. PAGE

1 OF 7

4. TITLE Technica! Specification Non-Compliance Caused by Improper Component Installation and Post Maintenance Test on an Area Radiation Monitor that Generates an Automatic Containment Ventilation Isolation Signal

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	16	2001	2001	004	00	10	30	2001		05000

9. OPERATING
MODE

1

11. THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: (Check all that apply)

10. POWER
LEVEL

100

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)	<input checked="" type="checkbox"/> 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

NAME

William Grundmann, Regulatory Assurance Manager

TELEPHONE NUMBER (Include Area Code)

(815) 234-5441, X2800

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
A	IL	MON	Sarento	Y					

14. SUPPLEMENTAL REPORT EXPECTED

15. EXPECTED
SUBMISSION
DATE

MONTH	DAY	YEAR

YES (If yes, complete EXPECTED SUBMISSION DATE) ☒ NO

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

On August 16, 2001, Instrument Maintenance Department (IMD) technicians began maintenance activities on the Unit 2 containment area radiation monitor 2AR11J. During the activity, an IMD technician improperly landed an electrical lead and caused the failure of several printed circuit boards. An emergent repair ensued which involved the improper re-installation of an output relay. This relay provides a containment ventilation isolation signal to the solid state protection system (SSPS). The faulty installation caused a permanent containment ventilation signal to be present. A containment ventilation isolation signal was generated and subsequently reset in the control room with the belief the signal was spurious due to the maintenance restoration activity. The reset activity blocked the signal from reactivation, though it was still present. The post maintenance test to demonstrate operability did not check the function of this relay and consequently, the monitor was restored to operable status with a faulty relay. The error was discovered 15 days later during the execution of an SSPS surveillance. The root causes were determined to be an improper installation of the relay by the IMD technician and a knowledge deficiency by the IMD and operations supervision in determining the post maintenance testing requirements. Corrective actions include counseling the IMD technicians involved and training the IMD and operations personnel to improve system knowledge. Due to redundant actuation trains and diverse isolation signals, there were no safety consequences as a result of this event. This event is reportable to the NRC in accordance with 10CFR 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	
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 Station, Unit 2		STN 05000455		YEAR	SEQUENTIAL NUMBER
				REVISION NUMBER	PAGE (3)
				2001 - 004 - 00	
				2 of 7	

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

A. Plant Conditions Prior to Event:

Event Date / Time: August 16, 2001 / 2200 hours

Unit 2 – Mode 1 – Power Operations, Reactor Power – 100%

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 16, 2001, at 1900 hours, non-licensed Instrument Maintenance Department (IMD) technicians began a maintenance activity on the Unit 2 Train 'A' Containment Fuel Handling Incident Area Radiation Monitor [IL] (i.e., 2AR11J). During this evolution, electrical supply leads were landed by IMD technician #1 incorrectly causing a failure of several printed circuit cards including the motherboard.

This caused an emergent repair beyond the scope of the original maintenance task. As a result of this error, all printed circuit cards and power supplies were replaced. The undamaged K-1 relay from the damaged motherboard had to be transferred to the new motherboard due to the unavailability of a replacement relay. The K-1 relay functions as an interposing relay to the final control element that outputs the conditions of 2AR11J to the input of the solid state protection system [JE] (SSPS). De-energizing relay K-1 causes a Containment Ventilation Isolation signal to be generated. Installation of the relay from the old motherboard onto the new motherboard was performed inside the cabinet containing the new motherboard. This is a cramped work area. During the reinstallation of relay K-1 onto the new motherboard, IMD technician #2 improperly installed the relay by unknowingly causing the pins for the operating coil of this relay to bend over and not properly seat into the relay socket thereby causing an actuated condition (i.e., relay contacts closed).

Subsequent to the completion of the repair activities on August 17, 2001, at 2200 hours, the calibration of AR11J was performed using Byron Instrument Maintenance Surveillance Requirement (BISR) procedure 3.6.6-200. All requirements specified in the calibration procedure were satisfied. The purpose of calibration procedure BISR 3.6.6-200 is to satisfy the calibration requirements and is not inclusive of all the functional requirements for 2AR11J.

NRC FORM 366A (7-2001)		U.S. NUCLEAR REGULATORY COMMISSION		APPROVED BY OMB NO. 3150-0104 EXPIRES 07/31/2004	
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Byron Station, Unit 2		STN 05000455		YEAR	SEQUENTIAL NUMBER
				REVISION NUMBER	PAGE (3)
				2001 - 004 - 00	3 of 7

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

B. Description of Event (continued):

BISR 3.6.6-200 does not test the final control element (i.e., relay K-1) and is not adequate to detect a relay failure as described. The IMD technician's non-licensed supervisor and the licensed Shift Operating Supervision together determined that BISR 3.6.6-200 was appropriate as a post maintenance test to verify repairs were complete and 2AR11J was operable.

An unexpected condition was noted at the time in that a green instrument available light on 2AR11J was not lit as expected. However, IMD technician #3 did not raise this as a potential operability concern.

During the calibration of AR11J, a known minor software database discrepancy involving the value printed on the local recorder was identified. This database issue does not impact the operability of 2AR11J, but the decision was made to leave the corrective work request open to allow resolution of this issue the next workday, when engineering personnel and the equipment vendor would be available for assistance.

After completion of the calibration activities, output leads of 2AR11J into SSPS were re-landed in accordance with the procedure. During this restoration step a containment ventilation isolation signal was received in the main control room.

Immediately following this actuation signal in SSPS, the IMD supervisor and operations personnel conferred. It was believed the signal was spurious resulting from the relay reconnection to SSPS. The licensed shift manager decided to reset the containment ventilation isolation signal. A repeat actuation signal did not occur and all parties accepted this as proof that the isolation signal had been properly reset. It was not recognized that, if the initiating signal has remained active, the reset functionally blocks the re-initiation of subsequent containment ventilation isolation signals, even though the alarm cleared as expected. For this reason it was not discovered at this time that there was an anomaly present in the output of 2AR11J. Operations personnel then performed a successful channel check of 2AR11J and exited the Technical Specification action requirement, though the work order remained opened. This is an acceptable practice; however, it bypassed the formal re-review by Work Planning and Engineering Department personnel to verify the adequacy of the post maintenance test requirements.

Resources to continue field work the next day were not available to resolve the recorder indication error which caused a postponement of work of 2AR11J due to a conflict with scheduled work beginning on the opposite safety train.

NRC FORM 366A (7-2001)		U.S. NUCLEAR REGULATORY COMMISSION		APPROVED BY OMB NO. 3150-0104 EXPIRES 07/31/2004		
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FACILITY NAME (1)		DOCKET NUMBER (2)		LER NUMBER (6)		PAGE (3)
Byron Station, Unit 2		STN 05000455		YEAR	SEQUENTIAL NUMBER	REVISION NUMBER
				2001 - 004 - 00		4 of 7

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

B. Description of Event (continued):

On August 24, 2001, a previously scheduled activity was started by IMD to perform an operational check on 2AR11J using procedure 2BISR 3.6.4-001. This procedure has a prerequisite that the 2AR11J instrument available lamp be lit. The lamp was observed to be off. This initiated troubleshooting activities including replacement of the socket and lamp by IMD technician #4. This activity was unsuccessful. Available resources did not allow further troubleshooting on 2AR11J on August 24, 2001.

On August 30, 2001, operations personnel began the performance of the SSPS bi-monthly surveillance requirement. During the performance of this surveillance a failure of SSPS relay K615 / K622, Logic B Position 23, was identified as abnormal. This logic point is associated with 2AR11J. Initial troubleshooting efforts indicated a possible failure of the safeguards driver circuit card or an undetected failure of 2AR11J. The surveillance was exited prior to its completion. The operations department declared this portion of the actuation circuit inoperable and applied and completed the appropriate Technical Specifications action requirements.

Troubleshooting activities continued through August 31, 2001, when it was discovered that the input to SSPS from 2AR11J was in a continually active condition and was the cause of the failed SSPS logic test. At this point a detailed review by IMD and engineering personnel determined the most probable failure of 2AR11J was a failed circuit board K-1 relay. IMD technicians confirmed an improperly installed relay (i.e., bent coil pins) on the motherboard. This condition was corrected and performance of an operational check, using procedure 2BISR 3.6.4-001, was successfully performed to verify the operability of 2AR11J. This surveillance procedure is adequate to detect failures of output devices of 2AR11J. After repairs to relay K-1, this surveillance was successfully completed at 2000 hours on August 31, 2001.

The ability for 2AR11J to generate a containment isolation signal was defeated since August 16, 2001. This is a violation of Technical Specifications 3.3.6, "Containment Ventilation Isolation Instrumentation," and reportable to the NRC in accordance with 10CFR 50.73 (a)(2)(i)(b).

C. Cause of Event:

The first root cause is a component replacement that was performed inadequately. This resulted in an improperly installed and malfunctioning component. The IMD technicians were familiar with component installation but did not recognize that the flexible construction of the relay leads presented an opportunity for error which should have raised the care with which the relay should have been installed. A cramped work area contributed to the improper installation of this component.

NRC FORM 366A (7-2001)		U.S. NUCLEAR REGULATORY COMMISSION		APPROVED BY OMB NO. 3150-0104 EXPIRES 07/31/2004	
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Byron Station, Unit 2		STN 05000455		YEAR	SEQUENTIAL NUMBER
				REVISION NUMBER	
				2001 - 004 - 00	
				5 of 7	

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

C. Cause of Event (continued):

The second root cause is a knowledge deficiency. As a result, certain field indications were not recognized and therefore, did not invoke the correct process to disposition the anomaly. The field supervisor and shift operations have demonstrated the ability to specify the correct post maintenance test in many other situations concerning operability. This particular operability determination of a complex system was different in that the lack of knowledge of the limits and scope of the surveillance in question and the extent of repairs was not understood as well as the effect these repairs might have on the operation of the system.

For this reason, an incorrect decision was made based on incorrect assumptions and incomplete knowledge. This flawed decision was based on inadequate knowledge of the significance of all of the indications on 2AR11J and the scope of verification provided by the calibration surveillance performed.

The following contributing causes were identified.

IMD technician #1 improperly landed electrical leads due to failing to self check, failure to follow procedure, and failure of a peer check. The technician directing the connection of leads did not read the caution in the procedure warning of the result of improper connection. There was no physical barrier in place to block attachment to the wrong location. The technician did not use another technician to provide a peer check.

Information concerning an unexpected condition was unrecognized and overlooked by IMD technician #3 and the IMD supervisor that should have flagged this anomaly as a concern relative to operability. The IMD supervisor and the operations supervisor discussed the testing performed and did not discuss, nor were they aware of, the unexpected missing local light indication of 2AR11J.

After successful resetting the containment isolation signal, the IMD supervisor and operations supervisor decided that the ability to reset the Containment Ventilation Isolation signal was proof that the isolation signal had been properly reset. The IMD supervisor and the operations supervisor discussed the actuation and recollected past actuations on other similar equipment as evidence that this actuation was also a momentary spurious condition. The reset of the actuation gave further false confidence to the thinking that this actuation was only a function of momentary contact of landed leads.

The IMD supervisor and IMD technician #4 should have applied an increased questioning attitude to investigate further, after the replacement of the light and socket did not resolve the indication anomaly. The IMD supervisor did not discuss this result with shift operations personnel. The individuals involved did not have sufficient knowledge of this specific system feature to recognize it as an important anomaly.

NRC FORM 366A (7-2001)		U.S. NUCLEAR REGULATORY COMMISSION		APPROVED BY OMB NO. 3150-0104 EXPIRES 07/31/2004	
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FACILITY NAME (1)		DOCKET NUMBER (2)		LER NUMBER (6)	
Byron Station, Unit 2		STN 05000455		YEAR	SEQUENTIAL NUMBER
				REVISION NUMBER	PAGE (3)
				2001 - 004 - 00	6 of 7

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

D. Safety Analysis:

The Train 'A' Containment Ventilation Isolation signal actuation rendered inoperable by this event has a low safety significance. Since the containment ventilation valves are normally in the closed position (i.e., safety position), have indication in the control room, are directed to be closed or verified closed by the control room alarm response procedure, and are backed up by redundant operable Containment Ventilation Isolation devices actuated for train B SSPS, the consequence of 2AR11J inoperability is low. The likelihood of a large breach of the reactor piping is very small. However, had a large Loss of Coolant Accident (LOCA) with core damage have occurred, it is very likely that a Safety Injection (SI) actuation would have occurred. Since the ability of the SI signal to initiate the automatic closure of the Containment Ventilation Isolation valves as a result of the LOCA was operable during this time period, the inability of 2AR11J to close these valves on a high radiation condition becomes insignificant. It has been determined there is no measurable risk increase.

E. Corrective Actions:

The IMD technicians involved were counseled. The Instrument maintenance department was briefed by Department Supervision on this occurrence and the causes of the errors that were made.

BISR 3.6.6-200 will be revised to include a functional check that is adequate to demonstrate AR11J operability.

A detailed description of this event will be presented to operations and IMD supervision, via their respective continuing training programs to increase the knowledge level of the operation of the radiation monitors and SSPS expected reset response. This will include the meaning of the normal indications present and the possible abnormal indications present during various modes of failure.

F. Previous Occurrences:

There are no previous instances of inoperability of radiation monitors caused by improper installation of active devices on the control boards that has led to an unexpected inoperable condition. There have been other component failures that have been detected and corrected through the PMT process. There are no apparent indication the industry experience recommendations were ineffective to prevent this event.

LICENSEE EVENT REPORT (LER)
TEXT CONTINUATION

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Byron Station, Unit 2	STN 05000455	YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	
		2001 - 004 - 00			7 of 7

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

G. Component Failure Data:

Manufacturer

Nomenclature

Model Number

Sarento

Area Radiation Monitor

0358-3881-0