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10 CFR 50.73

RA21-044

July 29, 2021

U.S. Nuclear Regulatory Commission
ATTN: Document Control Desk
Washington, DC 20555-0001

LaSalle County Station, Unit 2
Renewed Facility Operating License No. NPF-18
NRC Docket No. 50-374

Subject: Licensee Event Report 2021-002-00, Reactor Protection System Half Scram due to Motor Generator Set Output Breaker Trip

In accordance with 10 CFR 50.73(a)(2)(i)(B) and 10 CFR 50.73(a)(2)(iv)(A), Exelon Generation Company, LLC (EGC) is submitting Licensee Event Report (LER) Number 2021-002-00 for LaSalle County Station, Unit 2.

There are no regulatory commitments in this letter. Should you have any questions concerning this report, please contact Mr. Daniel Mearhoff, Regulatory Assurance Manager, at (815) 415-2800.

Respectfully,

Phil Hansett
Plant Manager
LaSalle County Station

Enclosure: Licensee Event Report

cc: Regional Administrator – NRC Region III
NRC Senior Resident Inspector – LaSalle County Station

NRC FORM 366 (08-2020) | U.S. NUCLEAR REGULATORY COMMISSION | APPROVED BY OMB: NO. 3150-0104 | EXPIRES: 08/31/2023

LICENSEE EVENT REPORT (LER)

(See Page 3 for required number of digits/characters for each block)
(See NUREG-1022, R.3 for instruction and guidance for completing this form
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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, Library, and Information Collections Branch (T-6 A10M), U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001, or by e-mail to Infocollects.Resource@nrc.gov, and the OMB reviewer at: OMB Office of Information and Regulatory Affairs, (3150-0104), Attn: Desk ail: oira_submission@omb.eop.gov. The NRC may not conduct or sponsor, and a person is not required to respond to, a collection of information unless the document requesting or requiring the collection displays a currently valid OMB control number.

1. Facility Name	2. Docket Number	3. Page
LaSalle County Station, Unit 2	05000 - 374	1 OF 5

4. Title
Reactor Protection System Half Scram due to Motor Generator Set Output Breaker Trip

5. Event Date			6. LER Number			7. Report Date			8. Other Facilities Involved	
Month	Day	Year	Year	Sequential Number	Revision No.	Month	Day	Year	Facility Name	Docket Number
05	31	2021	2021	- 002 -	00	07	29	2021	NA	05000
									Facility Name: NA	Docket Number: 05000

9. Operating Mode	10. Power Level
1	100 percent

11. This Report is Submitted Pursuant to the Requirements of 10 CFR §: *(Check all that apply)*

10 CFR Part 20	☐ 20.2203(a)(2)(vi)	☐ 50.36(c)(2)	☒ 50.73(a)(2)(iv)(A)	☐ 50.73(a)(2)(x)
☐ 20.2201(b)	☐ 20.2203(a)(3)(i)	☐ 50.46(a)(3)(ii)	☐ 50.73(a)(2)(v)(A)	**10 CFR Part 73**
☐ 20.2201(d)	☐ 20.2203(a)(3)(ii)	☐ 50.69(g)	☐ 50.73(a)(2)(v)(B)	☐ 73.71(a)(4)
☐ 20.2203(a)(1)	☐ 20.2203(a)(4)	☐ 50.73(a)(2)(i)(A)	☐ 50.73(a)(2)(v)(C)	☐ 73.71(a)(5)
☐ 20.2203(a)(2)(i)	**10 CFR Part 21**	☒ 50.73(a)(2)(i)(B)	☐ 50.73(a)(2)(v)(D)	☐ 73.77(a)(1)(i)
☐ 20.2203(a)(2)(ii)	☐ 21.2(c)	☐ 50.73(a)(2)(i)(C)	☐ 50.73(a)(2)(vii)	☐ 73.77(a)(2)(i)
☐ 20.2203(a)(2)(iii)	**10 CFR Part 50**	☐ 50.73(a)(2)(ii)(A)	☐ 50.73(a)(2)(viii)(A)	☐ 73.77(a)(2)(ii)
☐ 20.2203(a)(2)(iv)	☐ 50.36(c)(1)(i)(A)	☐ 50.73(a)(2)(ii)(B)	☐ 50.73(a)(2)(viii)(B)	
☐ 20.2203(a)(2)(v)	☐ 50.36(c)(1)(ii)(A)	☐ 50.73(a)(2)(iii)	☐ 50.73(a)(2)(ix)(A)	

☐ **OTHER** (Specify here, in abstract, or NRC 366A).

12. Licensee Contact for this LER

Licensee Contact	Phone Number (Include area code)
Joseph Reda, Senior Manager Engineering	(815) 415-3801

13. Complete One Line for each Component Failure Described in this Report

Cause	System	Component	Manufacturer	Reportable to IRIS		Cause	System	Component	Manufacturer	Reportable to IRIS
X	JE	RHE	O026	Y						

14. Supplemental Report Expected		15. Expected Submission Date	Month	Day	Year
☐ No	☒ Yes (If yes, complete 15. Expected Submission Date)		09	23	2021

16. Abstract (Limit to 1560 spaces, i.e., approximately 15 single-spaced typewritten lines)

On May 31, 2021, LaSalle Unit 2 was operating at 100 percent power, when the 2A reactor protection system (RPS) motor generator (MG) set output breaker tripped due to an overload condition, which resulted in a loss of 2A RPS bus. Loss of power to this bus created a half-scram and initiated closure of outboard isolation valves in multiple systems. The condition was an invalid actuation because it was not the result of actual plant conditions and not an intentional manual action. Actuations and isolations that occurred performed as designed, except for the outboard 2D main steam line isolation valve (MSIV) drain valve that was discovered later as having a slow closure time, rendering the component inoperable.

The cause of the MG set breaker trip was a degraded voltage adjustment potentiometer on the associated MG set, which caused the output voltage to fluctuate. The RPS bus loss resulted in general containment isolation signals that affected containment isolation valves in more than one system while the unit was critical. Therefore, the condition is reportable in accordance with 10 CFR 50.73(a)(2)(iv)(A).

The cause of the MSIV drain valve slow closure is indeterminate, pending further investigation. There was no loss of safety function since an inboard isolation valve in the flow-path remained operable. However, the condition is reportable in accordance with 10 CFR 50.73(a)(2)(i)(B) as an operation or condition prohibited by technical specifications (TS) due to having an inoperable component longer than permitted by TS.

LICENSEE EVENT REPORT (LER) CONTINUATION SHEET

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1. FACILITY NAME	2. DOCKET NUMBER	3. LER NUMBER		
		YEAR	SEQUENTIAL NUMBER	REV NO.
LaSalle County Station, Unit 2	05000- 374	2021	- 002	- 00

NARRATIVE

Plant and System Identification

LaSalle Country Station Unit 2 is a General Electric Boiling Water Reactor with 3546 Megawatts Thermal Rated Core Power. The affected system was the "A" reactor protection system (RPS) logic and associated isolation functions. RPS initiates a rapid insertion of all the control rods (scram) when monitored variables exceed their pre-established limits, neutron flux instrumentation becomes inoperable, or a manual scram signal is inserted by the operator. In addition, the setpoints, power sources, and controls and instrumentation are arranged in such a manner as to preclude spurious scrams.

Condition Prior to Event

Unit(s): 2 Date: May 31, 2021 Time: 19:26 CDT
Reactor Mode(s): 1 Mode(s) Name: Power Operation Power Level: 100 percent

Description

On May 31, 2021, the main control room (MCR) operating crew received an "A" RPS half scram due to loss of power to Unit 2 "A" (2A) RPS bus. The operating crew entered applicable abnormal operating procedure for the RPS power condition. Field operators determined that the 2A RPS MG set output breaker had overloaded and tripped. The loss of the power to the 2A RPS bus resulted in a half scram and closure of outboard isolation valves in multiple systems. The condition was considered an invalid actuation because it was not the result of a valid signal and not an intentional manual action. The actuations and isolations that occurred performed as designed except for the closure time of outboard main steam line isolation valve (MSIV) drain valve 2B21-F067D.

RPS MG Set

The 2A RPS bus loss resulted in isolations of the reactor water cleanup system, main steam line (MSL) drains, RCS sampling, instrument nitrogen system, reactor recirculation hydraulic power unit outboard isolation valves, and containment monitoring valves. The condition also resulted in loss of power to portions of the average power range monitor, local power range monitor, oscillating power range monitor, control rod block systems; as well as portions of the radiation monitoring for main steam lines, reactor building ventilation, and fuel pool ventilation. Appropriate actuations and primary containment isolations occurred as designed.

Due to the 2A RPS bus loss of power, applicable technical specification (TS) timeclocks were entered. Power was restored to 2A RPS bus in accordance with station procedures by transferring 2A RPS bus to the alternate power supply and resetting the half scram. When power was restored and the isolations were reset, the affected equipment was returned to operable status and timeclocks were exited.

MSIV Drain Valve

Position indication was lost on the Unit 2 "D" outboard MSIV drain valve (2B21-F067D) while power was being restored. This condition caused the station to enter TS Required Action (RA) to restore required post-accident monitor (PAM) instrumentation channel within 30 days. Position indication was restored after a reset of thermal breaker overloads. The 2D MSIV drain valve indicated in the closed position, verifying it performed its design function when 2A RPS power had been lost.

Subsequently, during reviews of computer traces from the loss of 2A RPS bus event, this valve was found to have exhibited closure time in excess of maximum isolation time limits specified in the technical requirements manual (TRM) and was declared inoperable as a primary containment isolation valve (PCIV). The station entered TS required actions to isolate the affected penetration flow path by use of at least one closed and de-activated automatic valve in four hours and to verify the affected penetration flow path is isolated once per 31 days. There was no loss of safety function as the penetration has two PCIVs in the flow-path, and the inboard PCIV remained operable.

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Cause

RPS MG Set

The RPS MG set can trip on either over-voltage, under-voltage, or under-frequency. A review of plant data recorders and component testing determined that the cause of the issue was a degraded voltage adjustment potentiometer (device 1P) on the 2A RPS MG set, which was causing intermittent resistance readings. The intermittent resistance caused the output voltage of the RPS MG set to fluctuate. As a result, the degraded potentiometer and the voltage regulator were replaced as part of the trouble-shooting efforts, and the system was restored back to its original configuration.

MSIV Drain Valve

The cause of the 2D outboard MSIV drain valve (2B21-F067D) loss of indication was most likely due to the motor operated valve (MOV) having a motor stall event after the valve achieved the full closed position. Following loss of the 2A RPS bus, 2B21-F067D was found tripped on thermals. Once the PCIS signal was reset, the thermal overload bypass no longer bypassed the overload condition (by design), which caused a loss of indication in the MCR. When operators reset the thermal overloads at the breaker, indication showed the full-closed position.

A causal investigation is ongoing to evaluate the cause of the slow closure time for this valve. However, based on the location of the component, it is not accessible until the next refueling outage when the primary containment is open and main steam lines are isolated. Therefore, the cause remains indeterminate until a component failure analysis can be performed. A supplemental LER will be provided upon completion of a causal investigation.

Reportability and Safety Analysis

RPS MG Set

The RPS is divided into two trip systems that are physically and electrically independent. The design of this system is such that the loss of power to one of these trip systems neither prevents nor causes a reactor scram. Normal power to RPS buses A and B is supplied by two motor-generator (MG) sets. Alternate power for either RPS bus is from the Alternate Instrument and RPS Bus Transformer. The loss of an RPS bus and associated RPS actuation was considered an invalid actuation because it was not the result of a valid signal and not an intentional manual action. The RPS bus loss condition resulted in general containment isolation signals that affected containment isolation valves in more than one system or multiple main steam isolation valves while the unit was critical. Therefore, the RPS bus loss condition is reportable in accordance with 10 CFR 50.73(a)(2)(iv)(A).

MSIV Drain Valve

The PCIS is designed to prevent the release of radioactive materials through containment penetrations in an accident where the primary system boundary has been lost and to prevent core damage when a major process line breaks outside primary containment. Major process lines are isolated automatically by PCIS on receipt of a trip signal. The PCIS logic is divided into two trip systems consisting of an inboard trip system and an outboard trip system. Main Steam is one of the several systems connected to the reactor which must close valves to isolate penetrations to the primary containment upon receipt of an isolation signal. The time required to close the Main Steam valves is designed to be short enough to minimize the loss of coolant from a steam line break. The 2D outboard MSIV drain valve indicated in the closed position, verifying it performed its design function when 2A RPS power had been lost. There was no loss of safety function as the penetration has two PCIVs in the flow-path, and the inboard PCIV remained operable.

The 2D outboard MSIV drain valve was subsequently found to have exhibited delayed closure time longer than the maximum isolation time limits specified in the technical requirements manual (TRM) and was declared inoperable as a primary containment isolation valve (PCIV). However, there was no loss of safety function as the penetration has two PCIVs in the flow-path, and the inboard PCIV remained operable. As a result of the inoperable valve, the condition is reportable in accordance with 10 CFR 50.73(a)(2)(i)(B) as operation or condition prohibited by technical specifications.

NARRATIVE

Safety System Functional Failure Review

The system equipment responses did not result in a safety system functional failure (SSFF) as defined in accordance with NEI 99-02, "Regulatory Assessment Performance Indicator Guideline." The RPS logic safety function was satisfied by its actuation for designed inputs, and the 2B21-F067D delayed closure time did not result in prevention of associated safety systems to the control the release of radioactive material since this valve is located between the inboard and outboard MSIVs on the "D" MSL which would have been isolated by the inboard MSIV.

Corrective Actions

The station completed actions to restore the affected systems and perform maintenance activities including:

- Declaration of affected systems inoperable and applicable TS required actions
- Evaluate "A" RPS MG set output breaker trip condition
- Maintenance activities to restore the "A" RPS logic
- Restore system alignments for the affected PCIS group
- Evaluate condition of 2B21-F067D performance (ongoing)

RPS MG Set

The degraded potentiometer and the voltage regulator for the 2A RPS MG set were replaced as part of the trouble-shooting efforts, and the RPS system was restored back to its original configuration. The station performed an extent of condition review to the Unit 1 RPS MG sets (1A and 1B) and the other Unit 2 RPS (2B), which included a review of trace recordings, which indicated less pronounced spiking for Unit 1 RPS (1A and 1B). The most likely cause for the 1A and 1B RPS MG sets voltage fluxuations is the voltage adjust potentiometer and/or voltage regulator. Therefore, the station is evaluating the need and scheduling to adjust the Unit 1 MG sets potentiometers. Operations and engineering will continue to monitor the installed recorders for any new voltage spiking events and or anomalies over the summer.

MSIV Drain Valve

Engineering recommends replacement of the motor operator, stem, and valve wedges during the next outage, or prior to restoring the MOV after a single stroke. Actions to evaluate potential MOV actuator and valve damage are ongoing to determine additional corrective maintenance and actions as necessary.

Previous Occurrences

There have been no similar reportable events in the prior three-year period involving an RPS bus loss that resulted in TS actuations that did not meet applicable requirements. However, during that period there have been non-reportable component performance issues captured in the corrective action program via an Issue Report (IR) for RPS MG set output breaker or separately a containment isolation valve.

- IR 4166455 – On August 23, 2018, the 2A RPS MG set output breaker did not trip open due a surveillance test. All instruments powered by the associated RPS bus functioned as designed, and the output breaker was repaired. There was no loss of operability or past operability for this event.

- IR 4368877 – On September 11, 2020, the 1A RPS experienced a half-scram during maintenance activities to replace a relay, due to the B1 logic bypass circuit output contact de-energizing when the replay's output contactor being loosened. The RPS configuration was reset, and work planning instructions were revised to jumper this part of the circuit. There was no loss of operability or past operability for this event.

- IR 4407689 – On March 9, 2021, during a refueling outage, the 2D inboard MSIV (2B21-F022D) was unresponsive during maintenance testing to close this valve. There was no loss of function since the valve was not required in this mode operation.

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NARRATIVE

Component Failure Data

Device: 2A RPS Logic MG Set Output Breaker – Voltage Adjustment Potentiometer
Component Type: Rheostat / Potentiometer [RHE]
Manufacturer: Ohmite [O026]
Part: RHS500