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10 CFR 50.73

November 15, 2017

Serial: BSEP 17-0096

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

Subject: Brunswick Steam Electric Plant, Unit No. 1 and 2
Renewed Facility Operating License Nos. DPR 71 and DPR-62
Docket Nos. 50 325 and 50-324
Licensee Event Report 1-2017-004

In accordance with the Code of Federal Regulations, Title 10, Part 50.73, Duke Energy Progress, LLC, submits the enclosed Licensee Event Report (LER). This report fulfills the requirement of 10 CFR 50.73(a)(1) for a written report within sixty (60) days of a reportable occurrence.

Please refer any questions regarding this submittal to Mr. Lee Grzeck, Manager – Regulatory Affairs, at (910) 832-2487.

Sincerely,

William R. Gideon

MAT/mat

Enclosure: Licensee Event Report 1-2017-004

cc (with enclosure):

U. S. Nuclear Regulatory Commission, Region II
ATTN: Ms. Catherine Haney, Regional Administrator
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NRC FORM 366 (04-2017) U.S. NUCLEAR REGULATORY COMMISSION

APPROVED BY OMB: NO. 3150-0104 EXPIRES: 03/31/2020

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 Information Services Branch (T-2 F43), U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001, or by e-mail to Infocollects.Resource@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 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)

(See Page 2 for required number of digits/characters for each block)

(See NUREG-1022, R.3 for instruction and guidance for completing this form http://www.nrc.gov/reading-rm/doc-collections/nuregs/staff/sr1022/r3/)

| 1. FACILITY NAME | 2. DOCKET NUMBER | 3. PAGE |
|---|---|---|
| Brunswick Steam Electric Plant (BSEP) Unit1 | 05000325 | 1 OF 4 |

**4. TITLE**

Emergency Diesel Generator and Primary Containment Isolation System Actuations

| 5. EVENT DATE | | | 6. LER NUMBER | | | 7. REPORT DATE | | | 8. OTHER FACILITIES INVOLVED | |
|---|---|---|---|---|---|---|---|---|---|---|
| MONTH | DAY | YEAR | YEAR | SEQUENTIAL NUMBER | REV NO. | MONTH | DAY | YEAR | FACILITY NAME | DOCKET NUMBER |
| | | | | | | | | | Brunswick Unit 2 | 05000324 |
| 09 | 17 | 2017 | 2017 | - 004 | - 00 | 11 | 15 | 2017 | FACILITY NAME | DOCKET NUMBER 05000 |

| 9. OPERATING MODE | 11. THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: *(Check all that apply)* | | | |
|---|---|---|---|---|
| 1 | ☐ 20.2201(b) | ☐ 20.2203(a)(3)(i) | ☐ 50.73(a)(2)(ii)(A) | ☐ 50.73(a)(2)(viii)(A) |
| | ☐ 20.2201(d) | ☐ 20.2203(a)(3)(ii) | ☐ 50.73(a)(2)(ii)(B) | ☐ 50.73(a)(2)(viii)(B) |
| | ☐ 20.2203(a)(1) | ☐ 20.2203(a)(4) | ☐ 50.73(a)(2)(iii) | ☐ 50.73(a)(2)(ix)(A) |
| | ☐ 20.2203(a)(2)(i) | ☐ 50.36(c)(1)(i)(A) | ☒ 50.73(a)(2)(iv)(A) | ☐ 50.73(a)(2)(x) |
| **10. POWER LEVEL** | ☐ 20.2203(a)(2)(ii) | ☐ 50.36(c)(1)(ii)(A) | ☐ 50.73(a)(2)(v)(A) | ☐ 73.71(a)(4) |
| | ☐ 20.2203(a)(2)(iii) | ☐ 50.36(c)(2) | ☐ 50.73(a)(2)(v)(B) | ☐ 73.71(a)(5) |
| | ☐ 20.2203(a)(2)(iv) | ☐ 50.46(a)(3)(ii) | ☐ 50.73(a)(2)(v)(C) | ☐ 73.77(a)(1) |
| 100 | ☐ 20.2203(a)(2)(v) | ☐ 50.73(a)(2)(i)(A) | ☐ 50.73(a)(2)(v)(D) | ☐ 73.77(a)(2)(i) |
| | ☐ 20.2203(a)(2)(vi) | ☐ 50.73(a)(2)(i)(B) | ☐ 50.73(a)(2)(vii) | ☐ 73.77(a)(2)(ii) |
| | | ☐ 50.73(a)(2)(i)(C) | ☐ OTHER Specify in Abstract below or in NRC Form 366A | |

**12. LICENSEE CONTACT FOR THIS LER**

| LICENSEE CONTACT | TELEPHONE NUMBER *(Include Area Code)* |
|---|---|
| Lee Grzeck, Manager - Regulatory Affairs | (910) 832-2487 |

**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 |
|---|---|---|---|---|---|---|---|---|---|
| X | EB | 81 | G080 | Y | | | | | |

**14. SUPPLEMENTAL REPORT EXPECTED**

☐ YES *(If yes, complete 15. EXPECTED SUBMISSION DATE)* ☒ NO

**15. EXPECTED SUBMISSION DATE**

| MONTH | DAY | YEAR |
|---|---|---|
| | | |


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

On September 17, 2017, at 0938 Eastern Daylight Time (EDT), a momentary power interruption to Emergency Bus E4 occurred during planned surveillance activities involving Emergency Diesel Generator (EDG) 4. This occurred when EDG 4 was disconnected from Emergency Bus E4 and offsite power was not supplying the bus. EDG 4 automatically transferred from manual mode to automatic control and reconnected to Emergency Bus E4. Normal frequency and voltage were restored with EDG 4 in automatic control. The momentary power interruption to Emergency Bus E4 resulted in various Unit 2 Primary Containment Isolation System (PCIS) actuations. The affected equipment responded as designed.

The direct cause of this event was that Operators were not aware that, at the time of the event, Emergency Bus E4 was being supplied solely by EDG 4. As a result of a failed under-frequency relay, the incoming line and feeder breakers from Balance of Plant (BOP) Bus 2C to Emergency Bus E4 had opened during the performance of the EDG 4 surveillance, leaving only EDG 4 to power Emergency Bus E4 in the manual mode of operation.

**NARRATIVE**

Energy Industry Identification System (EIIS) codes are identified in the text as [XX].

Background

*Initial Conditions*

At the time of the event, Unit 1 and Unit 2 were in Mode 1 at approximately 100 percent of rated thermal power (RTP).

*Reportability Criteria*

This event resulted in the automatic actuation of Emergency Diesel Generator (EDG) 4 [EK] and various Primary Containment Isolation System (PCIS) [JM] actuations. As such, this event is being reported in accordance with 10 CFR 50.73(a)(2)(iv)(A) as an event that resulted in valid actuation of systems listed in 10 CFR 50.73(a)(2)(iv)(B). The NRC was initially notified of this event on September 17, 2017 (i.e., Event Number 52974). Due to the shared configuration of the onsite AC Electrical Distribution System [EB], this event is applicable to both Units 1 and 2.

Event Description

On September 17, 2017, Unit 2 Operators were conducting a surveillance of EDG 4 in accordance with 0PT-12.2D, *No. 4 Diesel Generator Monthly Load Test*. As part of this surveillance, EDG 4 was started in the manual mode of operation and synchronized to the grid via Emergency Bus E4. Operators observed unexpected loading and drops in frequency and voltage following closure of the EDG 4 output breaker. As a result, the decision was made to back out of the ongoing surveillance. When the EDG 4 output breaker was opened, at 0938 Eastern Daylight Time (EDT), a momentary power interruption to Emergency Bus E4 occurred. EDG 4 automatically transferred from manual mode to automatic control and reconnected to Emergency Bus E4. Normal frequency and voltage were restored with EDG 4 in automatic control. The momentary power interruption to Emergency Bus E4 resulted in the partial actuation of Unit 2 PCIS Group 1, Group 2, Group 8, and Group 10; and a full actuation of PCIS Group 3 and Group 6. The affected equipment responded as designed. In addition, Unit 2 Reactor Building Ventilation System [VA] isolation (i.e., Secondary Containment isolation), and the automatic start of Standby Gas Treatment System [BH] occurred. These systems functioned as designed.

Per design, no Unit 1 PCIS actuations occurred. Unit 1 Conventional Service Water (CSW) System [KG] pump 1A and Unit 2 CSW pump 2B, which are powered from Emergency Bus E4, tripped, which resulted in the automatic start of CSW pump 1B. These systems functioned as design. EDG 4 continued to supply power to Emergency Bus E4 while troubleshooting was conducted to determine the cause of the electrical transient. Offsite power was restored to Emergency Bus E4 at 0023 EDT on September 18, 2017.

NARRATIVE

Event Cause

The direct cause of this event was that Operators were not aware that, when the EDG 4 output breaker was opened to back out of the performance of 0PT-12.2D, E4 was being supplied solely by EDG 4.

Troubleshooting activities determined that a failed relay (i.e., the 81PK under-frequency relay) caused the incoming and line feeder breakers from Balance of Plant (BOP) Bus 2C to Emergency Bus E4 to open during the performance of the EDG 4 surveillance. As a result, the only source of power to Emergency Bus E4 was EDG 4. The momentary power interruption to Emergency Bus E4 occurred when the EDG 4 output breaker was opened. The fact that EDG 4 was powering an isolated bus versus being paralleled to the grid also accounts for the unexpected EDG performance observed by the Operators when the EDG 4 output breaker was initially closed.

A contributing cause to the event was the failure of the field Operator, providing local oversight of the EDG 4 surveillance, to communicate the status of the open incoming line and feeder breakers to Control Room Operators.

Safety Analysis

The safety significance of this event is minimal. EDG 4 functioned, per design, to automatically transfer from manual mode to automatic control and reconnect to Emergency Bus E4. Since EDG 4 was running when the output breaker was opened, power was restored to Emergency Bus E4 in less than 5 seconds.

The 81PK under-frequency relay does not provide a Technical Specification required protective function. The 81PK under-frequency relay is only capable of tripping the feeder breaker when the associated EDG is in manual mode and, as such, its failure has no impact on the ability of EDG 4 to power Emergency Bus E4 in the event that the EDG received an automatic start signal under emergency conditions.

Corrective Actions

The following corrective actions have been completed.

- A temporary alteration was performed to disable the failed 81PK under-frequency relay and offsite power was restored to Emergency Bus E4.
- Actions were taken to address human performance deficiencies with the individuals directly involved in the event.
- A face-to-face meeting between the Operations Manager and affected Operations shift to discuss lessons learned from the event and shortfalls in operator fundamentals was held.
- A stand-down package was generated and discussed with the affected shift to ensure understanding of the lessons learned, behavioral shortfalls, and operator fundamental weaknesses exhibited during the event. The package was also reviewed with the remaining Operations shifts.

| 1. FACILITY NAME | 2. DOCKET NUMBER | 3. LER NUMBER | | |
|---|---|---|---|---|
| | | YEAR | SEQUENTIAL NUMBER | REV NO. |
| Brunswick Steam Electric Plant (BSEP) Unit 1 | 05000325 | 2017 | - 004 | - 00 |

**NARRATIVE**

The following corrective actions are planned. Any changes to the corrective actions and schedules noted below will be made in accordance with the site's corrective action program.

- The failed 81PK under-frequency relay will be replaced and the breaker circuitry restored to its normal configuration during a planned EDG 4 maintenance window, currently scheduled for the week of November 12, 2017.
- An evaluation to determine the cause of the failed 81PK under-frequency relay will be completed subsequent to its removal. The failure analysis is currently planned for completion by December 15, 2017.

Previous Similar Events

There have been no LERs associated with valid automatic actuations due to human performance issues in the past three years.

Invalid actuations, associated with EDGs, have been reported as follows:

- Event Notification 51739 reported an invalid actuation of EDG 2, which occurred on January 9, 2016, due to out-of-sequence performance of procedure steps.
- LER 1-2016-002 reported an invalid actuation of EDGs 2 and 4, which occurred on March 3, 2016, due to a clearance lift sequencing error in the restoration sequence for BOP Bus 1D.
- Event Notification 52778 reported an invalid actuation of EDGs 1, 2, 3, and 4, which occurred on April 6, 2017, due to a configuration error (i.e., missing flexible links) which occurred when transferring power supplies to BOP Bus 2C.

Corrective actions associated with the above events could not reasonably have been expected to prevent the event reported in LER 1-2017-004.

Commitments

No regulatory commitments are contained in this report.