DUKE ENERGY®

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10 CFR 50.73

June 15, 2023

Serial: RA-23-0116

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

Subject: Brunswick Steam Electric Plant, Unit No. 1
Renewed Facility Operating License No. DPR-71
Docket No. 50-325
Licensee Event Report 1-2023-001

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

This document contains no regulatory commitments.

Please refer any questions regarding this submittal to Mr. Mark DeWire, Manager – Nuclear Support Services, at (910) 832-6641.

Sincerely,

John A. Krakuszeski

John A. Krakuszeski

Enclosure: Licensee Event Report

cc (with enclosure):

Ms. Laura Dudes, NRC Regional Administrator, Region II
Mr. Luke Haeg, NRC Project Manager
Mr. Gale Smith, NRC Senior Resident Inspector

NRC FORM 366 (03-14-2023) U.S. NUCLEAR REGULATORY COMMISSION

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/)

APPROVED BY OMB: NO. 3150-0104 EXPIRES: 08/31/2023

1. Facility Name		2. Docket Number	3. Page
Brunswick Steam Electric Plant (BSEP), Unit 1	☒ 050 ☐ 052	00325	1 OF 3

4. Title

Loss of Redundant Power Supply Operation Causes Turbine Trip and Subsequent Reactor Scram

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	☐ 050	Docket Number
04	20	2023	2023	- 001 -	00	06	15	2023	Facility Name	☐ 052	Docket Number

9. Operating Mode	10. Power Level
1	100

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)	**10 CFR Part 50**	☐ 50.73(a)(2)(ii)(A)	☐ 50.73(a)(2)(viii)(A)	☐ 73.1200(a)
☐ 20.2201(b)	☐ 20.2203(a)(3)(i)	☐ 50.36(c)(1)(i)(A)	☐ 50.73(a)(2)(ii)(B)	☐ 50.73(a)(2)(viii)(B)	☐ 73.1200(b)
☐ 20.2201(d)	☐ 20.2203(a)(3)(ii)	☐ 50.36(c)(1)(ii)(A)	☐ 50.73(a)(2)(iii)	☐ 50.73(a)(2)(ix)(A)	☐ 73.1200(c)
☐ 20.2203(a)(1)	☐ 20.2203(a)(4)	☐ 50.36(c)(2)	☒ 50.73(a)(2)(iv)(A)	☐ 50.73(a)(2)(x)	☐ 73.1200(d)
☐ 20.2203(a)(2)(i)	**10 CFR Part 21**	☐ 50.46(a)(3)(ii)	☐ 50.73(a)(2)(v)(A)	**10 CFR Part 73**	☐ 73.1200(e)
☐ 20.2203(a)(2)(ii)	☐ 21.2(c)	☐ 50.69(g)	☐ 50.73(a)(2)(v)(B)	☐ 73.77(a)(1)	☐ 73.1200(f)
☐ 20.2203(a)(2)(iii)		☐ 50.73(a)(2)(i)(A)	☐ 50.73(a)(2)(v)(C)	☐ 73.77(a)(2)(i)	☐ 73.1200(g)
☐ 20.2203(a)(2)(iv)		☐ 50.73(a)(2)(i)(B)	☐ 50.73(a)(2)(v)(D)	☐ 73.77(a)(2)(ii)	☐ 73.1200(h)
☐ 20.2203(a)(2)(v)		☐ 50.73(a)(2)(i)(C)	☐ 50.73(a)(2)(vii)		

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

12. Licensee Contact for this LER

Licensee Contact	Phone Number (Include area code)
Mark DeWire, Manager – Nuclear Support Services	(910) 832-6641

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
B	JJ	RJX	K078	Y						

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

16. Abstract (Limit to 1326 spaces, i.e., approximately 13 single-spaced typewritten lines)

At 01:48 Eastern Daylight Time (EDT) on April 20, 2023, with Unit 1 in Mode 1 at approximately 100% power, an automatic reactor scram occurred due to a turbine trip. All control rods inserted as expected. Turbine bypass valves did not open on the scram; Safety Relief Valves (SRVs) opened automatically to control reactor pressure. Reactor Pressure reached approximately 1100 psig on the scram, exceeding the Reactor Protection System (RPS) setpoint. Reactor water level reached low level 1 following the scram resulting in automatic actuation of Primary Containment Isolation System (PCIS) Group 2, 6, and 8 isolation valves, by design.

Operations responded and stabilized the plant. Operations transitioned pressure control from SRVs to main steam line drains to the condenser. Following the scram, reactor water level was maintained via the condensate and feedwater systems.

The turbine trip and subsequent inoperative turbine bypass valves resulted from a complete loss of 24 Vdc power to the Turbine Protection system. The power supplies were replaced prior to restart.

There was no impact on the health and safety of the public or plant personnel. This event is being reported in accordance with 10 CFR 50.73(a)(2)(iv)(A) due to valid actuation of the RPS and PCIS.

LICENSEE EVENT REPORT (LER) CONTINUATION SHEET

1. FACILITY NAME		2. DOCKET NUMBER	3. LER NUMBER		
			YEAR	SEQUENTIAL NUMBER	REV NO.
Brunswick Steam Electric Plant (BSEP), Unit 1	■ 050 ☐ 052	00325	2023	- 001	- 00

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 was in Mode 1 (i.e., Power Operation), at approximately 100 percent rated thermal power.

Reportability Criteria

This event is being reported in accordance with 10 CFR 50.73(a)(2)(iv)(A) because it involved actuation of systems listed in 10 CFR 50.73(a)(2)(iv)(B). Specifically, the Reactor Protection System [JC] and Primary Containment Isolation System [JM] actuated during this event.

The NRC was notified of this event per 10 CFR 50.72(b)(2)(iv)(B) and 10 CFR 50.72(b)(3)(iv)(A) via Event Notification 56478 at 05:24 Eastern Daylight Time (EDT) on April 20, 2023.

Event Description

At 01:48 Eastern Daylight Time (EDT) on April 20, 2023, with Unit 1 in Mode 1 at approximately 100% power, an automatic reactor scram occurred due to a turbine trip. All control rods inserted as expected.

The turbine bypass valves [JI] did not open on the scram; main steam [SB] Safety Relief Valves (SRVs) 1C, 1F, 1G, 1K, and 1L cycled open automatically to control reactor pressure. Reactor pressure reached approximately 1100 psig on the scram; exceeding the 1060 psig Reactor Protection System (RPS) setpoint.

Reactor water level reached the low level 1 (LL1) setpoint following the scram. Per design, the LL1 signal resulted in Primary Containment Isolation System Group 2 (i.e., floor and equipment drain isolation valves), Group 6 (i.e., monitoring and sampling isolation valves) and Group 8 (i.e., shutdown cooling isolation valves) isolations.

Operations responded and stabilized the plant. Operations manually cycled open SRV 1B then transitioned pressure control from SRVs to the main steam line drains [SB] to the condenser [SG]. Following the scram, reactor water level was maintained via the condensate [SD] and feedwater [SJ] systems.

Event Cause

The direct cause of the turbine trip and subsequent inoperative turbine bypass valves was a complete loss of 24 Vdc power to the Turbine Protection system [JJ]. When 24 Vdc power was lost, Turbine Protection system data inputs for required pressure and flow transmitters were lost. With the loss of monitoring capability, the Turbine Protection system responded as designed by initiating a turbine trip to protect the turbine and inhibiting the opening of the turbine bypass valves to protect the condenser.

24 Vdc power is supplied to the Turbine Protection system via redundant power supplies [RJX]. Due to inadequacies in the vendor design, a unique combination of internal component failures on one power supply impacted the operation of the redundant power supply. As a result, both power supplies failed/shutdown within a short timeframe of one another resulting in a total loss of 24 Vdc power.

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NARRATIVE

Prior to this event the power supplies had operated successfully with no indication of deficiencies for approximately five years.

Safety Assessment

There was no adverse impact on the health and safety of the public or plant personnel. The safety significance of this event is minimal. The condenser remained available for pressure control. The condensate and feedwater systems remained available for level control.

Corrective Actions

Prior to restart from this event, the 24 Vdc Turbine Protection system power supplies were replaced.

The site is planning to implement changes to the current 24Vdc power supply functionality that will prevent a power supply internal failure from impacting the redundant power supply.

Any changes to corrective actions or completion schedules will be made in accordance with the site's corrective action program.

Previous Similar Events

No previous similar events have occurred within the past three years in which inadequate vendor design resulted in a turbine trip and reactor scram.

Commitments

No regulatory commitments are contained in this report.