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 https://www.nrc.gov/reading-rm/doc-collections/nuregs/staff/sr1022/r3/)

1. Facility Name	2. Docket Number	3. Page
Callaway Plant, Unit No. 1	05000483	1 OF 3

4. Title

Reactor Trip due to Main Generator Ground Fault

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
										05000
09	27	2020	2020	- 006 -	00	11	25	2020	Facility Name	Docket Number
										05000

9. Operating Mode	10. Power Level
MODE 1	98%

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 in NRC 366A).

12. Licensee Contact for this LER

Licensee Contact	Phone Number (Include Area Code)
T. B. Elwood, Supervising Engineer, Regulatory Affairs and Licensing	314-225-1905

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

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

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

On September 27, 2020 at 0203 with the reactor at 98% power during the cycle 24 coastdown, a main generator fault occurred that lead to a turbine trip and reactor trip. Safety systems functioned as required, including actuation of the auxiliary feedwater system, and the Operations staff responded to the event in accordance with applicable plant procedures. The post trip investigation indicated that a fault in the 25-kV portion of the generator output actuated the main generator protection system, which in turn caused the turbine trip (with reactor power above the P-9 setpoint) and an automatic reactor trip.

An ENS notification (ENS 54916) was made for this event.

The cause of the generator fault was due to a detached section of a flexible link in the B phase of the isophase bus ductwork.

All flexible links were inspected during refueling outage 24 and repairs completed.

NARRATIVE

1. DESCRIPTION OF STRUCTURE(S), SYSTEM(S),AND COMPONENT(S):

The systems and components affected by this event include the reactor trip system and the unit main generator.

The reactor trip system at Callaway Plant initiates a unit shutdown, based on the values of selected unit parameters, to protect against violating the core fuel design limits and reactor coolant system pressure boundary during anticipated operational occurrences and to assist the Engineered Safety Features systems in mitigating accidents.

The main generator has a number of trips in order to protect this asset from irreparable damage. The main generator isophase buses transport electrical power from the main generator to the main step-up transformers, unit auxiliary transformer, and excitation transformer.

2. INITIAL PLANT CONDITIONS

Callaway was at 98% Power/Mode 1 performing the cycle 24 coastdown at the time of this event.

3. EVENT DESCRIPTION

On September 27, 2020 at 0203 with the reactor at 98% power during the cycle 24 coastdown, the reactor was automatically tripped from a turbine trip caused by a main generator fault. Safety systems functioned as expected. The Operations staff responded to the event in accordance with applicable plant procedures. An ENS notification (EN 54916) was made for this event at 0416 on September 27, 2020.

The post trip relay positions indicated that a main generator fault in the 25-kV portion of the generator output caused a main generator trip, which in turn caused the turbine trip. Initial walkdowns did not identify any obvious damage to the main generator or isolated phase (isophase) bus system. Review of the relay data identified that the fault occurred in the B phase. Closer inspection of the isolated phase bus system identified a detached piece of a laminated sheet-style flexible link that was located inside the bus duct within the turbine building.

The initiating cause of the main generator/reactor trip was a laminated sheet on the 5B flexible link became detached and caused a phase-to-ground fault on B phase of the 25-kV isophase bus system. This actuated the main generator protection system, which resulted in a turbine trip (with reactor power above the P-9 setpoint) and an automatic reactor trip.

Per plant design, an auxiliary feedwater system actuation occurred as expected in response to the reactor trip.

4. ASSESSMENT OF SAFETY CONSEQUENCES:

There were no actual nuclear, radiological, or personnel safety impacts associated with this event. The potential impact was on nuclear safety with respect to challenging the reactor trip system as well as any potential challenges to the plant due to the transient associated with a reactor trip. However, all safety systems functioned as designed, and the reactor automatically tripped (i.e., shut down) per design when the main generator ground fault was detected.

5. REPORTING REQUIREMENTS

This LER is submitted pursuant to 50.73(a)(2)(iv)(A) to report a reactor protection system actuation during startup and an auxiliary feedwater actuation.

Specifically, 10 CFR 50.73(a)(2)(iv)(A) states in part, "The licensee shall report:

(A) Any event or condition that resulted in manual or automatic actuation of any of the systems listed in paragraph (a)(2)(iv)(B) of this section…

(B) The systems to which the requirements of paragraph (a)(2)(iv)(A) of this section are:

(1) Reactor protection system (RPS) including: reactor scram or reactor trip….
(6) PWR auxiliary or emergency feedwater system

The RPS was actuated on September 27, 2020 at 0203, during the cycle 24 coastdown. This fulfills the reporting requirement of 10 CFR 50.73(a)(2)(iv)(A) by actuation of the system specified in 10 CFR 50.73(a)(2)(iv)(B)(1).

A valid auxiliary feedwater system actuation was initiated after the reactor trip. This fulfills the reporting requirement of 10 CFR 50.73(a)(2)(iv)(A) by actuation of the system specified in 10 CFR 50.73(a)(2)(iv)(B)(6).

6. CAUSE OF THE EVENT

A main generator fault in the 25-kV portion of the generator output caused a main generator trip, which in turn caused the turbine trip/reactor trip. Inspection of the isolated phase bus system identified a detached piece of a laminated sheet-style flexible link that was located inside the bus duct. The laminated sheet on the 5B flexible link became detached and caused a phase-to-ground fault on B phase of the 25-kV isophase bus system. This actuated the main generator protection system, which resulted in a turbine trip (with reactor power above the P-9 setpoint) and an automatic reactor trip.

7. CORRECTIVE ACTIONS

All isophase flexible link locations were inspected and repaired, as necessary. Callaway continues to consider additional actions that may be taken to improve the flexible link design configuration. Additional plant changes that may be pursued will be provided in a supplement to this LER as warranted.

8. PREVIOUS SIMILAR EVENTS

On July 26, 2013, electrical faults caused damage to the isophase bus in the auxiliary transformer and main generator neutral connection box which caused a generator trip and subsequent reactor trip. See LER 2013-008.

On December 3, 2014 a turbine trip occurred, when the main generator excitation transformer faulted to ground. This resulted in a reactor trip classified as uncomplicated and safety systems performed as designed. See LER 2014-006.