



Steven M. Snider
Vice President
Oconee Nuclear Station

Duke Energy
ON01SC | 7800 Rochester Hwy
Seneca, SC 29672

o: 864.873.3478
f: 864.873.5791
Steve.Snider@duke-energy.com

RA-22-0116

March 28, 2022

10 CFR 50.73

Attn: Document Control Desk
U. S. Nuclear Regulatory Commission
11555 Rockville Pike
Rockville, MD 20852-2746

Duke Energy Carolinas, LLC
Oconee Nuclear Station Unit 2
Docket Number: 50-270
Renewed Operating Licenses: DPR-49

Subject: Licensee Event Report 287/2022-001, Revision 00 – Response Actions Resulted in Brief Inoperability of Both Onsite and Offsite Emergency AC Power Paths

Licensee Event Report 287/2022-001, Revision 00, is being submitted pursuant to the requirements of 10 CFR 50.73 to provide notification of the subject event.

There are no regulatory commitments associated with this LER.

There are no unresolved corrective actions necessary to restore compliance with NRC requirements.

If there are questions, or further information is needed, contact Laura Boyce, Regulatory Affairs, at (864) 873-6774.

Sincerely,

A handwritten signature in black ink, appearing to read "Steven M. Snider", written in a cursive style.

Steven M. Snider
Vice President
Oconee Nuclear Station

Enclosure: Licensee Event Report 287-2022-001 Rev.00

RA-22-0116
March 28, 2022
Page 2

cc (w/Enclosure):

Ms. Laura Dudes, Administrator, Region II
U.S. Nuclear Regulatory Commission
Marquis One Tower
245 Peachtree Center Ave., NE, Suite 1200
Atlanta, GA 30303-1257

Mr. Shawn Williams, Project Manager
U.S. Nuclear Regulatory Commission
11555 Rockville Pike
Mail Stop O-08B1A
Rockville, MD 20852-2738

Mr. Jared Nadel
NRC Senior Resident Inspector
Oconee Nuclear Station



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/nureqs/staff/sr1022/r3/>)

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-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: oir_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 Oconee Nuclear Station Unit 3	2. Docket Number 0500000287	3. Page 1 OF 4
--	---------------------------------------	--------------------------

4. Title
Response Actions Resulted in Brief Inoperability of Both Onsite and Offsite Emergency AC Power Paths

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
01	26	2022	2022	001	00	03	28	2022	NA	NA
									Facility Name	Docket Number
									NA	NA

9. Operating Mode 1	11. This Report is Submitted Pursuant to the Requirements of 10 CFR §: (Check all that apply)				
	<input type="checkbox"/> 20.2201(b)	<input type="checkbox"/> 20.2203(a)(3)(i)	<input type="checkbox"/> 50.73(a)(2)(ii)(A)	<input type="checkbox"/> 50.73(a)(2)(viii)(A)	
	<input type="checkbox"/> 20.2201(d)	<input type="checkbox"/> 20.2203(a)(3)(ii)	<input type="checkbox"/> 50.73(a)(2)(ii)(B)	<input type="checkbox"/> 50.73(a)(2)(viii)(B)	
	<input type="checkbox"/> 20.2203(a)(1)	<input type="checkbox"/> 20.2203(a)(4)	<input type="checkbox"/> 50.73(a)(2)(iii)	<input type="checkbox"/> 50.73(a)(2)(ix)(A)	
10. Power Level 100	<input type="checkbox"/> 20.2203(a)(2)(i)	<input type="checkbox"/> 50.36(c)(1)(i)(A)	<input type="checkbox"/> 50.73(a)(2)(iv)(A)	<input type="checkbox"/> 50.73(a)(2)(x)	
	<input type="checkbox"/> 20.2203(a)(2)(ii)	<input type="checkbox"/> 50.36(c)(1)(ii)(A)	<input checked="" type="checkbox"/> 50.73(a)(2)(v)(A)	<input type="checkbox"/> 73.71(a)(4)	
	<input type="checkbox"/> 20.2203(a)(2)(iii)	<input type="checkbox"/> 50.36(c)(2)	<input checked="" type="checkbox"/> 50.73(a)(2)(v)(B)	<input type="checkbox"/> 73.71(a)(5)	
	<input type="checkbox"/> 20.2203(a)(2)(iv)	<input type="checkbox"/> 50.46(a)(3)(ii)	<input checked="" type="checkbox"/> 50.73(a)(2)(v)(C)	<input type="checkbox"/> 73.77(a)(1)	
	<input type="checkbox"/> 20.2203(a)(2)(v)	<input type="checkbox"/> 50.73(a)(2)(i)(A)	<input checked="" type="checkbox"/> 50.73(a)(2)(v)(D)	<input type="checkbox"/> 73.77(a)(2)(ii)	
	<input type="checkbox"/> 20.2203(a)(2)(vi)	<input type="checkbox"/> 50.73(a)(2)(i)(B)	<input type="checkbox"/> 50.73(a)(2)(vii)	<input type="checkbox"/> 73.77(a)(2)(iii)	
				<input type="checkbox"/> 50.73(a)(2)(i)(C)	<input type="checkbox"/> Other (Specify in Abstract below or in NRC Form 366A)

12. Licensee Contact for this LER

Licensee Contact Laura Boyce, Senior Nuclear Engineer, Oconee Regulatory Affairs	Telephone Number (Include Area Code) (864) 873-6774
---	--

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
N/A					N/A				

14. Supplemental Report Expected <input type="checkbox"/> Yes (If yes, complete 15. Expected Submission Date) <input checked="" type="checkbox"/> No	15. Expected Submission Date Month: _____ Day: _____ Year: _____
--	--

Abstract (Limit to 1400 spaces, i.e., approximately 14 single-spaced typewritten lines)

At 1044 EST on January 26, 2022, a breaker failure relay associated with Power Circuit Breaker (PCB) 28 in the 230kV Switchyard actuated, resulting in lockout of the Unit 3 Start-up Transformer (CT-3). With Unit 3 Main Feeder Bus (MFB) powered from Auxiliary Transformer 3T, lockout of Start-up Transformer CT-3 had no immediate impact on operation of Unit 3.

Operations followed procedures to align offsite power from transformer CT-5 to Unit 3 to provide defense in depth against a loss of power. During this evolution, the Underground Emergency Power Path was made momentarily inoperable for one minute as part of aligning CT-5 to the Standby Bus and resulted in a brief inoperability of both onsite and offsite emergency power paths for Unit 3. An offsite power source was restored through CT-5 within 15 minutes. Following troubleshooting of the actuated breaker failure relay, transformer CT-3 was restored and all offsite and the onsite overhead power sources were returned to service by 1651 EST. Because of the power alignment at the time of the event, ONS Units 1, 2, and 3 did not experience a loss of AC power and did not initiate any actuation signal to the Keowee Hydroelectric Station (KHU) Units.

The CT-3 transformer lockout was caused by an invalid actuation of a breaker failure relay in the 230kV Switchyard. The momentary loss of safety function was caused by response actions following lockout of the CT-3 transformer. This event was reported to the NRC on January 26, 2022, in Event Notification (EN) number 55713, as an eight-hour, non-emergency notification under 10 CFR 50.72(b)(3)(v). It is also reportable as a 60-day written report under 10 CFR 50.73(a)(2)(v)(A-D).



**LICENSEE EVENT REPORT (LER)
CONTINUATION SHEET**

(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/>)

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-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. LER NUMBER		
		YEAR	SEQUENTIAL NUMBER	REV NO.
Oconee Nuclear Station Unit 3	0500000287	2022	001	00

NARRATIVE

BACKGROUND

At Oconee Nuclear Station (ONS), with the Unit's main generator online, offsite power [EA] is provided to the Unit's Main Feeder Buses (MFB) [EB] by the Unit's main generator [EL] via the Unit's Auxiliary Transformer [XFMR] (transformers 1T, 2T, and 3T for Units 1, 2, and 3, respectively). When the Unit's main generator is operating at low power output or is offline, offsite power is provided to the Unit's MFB from the 230kV Switchyard [FK] via the Unit's Start-up Transformer [XFMR] (transformers CT-1, CT-2, and CT-3 for Units 1, 2, and 3, respectively).

The Keowee Hydroelectric Station (KHS) [EK] serves the emergency power [EB] function typically performed by diesel generators [DG] at other nuclear facilities. The KHS consists of two (2) hydroelectric turbine/generator units (KHUs) and associated support equipment and auxiliaries. Each KHU is provided with its own automatic start equipment and both KHUs undergo simultaneous automatic emergency starts during an emergency. Emergency power can be provided to any or all three ONS Units from the Keowee Hydroelectric Station. There are two emergency power paths:

1. The Overhead Emergency Power Path, that includes the Unit's Start-up Transformer (CT-1, CT-2, or CT-3) on each ONS unit
2. The Underground Emergency Power Path, that includes Transformer CT-4 [XFMR] and both Standby Buses [EA].

ONS Technical Specification (TS) 3.8.1 specifies the AC electrical power sources required to be OPERABLE with a Unit in Modes 1-4:

- Two offsite sources on separate towers connected to the 230kV Switchyard to a Unit's Start-up Transformer
- Two KHUs with one capable of automatically providing power through the Underground Emergency Power Path to both MFB via the Standby Bus and the other capable of automatically providing power through the Overhead Emergency Power Path to both MFB

An additional power source to the ONS units is Transformer CT-5 [XFMR] via one or both Standby Buses. CT-5 is an available source of offsite power [EA] when energized from the Central Switchyard [FK] and is an available source of onsite emergency power [EB] when energized from a Lee Combustion Turbine (LCT) [TG] via dedicated 100kV transmission line.

EVENT DESCRIPTION

On January 26, 2022, Unit 1 was in MODE 1 operating at 100% reactor power with its Main Feeder Busses (MFB) [BU] powered from the Unit 1 Auxiliary Transformer (1T) [XFMR]. Unit 2 was in MODE 1 operating at 100% reactor power with its MFB powered from the Unit 2 Auxiliary Transformer (2T) [XFMR]. Unit 3 was in MODE 1 operating at 100% reactor power with its MFB powered from the Unit 3 Auxiliary Transformer (3T) [XFMR]. CT-5 was available to energize Standby Buses to provide an additional offsite power source. Power Circuit Breaker (PCB) 28 in the 230kV Switchyard was open to support planned preventative maintenance on associated protective relays.

At 1044 EST on January 26, 2022, with relay maintenance complete, a breaker failure relay associated with PCB-28 actuated (invalid), resulting in lockout of the Unit 3 Start-up Transformer (CT-3). With Unit 3 MFB powered from Auxiliary Transformer 3T, lockout of Start-up Transformer CT-3 had no immediate impact on operation of Unit 3. Operations entered TS 3.8.1, AC Sources - Operating, Condition A, for Unit 3 for both required offsite sources and the Overhead Emergency Power Path inoperable due to inoperable unit Start-up Transformer.

Operations followed procedures to align offsite power from transformer CT-5 to Unit 3 to provide defense in depth against a loss of power. During this evolution, the Underground Emergency Power Path was made momentarily inoperable for one minute as part of aligning CT-5 to the Standby Bus. TS 3.8.1 Condition D was entered for all three units for the Underground Emergency Power Path inoperable at 1050 EST. Additionally, TS 3.8.1 Condition I was entered for Unit 3 for both required emergency power paths inoperable. TS 3.8.1 Conditions D and I were exited at 1051 EST when the Underground Emergency Power Path was



**LICENSEE EVENT REPORT (LER)
CONTINUATION SHEET**

(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/>)

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-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. LER NUMBER		
		YEAR	SEQUENTIAL NUMBER	REV NO.
Oconee Nuclear Station Unit 3	0500000287	2022	001	00

NARRATIVE CONTINUED

declared OPERABLE. An offsite power source was restored through CT-5 within 15 minutes. Following troubleshooting of the actuated breaker failure relay, transformer CT-3 was restored and all offsite and the onsite overhead power sources were returned to service by 1651 EST. Because of the power alignment at the time of the event, ONS Units 1, 2, and 3 did not experience a loss of AC power and did not initiate any actuation signal to the KHS Units.

The CT-3 transformer lockout was caused by an invalid actuation of a breaker failure relay in the 230kV Switchyard. The momentary loss of safety function was caused by response actions following lockout of the CT-3 transformer.

Because the overhead and underground emergency power paths were briefly concurrently inoperable on Unit 3, this event is being reported as an event or condition that could have prevented fulfillment of a safety function in accordance with 10 CFR 50.73(a)(2)(v)(A-D).

CAUSAL FACTORS

The CT-3 transformer lockout was caused by an invalid actuation of a breaker failure relay in the 230kV Switchyard. The momentary loss of safety function was caused by response actions following lockout of the CT-3 transformer.

CORRECTIVE ACTIONS

Immediate:

1. Isolated PCB-28 breaker failure relay
2. Restored transformer CT-3
3. Replaced PCB-28 breaker failure relay

Planned:

Plan and schedule maintenance on 230kV Switchyard PCB breaker failure relays associated with Start-up Transformers such that the affected Unit maintains at least one additional emergency power path or is outside the MODE of applicability.

SAFETY ANALYSIS

A risk evaluation was performed that determined that the brief inoperability of both onsite and offsite emergency power paths for Unit 3 did not have a significant impact on public health and safety.

The CT-3 lockout did not cause a plant transient and Unit 3 remained online with internal electrical loads supplied from the normal power source (Auxiliary Transformer 3T). However, the CT3 lockout made the primary offsite power path and Keowee Overhead Emergency Power path to Unit 3 unavailable. The Keowee Underground Emergency Power path was available along with an alternate offsite power source via transformer CT5 from the Fant Black Line. Additional defense-in-depth to ensure safe shutdown was available from the Turbine-Driven Emergency Feedwater Pump, Protected Service Water (PSW) System, the Standby Shutdown Facility (SSF), and portable FLEX Equipment.



**LICENSEE EVENT REPORT (LER)
CONTINUATION SHEET**

(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/>)

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-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. LER NUMBER		
		YEAR	SEQUENTIAL NUMBER	REV NO.
Oconee Nuclear Station Unit 3	0500000287	2022	001	00

NARRATIVE CONTINUED

In response to the CT-3 lockout, the operations staff followed procedural guidance to align offsite power from CT5 to the Standby Buses. For Unit 1 and Unit 2, this action briefly made the Keowee Underground Emergency Power Path technically inoperable but it was still available. For Unit 3, this action briefly caused the emergency power system for both Keowee paths to be technically inoperable. However, the system remained available during the short evolution of the procedure. This action implements a risk reduction measure that allows the alternate offsite power source to be automatically aligned to the Main Feeder Buses if normal power is lost. This alternate alignment was maintained until power from CT3 was restored.

As a result, the lockout event and procedural response had a very low impact on core damage risk since there was no transient, AC power was maintained, emergency power was available, and additional defense-in-depth measures were also available. Therefore, it is concluded that the impact of the brief inoperability of both onsite and offsite emergency AC power paths on overall plant risk is very low and had no impact on public health and safety.

ADDITIONAL INFORMATION

A review of Duke Energy's Corrective Action Program did not identify any Oconee LERs or events in the last 3 years that involved the same underlying concerns or reasons as this event.

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

This event is considered INPO IRIS Reportable.

There were no releases of radioactive materials, radiation exposures, or personnel injuries associated with this event.