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-22-0062

February 7, 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 270/2021-003, Revision 00 – Conditions Prohibited by Technical Specifications Due to SSF and PSW Inoperability

Licensee Event Report 270/2021-003, 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,

Steven M. Snider
Vice President
Oconee Nuclear Station

Enclosure: Licensee Event Report 270-2021-003 Rev.00

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

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 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
Oconee Nuclear Station Unit 2	0500000270	1 OF 4

4. Title

Conditions Prohibited by Technical Specifications Due to SSF and PSW Inoperability

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
									NA	05000
12	5	2021	2021	003	00	02	07	2022	Facility Name	Docket Number
									NA	05000

9. Operating Mode	11. This Report is Submitted Pursuant to the Requirements of 10 CFR §: *(Check all that apply)*			
3	☐ 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)
000	☐ 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)
	☐ 20.2203(a)(2)(v)	☐ 50.73(a)(2)(i)(A)	☐ 50.73(a)(2)(v)(D)	☐ 73.77(a)(2)(ii)
	☐ 20.2203(a)(2)(vi)	☒ 50.73(a)(2)(i)(B)	☐ 50.73(a)(2)(vii)	☐ 73.77(a)(2)(iii)
		☐ 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)
Laura Boyce, Senior Nuclear Engineer, Oconee Regulatory Affairs	(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	15. Expected Submission Date	Month	Day	Year
☐ Yes (If yes, complete 15. Expected Submission Date) X No				

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

On December 7th, 2021 Protected Service Water (PSW) valves 2PSW-8 (PSW to 2A SG Stop Valve), 2PSW-10 (PSW to 2B SG Stop Valve), and 2PSW-200 (2PSW-6 Bonnet Relief Valve) were found out of expected position and on December 13th, 2021 Standby Shutdown Facility (SSF) breakers 2XSF-F4C (U2 SSF RCMUP) and 2XSF-F2B (2RC-219 Valve Operator) were found out of expected position for Mode 1 operation of ONS Unit 2. Both events were caused by unvalidated assumptions associated with procedure sequencing and work dispatch.

An investigation determined that the PSW system was inoperable from the time Unit 2 entered Mode 2 (mode of applicability) on December 6th until Mode 3 on December 7th and then again from the time Unit 2 entered Mode 2 on December 7th until Technical Specification (TS) 3.7.10 Condition A was exited on December 7th. Entry into a Mode or other specified condition in the applicability for Limiting Condition for operation (LCO) 3.7.10 is prohibited by LCO 3.0.4 while the LCO or exceptions in LCO 3.0.4 are not met.

The SSF RCMU system was inoperable from the time Unit 2 entered Mode 3 (mode of applicability) on December 5th until TS 3.10.1 Condition C was exited on December 13th. This period of inoperability exceeded the LCO TS 3.10.1 Condition C, SSF RCMU System inoperable, completion time of 7 days by approximately 37 hours. Subsequently, if the Condition C completion time is not met, Unit 2 is required to be in Mode 3 within 12 hours and Mode 4 in 84 hours (TS 3.7.10 Condition G). Additionally, entry into a Mode or other specified condition in the applicability for LCO 3.10.1 is prohibited by LCO 3.0.4 while the LCO or exceptions in LCO 3.0.4 are not met.

Therefore, this event is being reported under 10 CFR 50.73(a)(2)(i)(B) for an Operation or Condition Prohibited by TS.

1. FACILITY NAME	2. DOCKET NUMBER	3. LER NUMBER		
		YEAR	SEQUENTIAL NUMBER	REV NO.
Oconee Nuclear Station Unit 2	0500000270	2021	003	00

NARRATIVE

BACKGROUND

SSF Background:
The SSF serves as a backup for existing safety systems to provide an alternate and independent means to achieve and maintain one, two, or three Oconee units in MODE 3 for up to 72 hours following a fire or a turbine building flood. The SSF is also credited for station blackout (SBO) coping, which has a 4 hour coping duration. The SSF RC Makeup System (RCMU) is designed to supply makeup to the RCS in the event that normal makeup systems are unavailable. An SSF RC Makeup Pump (RCMUP) located in the Reactor Building of each unit supplies makeup to the RCS should the normal makeup system flow and Reactor Coolant Pump seal cooling become unavailable.

The SSF RCMU system also provides a path to letdown RCS inventory to maintain overall RCS inventory. Letdown flow is controlled by parallel throttle valves 2RC-218 and 2RC-219 and is isolated by 2RC-223. 2RC-218 is throttled open as required to control Pressurizer level and flow is routed to the SFP. 2RC-219 is not required for normal SSF letdown, and flow is routed to the Quench Tank inside the Reactor Building. 2RC-219 is used for SSF mitigated events initiating from off-nominal RCS conditions. Operation of 2RC-219 is also available if a beyond design basis event occurs requiring higher letdown flow that exceeds the capacity of 2RC-218. The additional letdown flow capacity provided by 2RC-218 is needed to accommodate the RCS inventory swell during off-nominal conditions initiated from low RCS temperatures with high decay heat.

TS 3.10.1 requires the SSF to be OPERABLE in Modes 1, 2, and 3.

PSW Background:
The Protected Service Water (PSW) system is designed as a standby system for use under emergency conditions. The PSW system provides added "defense in-depth" protection by serving as a backup to existing safety systems and as such, the system is not required to comply with single failure criteria. PSW utilizes the inventory of lake water contained in the Unit 2 Condenser Circulating Water (CCW) piping and discharges into the steam generators of each unit via the Emergency Feedwater (EFW) system headers. The raw water is vaporized in the steam generators (SGs), removing residual heat, and is dumped to atmosphere via the Main Steam Relief Valves (MSRVs) or Atmospheric Dump Valves (ADVs).

2PSW-8 and 2PSW-10 are required to be open for PSW OPERABILITY. 2PSW-8 and 2PSW-10 align PSW feed to Oconee Nuclear Station (ONS) Unit 2 (U2) Steam Generators (SGs). 2PSW-200 is the 2PSW-6 bonnet relief valve and is not tied to PSW operability.

TS 3.7.10 requires PSW to be OPERABLE in Modes 1 and 2.

EVENT DESCRIPTION

On December 2nd, 2021, Operations was performing a pressurizer cooldown procedure enclosure in preparation for returning Unit 2 from Mode 4 to Mode 5 for Control Rod Drive (CRD) troubleshooting. Operations completed the pressurizer cooldown enclosure which correctly opened breaker 2XSF-F4C (U2 RCMUP Breaker). Unit 2 entered Mode 5 at 0842 on December 2nd, 2021, Mode 4 at 0129 on December 5th, 2021 and Mode 3 at 0331 the same day.

On December 5th, 2021, Operations was performing unit startup activities and incorrectly credited the previous Standby Shutdown Facility system lineup prior to the December 2nd, 2021 return to Mode 5 for position of breaker 2XSF-F4C (U2 RCMUP Breaker). Operations correctly opened breaker 2XSF-F2B (SSF 2RC-219). Operations was also performing PSW system fill, vent, and configuration checklist activities in preparation for returning Unit 2 from Mode 3 to Mode 2. Enclosures for these activities were not performed in the correct order, which left valves 2PSW-8, 2PSW-10, and 2PSW-200 closed instead of open. Unit 2 entered Mode 2 at 2005 on December 6th, 2021.

1. FACILITY NAME	2. DOCKET NUMBER	3. LER NUMBER		
		YEAR	SEQUENTIAL NUMBER	REV NO.
Oconee Nuclear Station Unit 2	0500000270	2021	003	00

NARRATIVE CONTINUED

On December 7th, 2021, Unit 2 entered Mode 3, Mode 2, and Mode 1. After entry into Mode 1, three PSW valves: 2PSW-8, 2PSW-10, and 2PSW-200 were found out of expected position for Mode 1 operation of ONS Unit 2. 2PSW-8 and 2PSW-10 are required to be open for PSW system operability. Operations entered Technical Specification (TS) 3.7.10 Condition A for PSW system inoperable and took appropriate actions to re-verify system fill and vent and correctly position the valves for proper operational standby. TS 3.7.10 Condition A was exited at 2040 on December 7th, 2021.

On December 13th, 2021, during operator rounds, breakers 2XSF-F4C (U2 SSF RCMUP) and 2XSF-F2B (2RC-219 Valve Operator) were found out of expected position for Mode 1 operation of ONS Unit 2. 2XSF-F4C was open and should have been closed. 2XSF-F2B was closed and should have been open and racked out. 2XSF-F4C is required for SSF RCMU System operability. Operations entered TS 3.10.1 Condition C for SSF RCMU System inoperable and took appropriate action to correctly position the breakers for operational standby. TS 3.10.1 Condition C was exited at 1642 on December 13th, 2021.

There were no component failures associated with the PSW valve or SSF breaker positioning events. The investigations determined that both events were caused by unvalidated assumptions associated with procedure sequencing and work dispatch.

SSF Reportability:
From the time Unit 2 entered Mode 3 (mode of applicability) on December 5th until TS 3.10.1 Condition C was exited on December 13th, the SSF RCMUP was INOPERABLE. This period of INOPERABILITY exceeded the limiting condition for operation (LCO) TS 3.10.1 Condition C, SSF RCMU System INOPERABLE, completion time of 7 days by approximately 37 hours. Subsequently, if the Condition C completion time is not met, Unit 2 is required to be in Mode 3 with in 12 hours and Mode 4 in 84 hours (TS 3.7.10 Condition G). Additionally, entry into a Mode or other specified condition in the applicability for LCO 3.10.1 is prohibited by LCO 3.0.4 while the LCO or exceptions in LCO 3.0.4 are not met. Therefore, this event is being reported under 10 CFR 50.73(a)(2)(i)(B) for an Operation or Condition Prohibited by TS.

PSW Reportability:
PSW was INOPERABLE from the time Unit 2 entered Mode 2 (mode of applicability) on December 6th until Mode 3 on December 7th and then again from the time Unit 2 entered Mode 2 on December 7th until TS 3.7.10 Condition A was exited on December 7th. These two periods of INOPERABILITY do not exceed the LCO TS 3.7.10 Condition A, PSW System INOPERABLE, completion time of 7 days. However, entry into a Mode or other specified condition in the applicability for LCO 3.7.10 is prohibited by LCO 3.0.4 while the LCO or exceptions in LCO 3.0.4 are not met. Therefore, this event is being reported under 10 CFR 50.73(a)(2)(i)(B) for an Operation or Condition Prohibited by TS.

CAUSAL FACTORS

For both the SSF and PSW events, cause evaluations were performed. The evaluations determined that both events were caused by unvalidated assumptions associated with procedure sequencing and work dispatch.

CORRECTIVE ACTIONS

Immediate:

1. Aligned SSF system and PSW system to correct configurations for plant conditions.

Planned:

1. Develop and deliver training on validating assumptions.
2. Review startup procedures to improve procedure sequencing (Extent of condition).

1. FACILITY NAME	2. DOCKET NUMBER	3. LER NUMBER		
		YEAR	SEQUENTIAL NUMBER	REV NO.
Oconee Nuclear Station Unit 2	0500000270	2021	003	00

NARRATIVE CONTINUED

SAFETY ANALYSIS

A risk evaluation of these violations determined that they had no significant impact on public health and safety. The impact on core damage risk of the PSW system being unavailable was very low given the relatively short duration and that PSW is one of several backup systems for providing feedwater for steam generator cooling. Although the SSF RCMU Pump was out of service for a longer period of time, it's unavailability also had a very low impact on core damage risk because of Oconee's low-leakage RCP seal design and the ability to repower the HPI pumps from the PSW switchgear for fire, high wind, and other events that could cause a station blackout on the main 4kV buses.

It was noted that the PSW and SSF RCMU systems were out of service concurrently for approximately 24 hours. However, the combined risk impact remained very low because each system is related to a different safety function and the risk impact is not increased further. Also, the breaker for 2RC-219 found closed during power operation has a negligible risk impact given the low probability of a fire event during the short time period, the low probability of this specific hot short circuit, the capability to isolate letdown with 2RC-223, and the other separate means of mitigating these fire events.

Finally, the RCMU Pump was out of service at the time of a Unit 2 Reactor Trip on December 10, 2021. This was an uncomplicated reactor trip where all electrical power sources and normal RCP seal cooling were maintained, and thereby the unavailability of the RCMU Pump was not a risk contributor to the trip event.

Therefore, taking these factors into consideration, it is concluded that these violations had only a very small impact on core damage risk 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.

This event is considered INPO IRIS Reportable.

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