Tom Simril
Vice President
Catawba Nuclear Station

Duke Energy
CN01VP I 4800 Concord Road
York, SC 29745

o: 803.701.3340
f: 803.701.3221

RA-21-0322

10 CFR50.73

December 21, 2021

U.S. Nuclear Regulatory Commission
Attention: Document Control Desk
Washington, D.C. 20555

Subject: Duke Energy Carolinas, LLC
Catawba Nuclear Station, Unit 1
Docket No. 50-413
Licensee Event Report (LER) 413/2021-005-00

Pursuant to 10 CFR 50.73(a)(1) and (d), attached is LER 413/2021-005-00, entitled " Automatic Actuation of the 1B Emergency Diesel Generator Load Sequencer on Bus Undervoltage Condition". This report is being submitted in accordance with 10 CFR 50.73(a)(2)(iv)(A).

There are no regulatory commitments contained in this letter or its attachment.

This event is considered to be of no significance with respect to the health and safety of the public.

If questions arise regarding this LER, please contact Ari D. Tuckman of Regulatory Affairs at (803) 701-3771.

Sincerely,

Tom Simril

Tom Simril
Vice President, Catawba Nuclear Station

Attachment

xc (with attachment):

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

Z. Stone
NRC Project Manager (CNS)
U.S. Nuclear Regulatory Commission
11555 Rockville Pike
Mailstop O-8G9A
Rockville, MD 20852

J. Austin (without enclosure)
NRC Senior Resident Inspector

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
Catawba Nuclear Station, Unit 1	05000413	1 OF 4

4. Title

Automatic Actuation of the 1B Emergency Diesel Generator Load Sequencer on Bus Undervoltage Condition

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
										05000
10	27	2021	2021	- 005 -	00	12	21	2021	Facility Name	Docket Number
										05000

9. Operating Mode	10. Power Level
6	0%

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)
Ari D. Tuckman, Lead Engineer	(803) 701-3771

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 October 27, 2021, at approximately 1430, with Unit 1 in Mode 6 at 0% power, the 1B Emergency Diesel Generator (EDG) Load Sequencer was actuated by a valid undervoltage condition on the 1B 4160v Essential Bus that occurred during 1B sequencer timer calibration activities. Valid actuation signals were sent to both the 1B EDG and the Unit 1 Auxiliary Feedwater (CA) System. Neither system automatically started as they were both removed from service for maintenance activities at the time. Decay heat removal was maintained via 1A train systems.

During performance of the 1B EDG sequencer timer calibration, jumpers equipped with mini grabbers are used to place the sequencer into a test configuration. The cause of the event is the mini grabber placed during the testing activity lost adequate connection which allowed the load sequencer to realign from the test condition.

This event was reported to the NRC as an eight-hour, non-emergency Event Notification Number 55549 on October 27, 2021, per 10CFR 50.72(b)(3)(iv)(A), Specified safety system actuation.

BACKGROUND

The following systems and component information is provided to assist readers in understanding the event described in this LER. Applicable Energy Industry Identification [EIIS] system and component codes are enclosed with brackets. Catawba Nuclear Station unique system and component identifiers are contained within parentheses.

This event is being reported under the following criterion:

10CFR 50.73(a)(2)(iv)(A), for any event or condition that resulted in manual or automatic actuation of the PWR auxiliary feedwater system and the emergency AC electrical power system.

Engineered Safety Features Actuation System [JE](ISE), Diesel Generator Load Sequencer [EK](EQB)(EQC)

The onsite standby power source for each 4160 volt Engineered Safety Features (ESF) bus at Catawba is a dedicated Diesel Generator [DG] (DG). For each unit, DGs A and B are dedicated to ESF buses ETA and ETB, respectively. Each DG starts automatically on a Safety Injection (SI) signal (i.e., low pressurizer pressure or high containment pressure) or on an ESF bus degraded voltage or undervoltage signal. After the DG has started, it will automatically tie to its respective bus after offsite power is tripped as a consequence of ESF bus undervoltage or degraded voltage, independent of or coincident with an SI signal. With no SI signal, there is a ten-minute delay between the degraded voltage signal and the DG start signal. The DGs will also start and operate in the standby mode without tying to the ESF bus on an SI signal alone. Following the trip of offsite power, a sequencer strips loads from the ESF bus. When the DG is tied to the ESF bus, loads are then sequentially connected to its respective ESF bus by the automatic load sequencer. The sequencing logic controls the permissive and starting signals to motor breakers to prevent overloading the DG by automatic load application.

In the event of a loss of preferred power, the ESF electrical loads are automatically connected to the DGs in sufficient time to provide for safe reactor shutdown and to mitigate the consequences of a Design Basis Accident (DBA) such as a Loss of Coolant Accident (LOCA).

Certain required unit loads are returned to service in a predetermined sequence in order to prevent overloading the DG in the process. Approximately one minute after the initiating signal is received, all loads needed to recover the unit or to maintain it in a safe condition are returned to service.

Auxiliary Feedwater System [BA](CA)

The Auxiliary Feedwater System assures sufficient feedwater supply to the steam generators in the event of loss the condensate/feedwater system, to remove energy stored in the core and primary coolant. The CA system may also be required in some other circumstances such as evacuation of the main control room or

cooldown after a loss-of-coolant accident for a small break, including maintaining a water level in the steam generators following such a break.

The CA system is designed to start automatically in the event of a loss of offsite electrical power, trip of both main feedwater pumps, safety injection signal, or low-low steam generator water level; any of which may result in, coincident with, or be caused by a reactor trip. The CA system will supply sufficient feedwater to maintain the reactor at hot standby for two hours followed by cooldown of the reactor coolant system to the temperature at which the residual heat removal system may be operated.

The motor driven auxiliary feedwater pumps will automatically start and provide the minimum required feedwater flow within one minute following any of these conditions:

- Trip of both main feedwater pumps
- AMSAC Actuation (ATWS Mitigation System and Actuation Circuitry)
- Two out of four (2/4) low-low level alarms in any one SG
- Initiation of a Safety Injection signal
- Loss of power to the 4160V essential bus

EVENT DESCRIPTION

At the time of the event, Unit 1 was in mode 6, 0% power for a scheduled refueling outage and Unit 2 was operating in mode 1 at 100% power.

On October 27, 2021 at approximately 1430, with Unit 1 in Mode 6 at 0% power, during planned 1B EDG sequencer timer calibration, the 4160 Volt essential power bus 1ETB de-energized when the feeder breaker from transformer SATB opened. This undervoltage condition on the essential power bus actuated the 1B EDG load sequencer which sent valid start signals to the 1B EDG and the Unit 1 CA system. Neither system automatically started as they were both removed from service for planned maintenance activities at the time.

CAUSAL FACTORS

A fault tree was performed to investigate all potential equipment failures that could have resulted in this event and all were refuted. The investigation concluded that a jumper which was placed with a mini grabber lost adequate connection resulting in test relays changing state and re-establishing the normal system configuration. Additionally, the procedure directing the timer calibration evolution did not have proper verification controls during performance to manage/eliminate risk to prevent the loss of the essential bus.

CORRECTIVE ACTIONS

1. Power was restored to 1ETB (complete)
2. Revise all unit and train related procedures to ensure proper controls are in place for timer calibration to detect if the sequencer is removed from test condition and prevent opening the incoming and alternate breakers. (complete)
3. Issue standing order to restrict mini grabber jumper usage unless proper controls and oversight have been implemented. (complete)
4. Revise administrative maintenance procedure to restrict use of mini grabber leads for output blocking. (planned)

SAFETY ANALYSIS

At the time of the event, Unit 1 was in Mode 6 at 0% power. Both the 1B Emergency Diesel Generator and Auxiliary Feedwater systems were previously removed from service for maintenance. Unit 1 core cooling and spent fuel cooling remained in service via 1A train equipment upon the loss of power to the 1B train essential 4160 Volt bus.

This event is considered low safety significance as decay heat removal was not challenged and all equipment operated as designed.

ADDITIONAL INFORMATION

There have been no previous Licensee Event Reports at Catawba Nuclear Station in the last 3 years with the same causal factor as this issue.