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ONS-2015-102

10 CFR 50.73

September 25, 2015

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

Subject: Duke Energy Carolinas, LLC (Duke Energy)
Oconee Nuclear Station Unit 2
Docket No. 50-270
Licensee Event Report 270/2015-001, Revision 0
Nuclear Condition Report No.: 01939072

Enclosed is Licensee Event Report (LER) 270/2015-001, Revision 0, for Oconee Nuclear Station (ONS), Unit 2, describing an event in which the unit experienced a valid Emergency Feedwater Actuation caused by a Main Feedwater System Block Valve malfunction.

This report is being submitted in accordance with 10 CFR 50.73(a)(2)(iv)(A), "System Actuation." There are no regulatory commitments contained in this LER.

If you have any questions regarding this this report, please contact Stephen C. Newman, ONS Regulatory Affairs Group Lead Engineer, at (864) 873-4388.

Sincerely,

Scott L. Batson
Vice President
Oconee Nuclear Site

Enclosure

IE22
MLR

cc: Mr. Leonard D. Wert Jr.
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INPO (Word File via E-mail)



LICENSEE EVENT REPORT (LER)

(See Page 2 for required number of digits/characters for each block)

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 FOIA, Privacy and Information Collections Branch (T-5 F53), U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001, or by Internet e-mail to Infocollects.Resource@nrc.gov, and to the Desk Officer, Office of Information and Regulatory Affairs, NEOB-10202, (3150-0104), Office of Management and Budget, Washington, DC 20503. If a means used to impose an information collection does not display a currently valid OMB control number, the NRC may not conduct or sponsor, and a person is not required to respond to, the information collection.

1. FACILITY NAME Oconee Nuclear Station, Unit 2	2. DOCKET NUMBER 05000 270	3. PAGE 1 OF 4
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4. TITLE
Valid Emergency Feedwater System Actuation Caused by a Main Feedwater System Block Valve Malfunction.

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
07	27	2015	2015	001	00	09	25	2015	FACILITY NAME	DOCKET NUMBER

9. OPERATING MODE **11. THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: (Check all that apply)**

1	<input type="checkbox"/> 20.2201(b)	<input type="checkbox"/> 20.2203(a)(3)(i)	<input type="checkbox"/> 50.73(a)(2)(i)(C)	<input type="checkbox"/> 50.73(a)(2)(vii)
	<input type="checkbox"/> 20.2201(d)	<input type="checkbox"/> 20.2203(a)(3)(ii)	<input type="checkbox"/> 50.73(a)(2)(ii)(A)	<input type="checkbox"/> 50.73(a)(2)(viii)(A)
	<input type="checkbox"/> 20.2203(a)(1)	<input type="checkbox"/> 20.2203(a)(4)	<input type="checkbox"/> 50.73(a)(2)(ii)(B)	<input type="checkbox"/> 50.73(a)(2)(viii)(B)
	<input type="checkbox"/> 20.2203(a)(2)(i)	<input type="checkbox"/> 50.36(c)(1)(i)(A)	<input type="checkbox"/> 50.73(a)(2)(iii)	<input type="checkbox"/> 50.73(a)(2)(ix)(A)
	<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)(iv)(A)	<input type="checkbox"/> 50.73(a)(2)(x)
16.6	<input type="checkbox"/> 20.2203(a)(2)(iii)	<input type="checkbox"/> 50.36(c)(2)	<input type="checkbox"/> 50.73(a)(2)(v)(A)	<input type="checkbox"/> 73.71(a)(4)
	<input type="checkbox"/> 20.2203(a)(2)(iv)	<input type="checkbox"/> 50.46(a)(3)(ii)	<input type="checkbox"/> 50.73(a)(2)(v)(B)	<input type="checkbox"/> 73.71(a)(5)
	<input type="checkbox"/> 20.2203(a)(2)(v)	<input type="checkbox"/> 50.73(a)(2)(i)(A)	<input type="checkbox"/> 50.73(a)(2)(v)(C)	<input type="checkbox"/> OTHER
	<input type="checkbox"/> 20.2203(a)(2)(vi)	<input type="checkbox"/> 50.73(a)(2)(i)(B)	<input type="checkbox"/> 50.73(a)(2)(v)(D)	Specify in Abstract below or in NRC Form 366A

12. LICENSEE CONTACT FOR THIS LER

LICENSEE CONTACT Stephen C. Newman, Regulatory Affairs Lead Engineer	TELEPHONE NUMBER (Include Area Code) (864) 873-4388
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13. COMPLETE ONE LINE FOR EACH COMPONENT FAILURE DESCRIBED IN THIS REPORT

CAUSE	SYSTEM	COMPONENT	MANU-FACTURER	REPORTABLE TO ICES	CAUSE	SYSTEM	COMPONENT	MANU-FACTURER	REPORTABLE TO ICES

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
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ABSTRACT (Limit to 1400 spaces, i.e., approximately 15 single-spaced typewritten lines)

Upon return from a Unit 2 forced outage, at 0957 hours on July 27, 2015, at approximately 16.6% power and increasing, there was an unexpected water level reduction in the 2B Steam Generator due to a malfunctioning main feedwater block valve that failed to open on demand. The level reduction resulted in a valid Emergency Feedwater System actuation and subsequently, reactor power was decreased so that feedwater/Steam Generator level could be controlled by only the startup control valve.

An investigation determined that 2FDW-40 failed to open due to the Automatic Feedwater Isolation System (AFIS) testing links not being fully closed and engaged. The root cause was due to a procedure use and adherence error by personnel performing the last AFIS Circuitry Test in the Fall of 2013.

This event had a negligible impact on nuclear safety. A planned corrective action is to revise applicable procedures for each Unit. This event is reportable under 10 CFR 50.73(a)(2)(iv)(A) due to the automatic actuation of the Unit's Emergency Feedwater System.



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

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 FOIA, Privacy and Information Collections Branch (T-5 F53), U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001, or by internet e-mail to Infocollects.Resource@nrc.gov, and to the Desk Officer, Office of Information and Regulatory Affairs, NEOB-10202, (3150-0104), Office of Management and Budget, Washington, DC 20503. If a means used to impose an information collection does not display a currently valid OMB control number, the NRC may not conduct or sponsor, and a person is not required to respond to, the information collection.

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NARRATIVE

EVALUATION:

BACKGROUND

The Main Feedwater System (FDW) [EIIS: SJ] receives water from the Condensate System [EIIS: SD], increases the water's pressure using the turbine driven feedwater pumps [EIIS: P], increases the water's temperature using the high pressure feedwater heaters (heaters B and A) [EIIS: HTR], and controls the rate at which water is supplied to the steam generators (SGs) [EIIS: SG] using the startup FDW control valves [EIIS: FCV] and the main FDW control valves. The FDW pumps and control valves are controlled by the Integrated Control System (ICS) [EIIS: JA].

The startup and main feedwater control valves 2FDW-32, 35, 41, 44 are pneumatically operated valves that are designed to fail as is on loss of instrument air [EIIS: LD]. These valves, on the affected header, are designed to automatically close following a Main Steam Line Break (MSLB).

Steam generator 2B main feedwater control valve 2FDW-41 controls the flow of feedwater to steam generator 2B between approximately 15% and 100% reactor power. Whether 2FDW-41 is in AUTO or manual control, an Automatic Feedwater Isolation System (AFIS) circuitry actuation due to a MSLB on the 2B header will automatically close 2FDW-41. The AFIS circuitry actuates various components including the main and startup feedwater control valves in order to mitigate a MSLB with or without a Loss of Offsite Power (LOOP). Technical Specification 3.7.3 requires the flow control valves to be operable. The flow control valves fail as-is and require Instrument Air (IA) to close.

Steam generator 2B startup feedwater control valve 2FDW-44 controls the flow of feedwater to steam generator 2B between approximately 0 and 15 percent reactor power. Whether 2FDW-44 is in AUTO or manual control, an AFIS circuitry actuation on the 2B header will automatically close 2FDW-44. The valve's control signal normally controls steam generator level to 25 inches as measured on the startup range level transmitters.

Steam generator 2B main block valve 2FDW-40 is a motor-operated valve that isolates the feedwater supply to the main feedwater control valve, 2FDW-41. Manual controls for 2FDW-40 are located in the control room. For normal operation, an AUTO-OPEN-CLOSE switch is provided and 2FDW-40 is opened by turning the switch to OPEN. When the switch is set to AUTO, 2FDW-40 is opened automatically when the feedwater demand signal to startup feedwater control valve 2FDW-44 is 90% or more. Conversely, 2FDW-40 is automatically closed if the feedwater demand signal to startup feedwater control valve 2FDW-44 is 50% or less. Also, when the switch is set to AUTO, 2FDW-40 is automatically closed if the AFIS circuitry actuates due to a MSLB on the 2B header. When the feedwater demand signal to 2FDW-44 reaches 98% increasing it receives a signal to close and the main feedwater control valve 2FDW-41 receives a signal to open to begin controlling Feedwater flow to the 2B Steam Generator.

EVENT DESCRIPTION

Upon return from a forced outage, at 0957 hours on July 27, 2015, Unit 2 reactor power was at approximately 16.6% power and increasing when the feedwater valve demand for the 2B main feedwater header reached the point in which the 2B startup control valve (2FDW-44) is driven to close and the 2B main control valve (2FDW-41) is driven to open to transition to the condition in which a significant portion of the feedwater flow for the 2B Steam Generator (SG) is through the main control valve. Specifically, feedwater demand to startup feedwater control valve 2FDW-44 reached 98% increasing and it went closed. Main feedwater control valve 2FDW-41 went open to begin controlling Feedwater to the 2B Steam Generator, however, main feedwater block valve 2FDW-40 had not

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received an open signal since the AFIS testing link, through which the open signal passes, was not closed. Consequently, there was insufficient feedwater flow to the 2B Steam Generator and the level dropped from setpoint (25 inches) to a level that feeds into the dryout protection circuit (21 inches) in less than one minute. This resulted in an emergency feedwater system actuation and subsequently, reactor power was decreased so that feedwater/SG level could be controlled by only the startup control valve.

Units 1 and 3, were operating in MODE 1 at approximately 100% power and were unaffected by the event. No structures, systems or components (SSCs) were out of service such that they contributed to this event.

On July 27, 2015, this event was reported as an 8-hour notification (EN number 51268) pursuant to 10 CFR 50.72(b)(3)(iv)(A) due to the valid actuation of the Emergency Feedwater System [EIIIS: BA]. This event is reportable under 10 CFR 50.73(a)(2)(iv)(A) due to the automatic actuation of the Unit's Emergency Feedwater System.

CAUSAL FACTORS

An investigation determined that 2FDW-40 failed to open due to the Automatic Feedwater Isolation System (AFIS) testing links not being engaged. The subject links are Weidmüller links that must be "snapped" closed to be fully engaged. The root cause was due to a procedure use and adherence error by personnel performing the last AFIS Circuitry Test in the Fall of 2013. Noteworthy is that during reactor restart following this AFIS test, 2FDW-40 successfully operated as expected. Additionally, when restarting from an October 2014 forced unit outage to repair control rod drive head fans, 2FDW-40 again operated successfully.

CORRECTIVE ACTIONS

Immediate:

A Failure Investigation Process (FIP) Team was assembled to assess the event including its cause(s), necessary corrective actions, and past/future unit operational impacts.

Subsequent:

1. The AFIS links were verified closed and the unit restarted without incident.
2. The Unit 1 and 3 AFIS testing links were verified to be in the fully-closed position.

Planned:

For each Unit, applicable procedures will be revised to include additional detail on ensuring that the links are fully closed.

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SAFETY ANALYSIS

The EFW system responded as expected to an actual SG dryout protection signal on low SG level. Initiation of EFW on low SG level is not credited for any design basis accidents or transients. In addition, the AFIS was effectively in its' fail-safe position and there were no other complications or equipment failures. This event had a negligible impact on nuclear safety.

ADDITIONAL INFORMATION

Energy Industry Identification System (EIS) codes are identified in the text as [XX]. This event did not include a Safety System Functional Failure. There were no releases of radioactive materials, radiation exposures in excess of limits or personnel injuries associated with this event.

SIMILAR EVENTS

A search of the Oconee Corrective Action Program (CAP) database was conducted for the preceding five (5) year period. Similarly, a review of industry Operating Experience (OE) databases was conducted using keyword searches, i.e., "Weidmüller," "emergency feedwater actuation," "AFIS," "test links," "steam generator dryout," etc., to determine other similarly-reported events.

Although there have been two (2) instances in the past 2 years where Unit 3 was manually tripped due to feedwater oscillations, no prior LERs or other industry-related OE could be found in the previous 5-year period that compared similarly to this event.