Tom Simril
Vice President
Catawba Nuclear Station

Duke Energy
CN01VP | 4800 Concord Road
York, SC 29745

o: 803.701.3340
f: 803.701.3221

RA-19-0267

10 CFR 50.73

June 10, 2019

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) 413/2019-002-00

Pursuant to 10 CFR 50.73(a)(1) and (d), attached is LER 413/2019-002-00, entitled "Condition Prohibited by Technical Specifications due to Auxiliary Feedwater Sump Pump Conditions."

This report is being submitted in accordance with 10 CFR 50.73(a)(2)(i)(B).

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

This was no impact to the health and safety of the public.

If questions arise regarding this LER, please contact Sherry Andrews of Regulatory Affairs at (803) 701-3424.

Sincerely,

Tom Simril

Tom Simril
Vice President, Catawba Nuclear Station

Attachment

xc (with attachment):

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

M. Mahoney
NRC Project Manager (CNS)
U.S. Nuclear Regulatory Commission
One White Flint North, Mail Stop O-8B1A
11555 Rockville Pike
Rockville, MD 20852-2738

J. Austin (without enclosure)
NRC Senior Resident Inspector

INPO Records Center
700 Galleria Parkway, SE
Suite 100
Atlanta, GA 30339-5943

NRC FORM 366
(04-2018)

U.S. NUCLEAR REGULATORY COMMISSION

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/)

APPROVED BY OMB: NO. 3150-0104 EXPIRES: 03/31/2020

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-2 F43), U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001, or by 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	2. Docket Number	3. Page
Catawba Nuclear Station, Unit 1	05000 413	1 OF 5

4. Title

Condition Prohibited by Technical Specifications due to Auxiliary Feedwater Sump Pump Conditions

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
									None	05000
4	11	2019	2019	002	0	6	10	2019	Facility Name: None	Docket Number: 05000

9. Operating Mode	11. This Report is Submitted Pursuant to the Requirements of 10 CFR §: *(Check all that apply)*			
1	☐ 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)
100	☐ 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)(i)
	☐ 20.2203(a)(2)(vi)	☑ 50.73(a)(2)(i)(B)	☐ 50.73(a)(2)(vii)	☐ 73.77(a)(2)(ii)
		☐ 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)
Mandy Hare, Manager Nuclear Support Services, Regulatory Affairs	(803) 701-2218

13. Complete One Line for each Component Failure Described in this Report

Cause	System	Component	Manufacturer	Reportable to ICES		Cause	System	Component	Manufacturer	Reportable to ICES
X	BA	P	C666	YES						

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

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

On April 11, 2019, the 1B Motor Driven (MD) Auxiliary Feedwater (AFW) sump pump failed to start in manual and was non-operational. The pump impeller was found seized. The 1B MDAFW sump pump was repaired and returned to service on May 1, 2019.

A new Auxiliary Building flooding calculation subsequently has shown that, in the event of a feedwater line break in the interior doghouse coincident with a loss of offsite power, the sump pumps for all three trains of the AFW pumps are required to remain functional. Taking into consideration the specified function of the AFW sump pumps, the 1B MDAFW pump should have been declared inoperable for the corresponding times that the sump pump was out of service. Therefore, the 1B MDAFW pump was inoperable for a period longer than the allowed Technical Specification (TS) Limiting Condition for Operation (LCO).

An extent of condition review identified two additional instances between April 11, 2019, and April 18, 2019, where two trains of AFW were inoperable due to the associated non-functional sump pumps and/or MDAFW pump inoperability for a period longer than the allowed TS LCO. Furthermore, the review identified one instance on January 19, 2019, where a test procedure resulted in all associated Unit 1 AFW sump pumps discharge valves being closed which resulted in a condition prohibited by the TS LCO. The health and safety of the public were not affected by this event.

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/)

1. FACILITY NAME	2. DOCKET NUMBER	3. LER NUMBER		
		YEAR	SEQUENTIAL NUMBER	REV NO.
Catawba Nuclear Station, Unit 1	05000- 413	2019	- 002	- 00

NARRATIVE

BACKGROUND

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

This event is reportable pursuant to 10 CFR 50.73(a)(2)(i)(B) for Condition Prohibited by Technical Specifications (TSs).

There are two Main Steam Doghouses, an interior and exterior for each unit that encloses the high pressure steam and feedwater piping that penetrate the Reactor Building containment structures. These doghouses are located on opposite sides of their respective Reactor Building. The doghouses are subcompartments of the Auxiliary Building that house and protect the Auxiliary Feedwater (AFW) System [BA]. Floor drains in the interior doghouses route water to floor drain sumps located in the Auxiliary Feedwater Pump room.

The AFW System automatically supplies feedwater to the steam generators to remove decay heat from the Reactor Coolant System upon the loss of normal feedwater supply. The AFW pumps take suction through suction lines from the condensate storage system and pump to the steam generator secondary side. The normal supply of water to the AFW pumps is from the condensate system. The supply valves are open with power removed from the valve operator. The assured source of water to the AFW System is supplied by the Nuclear Service Water System. The turbine and motor driven pump discharge lines to each individual steam generator join into a single line outside containment. These individual lines penetrate the containment and enter each steam generator through the auxiliary feedwater nozzle. The steam generators function as a heat sink for core decay heat. The heat load is dissipated by releasing steam to the atmosphere from the steam generators via the main steam safety valves or steam generator pressure operated relief valves. If the main condenser is available, steam may be released via the steam dump valves and recirculated to the hotwell.

The AFW System consists of two motor driven AFW pumps and one steam turbine driven pump configured into three trains. Each of the motor driven pumps supply 100% of the flow requirements to two steam generators, although each pump has the capability to be realigned to feed other steam generators. The turbine driven pump provides 200% of the flow requirements and supplies water to all four steam generators. Travel stops are set on the steam generator flow control valves such that the pumps can supply the minimum flow required without exceeding the maximum flow allowed. The pumps are equipped with independent recirculation lines to prevent pump operation against a closed system. Each motor driven AFW pump is powered from an independent Class 1E power supply. The steam turbine driven AFW pump receives steam from two main steam lines upstream of the main steam isolation valves. Each of the steam feed lines will supply 100% of the requirements of the turbine driven AFW pump.

Each auxiliary feedwater (AFW) pump is located in a pit below floor elevation to meet NPSH requirements. The pits are completely separated so a pipe break or water jet from one AFW pump will not flood the redundant AFW pump. The pit for each AFW pump, both motor and steam turbine driven, has a stainless steel lined sump capable of collecting 500 gallons, or the amount equal to a 50 gpm leak for ten minutes. Each auxiliary feedwater pump is mounted in a separate pit to meet NPSH requirements, so each pit has a sump and safety-related sump pump of corresponding channel to prevent flooding of the AFW pump, assuming a 50 gpm leak. The steam driven AFW pump pit has two sump pumps, so one can deliver 50 gpm discharge assuming single failure of the other pump or power supply.

LICENSEE EVENT REPORT (LER) CONTINUATION SHEET

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1. FACILITY NAME	2. DOCKET NUMBER	3. LER NUMBER		
		YEAR	SEQUENTIAL NUMBER	REV NO.
Catawba Nuclear Station, Unit 1	05000- 413	2019	- 002	- 00

NARRATIVE

The AFW System is configured into three trains. The AFW System is considered OPERABLE when the components and flow paths required to provide redundant AFW flow to the steam generators are OPERABLE. This requires that the two motor driven AFW pumps be OPERABLE in two diverse paths, each supplying AFW to separate steam generators. The turbine driven AFW pump is required to be OPERABLE with redundant steam supplies from two main steam lines upstream of the MSIVs, and shall be capable of supplying AFW to any of the steam generators. The piping, valves, instrumentation, and controls in the required flow paths also are required to be OPERABLE.

Technical Specification (TS) 3.7.5 governs the AFW system. Limiting Condition for Operation (LCO) 3.7.5 requires three AFW trains to be OPERABLE in MODE 1, 2, and 3; only one AFW train which includes a motor driven pump, is required to be OPERABLE in MODE 4, when steam generators are relied upon for heat removal. With one of the required AFW trains (pump or flow path) inoperable in MODE 1, 2, or 3 for reasons other than Condition A, action must be taken to restore OPERABLE status within 72 hours. Condition C states that when two AFW trains are inoperable in MODE 1, 2, or 3, the unit must be in MODE 3 within 6 hours. Condition D states that when three AFW trains are inoperable in MODE 1, 2, or 3, LCO 3.0.3 and all other LCO Required Actions requiring MODE changes are suspended until one AFW train is restored to OPERABLE status and action shall be immediately initiated to restore one AFW train to OPERABLE status.

No other inoperable structures, systems, or components contributed to the event.

EVENT DESCRIPTION

On April 11, 2019, with the Unit 1 and Unit 2 operating at 100 percent power, the 1B Motor Driven (MD) Auxiliary Feedwater (AFW) [BA] pit sump pump failed to start in manual and was non-operational. The pump impeller was found seized. Once the impeller was repaired, the pump operated as expected. The 1B MDAFW sump pump was returned to service on May 1, 2019.

At the time of the 1B MDAFW sump pump failure, the associated 1B MDAFW pump was not declared inoperable. A new Auxiliary Building flooding calculation subsequently has shown that, in the event of a feedwater line break in the interior doghouse coincident with a loss of offsite power, the sump pumps for all three trains of the AFW pump are required to maintain OPERABILITY of their associated pumps. Taking into consideration the specified function of the AFW sump pumps (as verified by the new flooding calculation), the 1B MDAFW pump should have been declared inoperable for the corresponding times that the sump pump was out of service. Therefore, the 1B MDAFW pump was inoperable for a period longer than the allowed 72-hour completion time of Technical Specification (TS) Limiting Condition for Operation (LCO) 3.7.5 (three AFW trains shall be OPERABLE), Condition B (One AFW train inoperable in MODE 1, 2 of 3).

An extent of condition review identified two instances where two trains of AFW were inoperable due to the associated non-functional sump pumps and/or MDAFW pump inoperability for a period longer than the allowed 6 hour completion time of TS LCO 3.7.5, Condition C (Two AFW trains inoperable in MODE 1, 2 of 3). The first instance occurred on April 11, 2019, when both the 1A and 1B MDAFW sump pumps were out of service simultaneously. The 1A MDAFW sump pump was returned to service on April 12, 2019. The second instance occurred on April 17, 2019, when the 1B MDAFW sump pump was out of service at the same time as the 1A MDAFW pump was removed from service. The 1A MDAFW pump was returned to service on April 18, 2019.

1. FACILITY NAME	2. DOCKET NUMBER	3. LER NUMBER		
		YEAR	SEQUENTIAL NUMBER	REV NO.
Catawba Nuclear Station, Unit 1	05000- 413	2019	- 002	- 0

NARRATIVE

Additionally, the extent of condition review identified one instance where all associated Unit 1 AFW sump pumps were non-functional. On January 19, 2019, during performance of a test procedure enclosure the Turbine Driven (TD) AFW pump #1 was declared inoperable due to both TDAFW #1 sump pumps discharge valves being closed. Additionally, both the 1A and 1B MDAFW trains should have been declared inoperable due to closing their respective sump pump discharge valves. The test procedure resulted in a condition prohibited by TS with three inoperable AFW trains as action was not initiated to immediately restore one AFW train to OPERABLE status. The discharge valves were reopened at a later time on the same day (January 19, 2019).

Timeline of Events:

January 19, 2019 - 1A and 1B MDAFW sump pumps and 1TDAFW sump pumps discharge valves procedurally closed
January 19, 2019 - 1A and 1B MDAFW sump pumps and 1TDAFW sump pumps discharge valves procedurally opened
April 10, 2019 - 1A MDAFW sump pump removed from service
April 11, 2019 - 1B MDAFW sump pump was removed from service for maintenance (returned to service on May 1, 2019)
April 12, 2019 - 1A MDAFW sump pump returned to service
April 17, 2019 - 1A MDAFW pump inoperable
April 18, 2019 - 1A MDAFW pump returned to OPERABLE
May 1, 2019 - 1B MDAFW sump pump was returned to service
May 30, 2019 - A new Auxiliary Building flooding calculation approved and issued concluding that, in the event of a feedwater line break in the interior doghouse coincident with a loss of offsite power, the sump pumps for all three trains of the AFW pumps are required to maintain OPERABILITY of their associated pumps.

CAUSAL FACTORS:

Inaccurate information existed in the AFW Design Basis Specification, which stated that the MDAFW sump pumps are not required for the OPERABILITY of the AFW system. This caused a failure of recognizing the safety function of the MDAFW sump pumps, and their impact on the OPERABILITY of the MDAFW pumps.

Catawba Licensee Event Report (LER) 2008-001 described an event where flow restrictor cover plates were not installed for the interior doghouse floor drains. The LER identified the cause as inaccurate and non-conservative information in the original design basis calculation for sizing the floor drain flow restrictor plates. Evaluations performed in support of LER 2008-001 demonstrated that the AFW sump pumps are necessary to mitigate flooding of the AFW pumps in the event of a Main Feedwater (MFW) rupture. The AFW Design Basis Specification was not updated to reflect these details, resulting in failure to recognize the safety function of the MDAFW pump sump pumps and their impact on the OPERABILITY of the MDAFW pumps.

CORRECTIVE ACTIONS:

Immediate

The 1B MDAFW sump pumps were repaired and returned to service – Complete

An extent of condition review was performed to identify previous instances of non-functional MDAFW sump pumps, inoperable MDAFW pumps and/or inoperable TDAFW pumps. Procedures were also reviewed to determine equipment out of service. The results were cross-referenced to verify available trains of AFW – Complete

LICENSEE EVENT REPORT (LER) CONTINUATION SHEET

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1. FACILITY NAME	2. DOCKET NUMBER	3. LER NUMBER		
		YEAR	SEQUENTIAL NUMBER	REV NO.
Catawba Nuclear Station, Unit 1	05000- 413	2019	- 002	- 00

NARRATIVE

Planned

Resolve the design basis documentation and procedures to capture the safety significance of the AFW sump pumps as described in the new Auxiliary Building flooding calculation.

A cause analysis will be performed to determine why the safety significance of the AFW sump pumps was not recognized.

SAFETY ANALYSIS:

During the period of review, while various times existed that the AFW sump pumps were unavailable or non-functional, the AFW system was always available to perform its required safety function. No damage to AFW equipment occurred. This event is considered to be of very low safety significance as decay heat removal was not challenged. There was no impact to the health and safety of the public.