

UNITED STATES NUCLEAR REGULATORY COMMISSION REGION II 245 PEACHTREE CENTER AVENUE N.E., SUITE 1200 ATLANTA, GEORGIA 30303-1200

August 14, 2019

Mr. J. Ed Burchfield Site Vice President Oconee Nuclear Station Duke Energy Carolinas, LLC 7800 Rochester Highway Seneca, SC 29672

SUBJECT: OCONEE NUCLEAR STATION – NRC INSPECTION REPORT 05000269/2019090

Dear Mr. Burchfield:

On June 14, 2019, the U.S. Nuclear Regulatory Commission (NRC) issued Inspection Report 05000269/270/287/2019010 (ML19164A220). The report documented two apparent violations for which the NRC had not yet reached a preliminary significance determination. Based on subsequent review, the NRC has completed the final disposition regarding these apparent violations. On August 7, 2019, the NRC discussed the results of the evaluation with you and other members of your staff. The results are documented in the enclosed report.

One finding of very low safety significance (Green) is documented in this report. This finding involved a violation of NRC requirements. Additionally, one Severity Level IV violation without an associated finding is documented in this report. We are treating these violations as non-cited violations (NCVs) consistent with Section 2.3.2.a of the Enforcement Policy.

If you contest the violations or significance or severity of these NCVs documented in this inspection report, you should provide a response within 30 days of the date of this inspection report, with the basis for your denial, to the U.S. Nuclear Regulatory Commission, ATTN: Document Control Desk, Washington, DC 20555-0001; with copies to the Regional Administrator, Region II; the Director, Office of Enforcement; and the NRC Resident Inspector at Oconee Nuclear Station.

For administrative purposes, this letter is issued as NRC Inspection Report 05000269/2019090. Accordingly, the apparent violations (AVs) documented in NRC Inspection Report 05000269/270/287/2019010 (ML19164A220) are designated as NCVs 05000269/2019010-01 and 05000269/2019010-02.

This letter, its enclosure, and your response (if any) will be made available for public inspection and copying at http://www.nrc.gov/reading-rm/adams.html and at the NRC Public Document Room in accordance with 10 CFR 2.390, "Public Inspections, Exemptions, Requests for Withholding."

Sincerely,

/**RA**/

Frank J. Ehrhardt, Chief Reactor Projects Branch 1 Division of Reactor Projects

Docket No. 05000269 License No. DPR-38

Enclosure: Inspection Report 05000269/2019090

cc w/ encl: Distribution via LISTSERV

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U.S. NUCLEAR REGULATORY COMMISSION Inspection Report

Docket Number:	05000269
License Number:	DPR-38
Report Number:	05000269/2019090
Enterprise Identifier:	I-2019-090-0002
Licensee:	Duke Energy Carolinas, LLC
Facility:	Oconee Nuclear Station
Location:	Seneca, SC
Inspection Dates:	June 14, 2019 to July 31, 2019
Inspectors:	S. Freeman, Senior Reactor Analyst A. Ruh, Senior Resident Inspector M. Toth, Project Engineer
Approved By:	Frank J. Ehrhardt, Chief

Reactor Projects Branch 1 Division of Reactor Projects

SUMMARY

The U.S. Nuclear Regulatory Commission (NRC) continued monitoring the licensee's performance by conducting an NRC inspection at Oconee Nuclear Station in accordance with the Reactor Oversight Process. The Reactor Oversight Process is the NRC's program for overseeing the safe operation of commercial nuclear power reactors. Refer to <u>https://www.nrc.gov/reactors/operating/oversight.html</u> for more information. Findings and violations being considered in the NRC's assessment are summarized in the table below.

List of Findings and Violations

Inadequate Procedure for Reinstalling Reactor Coolant Makeup Pump Oil Suction Tubing			
Cornerstone	Significance	Cross-Cutting	Report
		Aspect	Section
Mitigating	Green	Not Present	71152B
Systems	NCV 05000269/2019010-01	Performance	
	Closed	(NPP)	
A self-revealing Green NCV of Technical Specification (TS) 5.4.1, "Procedures," was			
identified when the licensee failed to provide procedures, instructions, or drawings regarding			

identified when the licensee failed to provide procedures, instructions, or drawings regarding reinstallation of the reactor coolant makeup (RCM) pump suction tubing that were appropriate to the circumstances.

Failure to Report a Condition Prohibited by Technical Specifications			
Cornerstone	Significance	Cross-Cutting	Report
	-	Aspect	Section
Not Applicable	Severity Level IV	Not Applicable	71152B
	NCV 05000269/2019010-02		
	Closed		
The inspectors identified a Severity Level (SL) IV NCV of 10 CFR 50.73(a)(2)(i)(B) when the			
licensee failed to submit a licensee event report (LER) to the NRC within 60 days of discovery			
of a condition prohibited by the plant's TS. Specifically, the licensee failed to report that the			
Unit 1 RCM pump was inoperable for a period of time that exceeded the required action			
completion time of	TS 3.10.1 Conditions C and G.		

Additional Tracking Items

None.

INSPECTION SCOPES

Inspections were conducted using the appropriate portions of the inspection procedures (IPs) in effect at the beginning of the inspection unless otherwise noted. Currently approved IPs with their attached revision histories are located on the public website at http://www.nrc.gov/reading-rm/doc-collections/insp-manual/inspection-procedure/index.html. Samples were declared complete when the IP requirements most appropriate to the inspection activity were met consistent with Inspection Manual Chapter (IMC) 2515, "Light-Water Reactor Inspection Program - Operations Phase." The inspectors reviewed selected procedures and records, observed activities, and interviewed personnel to assess licensee performance and compliance with Commission rules and regulations, license conditions, site procedures, and standards.

OTHER ACTIVITIES – BASELINE

71152B - Problem Identification and Resolution

Biennial Team Inspection (IP Section 02.04)

The inspectors completed the detailed risk evaluation associated with two apparent violations that were issued with Inspection Report 05000269/270/287/2019010 (ML19164A220) on June 14, 2019. The results and disposition of the RCM pump issue and the associated failure to make a 60-day report to the NRC are documented in the tables below.

INSPECTION RESULTS

Inadequate Procedure for Reinstalling Reactor Coolant Makeup Pump Oil Suction Tubing				
Cornerstone	Significance	Cross-Cutting	Report	
		Aspect	Section	
Mitigating	Green	NPP	71152B	
Systems	NCV 05000269/2019010-01			
	Closed			
A self-revealing Gr	een NCV of TS 5.4.1, "Procedures," was i	identified when the	licensee	
failed to provide pro	ocedures, instructions, or drawings regard	ling reinstallation o	f the RCM	
pump suction tubin	g that were appropriate to the circumstan	ces.		
Description: On No	ovember 9, 2016, during a routine pump l	ubrication preventa	tive	
maintenance task,	the licensee discovered a broken section	of lube oil tubing in	iside the Unit	
1 RCM pump and documented the issue in Nuclear Condition Report (NCR) 2077410. The				
broken tubing was part of the suction line that allows a shaft-driven lubricating pump to pull oil				
from the pump's oil sump. The lubricating pump normally injects pressurized oil to the				
pump's hydrodynamic bearings which drain back to the sump. The line was broken at a point				
that was above the standing oil level of the sump, which would have prevented the lubricating				
pump from being able to draw oil from the sump. The tubing showed evidence that the				
reciprocating motio	reciprocating motion of the pump's connecting rods caused the connecting rod cap to			
repeatedly strike the tubing, causing gradual material loss and an eventual circumferential				
fracture. The licensee's engineering evaluation determined the condition called into question				
the capability of the	the capability of the pump to operate for the 72-hour mission time of the standby shutdown			
facility and was classified as a maintenance rule functional failure. The evaluation also				
included a statement from the vendor that concluded "forced flow oil lubrication is required				

for operability." The RCM pump is designed to supply borated makeup to the reactor coolant system (RCS) to provide reactor coolant pump seal cooling and RCS inventory during certain postulated events that could disable normal plant safety systems.

A "Quick Cause Evaluation" by engineering determined the most probable cause for the tubing failure was an incorrect placement and alignment of the tubing during a tubing replacement activity in November 2014 under work order (WO) 2166213. The licensee determined a lack of guidance regarding placement and interference checks in the WO was determined to have permitted the incorrect installation. However, a subsequent "Performance Analysis" by the maintenance department determined that the internal tubing was not actually replaced in 2014, which was different than the cause determined by engineering. On April 26, 2019, inspectors reviewed these evaluations as part of a biennial problem identification and resolution inspection and noted the discrepancies between the evaluations. After responding to questions posed by NRC inspectors, the licensee subsequently determined the tubing likely became bent during routine removal, inspection, and reinstallation of the suction strainer line per WO 2139921 during the same November 2014 maintenance period. The tubing removal and installation can be difficult to accomplish due to a limited amount of working space. Also, the detection of an improper installation was unlikely because neither the work order nor the referenced generic maintenance procedure, MP/0/A/1840/040, "Pumps - Motors - Miscellaneous Components - Lubrication - Oil Sampling – Oil Change," contained instructions to inspect for potential interference with the pump's moving parts.

During the two year operating cycle, between when the improper installation was introduced and the failed condition was discovered, the pump was run 10 times for routine testing with a cumulative run time of approximately 4 hours and 53 minutes. It was not immediately evident the precise time that the failure occurred because the pump passed all surveillance tests satisfactorily, had no sudden changes in vibration readings, and did not experience a low lube oil pressure protective trip during testing. After discovery in 2016, routine lube oil sampling showed the lube oil tested high for contamination and wear and necessitated the oil to be changed. The licensee did not inspect the pump's bearings at that time based on the satisfactory performance of the pump.

Corrective Actions: The broken tubing was replaced in November 2016 under work order 20050086-04. Additionally, the routine preventive maintenance instructions for replacing the suction strainer tubing were revised to include clearance checks consisting of rotation of the pump by hand to demonstrate no interference exists.

Corrective Action References: NCRs 2271065 and 2271539. Performance Assessment:

Performance Deficiency: The failure to provide appropriate procedures, instructions, or drawings for maintenance that could affect the performance of safety-related equipment per TS 5.4.1 and Regulatory Guide 1.33 was a performance deficiency. Specifically, the licensee's procedure to perform preventive maintenance on the reactor coolant make-up pump was inappropriate for the circumstances and led to oil suction tubing failure.

Screening: The inspectors determined the performance deficiency was more than minor because it was associated with the procedure quality attribute of the mitigating systems cornerstone and it adversely affected the cornerstone objective of ensuring the availability, reliability, and capability of the RCM pump to respond to initiating events and prevent

undesirable consequences (i.e. core damage). Specifically, the final tubing configuration resulted in the eventual failure of the lube oil suction line. The broken line impaired the direct injection of lube oil to the pump's bearings, which created a reasonable doubt on the capability of the pump to remain operable for its 72-hour mission time.

Significance: Using Inspection Manual Chapter 0609, Appendix A, "The Significance Determination Process for Findings At-Power," Exhibit 2, "Mitigating Systems Screening Questions," dated June 19, 2012, the issue screened as requiring a detailed risk evaluation because the finding represented a loss of system due to inoperability of the RCM pump. A regional SRA conducted a quantitative risk evaluation using SAPHIRE Version 8.1.8 and Oconee SPAR model Version 8.60. In completing the evaluation, the SRA assumed the RCM pump was capable of starting and running, but was degraded due to the severed oil line, which increased the fail-to-run probability above nominal while remaining less than 1.0. The SRA also assumed that FLEX equipment was partially available, but the Protected Service Water System was not. The result was a change in core damage frequency of less than 1E-6/year, which was of very low safety significance (Green). The dominant sequence was an auxiliary building flood with operator failure to isolate, RCM pump failure to run, and failure to implement FLEX. Remaining mitigation capability included operator capability to trip the RCPs, isolate the seal bleed off line, and maintain the RCS subcooled.

Cross-Cutting Aspect: Not Present Performance. No cross-cutting aspect was assigned to this finding because the inspectors determined the finding did not reflect present licensee performance, in that the performance deficiency occurred more than three years ago. Enforcement:

Violation: Oconee Unit 1 TS 5.4.1, "Procedures," states, in part, that written procedures shall be implemented covering the applicable procedures recommended in Appendix 'A' of Regulatory Guide 1.33, February 1978. Regulatory Guide 1.33, "Quality Assurance Program Requirements (Operation)", Appendix A, Paragraph 9.a, "Procedures for Performing Maintenance," requires that "maintenance that can affect the performance of safety-related equipment should be properly pre-planned and performed in accordance with written procedures, documented instructions, or drawing appropriate to the circumstances." Contrary to the above, on November 21, 2014, WO 2139921-01 did not provide procedures, instructions, or drawings regarding reinstallation of the RCM suction strainer tubing that were appropriate to the circumstances. Specifically, the work order tasked mechanics to remove and inspect the RCM pump lube oil suction strainer per procedure MP/0/A/1840/040. However, there were no instructions or drawings to ensure adequate clearance was established between tubing and the pump's moving parts upon reinstallation.

Enforcement Action: This violation is being treated as an NCV, consistent with Section 2.3.2 of the Enforcement Policy.

Failure to Report a Condition Prohibited by Technical Specifications

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		Aspect	Section
Not	Severity Level IV	Not	71152B
Applicable	NCV 05000269/2019010-02 Closed	Applicable	

The inspectors identified a SL IV NCV of 10 CFR 50.73(a)(2)(i)(B) when the licensee failed to submit an LER to the NRC within 60 days of discovery of a condition prohibited by the plant's TS. Specifically, the licensee failed to report that the Unit 1 RCM pump was inoperable for a period of time that exceeded the required action completion time of TS 3.10.1 Conditions C and G.

<u>Description</u>: On November 9, 2016, during a routine pump lubrication preventative maintenance task, the licensee discovered a broken section of lube oil tubing inside the Unit 1 RCM pump and documented the issue in NCR 2077410. An engineering evaluation determined the condition called into question the capability of the pump to remain operable for the 72-hour mission time of the standby shutdown facility. A reportability evaluation by the licensee concluded the failure should be assumed to have occurred at the time of discovery because there was no firm evidence that the failure existed before discovery for a time longer than permitted by TS. This conclusion was based on completion of nine surveillance tests with satisfactory results, no low lube oil pressure trips, and no traceable error in installation practice or procedural guidance.

Inspectors questioned the above rationale because, although the specific time of failure could not be determined, the licensee's "Quick Cause Evaluation" concluded the condition was traceable to an error in installation procedure guidance and that the failure mechanism was directly induced by physical operation of the pump - both of which had occurred prior to the date of discovery. The last time the pump had been successfully operated was during an October 4, 2016, surveillance test. If the failure occurred during this last pump run or during shutdown of the pump, then the prior history of satisfactory test results was irrelevant, and the degraded condition would have existed while the unit was in Mode 1 for approximately 36 days until the unit was shutdown for a planned refueling outage on November 5, 2016. This duration was longer than the 7 day and 12 hour required action completion time of TS 3.10.1 Conditions C and G. If the failure occurred during an earlier test, the long-term operability of the pump (72-hour mission time) was still not assured solely by successful results during the relatively brief quarterly surveillance tests. These tests generally averaged less than 23 minutes of run time to complete.

Corrective Actions: The licensee entered the issue into the corrective action program and made plans to submit an LER for the condition.

Corrective Action References: NCR 2271065

<u>Performance Assessment</u>: This violation was associated with a finding assessed using the significance determination process which was documented under NCV 05000269/2019010-01.

<u>Enforcement</u>: The ROP's significance determination process does not specifically consider the regulatory process impact in its assessment of licensee performance. Therefore, it is necessary to address this violation which impedes the NRC's ability to regulate using traditional enforcement to adequately deter non-compliance. Based on the examples provided in Section 6.9 of the Enforcement Policy, dated May 28, 2019, "Inaccurate and Incomplete Information or Failure to Make a Required Report," the performance deficiency was determined to be a SL IV violation. Specifically, example d.9 states that a SL IV violation involves a failure to make a report to the NRC in accordance with 10 CFR 50.73.

Violation: 10 CFR 50.73 (a)(1) states, in part, a licensee shall submit an LER for any event described in the paragraph within 60 days after the discovery of the event. Paragraph 50.73 (a)(2)(i)(B) states, in part, the licensee shall report any operation or condition which was prohibited by the plant's technical specifications. Contrary to the above, the licensee failed to report to the NRC on January 8, 2017, (the 60-day reporting period) that the Unit 1 RCM pump was inoperable for longer than the plant's TS required action completion time, which was a condition prohibited by the plant's technical specifications.

Enforcement Action: This violation is being treated as an NCV, consistent with Section 2.3.2 of the Enforcement Policy.

EXIT MEETINGS AND DEBRIEFS

The inspectors verified no proprietary information was retained or documented in this report.

• On August 7, 2019, the inspectors presented the NRC inspection results to Mr. Ed Burchfield and other members of the licensee staff.

DOCUMENTS REVIEWED

Inspection	Туре	Designation	Description or Title	Revision or
Procedure		-		Date
71152B	Corrective Action	NCR 2077410	Unit 1 SSF RCMU Pump Severed Lube Oil Suction Tubing	1
	Documents			
	Engineering	0079-0229-RPT-	MPR Reactor Coolant Makeup Pump: Evaluation in Support	0
	Evaluations	001	of a Past Operability Assessment with a Broken Lube Oil	
			Pump Suction Line	
	Miscellaneous	Energy Steel	Duke Energy Oconee SSF Makeup Pump Test Report	05/23/2019