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RA-19-0335

August 13, 2019

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 1
Docket Numbers: 50-269
Renewed Operating Licenses: DPR-38

Subject: Licensee Event Report 269/2019-001, Revision 00 – Unit 1 Standby Shutdown Facility Reactor Coolant Makeup Pump Oil Suction Tubing Failure

Licensee Event Report 269/2019-001, 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 Sam Adams, Regulatory Affairs, at (864) 873-3348.

Sincerely,

Sheila Dalton

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Manager, Nuclear Support Services
Oconee Nuclear Station

Enclosure

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

Ms. Audrey L. Klett, Project Manager
(by electronic mail only)
U.S. Nuclear Regulatory Commission
11555 Rockville Pike
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Mr. Adam Ruh
NRC Senior Resident Inspector (Acting)
Oconee Nuclear Station

NRC FORM 366 (04-2018)

U.S. NUCLEAR REGULATORY COMMISSION

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.

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
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4. Title

Unit 1 Standby Shutdown Facility Reactor Coolant Makeup Pump Oil Suction Tubing Failure

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
11	09	2016	2019	001	00	08	13	2019	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)*			
6	☐ 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)
Sam Adams, Senior Nuclear Engineer, Oconee Regulatory Affairs	(864) 873-3348

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
D	BQ	P	G045	Y					

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 November 9, 2016, with Unit 1 shut down for a refueling outage, a pump lubrication Planned Maintenance (PM) activity was performed on the Unit 1 Standby Shutdown Facility (SSF) Reactor Coolant Makeup (RCM) Pump. During performance of the PM it was discovered that the copper tube to the oil strainer had been sheared above the static oil level. A cause evaluation performed in 2016 identified the cause to be repeated impact from the rotating components associated with the pump shaft due to inadequate clearance being maintained when the tubing was installed on November 12, 2014.

Because the cause was determined to be repeated impact from the rotating components of the pump shaft to the pump's oil suction tubing, the tubing failure would occur while the pump was running. The last time the pump ran prior to discovery of the failed tubing was on October 4, 2016. Oconee staff determined the failed oil tubing impacted operability of the RCM Pump from at least October 4, 2016, until the Unit 1 Shutdown date of November 5, 2016, a total of 32 days. This duration exceeds the 7 days allowed by the TS, therefore this event was reportable under 10 CFR 50.73(a)(2)(i)(B) and is now being reported as an operation or condition prohibited by TS.

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NARRATIVE

BACKGROUND

The Standby Shutdown Facility (SSF) Reactor Coolant Makeup (RCM) [EIIS: BQ] System is designed to supply borated makeup water from the spent fuel pool to the Reactor Coolant System (RCS) [EIIS: AB] to provide Reactor Coolant Pump (RCP) Seal cooling and RCS inventory. An SSF RCM Pump located in the Reactor Building of each unit supplies makeup to the RCS should the normal makeup system flow and RCP seal cooling become unavailable. The system is designed to ensure that sufficient borated water is available from the spent fuel pools to allow the SSF to maintain mode 3 with an average Reactor Coolant temperature ≥ 525°F (the initiating event may cause average RCS temperature to drop below 525°F) for all three units for approximately 72 hours.

These safety functions are required by Technical Specification 3.10.1 in support of design events mitigated by the SSF.

TS 3.10.1 – Standby Shutdown Facility states, "The SSF instrumentation and the following SSF Systems shall be OPERABLE:"

a. SSF Auxiliary Service Water System
b. SSF Portable Pumping System
c. SSF Reactor Coolant Makeup System
d. SSF Power System

Applicability: Modes 1,2, and 3.

The SSF RCM Pump is a three-plunger reciprocating positive displacement pump (Gaulin model NP6) driven by an induction motor, powered from the SSF Power System. The pump oil reservoir surrounds the eccentric pump shaft to provide a combination of splash lubrication and direct injection to the shaft and connecting rod bearings through the gun-drilled shaft provided by an external, shaft mounted oil pump. The oil pump takes suction through a strainer located at the bottom of the oil reservoir. The RCM pump is in the Reactor Building basement sufficiently below the spent fuel pool water level to assure that adequate net positive suction head is available to allow the RCM pump to provide makeup water for RCP seal cooling and RCS inventory.

EVENT DESCRIPTION

On November 9, 2016, with Unit 1 shut down for a refueling outage, a pump lubrication Planned Maintenance (PM) activity was performed on the Unit 1 Reactor Coolant Makeup (RCM) Pump. During performance of the PM it was discovered that the copper tube to the oil strainer had been sheared above the static oil level. A reportability evaluation performed in 2016 determined the issue was not reportable based on the satisfactory performance of the pump during all surveillance testing conducted during the operating cycle. As such, it was concluded that there was no past inoperability and the time of discovery was determined to be the date that the sheared tubing was found, November 9, 2016, while not in a mode of applicability for the Technical Specification (TS). Based on the conclusion in the reportability evaluation, it was determined there was no Operation or Condition Prohibited by TS. Upon further review in 2019, the cause of the tubing failure was determined to be mechanical interference with the rotating shaft components, which meant that the tubing failure would occur while the pump was running. The time duration between the last time the pump ran, October 4, 2016, and the Unit 1 shutdown on November 5, 2016 was 32 days which exceeds the TS limit of 7 days. Oconee staff determined the failed suction tubing impacted operability of the RCM Pump, therefore the pump was inoperable for longer than allowed by the TS and this is an operation or condition prohibited by TS in accordance with 10 CFR 50.73(a)(2)(i)(B).

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Subsequent engineering testing, analysis and evaluation was performed, in May and June of 2019, to review past-operability of the RCM pump with the sheared lube oil suction tube. A reportability evaluation performed by Oconee staff reviewed all of the test, analysis and evaluation results. Oconee staff concluded that the RCM pump could have operated with this degraded condition, however the evaluation could not demonstrate Operability of the pump for the 72-hour mission time without uncertainty. Therefore, past-operability cannot be conclusively determined and the suction tubing failure on the RCM Pump is being reported as an operation or condition prohibited by TS in accordance with 10 CFR 50.73(a)(2)(i)(B).

CAUSAL FACTORS

A cause evaluation was performed in accordance with the Duke Energy Corrective Action Program. The cause evaluation determined that the direct cause of the mechanical interference between the copper oil tubing and rotating shaft components was an incorrect placement and alignment of the tubing when it was installed in the previous refueling outage.

The cause analysis concluded that the root cause was that the work instructions were inadequate in that the PM did not provide instructions for checking and ensuring proper clearance between the rotating shaft components and the tubing.

CORRECTIVE ACTIONS

1. The sheared oil suction tubing was replaced.
2. The procedures for the performance of the lubrication PM were revised to add task instructions to do a functional verification by hand rotating the pump shaft to ensure no mechanical interferences exist.

SAFETY ANALYSIS

The subject event was evaluated using the Oconee Probabilistic Risk Assessment (PRA) model and found to be of very low safety significance. Although the condition of the RCM pump was degraded and assumed to be inoperable, pump testing and analysis demonstrated that it remained able to perform its design function. The uncertainty associated with the reliability of the RCM pump was evaluated in a sensitivity analysis that determined that the plant core damage frequency would not increase significantly even if the nominal pump run failure probability was significantly increased. Therefore, it is concluded that the risk impact is very low and had no significant impact on public health and safety.

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NARRATIVE

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.

Energy Industry Identification System (EIIS) codes are identified in the text as [XX]. This event is considered INPO Consolidated Events System (ICES) Reportable. There were no releases of radioactive materials, radiation exposures or personnel injuries associated with this event.