NEXTera ENERGY
DUANE ARNOLD

June 1, 2015

NG-15-0107
10 CFR 50.73

U.S. Nuclear Regulatory Commission
Attn: Document Control Desk
Washington, D.C. 20555-0001

Duane Arnold Energy Center
Docket 50-331
Renewed Op. License No. DPR-49

Licensee Event Report 2015-002

Please find attached the subject report submitted in accordance with 10 CFR 50.73. This letter makes no new commitments or changes to any existing commitments.

T. A. Vehec
Vice President, Duane Arnold Energy Center
NextEra Energy Duane Arnold, LLC

cc: Administrator, Region III, USNRC
Project Manager, DAEC, USNRC
Resident Inspector, DAEC, USNRC

IE22
NRR

Rec'd @ OPC
on 6/2/15

NRC FORM 366 (02-2014) U.S. NUCLEAR REGULATORY COMMISSION

APPROVED BY OMB: NO. 3150-0104 EXPIRES: 01/31/2017

LICENSEE EVENT REPORT (LER)

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

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4. TITLE

Unanalyzed Condition Due to Degraded Primary Containment Suppression Pool Coating

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
									N/A	N/A
3	31	2015	2015	- 002	- 00	6	01	2015	FACILITY NAME N/A	DOCKET NUMBER N/A

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)(i)(C)	☐ 50.73(a)(2)(vii)
	☐ 20.2201(d)	☐ 20.2203(a)(3)(ii)	☐ 50.73(a)(2)(ii)(A)	☐ 50.73(a)(2)(viii)(A)
	☐ 20.2203(a)(1)	☐ 20.2203(a)(4)	☒ 50.73(a)(2)(ii)(B)	☐ 50.73(a)(2)(viii)(B)
	☐ 20.2203(a)(2)(i)	☐ 50.36(c)(1)(i)(A)	☐ 50.73(a)(2)(iii)	☐ 50.73(a)(2)(ix)(A)
10. POWER LEVEL	☐ 20.2203(a)(2)(ii)	☐ 50.36(c)(1)(ii)(A)	☐ 50.73(a)(2)(iv)(A)	☐ 50.73(a)(2)(x)
	☐ 20.2203(a)(2)(iii)	☐ 50.36(c)(2)	☐ 50.73(a)(2)(v)(A)	☐ 73.71(a)(4)
100%	☐ 20.2203(a)(2)(iv)	☐ 50.46(a)(3)(ii)	☐ 50.73(a)(2)(v)(B)	☐ 73.71(a)(5)
	☐ 20.2203(a)(2)(v)	☐ 50.73(a)(2)(i)(A)	☐ 50.73(a)(2)(v)(C)	☐ OTHER
	☐ 20.2203(a)(2)(vi)	☐ 50.73(a)(2)(i)(B)	☐ 50.73(a)(2)(v)(D)	Specify in Abstract below or in NRC Form 366A

12. LICENSEE CONTACT FOR THIS LER

LICENSEE CONTACT	TELEPHONE NUMBER *(Include Area Code)*
Bob Murrell, Licensing Engineer	(319) 851-7900

13. COMPLETE ONE LINE FOR EACH COMPONENT FAILURE DESCRIBED IN THIS REPORT

CAUSE	SYSTEM	COMPONENT	MANU-FACTURER	REPORTABLE TO EPIX	CAUSE	SYSTEM	COMPONENT	MANU-FACTURER	REPORTABLE TO EPIX
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

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 15 single-spaced typewritten lines)*

On March 31, 2015, while operating at 100% power, with no structures, systems, or components inoperable, an unanalyzed condition regarding the primary containment suppression pool coating was identified. Specifically, during an inspection of suppression pool (torus) during the October 2014 refueling outage, degradation of the torus coating was discovered. Some of the coating had become delaminated. NextEra Energy Duane Arnold took immediate action to restore the coating to within design parameters during the refueling outage and the degraded condition no longer exists. Extensive analysis was performed to determine the effect of the delaminated material. Upon completion of this investigation, NextEra Energy Duane Arnold determined that an unanalyzed condition existed as a result of the coating degradation and is reporting the condition under 10 CFR 50.73(a)(2)(ii)(B). The root causes of this event were less than adequate coating application specification and work instructions and less than adequate project oversight and control of special processes.

NARRATIVE

I. Description of Event:

The torus interior was recoated in Refueling Outage (RFO) 23 to address age management issues regarding the primary containment suppression pool. Existing coating systems, such as inorganic zinc, required frequent repairs each refueling outage and a more robust coating system was sought. Extensive testing concluded that Carboguard 6250N was the optimal coating system despite being a first-of-a-kind application for a torus recoat. The coating was designed to be a single layer application with a thickness of 45 ± 5 mils. However, as documented in Condition Report (CR) 1821308, dated November 8, 2012, widespread areas failed to meet this thickness criterion. The torus recoat project team decided to apply a secondary application to build-up thin areas to meet design specifications. After consultation with the coating vendor, Carboline, the team determined the secondary coating was within the recoat window specified in the Carboguard 6250N Product Data Sheet (PDS). After completion of the second application and verification of proper coating thickness by Dry Film Testing (DFT), the coating was forced cured in accordance with the PDS specifications and the torus was re-filled.

On October 9, 2014, an initial walkdown of the torus interior during RFO 24 discovered areas of coating delamination at the water line in Bays 1, 12, and 15, as identified in CR 1997546. Furthermore, the coating appeared to be sagging on several downcomers. The areas of coating delamination were coincident with areas that were subject to a secondary recoat during the torus recoat project in RFO 23. Subsequent walkdowns and underwater inspections identified additional areas of coating delamination in Bays 1, 2, 3, 5, 6, 7, 9, and 10, as identified in CR 1999648. These areas were also limited to the second coating application that was applied during the RFO 23. The inspections did not identify any primary coating delamination.

The torus coating protects the internal torus metal shell and supports from corrosion. The torus shell coating is a qualified coating designed to adhere to the torus shell following a Design Bases Accident (DBA). Any coating that does not adhere could result in additional debris burden to the Emergency Core Coolant System (ECCS) suction strainers. A loss of coating material does not lead to a rapid degradation of the torus metal. However, the delaminating coating has the potential to impact the ECCS suction strainers during a DBA. This system is a Critical 1, Quality Level 1, Service Level 1 system. The severity of the event was classified as a Significance Level 1 event.

A Failure Investigation Process (FIP) Team was assembled and tasked with the responsibility to determine the apparent cause of the delamination and to restore the torus coating. Loosely adhered coating was removed through a combination of mechanical scraping and pressure washing. A total of approximately 5300 square feet of coating was

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III. Cause of Event:

A Root Cause Evaluation (RCE) was completed. The RCE identified the following Direct, Root, and Contributing Causes.

DC1: Conditions for applying the second layer of torus coating were not met

RC1: Less than Adequate Coating Application Specification and Work Instructions

RC2: Less than Adequate Project Oversight and Control

CC1: Less than Adequate Guidance for Curing Schedule

CC2: Less than Adequate Contingency Planning for Areas of Low Millage

IV. Corrective Actions:

Immediate Corrective Action

The degraded condition of the torus shell coating was inspected and repaired prior to plant startup from RFO24. POD 1997546-01 determined that the remaining coating would not adversely impact the function of the ECCS suction strainers.

Corrective Actions to Prevent Recurrence

Administrative Control Procedure (ACP) 1602, Specification for Protective Coatings in Areas Outside the Primary Containment, and ACP 1603, Protective Coatings for Service Level 1 Applications Inside the Reactor Containment, were revised to require Wet Film Thickness measurements be taken during coating application.

Nuclear Fleet Administrative Procedure, PR-AA-100-1001, Project Management, was revised to implement the Enterprise Risk process to provide adequate project oversight for projects meeting the definition of Enterprise Risk.

V. Additional Information:

Previous Similar Occurrences:

A review of NextEra Energy Duane Arnold Licensee Event Reports found no other instances of torus coating delamination events.

NARRATIVE

removed, which represented about 94% of the secondary coating. As documented in Prompt Operability Determination (POD) 1997546-01, the as-left coating was determined to meet full qualification by inspection and adhesion testing.

II. Assessment of Safety Consequences:

The coating delamination did not affect the integrity of the torus as a pressure retaining component (there was no identified corrosion of the torus due to the delamination).

The coating delamination had the potential to significantly increase debris loading of the ECCS suction strainers, which could have affected Emergency Core Cooling Systems (ECCS) that interface with the torus. In particular, those ECCS systems that are designed to draw suction from the torus in various operating modes. These ECCS systems include Residual Heat Removal (RHR), Core Spray (CS), and High Pressure Coolant Injection (HPCI). In addition, the Reactor Core Isolation Cooling (RCIC) system can be aligned to the torus as a suction source. The plugging of system strainers with delaminated coating could render some or all of the associated systems ineffective to fulfill their safety functions as specified in the Current Licensing Basis (CLB) for some or all of Cycle 24.

A Past Operability Review (POR) 1999648-01 performed an evaluation of the impact on the Net Positive Suction Head (NPSH) of the Emergency Core Cooling Systems (ECCS) and Reactor Core Isolation Cooling (RCIC) due to torus secondary coating delamination. The POR concluded that the ECCS and RCIC pumps were capable of performing their safety functions as described in the current licensing basis but were degraded over the time period between RFO23 and RFO24. However, as discussed in NRC Inspection Report 2014-011, there were several uncertainties in the evaluation such as the fact that the original ECCS suction strainer loading analysis assumed the debris mass was generated in the drywell and transported to the torus and strainers. A LOCA under this assumption could lead to the ECCS suction strainer surface areas being blocked by the delaminated coating prior to the arrival of the drywell debris. An additional uncertainty was coating debris size characteristics during LOCA conditions.

Based on the conclusions of the POR, it was concluded that an event or condition that alone could have prevented a loss of safety function did not occur. However, based on the level of uncertainties in the POR and the fact that the amount of loose coating material was beyond the original design consideration for the ECCS suction strainers, it was concluded that an unanalyzed condition existed. Therefore, this event was reported to the NRC on March 31, 2015 under EN#50943 pursuant to 10CFR50.72(b)(3)(ii).

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EIIS System and Component Codes:

N/A

Reporting Requirements:

This activity is being reported per 10 CFR 50.73(a)(2)(ii)(B) as an Unanalyzed Condition.