Duke Energy®
Carolinas

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February 14, 2012

U.S. Nuclear Regulatory Commission
Attention: Document Control Desk
Washington, D.C. 20555

Subject: Duke Energy Carolinas, LLC (Duke Energy)
Catawba Nuclear Station, Units 1 and 2
Docket Nos. 50-413 and 50-414
Licensee Event Report 413/2011-003

Pursuant to 10 CFR 50.73(a)(1) and (d), attached is Licensee Event Report 413/2011-003, Revision 0 entitled, "Technical Specification Required Shutdown of Unit 1 and Unit 2 and Associated Technical Specification Violation Involving Notice of Enforcement Discretion Due to Two Inoperable Trains of the Control Room Area Chilled Water System".

This report is being submitted in accordance with 10 CFR 50.73(a)(2)(i)(A), 10 CFR 50.73(a)(2)(i)(B), and 10 CFR 50.73(a)(2)(v)(D).

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

This event is considered to be of no significance with respect to the health and safety of the public.

If there are any questions on this report, please contact Adrienne F. Driver at (803) 701-3445.

Sincerely,

James R. Morris

Attachment

IE22
NRR

xc (with attachment):

V.M. McCree
Regional Administrator
U.S. Nuclear Regulatory Commission - Region II
Marquis One Tower
245 Peachtree Center Ave., NE Suite 1200
Atlanta, GA 30303-1257

J.H. Thompson (addressee only)
NRC Project Manager
U.S. Nuclear Regulatory Commission
Mail Stop 8-G9A
11555 Rockville Pike
Rockville, MD 20852-2738

G.A. Hutto, III
NRC Senior Resident Inspector
Catawba Nuclear Station

INPO Records Center
700 Galleria Place
Atlanta, GA 30339-5957

NRC FORM 366 (10-2010) U.S. NUCLEAR REGULATORY COMMISSION

LICENSEE EVENT REPORT (LER)

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

1. FACILITY NAME	2. DOCKET NUMBER	3. PAGE
Catawba Nuclear Station, Unit 1	05000413	1 OF 8

4. TITLE

Technical Specification Required Shutdown of Unit 1 and Unit 2 and Associated Technical Specification Violation Involving Notice of Enforcement Discretion Due to Two Inoperable Trains of the Control Room Area Chilled Water System

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
									Catawba Unit 2	05000414
12	15	2011	2011	- 003	- 0	02	14	2012	FACILITY NAME	DOCKET NUMBER

9. OPERATING MODE
1

10. POWER LEVEL
100%

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

☐ 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)
☐ 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)
☐ 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

FACILITY NAME	TELEPHONE NUMBER (Include Area Code)
Adrienne F. Driver, Regulatory Compliance	(803) 701-3445

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
X	KM	DCC	Trane	Yes					

14. SUPPLEMENTAL REPORT EXPECTED

☐ YES (If yes, complete EXPECTED SUBMISSION DATE) ☒ NO

15. EXPECTED SUBMISSION DATE	MONTH	DAY	YEAR

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

On December 15, 2011 at 1421 hours and 1422 hours, respectively, Unit 1 and Unit 2 entered Mode 3 to complete a Technical Specification (TS) Limiting Condition for Operation (LCO) 3.0.3 required shutdown due to both trains of the Control Room Area Chilled Water System (CRACWS) being inoperable. The primary cause of this event was failure of a microprocessor for the Train "B" CRACWS Chiller. Further testing is being conducted to determine the cause and support implementation of changes to improve the reliability of the microprocessor. Two additional causes identified include the 1) lack of procedures to replace the Train "B" microprocessor component within the allowable LCO 3.0.3 completion time and 2) insufficient maintenance procedural guidance for alignment of the chilled water pump. Corrective actions include developing a procedure to replace the microprocessor, and revising the procedure to provide additional detail for pump alignment. Throughout this event, all other plant safety related systems were capable of performing their required safety related functions.

NARRATIVE

BACKGROUND

This event is being reported under the following criteria:

10 CFR 50.73(a)(2)(i)(A), the completion of any nuclear plant shutdown required by the plant's Technical Specifications (TS),

10 CFR 50.73(a)(2)(i)(B), any operation or condition which was prohibited by the plant's TS, and

10 CFR 50.73(a)(2)(v)(D), any event or condition that could have prevented the fulfillment of the safety function of structures or systems that are needed to mitigate the consequences of an accident.

Catawba Nuclear Station Units 1 and 2 are Westinghouse four-loop Pressurized Water Reactors (PWRs) [EIIS: RCT].

The Control Room Area Chilled Water System (CRACWS) [EIIS: KM] provides temperature control for the control room and the control room area. The CRACWS consists of two independent and redundant trains that provide cooling to the control room and control room area. Each train consists of a chiller package [EIIS: CHU], chilled water pump [EIIS: P], and air handling units [EIIS: AHU] with cooling coils [EIIS: CLR]. Chilled water is passed through the cooling coils of the air handling unit to cool the air. Electric duct heaters [EIIS: HTR] are then used to control the supply air temperature. The CRACWS provides both normal and emergency cooling to the control room and control room area. A single train will provide the required temperature control to maintain the control room approximately 74°F. The CRACWS operation in maintaining the control room temperature is discussed in the Updated Final Safety Analysis Report (UFSAR), Section 9.4. The design basis of the CRACWS is to maintain the control room temperature for 30 days of continuous occupancy less than or equal to 90 degrees Fahrenheit.

The CRACWS components are arranged in redundant, safety related trains. A single active failure of a component of the CRACWS, with a loss of offsite power, does not impair the ability of the system to perform its design function. The CRACWS is capable of removing sensible and latent heat loads from the control room, which include consideration of equipment heat loads and personnel occupancy requirements, to ensure equipment operability.

NARRATIVE

The CRACWS is shared between the two units. The system must be operable for each unit when that unit is in the Mode of Applicability.

TS 3.7.11 governs the CRACWS. Limiting Condition for Operation (LCO) 3.7.11 requires two operable CRACWS trains for each unit that is in Modes 1, 2, 3, 4, 5, and 6, and during movement of recently irradiated fuel assemblies (i.e., fuel assemblies that have been part of an active core within the previous 72 hours). With one CRACWS train inoperable (Condition A), the inoperable CRACWS train must be restored to operable status within 30 days. With two CRACWS trains inoperable in Modes 1, 2, 3, or 4 (Condition E), the affected unit(s) must enter LCO 3.0.3 immediately. LCO 3.0.3 requires action to be initiated within 1 hour to place the unit(s), as applicable, in Mode 3 within 7 hours, Mode 4 within 13 hours, and Mode 5 within 37 hours.

On December 15, 2011, when this event occurred, Units 1 and 2 were in Mode 1 at 100% power operation.

EVENT DESCRIPTION

Date/Time	Event
12/11/2011/2150	Train "A" of the CRACWS was declared inoperable for planned maintenance to replace the pump shaft on the chilled water pump.
12/15/2011/0720	Train "B" CRACWS chiller unexpectedly shutdown
12/15/2011/0739	Train "B" of the CRACWS was declared inoperable. Both units immediately entered LCO 3.0.3 as required by TS 3.7.11 Condition E.
12/15/2011/1030	Unit 1 began its LCO 3.0.3 required shutdown.
12/15/2011/1059	Unit 2 began its LCO 3.0.3 required shutdown.
12/15/2011/1421	Unit 1 entered Mode 3.
12/15/2011/1422	Unit 2 entered Mode 3.
12/15/2011/~1700	Duke Energy requested a Notice of Enforcement Discretion (NOED) from the NRC in a telephone conference call to allow the units to remain in Mode 3 for an additional 12

hours so that repairs could be completed to restore Train A of the CRACWS to operable status.

12/15/2011/~1800 The NRC verbally granted the NOED request.

12/15/2011/2236 Train "A" of the CRACWS was restored to operable status. Both units exited LCO 3.0.3.

12/16/2011/0239 Train "B" of the CRACWS was restored to operable status.

12/19/2011 The written NOED request was formally submitted to the NRC.

12/22/2011 The NRC formally documented the verbal granting of the NOED request via written correspondence (NOED No. 11-2-004).

CAUSAL FACTORS

The immediate cause of this event was identified to be a microprocessor failure, resulting in the Train "B" CRACWS chiller to shutdown while Train "A" of the CRACWS was inoperable for planned maintenance.

The actual cause of the microprocessor failure has not been determined and further testing is being conducted to determine a cause. The microprocessor was replaced on December 16, 2011 when the shutdown of Train "B" CRACWS chiller could not be duplicated.

An additional cause of this event was the lack of procedures to replace the microprocessor hindering the station from successfully replacing the Train "B" microprocessor component within the allowable LCO 3.0.3 completion time.

Additional investigation included a review of the restoration of Train "A" of the CRACWS. The initial attempt to restore Train "A" of the CRACWS was not successful due to misalignment of the chilled water pump. The cause of the misalignment was determined to be a result of insufficient procedural guidance for pump alignment and clearances.

NARRATIVE

CORRECTIVE ACTIONS

Immediate:

1. Both units immediately entered LCO 3.0.3 when Train "B" of the CRACWS was declared inoperable.

2. Unit Threat and Failure Identification Process (FIP) teams were established.

Subsequent:

1. Commenced Unit 1 and Unit 2 Shutdown

2. Unit 1 and Unit 2 entered Mode 3 as required by LCO 3.0.3.

3. A NOED was requested and verbally granted by the NRC to allow the units to remain in Mode 3 until Train "A" of the CRACWS could be restored to operable status.

4. Train "A" of the CRACWS was restored to operable status. LCO 3.0.3 was exited for both units.

5. Train "B" of the CRACWS was restored to operable status.

Planned:

1. Develop a detailed digital controller replacement procedure.

2. Clarify procedure guidance to provide additional detail for appropriate pump alignment and clearances.

3. Submit a permanent license amendment to address operability requirements of CRACWS following NRC approval of TSTF-426, "Revise or Add Actions to preclude entry into LCO 3.0.3," NRC approval of WCAP-16125, Rev. 1, "Justification for Risk Informed Modifications to Selected Technical Specifications for Conditions Leading to Exigent Plant Shutdown," and submittal by the Technical Specification Task Force of the corresponding Traveler applicable to Westinghouse plants (currently under development) and subsequent NRC approval of this Traveler. This planned corrective action is a previous NRC commitment docketed in letter

to the NRC dated December 19, 2011 and issuance of the NOED 11-2-004 by the NRC on December 22, 2011.

4. Station Engineering to review the failure investigation report for any new applicable guidance and create additional actions to support CNS implementation of changes to process/procedures to improve the reliability of the microprocessor.

There are no new NRC commitments contained in this LER.

SAFETY ANALYSIS

The CRACWS has no impact on the calculated Core Damage Frequency (CDF) at Catawba. The CRACWS, specifically the control room chillers, are not included in the Level One Probabilistic Risk Assessment (PRA) model. The safety significance of the CRACWS is low because of the opportunity to mitigate the consequences with plant Abnormal Procedures (APs). When control room temperature becomes elevated, the control room Senior Reactor Operator will enter AP/0/A/5500/039, "Control Room High Temperature." This procedure will direct the control room crew to monitor and take actions necessary to cool the control room via opening doors. As a result, the loss of the CRACWS has been screened out of the Catawba PRA as either an initiating event or as a support system failure since it is a slow moving transient due to the preplanned actions described above. The loss of the CRACWS can be mitigated by the following remedial measures:

- The control room and its equipment can be cooled by opening the control room doors and allowing the computer area cooling system to provide some heat removal capability along with the additional air flow achieved with the doors open. Cabinet doors can be opened as needed to help ventilate equipment in the control room.

- The essential switchgear rooms are also cooled by the CRACWS. Adequate cooling for these rooms can be maintained by opening doors.

- The plant can also be maintained in hot standby from the Standby Shutdown Facility (SSF). Reactor coolant pump seal injection and heat removal can be maintained independent of any equipment affected by a loss of the CRACWS. Seal injection can be maintained by the standby makeup pump controls along with the necessary valve controls.

- The units can be maintained in a stable condition from remote locations. The Auxiliary Shutdown Panels (ASPs), located in the AFW

pump rooms, can be used to provide control for all systems needed to maintain a hot standby condition and to cool down the units to cold shutdown conditions. In addition to AFW, these systems include the Nuclear Service Water System, the Chemical and Volume Control System, the Residual Heat Removal (RHR) System, and the Component Cooling Water System.

The CRACWS has no impact on the calculated Large Early Release Frequency (LERF) at Catawba. The CRACWS, specifically the chillers, are not included in the LERF model for the reasons described previously.

In summary, the conclusions for the CRACWS having minimal safety significance are:

- Slow moving transient - there is time to react before failures occur and there are preplanned remedial actions available.
- Control from the ASPs is available.
- Control from the SSF is available.

Therefore, the impact on the Incremental Conditional Core Damage Probability (ICCDP) is expected to be much less than 5E-07 and the impact on the Incremental Conditional Large Early Release Probability (ICLERP) is expected to be much less than 5E-08.

The probabilistic risk analysis and other technical information contained in the enforcement discretion request fully supported the 12-hour extension of the applicable LCO 3.0.3 Completion Time. The details of the enforcement discretion request can be found in the letter from Duke Energy to the NRC dated December 19, 2011 (ADAMS Accession Number ML11356A241). The NRC letter granting the enforcement discretion request (NOED No. 11-2-004) was issued on December 22, 2011 (ADAMS Accession Number ML113560359).

This event did not affect the health and safety of the public.

ADDITIONAL INFORMATION

Within the previous three years, there have been no other TS required shutdowns due to both CRACWS trains being inoperable. There have been other LER events involving TS violations and NOEDs. However, the specific circumstances surrounding these events and the corrective actions taken in

response to these events could not have prevented this event from occurring. This event is therefore considered to be non-recurring.

Energy Industry Identification System (EIIS) codes are identified in the text as [EIIS: XX]. This event is considered reportable to the Equipment Performance and Information Exchange (EPIX) program.

This event is considered to constitute a Safety System Functional Failure. The CRACWS is a shared system with the associated TS safety functional requirement to ensure the Control Room temperature is maintained less than or equal to 90 degrees Fahrenheit during all MODES of operation and movement of recently irradiated fuel assemblies. The respective safety system functional criterion as described above was not met.

Throughout this event, all other plant safety related systems were capable of performing their required safety related functions. The health and safety of the public were not adversely affected by this event.

However, as described above, this event had no material effect upon overall nuclear safety. There was no release of radioactive material, radiation overexposure, or personnel injury associated with the event described in this LER.