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CNS-16-051

August 2, 2016

10 CFR 50.90

U.S. Nuclear Regulatory Commission (NRC)
Attention: Document Control Desk
Washington, D.C. 20555-0001

Subject: Duke Energy Carolinas, LLC (Duke Energy)
Catawba Nuclear Station, Units 1 and 2
Docket Numbers 50-413 and 50-414
License Amendment Request (LAR) to Adopt National Fire Protection Association (NFPA) 805 Performance-Based Standard for Fire Protection for Light-Water Reactor Generating Plants
Response to NRC Request for Additional Information (RAI) and Revision to RAI Response
(TAC Nos. MF2936 and MF2937)

References:

1. Letters from Duke Energy to the NRC, dated September 25, 2013 (ADAMS Accession Number ML13276A503), January 13, 2015 (ADAMS Accession Number ML15015A409), January 28, 2015 (ADAMS Accession Number ML15029A697), February 27, 2015 (ADAMS Accession Number ML15065A107), March 30, 2015 (ADAMS Accession Number ML15091A339), April 28, 2015 (ADAMS Accession Number ML15119A533), July 15, 2015 (ADAMS Accession Number ML15198A036), August 14, 2015 (ADAMS Accession Number ML15231A010), September 3, 2015 (ADAMS Accession Number ML15310A123), December 11, 2015 (ADAMS Accession Number ML15350A014), January 7, 2016 (ADAMS Accession Number ML16011A121), March 23, 2016 (ADAMS Accession Number ML16096A262, and June 15, 2016 ADAMS Accession Number ML16169A107)

2. Letter from the NRC to Duke Energy, "Catawba Nuclear Station, Units 1 and 2: Request for Additional Information (RAI) Regarding License Amendment Request to Implement a Risk-Informed, Performance-Based Fire Protection Program (TAC Nos. MF2936 and MF2937)", dated November 20, 2014 (ADAMS Accession Number ML14308A037)

A006

3. Letter from the NRC to Duke Energy, "Catawba Nuclear Station, Units 1 and 2 - Request for Additional Information Regarding License Amendment Request to Implement a Risk-Informed, Performance-Based Fire Protection Program (TAC Nos. MF2936 and MF2937)", dated July 7, 2016 (ADAMS Accession Number ML16187A066)

The Reference 1 letters comprise in their entirety Duke Energy's request for NRC review and approval for adoption of a new fire protection licensing basis which complies with the requirements in 10 CFR 50.48(a), 10 CFR 50.48(c), and the guidance in Regulatory Guide (RG) 1.205, "Risk-Informed, Performance-Based Fire Protection for Existing Light-Water Nuclear Power Plants," Revision 1, dated December 2009. The September 25, 2013, reference LAR was developed in accordance with the guidance contained in Nuclear Energy Institute (NEI) 04-02, "Guidance for Implementing a Risk-Informed, Performance-Based Fire Protection Program Under 10 CFR 50.48(c)," Revision 2.

The Reference 2 letter, from the NRC to Duke Energy, transmitted RAIs necessary for the NRC to continue its review of the September 25, 2013, reference LAR. The Reference 1 letter dated January 28, 2015 (ML15029A697), provided Duke Energy's 90-day response to the RAIs.

The Reference 3 letter transmitted an RAI necessary for the NRC to continue its review of the September 25, 2013, reference LAR.

The purpose of this letter is to provide a revision to a response provided in the Reference 1 letter dated January 28, 2015 (specifically, FPE RAI 02). As a result of this revision, a revision to "Transition to 10 CFR 50.48(c) - NFPA 805 Performance-Based Standard for Fire Protection for Light Water Reactor Electric Generating Plants, 2001 Edition, Transition Report," (specifically, page L-16 of Attachment L) is also required. Attachment L of the Transition Report was provided to the NRC in the Reference 1 letter dated February 27, 2015 (ML15065A107). The purpose of this letter is also to provide the response to the RAI transmitted in Reference 3 (specifically, PRA RAI 24).

The enclosures to this letter provide the revised FPE RAI 02, the revised (Revision 7) cover letter and affected page L-16 of the Transition Report, and the PRA RAI 24 response. For the specified RAIs, the format of the enclosure is to restate each RAI question, followed by its associated response. Enclosures 1 and 2 have the revisions designated by revision bars.

The conclusions of the No Significant Hazards Consideration and the Environmental Consideration contained in the September 25, 2013 reference LAR are unaffected by this submittal.

There are no new regulatory commitments contained in this letter.

Pursuant to 10 CFR 50.91, a copy of this LAR supplement is being sent to the appropriate State of South Carolina official.

Inquiries on this matter should be directed to Sherry Andrews at (803) 701-3424.

I declare under penalty of perjury that the foregoing is true and correct.

Executed on August 2, 2016.

Very truly yours,

Kelvin Henderson
Vice President, Catawba Nuclear Station

Enclosures

xc:

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Enclosure 1

Revised FPE RAI 02

Fire Protection Engineering (FPE) Request for Additional Information (RAI) 02

NFPA 805, Section 3.9.2 requires that each automatic and manual water-based fire suppression system be equipped with a water flow alarm. The compliance basis for LAR Attachment A, Section 3.9.2 is "Complies with Clarification" and indicates that manual water-based suppression systems are not provided with water flow alarms. Nuclear Energy Institute (NEI) 04-02, "Guidance for Implementing a Risk- Informed, Performance-Based Program Under 10 CFR 50.48(c)," defines "complies with clarification" as an editorial issue and compliance should be explained in the compliance basis field. The NRC staff does not consider the lack of water flow alarms as an editorial issue.

Provide a compliance strategy commensurate with the guidance of NEI 04-02 that demonstrates compliance with NFPA 805 or provide a detailed justification for not meeting the requirement of NFPA 805 Section 3.9.2.

Duke Energy Response:

Catawba will revise LAR Attachment A Section 3.9.2 compliance statements to include "Comply" and "Submit for NRC Approval" compliance statements. Catawba automatic water-based suppression systems comply with Section 3.9.2 as each system is provided with a water flow alarm. The manual water-based suppression systems do not have water flow alarms and approval is requested for this configuration under 10 CFR 50.48(c)(2)(vii). The approval request is as follows:

Approval Request 5

NFPA 805 Section 3.9.2

NFPA 805, Section 3.9.2 states:

"Each system shall be equipped with a water flow alarm."

At Catawba the automatic water-based suppression systems are provided with water flow alarms. Certain manual water-based suppression systems are not provided with water flow alarms. The manual suppression systems without water flow alarms are those which are located in containment. The manual sprinkler systems are provided for the reactor coolant pumps, the lower containment filters (carbon beds), and the reactor building pipe corridors. These systems require opening of the containment isolation valve in order for water to reach the system and therefore are considered manual suppression systems.

The containment isolation valve is opened if there is indication that there may be fire. Each system is equipped with closed head fusible link sprinklers. Each system also has an independent detection system in the area consisting of either line-type heat, photo-electric smoke, or rate-of-rise devices. Indication of suppression system actuation would be visual confirmation based on operator response to a detection alarm, personnel in the area observing system operation, or abnormal fire pump/jockey pump operation.

Due to the limited times the containment isolation valve is open, inadvertent actuation without water flow alarm indication is not a concern.

Basis for Request:

The basis for the approval request of this deviation is:

- The control room authorizes opening of the containment isolation valve.
- The suppression systems will only operate after an operator opens the containment isolation valve.
- Each area protected by the manual water-based suppression systems are also protected by automatic detection systems.
- Multiple alternative means of indication of suppression system operation are available.

Nuclear Safety and Radiological Release Performance Criteria:

The lack of water flow alarms does not affect nuclear safety. The manual suppression systems are normally isolated. The Fire PRA and the Fire Risk Evaluations have evaluated the reactor building fire areas and do not credit the manual suppression systems for risk reduction or for defense-in-depth. The suppression systems will only operate after the containment isolation valve is opened. If a fire were to occur there are multiple means of indication that the suppression system has actuated. Therefore there is no impact on the nuclear safety performance criteria.

The radiological review was performed based on the potential location of radiological concerns and is not dependent on water flow alarms in fire protection suppression systems. The lack of water flow alarms does not change the results of the radiological release evaluation performed that concluded that potentially contaminated water is contained and smoke is monitored. The lack of water flow alarms does not add additional radiological materials to the areas or challenge system boundaries.

Safety Margin and Defense-in-Depth:

The methods, input parameters, and acceptance criteria used in this analysis were reviewed against those used for NFPA 805 Chapter 3 acceptance. The methods, input parameters, and acceptance criteria used to determine the adequacy of the fire suppression systems were not altered. The suppression systems will actuate when water is present and the lack of a water flow alarm will not impact the ability of the suppression system to perform its design objectives. Therefore, the safety margin inherent in the analysis of the fire event has been preserved.

The three echelons of defense-in-depth are 1) to prevent fires from starting (combustible/hot work controls), 2) rapidly detect, control and extinguish fires that do occur thereby limiting damage (fire detection systems, automatic fire suppression, manual fire suppression, pre-fire plans), and 3) to provide adequate level of fire protection for systems and structures so that a fire will not prevent essential safety functions from being performed (fire barriers, fire rated cable, success path remains free of fire damage, recovery actions). The manual suppression systems will actuate when the containment isolation valve is open. The lack of water flow alarms does not impact fire protection defense-in-depth and does not result in compromising automatic fire suppression functions, manual fire suppression functions, or post-fire safe shutdown capability. Since both the automatic and manual fire suppression functions are maintained, defense-in-depth is maintained.

Conclusion:

NRC approval is requested for the lack of a water flow alarm on the manual water based suppression systems.

The engineering analysis performed determined that the performance-based approach utilized to evaluate a variance from the requirements of NFPA 805 Chapter 3:

(A) Satisfies the performance goals, performance objectives, and performance criteria specified in NFPA 805 related to nuclear safety and radiological release;
(B) Maintains safety margins; and
(C) Maintains fire protection defense-in-depth (fire prevention, fire detection, fire suppression, mitigation, and post-fire safe shutdown capability).

A revision to LAR Section 4.1.2.3, Attachment A, and Attachment L for this item is planned to be submitted with the 120 day RAI responses that will include this clarification.

Enclosure 2

Revised Transition Report Pages

Duke Energy Carolinas, LLC
Catawba Nuclear Station

Transition to 10 CFR 50.48(c) - NFPA 805
Performance-Based Standard for Fire Protection for Light Water Reactor Electric Generating Plants, 2001 Edition

Transition Report
Revision 7

July 2016

Approval Request 5

NFPA 805 Section 3.9.2

NFPA 805, Section 3.9.2 states:

"Each system shall be equipped with a water flow alarm."

At CNS the automatic water-based suppression systems are provided with water flow alarms. Certain manual water-based suppression systems are not provided with water flow alarms. The manual suppression systems without water flow alarms are those which are located in containment. The manual sprinkler systems are provided for the reactor coolant pumps, the lower containment filters (carbon beds), and the reactor building pipe corridors. These systems require opening of the containment isolation valve in order for water to reach the system and therefore are considered manual suppression systems.

The containment isolation valve is opened if there is indication that there may be fire. Each system is equipped with closed head fusible link sprinklers. Each system also has an independent detection system in the area consisting of either line-type heat, photo-electric smoke, or rate-of-rise devices. Indication of suppression system actuation would be visual confirmation based on operator response to a detection alarm, personnel in the area observing system operation, or abnormal fire pump/jockey pump operation.

Due to the limited times the containment isolation valve is open, inadvertent actuation without water flow alarm indication is not a concern.

Basis for Request:

The basis for the approval request of this deviation is:

- The control room authorizes opening of the containment isolation valve.
- The suppression systems will only operate after an operator opens the containment isolation valve.
- Each area protected by the manual water-based suppression systems are also protected by automatic detection systems.
- Multiple alternative means of indication of suppression system operation are available.

Nuclear Safety and Radiological Release Performance Criteria:

The lack of water flow alarms does not affect nuclear safety. The manual suppression systems are normally isolated. The Fire PRA and the Fire Risk Evaluations have evaluated the reactor building fire areas and do not credit the manual suppression systems for risk reduction or for defense-in-depth. The suppression systems will only operate after the containment isolation valve is opened. If a fire were to occur there are multiple means of indication that the suppression system has actuated. Therefore there is no impact on the nuclear safety performance criteria.

The radiological review was performed based on the potential location of radiological concerns and is not dependent on water flow alarms in fire protection suppression

Enclosure 3

PRA RAI 24 Response

Probabilistic Risk Assessment (PRA) Request for Additional Information (RAI) 24

In its letter dated June 15, 2016, the licensee stated that "a gap was identified in the NFPA 805 safe shutdown analysis related to the reactor coolant pump seals and the time available to start the Standby Shutdown Facility's (SSF) standby make-up pump (SMUP)." The NRC staff's understanding of the licensee's PRA is that the SSF is an important contributor to keeping the risk from fires low, and that RCP seal LOCAs are an important contributor to fire risk. Because of the potential importance of the scenarios, the NRC staff requires additional information to determine whether the risk results following the RCP analysis update will remain acceptable or whether additional modifications or evaluations are needed. Please provide the following:

- Summarize the PRA models in which the time available to start the SSF SMUP are used.
- Describe the changes to the PRA input values that may occur when the time available will change.
- Provide the risk results (total CDF, total LERF, change-in-risk associated with transition to NFPA-805) of a sensitivity study based on a reasonable bounding estimate of the change in the time available.
- If the risk results indicate that the risk acceptance guidelines would be exceeded after the RCP analysis update, describe what actions can be taken to bring the risk results below the acceptance guidelines.

Duke Energy Response:

The Catawba Fire PRA uses the Westinghouse Owners' Group (WOG) 2000 Reactor Coolant Pump Seal LOCA model to determine the probability of a potential seal LOCA following an event. A time available of 13 minutes is used to calculate the human error probability (HEP) associated with starting the SSF SMUP. CNS is currently pursuing an analysis to address the gap related to the reactor coolant pump seals and the time available to start the SSF SMUP. It is expected that the new analysis will indicate that the time available for the action to start the SSF SMUP on a loss of all seal cooling will be at least the same or exceed the time currently used for this action's HEP. The new analysis is expected to show a time available of 20 to 30 minutes based on analysis for a similar plant.

The timing results of this analysis will be compared to the assumptions in the Fire PRA to confirm that the HEP is still representative of or bounds the as-built as operated plant. If the time available, based on the current analysis, does not bound the results of the updated analysis, the requested sensitivity and evaluation of impact on the risk acceptance guidelines will be provided via update to the RAI – 03 response.