DUKE ENERGY®

Tom Simril
Vice President
Catawba Nuclear Station

Duke Energy
CN01VP | 4800 Concord Road
York, SC 29745

o: 803.701.3340
f: 803.701.3221
tom.simril@duke-energy.com

RA-18-0169

10 CFR 50.90

September 20, 2018

ATTN: Document Control Desk
U.S. Nuclear Regulatory Commission
Washington, DC 20555-0001

Subject: Duke Energy Carolinas, LLC (Duke Energy)
Catawba Nuclear Station (CNS), Units 1 and 2
Facility Operating License Numbers NPF-35 and NPF-52
Docket Numbers 50-413 and 50-414
Supplement to License Amendment Request to Revise Technical Specification Section 3.7.8, "Nuclear Service Water System"

References:

1. Letter from Duke Energy to the NRC dated September 14, 2017, ADAMS Accession No. ML17261B255
2. Email from the NRC to Duke Energy dated July 17, 2018, ADAMS Accession No. ML18198A195
3. Letter from Duke Energy to the NRC dated August 17, 2018, ADAMS Accession No. ML18232A245
4. Email from the NRC to Duke Energy dated September 6, 2018

The Reference 1 letter was submitted for the Catawba Nuclear Station (CNS), Units 1 and 2, Facility Operating License Numbers NPF-35 and NPF-52, Docket Numbers 50-413 and 50-414, License Amendment Request (LAR) to Revise Technical Specification Section 3.7.8, "Nuclear Service Water System." The Reference 2 email transmitted Probablistic Risk Assessment (PRA) Requests for Additional Information (RAIs) from the NRC associated with the subject matter LAR. The Reference 3 letter transmitted PRA RAI Responses to the NRC. The Reference 4 email requested clarification for RAI responses.

The Nuclear Regulatory Commission (NRC) staff reviewed the application and responses to the request for information and concluded that additional information is necessary to enable the NRC staff to make an independent assessment regarding the acceptability of the proposed amendment. By email dated September 6, 2018 (Reference 4), the clarification was requested. The Duke Energy revised response to RAI-11 is provided in the Enclosure to this letter. The response for RAI-15 for recovery action WRNFLDVDHE does not require revising.

A001
NRR

The proposed change has been evaluated in accordance with 10 CFR 50.91(a)(1) using criteria in 10 CFR 50.92(c), and it has been determined that the significant hazards consideration analysis provided in the original submittal is not altered by the additional information provided.

There are no regulatory commitments contained in this letter or the enclosure.

In accordance with 10 CFR 50.91, Duke Energy is notifying the State of South Carolina of this request by transmitting a copy of this letter and enclosure to the designated State Official.

Please direct questions on this matter to Carrie L. Wilson, Sr. Engineer, at (803) 701-3014.

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

Executed on September 20, 2018.

Sincerely,

Tom Simril
Vice President, Catawba Nuclear Station

Enclosure: License Amendment Request Supplemental Information

xc (with enclosure):

C. Haney, Region II Administrator
U.S. Nuclear Regulatory Commission
Marquis One Tower
245 Peachtree Center Avenue NE, Suite 1200
Atlanta, GA 30303-1257

J. D. Austin, Senior Resident Inspector
U.S. Nuclear Regulatory Commission
Catawba Nuclear Station

M. Mahoney, Project Manager
U.S. Nuclear Regulatory Commission
11555 Rockville Pike
Mailstop O-8B1A
Rockville, MD 20852

L.D. Garner, Manager
S.C. DEHEC
Radioactive & Infectious Waste Management
garnerld@dhec.sc.gov

Enclosure

License Amendment Request Supplemental Information

SUPPLEMENT TO LICENSE AMENDMENT REQUEST TO ADD NEW CONDITION TO

TECHNICAL SPECIFICATION 3.7.8, "NUCLEAR SERVICE WATER SYSTEM"

DUKE ENERGY CAROLINAS, LLC

CATAWBA NUCLEAR STATION (CNS), UNITS 1 AND 2

DOCKET NUMBERS 50-413 AND 50-414

Request for Additional Information RAI-11 - Clarification Question

The response to RAI 11 (Reasonableness of Human Error Probabilities for Operator Actions), dated August 17, 2018, states that two new recovery actions (i.e., WRNFLDVDHE, WRNLKWYDHE) were developed and credited in the fire probabilistic risk assessment (PRA) supporting the Catawba Nuclear Service Water System (NSWS) license amendment request (LAR) dated September 14, 2017.

Associated with recovery action WRNFLDVDHE ("Operator Fails to Address Flow Diversion"), the response states:

> "During the SNSWP [Standby Nuclear Service Water Pond] return header alignment, if a fire event causes valve 1RN57A (normally-closed isolation valve) to transfer position, flow will be diverted away from the operating SNSWP return line and discharge through open manways in the isolated (non-operating) return line. The spurious opening of 1RN57A coupled with normally-open isolation valve 1RN843B during this alignment can lead to draining of the SNSWP."

It is not clear how a fire event causing valve 1RN57A to transfer open would divert flow through the open manways in the isolated return line. Based on LAR Figure 2-2, "Proposed Single Pond Return Header Operation for the NSWS," it seems the opening of this valve would divert NSWS flow to Lake Wylie. The staff notes that the human error probability for this recovery action is impacted by whether the flow diversion is through the manways in the isolated return line or through Lake Wylie.

Clarify recovery action WRNFLDVDHE, including a discussion of the specific operator actions and flow diversion path associated with this recovery action. As necessary, revise or update the response to RAI 11.a and RAI 15 for recovery action WRNFLDVDHE.

Duke Energy Response:

a. Two new operator actions were developed and credited in Fire PRA supporting the CNS Nuclear Service Water System Single Pond Return Header LAR:

- WRNFLDVDHE – Operator Fails to Address Flow Diversion
- WRNLKWYDHE – Operator Fails to Align Flow From Lake Wylie

No previously modeled recovery actions credited in the Fire PRA were modified in support of this LAR.

i. These operator actions were initially developed using a conservative screening value of 1.00E-02. A detailed analysis has since been performed for these HFEs utilizing guidance found in NUREG-1921 and the EPRI HRA Calculator tool. The development of each action is discussed below:

a) WRNFLDVDHE –

During the SNSWP return header alignment, if a fire event causes valve 1RN57A (normally-closed isolation valve) to transfer position, flow will be partially diverted away from the operating SNSWP return line and discharge back to Lake Wylie. Thus, the spurious opening of 1RN57A coupled with normally-open isolation valve 1RN843B during this alignment can lead to draining of the SNSWP.

Discussions with CNS engineers and Operations staff determined that operators would receive multiple alarms / indications on the Operator Aid Computer (OAC) that would inform them of SNSWP level decreasing. Based on discussions with Operations, the SNSWP Level will typically be around 573 - 574 ft. The SNSWP low level alarm set point is 572 ft. and the low-low level alarm set point 571.5 ft. (Minimum Tech. Spec. level is 571 ft.)

Assuming the SNSWP level is at 573.5 ft at the start of the event and using estimated pond volumes from CNS Engineering, it will take approximately 24.1 hours to reach 571 ft (2.5 ft decrease in pond level). Ops would receive a SNSWP low level alarm at 572 ft in 14.5 hrs. (1.5 ft decrease in pond level).

Thus, for HEP calculation purposes, the total time window available before the SNSWP reaches the minimum Tech. Spec. level is 24.1 hours and the operator cognitive time (when the low-level indication is received) is conservatively applied to be 14.5 hrs. Further, it is assumed it will take 20 minutes to reach the Auxiliary Building from the Control Room and 5 minutes to manipulate the valve, based on discussions with Ops.

Using CBDTM & THERP methodologies in the EPRI HRA Calculator tool, the HEP value is calculated to be 3.09E-04. (Note that using a full pond elevation of 574 ft. will not change this value.) As mentioned above, the modeling and feasibility of these actions were performed consistent with the guidance in NUREG-1921.

b) WRNLKWYDHE –

During the SNSWP return header alignment, if a fire event causes damage to the normally closed isolation valves on the return path to Lake Wylie, such that they spuriously open, this could result in flow being diverted to Lake Wylie and subsequently draining the SNWS Pond. Operators will have to manually close these valves.

Discussions with CNS engineers and Operations staff determined that operators would receive multiple alarms / indications on the Operator Aid Computer (OAC) that would inform them of SNSWP level decreasing. Based on discussions with Operations, the SNSWP Level will typically be around 573 - 574 ft. The SNSWP low level alarm set point is 572 ft. and the low-low, level alarm set point 571.5 ft. (Minimum Tech. Spec. level is 571 ft.)

Assuming the SNSWP level is at 573.5 ft at the start of the event, using estimated pond volumes from CNS Engineering, the volume of water between 573.5 ft and 571 ft is approximately 75 acre-ft (~24 million gal.)[1]. At a header discharge rate of 20300[2] gpm, it will take approximately 20 hours to reach 571 ft (2.5 ft decrease in pond level). Ops would receive a SNSWP low level alarm at 572 ft in 12 hrs. (1.5 ft decrease in pond level).

Thus, for HEP calculation purposes, the total time window available before the SNSWP reaches the minimum Tech. Spec. level is 20 hours and the operator cognitive time (when the low level indication is received) is conservatively applied to be 12 hrs. Further, it is assumed it will take 20 minutes to reach the Auxiliary Building from the Control Room and 5 minutes to manipulate the valve, based on discussions with Ops.

Using CBDTM & THERP methodologies in the EPRI HRA Calculator tool, the HEP value is calculated to be 5.49E-03. (Note that using a full pond elevation of 574 ft. will not change this value.) As mentioned above, the modeling and feasibility of these actions were performed consistent with the guidance in NUREG-1921.

ii. N/A.

iii. The operator actions developed for this response are new to the plant in support of the LAR.

iv. There will be a license condition prior to implementing the 30-day CT for the NSWSP Single Return Header to address the following:

a) The plant engineering process will be utilized to develop new plant procedures and required training to support this alignment and new operator actions credited in the PRA.

b) HEPs for the two new operator actions developed in support of this LAR will be updated as needed to be consistent with the updated procedural guidance and training. Risk estimates will also be updated to include the updated HEPs.

c) After the HEPs are updated, it will be confirmed that the risk estimates associated with this LAR are within the acceptance guidelines of RG 1.177 and RG 1.174. If the risk estimates are not within the acceptance guidelines of RG 1.177 and RG 1.174, additional risk reduction measures will be taken as needed to ensure that the acceptance guidance are met.

[1] Based on volume and flow rate information provided in Duke calc. CNC-1223.24-00-0072, Rev. 1

The values for these HFEs have been updated in the aggregate cutsets associated with the RN Single Pond Header Alignment. See table below for new FPRA numbers.

Table 1 – Updated Fire PRA Results

Unit	Configuration	Old CDF	New CDF	Old LERF	New LERF
1	RN Single Pond Header Alignment (Aggregate Cutset)	3.88E-05	3.79E-05	4.02E-06	3.96E-06
2	RN Single Pond Header Alignment (Aggregate Cutset)	4.01E-05	3.91E-05	4.01E-06	3.95E-06

The response for RAI-15, as it pertains to recovery action WRNFLDVDHE, does not require revising since its calculated HEP value, noted on Enclosure Page 3, did not change.