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CNS-18-023

10 CFR 50.9

May 8, 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
Response to NRC Requests for Additional Information (RAIs)
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. Letter from the NRC to Duke Energy dated March 9, 2018, ADAMS
Accession No. ML18068A505

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 letter transmitted Requests for Additional Information (RAIs) from the NRC associated with the subject matter LAR.

The purpose of this letter is to formally respond to the RAI questions contained in the Reference 2 letter. The enclosure to this letter constitutes Duke Energy's response to the RAIs. The format of the enclosure is to re-state each RAI question, followed by its associated response. The attachment 1 to this letter contains the marked-up Technical Specification Pages and attachment 2 contains marked-up TS Bases insert pages.

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 or attachments.

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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 May 8, 2018

Sincerely,

A handwritten signature in black ink that reads "Tom Simril". The signature is written in a cursive style with a large, looping initial "T" and a distinct "S".

Tom Simril
Vice President, Catawba Nuclear Station

Enclosure: Response to NRC Requests for Additional Information (RAIs)

Attachment 1: Technical Specification Pages (Mark-up)

Attachment 2: Technical Specification Bases Pages (Mark-up, For Information Only)

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xc (with enclosure):

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Enclosure

Response to NRC Requests for Additional Information (RAIs)

RESPONSE TO NRC REQUESTS FOR ADDITIONAL INFORMATION (RAIS)
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

By letter dated September 14, 2017, (Agencywide Documents Access Management System (ADAMS) Accession No. ML17261B255), Duke Energy, (the licensee), submitted a License Amendment Request (LAR) to add a new condition to Technical Specification 3.7.8, "Nuclear Service Water System."

In order to complete its review, the U.S. Nuclear Regulatory Commission staff requests the following additional information.

RAI-01

The Code of Federal Regulations, 10 CFR 50.36(c)(2)(i) states that technical specification limiting conditions for operation (LCOs) are the lowest functional capability or performance levels of equipment required for safe operation of the plant. It further requires that when an LCO is not met the licensee shall shut down the reactor or follow any remedial action permitted by the technical specification until the condition can be met.

In other words, when an LCO cannot be met (the SSC is inoperable) then the CONDITION statement that reflects the inoperability is entered and the REQUIRED ACTION (remedial action) is taken within the required COMPLETION TIME until the condition is met. In the case of when Catawba's LCO 3.7.8 is not met, which requires "Two NSWS trains to be OPERABLE," (i.e., one NSWS train is inoperable) the appropriate CONDITION is entered. If a portion of an NSWS train is inoperable, then the train is inoperable. In the TS Bases markups for proposed CONDITION D to TS 3.7.8, (and in the Bases for existing CONDITION B), it is stated that, "...with the Pond return header that is taken out of service...each NSWS train is considered OPERABLE...While the NSWS is operating in the single Pond return header alignment, an NSWS train is considered OPERABLE during MODES 1, 2, 3, and 4 when:

- a. The associated train related NSWS pumps are OPERABLE; and
- b. The associated piping (except for the Pond return header that is taken out of service), valves, and instrumentation and controls required to perform the safety related function are OPERABLE."

It is believed by the NRC staff that there is no need to "consider a train OPERABLE," particularly when it is in fact not OPERABLE. It is not correct and is confusing. If the train is (considered) OPERABLE then it is not in a TS CONDITION of inoperability. This concept of

“Considering a train OPERABLE,” when it in fact is not, is used “to prevent cascading inoperability to NSWs cooled components that have a less than 30 day CT.” While it is logical that support systems would have shorter or identical COMPLETION TIMES than the supported systems, nowhere is it required that this is so. In fact, LCO 3.0.6 which precludes cascading to TS supported systems when entering a TS support system, as long as a loss of function does not exist, does not mention the COMPLETION TIMES of TS support systems versus those of the TS supported system. Since the proposed CONDITION D and corresponding extended CT, if approved, would be available only for a limited time and is supported by a PRA, a longer temporary extended CT for the support system (i.e. NSWs) as compared to the normal CT of the supported systems (i.e. EDG and CCW) can be justified and thus take advantage of the noncascading process of TS 3.0.6. The concept of “Considering a train OPERABLE,” is not reflected in LCO 3.7.8; and TS 3.7.8 functions correctly without this concept. If it is felt necessary to address the issue of not cascading, it can be addressed in the Bases and justified in the LAR.

Explain the concept of “Considering a train OPERABLE,” when it in fact is not operable, as it is described in the TS BASES markups (both the discussions for Conditions B and D).

Duke Energy Response:

The submittal for the NSWs Single Pond Return Header Operation specifies an LCO with required actions and a 30-day completion time of one NSWs Pond return header being inoperable. The submittal provides technical justification for the new condition to not consider the entire NSWs train being inoperable. The technical justification for the NSWs single Pond return header alignment demonstrates that the NSWs can meet all design flow requirements in response to all design basis accidents. The utilization of the single pond return header has been analyzed in the PRA risk based assessment with no significant increase in risk.

With the NSWs aligned with respect to TS 3.7.8 Condition D, a failure resulting in the inoperability of the operable NSWs Pond return header would render both trains of the NSWs inoperable with the station entering a dual unit shutdown due to entry into TS 3.0.3.

If a NSWs component becomes inoperable while in the proposed Condition D, the TS requires immediate entry into Condition A of the LCO which requires the inoperability to be resolved within 72 hours. If one or more NSWs components become inoperable with no NSWs Trains remaining operable, the TS requires entry into TS 3.0.3.

Routine testing, maintenance and plant operation activities occasionally renders a NSWs train supported system inoperable. With the NSWs operating while in the proposed TS 3.7.8 Condition D (return header inoperable), the loss of an opposite train supported system would result in the inoperability of that supported system with the associated support system of the train entered under Condition D being operable. If the proposed Condition D was worded such that the NSWs train was inoperable, as opposed to the return header, a support system inoperability would result in the entry of TS 3.0.3 due to the loss of the support system safety function. However, the NSWs Train in Condition D is fully capable of supporting these systems and a loss of safety function has not occurred.

The TS 3.7.8 bases define the required conditions for operability of the NSWs while aligned in the Single Pond Return header, TS 3.7.8 Condition D. In this alignment, the associated NSWs train is Operable with the out of service Pond return header inoperable. Similarly, in TS 3.7.8 Condition B, NSWs Single Supply Header Operation, the associated NSWs train is Operable with the out of service supply header inoperable. NSWs Single Supply Header Operation was approved by the NRC in July 2008 (Ref. ML081980769).

RAI-02

American Nuclear Society (ANS) 51.1, "Nuclear Safety Criteria for the Design of Stationary Pressurized Water Reactor Plants," which replaced ANSI 18.2, and SECY-77-439, "Single Failure Criterion," (ADAMS Accession ML060260236) both of which are referenced in NUREG-0800 Standard Review Plan Chapter 15.0, "Introduction-Transient and Accident Analysis," and ANSI/ANS-58.9, "Single Failure for Light Water Reactor Safety-Related Fluid Systems," each specify, "spurious action of a powered component originating within its actuation or control system shall be regarded as an active failure unless specific design features or operating restrictions preclude spurious action."

RG 1.177, "An Approach For Plant-Specific, Risk-Informed Decisionmaking: Technical Specifications," states that the licensee should consider whether potential compensatory measures could be taken to offset any negative impact from the proposed change.

The licensee stated in section 3.2.1.7 of the LAR:

As part of the requirements for entry into NSWs Single Pond Return Header Operation, the NSWs will be pre-aligned to the SNSWP. This configuration removes the possibility of an active failure that could prevent one of the NSWs pump pits from being aligned to the SNSWP. This therefore prevents the complete loss of one pit on a single active failure. The next most limiting active failure would be failure of an EDG to start which would include loss of the associated NSWs Pump.

However, spurious opening or closing of a motor operated valve is considered an active failure. Therefore, the spurious closing of either 1RN3A or 1RN4B is a possible active failure.

What actions are necessary to either prevent a spurious closing of 1RN3A or 1RN4B or satisfactorily bring both units to safe shutdown after a DBA and a spurious closing of 1RN3A or 1RN4B when in the Single Pond Return header lineup?

Duke Energy Response:

The spurious operation, or closing, of 1RN3A or 1RN4B will be prevented by opening each valve during the alignment of the NSWs to the SNSWP and removing power from the valve's motor operator. This action will eliminate the most restrictive single active failure, the complete loss of one train of the NSWs due to loss of suction supply.

RAI-03

Catawba's Final Updated Safety Analysis Report (UFSAR), Section 9.3.4.2.3.1, "Charging Pumps": In order to improve the total core damage frequency, backup cooling was provided to Centrifugal Charging Pump (CCP) 1A per NSM CN-11389/00 and 2A per NSM CN-21389/00. The Probabilistic Risk Assessment (PRA) for Catawba Nuclear Station that a "Loss of KC" event and a "Loss of RN" event are significant contributors to an NC pump seal LOCA.....The backup cooling water to CCP 1A (2A) is supplied by a non-safety-related four inch YD System Header in the Auxiliary Building on the 543' - 00" Elevation.

Postulated flow blockage as shown on Figures 3-3 and 3-6 where flow is blocked to the only available RN Return Header show scenarios where there is a total loss of NSWS until the NSWS is realigned to discharge to Lake Wylie.

Do the recovery actions stated on Figures 3-3 and 3-6 of the LAR provide cooling to reactor coolant system (NC) pump seals to prevent NC pump seal during Loss of Coolant Accident (LOCA)? Explain.

Duke Energy Response:

The Reactor Coolant (NC) Pump seal flow is provided by the Chemical and Volume Control (NV) system. The NV system is subsequently cooled by the Component Cooling (KC) system which is, in turn, cooled by the Nuclear Service Water (RN) system.

In the scenario of flow blockage in the in-service RN discharge header to the Standby Nuclear Service Water Pond (SNSWP), as depicted in Figures 3-3 and 3-6, the one RN SNSWP discharge is isolated per the proposed LCO with the opposite train in service. The blockage of the in-service train discharge results in the loss of cooling water flow to the KC system heat exchangers and therefore, to the NV system resulting in a loss of NC pump seal cooling.

This condition will be evident to the Operators by immediately receiving a Control Room Annunciator alarms for RN Pump(s) Hi-Lo Flow, which will direct the Operator to the abnormal procedure AP/0/A/5500/020, Loss of Nuclear Service Water. The abnormal procedure will immediately direct Operators to establish a discharge flow path to Lake Wylie for the RN system by opening 1RN-843B or 1RN-57A, as appropriate. Opening the Lake Wylie isolation valve 1RN-843B or 1RN-57 reestablishes a RN flow path which allows for the cooling of the KC heat exchangers; thereby supplying cooling to the NV system and the NC pump seals.

In addition to the RN Pump flow annunciators, the RN flow blockage will eventually result in high temperature alarms on components supplied by the Component Cooling System, unless the RN discharge flow path is reestablished beforehand as described above. The high temperature alarms are entry condition for Operators into the abnormal procedure AP/0/A/5500/021, Loss of Component Cooling. This procedure has the actions necessary to align the Drinking Water System (YD) to a NV pump for NC Pump seal cooling, if required.

RAI-04

RG 1.177, "An Approach For Plant-Specific, Risk-Informed Decisionmaking: Technical Specifications," describes methods acceptable to the NRC staff for assessing the nature and impact of proposed TS changes by considering engineering issues and applying risk insights. Licensees submitting risk information (whether on their own initiative or at the request of the staff) should address each of the principles of risk-informed regulation discussed in this regulatory guide. Licensees should identify how chosen approaches and methods (whether they are quantitative or qualitative, traditional or probabilistic), data, and criteria for considering risk are appropriate for making the necessary decision.

The licensee states in Section 2.4 of the LAR: "This requested condition will be entered for preplanned maintenance and inspections only. It is anticipated that entry into the condition should not be required more often than once per year, per train."

The licensee used this information as described above in their PRA quantitative analysis, yet the LAR does not limit the amount of time per 12-month period when the licensee can enter the proposed condition.

The licensee is requested to provide additional information that limits entry into this condition to 60 days per 12-month period.

Duke Energy Response:

An additional note will be added to the notes within Condition D of TS 3.7.8 specifying the time limitation of 60 days per 12-month period such that the agreement between the new Condition and the PRA analysis is clear. The TS 3.7.8 Bases will also be revised to include the fourth note. See attached marked-up TS pages.

Attachment 1

Technical Specification Pages

(Mark-up)

ACTIONS (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
<p>D. -----NOTES-----</p> <ol style="list-style-type: none"> 1. Entry into this Condition shall only be allowed for pre-planned activities as described in the Bases of this Specification 2. Immediately enter Condition A of this LCO if one or more NSWS components become inoperable while in this Condition and one NSWS train remains OPERABLE. 3. Immediately enter LCO 3.0.3 if one or more NSWS components become inoperable while in this Condition and no NSWS train remains OPERABLE. 4. Entry into this Condition shall only be allowed for 60 days per 12-month period. <p>-----</p> <p>One NSWS Pond return header inoperable due to NSWS being aligned for single Pond return header operation.</p>	<p>D.1 Restore NSWS Pond return header to OPERABLE status.</p>	<p>30 days</p>

(continued)

Attachment 2

Technical Specification Bases Pages

(Mark-up, For Information Only)

INSERT 1 FOR TS 3.7.8 BASES

D.1

While the NSWS is operating in the single Pond return header alignment, one of the shared discharge headers from the Aux Bldg to the SNSWP is removed from service in support of planned maintenance or modification activities associated with the Pond return header that is taken out of service. In this configuration, each NSWS train is considered OPERABLE with the required NSWS flow path from safety related equipment through the remaining OPERABLE NSWS Pond return header. The technical justification for the NSWS single Pond return header alignment demonstrates that the NSWS can meet all design flow requirements in response to all design basis accidents. The utilization of the single pond return header has been analyzed in the PRA risk based assessment with no significant increase in risk. While the NSWS is operating in the single Pond return header alignment, an NSWS train is considered OPERABLE during MODES 1, 2, 3, and 4 when:

- a. The associated train related NSWS pumps are OPERABLE; and
- b. The associated piping (except for the Pond return header that is taken out of service), valves, and instrumentation and controls required to perform the safety related function are OPERABLE.

When in the single Pond return header alignment with the NSWS Train A Pond return header inoperable, the NSWS piping downstream of valves 1RN63A and 1(2)RN846A is isolated. Valve 1RNP20 is locked open, 1RN58B is open with power removed, and 1(2)RN848B are open with power removed to protect against closing that would isolate the discharge flow from both trains.

Similarly, when in the single Pond return header alignment with the NSWS Train B Pond return header inoperable, the NSWS piping downstream of valves 1RN58B and 1(2)RN849B is isolated. In this case valve 1RNP19 is locked open, 1RN63A is open with power removed, and 1(2)RN846A are open with power removed to protect against closing that would isolate the discharge flow from both trains.

When in the single Pond return header alignment the RN System is aligned to the SNSWP, with power removed from pit isolation valves 1RN3A and 1RN4B, to preclude a single active failure that could result in the complete loss of one RN pit (two RN pumps). Aux Bldg discharge crossover piping valves 1RN53B and 1RN54A are open with power removed to allow both Aux Bldg trains to discharge through one header. Similarly, Unit 1 and Unit 2 D/G crossover valves 1(2)RNP08 and 1(2)RNP09 are locked open to allow both trains of D/Gs to discharge through one header one each unit. Finally, both Unit 1 and Unit 2 RN non-essential headers are isolated.

Operation of the NSWS in the single Pond return header alignment while in either the single supply header alignment or the single Auxiliary Building discharge header alignment at the same time is prohibited.

If one NSWS Pond return header is inoperable due to the NSWS being aligned for single Pond return header operation, the NSWS Pond return header must be restored to OPERABLE status within 30 days. The Completion Time of 30 days is supported by probabilistic risk analysis. While in Condition D, the single Pond return header alignment is adequate to perform the heat removal function for all required safety related equipment for both safety trains of both units. Due to the shared nature of the NSWS, both units are required to enter this Condition when the NSWS is aligned for single Pond return header operation. In order to ensure adequate flow to essential components, the single NSWS pump flow balance alignment is prohibited while the NSWS is aligned for single Pond return header operation.

Condition D is modified by four Notes. Note 1 states that entry into this Condition shall only be allowed for pre-planned activities as described in the Bases of this Specification. Condition D is only allowed to be entered in support of planned maintenance or modification activities associated with the Pond return header that is taken out of service. An example of a situation for which entry into this Condition is allowed is refurbishment or inspection of a Pond return header. Entry into this Condition is not allowed in response to unplanned events or for other events involving the NSWS. Examples of situations for which entry into this Condition is prohibited are emergent repair of discovered piping leaks and other component failures. For unplanned events or other events involving the NSWS, Condition A must be entered. Note 2 requires immediate entry into Condition A of this LCO if one or more NSWS components become inoperable while in this Condition and one NSWS train remains OPERABLE. With one remaining OPERABLE NSWS train, the NSWS can still perform its safety related function. However, with one inoperable NSWS train, the NSWS cannot be assured of performing its safety related function in the event of a single failure of another NSWS component. While the loss of any NSWS component subject to the requirements of this LCO can result in the entry into Condition A, the most common example is the inoperability of an NSWS pump. This occurs during periodic testing of the emergency diesel generators. Inoperability of an emergency diesel generator renders its associated NSWS pump inoperable. Note 3 requires immediate entry into LCO 3.0.3 if one or more NSWS components become inoperable while in this Condition and no NSWS train remains OPERABLE. In this case, the NSWS cannot perform its safety related function. Note 4 states that entry into this Condition shall only be allowed for 60 days per 12-month period. This limitation of entry into this Condition is in agreement with inputs to the PRA quantitative analysis for the NSWS alignment supporting operation in this Condition.