NRR-DRMAPEm Resource

From: Klett, Audrey
Sent: Friday, June 28, 2019 3:00 PM
To: Zaremba, Arthur H.
Subject: NRC Request for Additional Information for Oconee LAR 2018-02 (L-2018-LLA-0251)
Attachments: L-2018-LLA-0251 - LAR2018-02 - Oconee RAIs.docx

Hi Art,
Attached is the RAI for Oconee LAR 2018-02. NRC is requesting a due date of 30 days from today. Please call me if you have any questions.

-Audrey

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REQUEST FOR ADDITIONAL INFORMATION
BY THE OFFICE OF NUCLEAR REACTOR REGULATION
LICENSE AMENDMENT REQUEST 2018-02
DUKE ENERGY CAROLINAS, LLC
OCONEE NUCLEAR STATION, UNITS 1, 2, AND 3
DOCKET NOS. 50-269, 50-270, and 50-287

By letter RA-18-0026 dated September 14, 2018, (Agencywide Documents Access and Management System (ADAMS) Accession No. ML18264A023), as supplemented by letter RA-19-0086 dated January 24, 2019 (ADAMS Accession No. ML19036A625), Duke Energy Carolinas, LLC (the licensee) applied for license amendments to Renewed Facility Operating Licenses DPR-38, DPR-47, and DPR-55, for the Oconee Nuclear Station, Units 1, 2, and 3 (Oconee), respectively. The licensee requested that the Updated Final Safety Analysis Report (UFSAR) be revised regarding the tornado licensing basis to allow the Standby Shutdown Facility (SSF) to mitigate a tornado with the assumed initial conditions of loss of all alternating current power to all units with significant tornado damage to one unit, the use of tornado missile probabilistic methodology, and the elimination of the spent fuel pool to high pressure injection flow path for reactor coolant makeup.

On February 11, 2019, the U.S. Nuclear Regulatory Commission (NRC or the Commission) staff began an audit to support its review of the amendment request, as discussed in the NRC staff's audit plan dated February 8, 2019 (ADAMS Accession No. ML19037A005). Based on its review of the application and its audit, the NRC staff determined that it needs responses to the following requests for additional information (RAIs) to complete its review. As discussed via email with Mr. Arthur Zaremba of the licensee's staff on June 27, 2019, the NRC staff requests the licensee to respond to the RAIs within 30 days. Changes to the draft RAIs based on the clarification call on June 10, 2019, are shown in "tracked changes."

RAI 1 (STSB)

Regarding Section 3.8 of the application dated September 14, 2018 (i.e., the license amendment request (LAR)), the NRC staff requests the licensee to provide a discussion of the meaning of "Passive Civil Features" with respect to the Oconee licensing basis and Technical Specification operability.

RAI 2 (STSB)

Section 3.8 of the LAR states, "Because a tornado is a design criterion and does not constitute a design basis accident or transient as described in 10 CFR 50.36(c)(2)(ii), degradation of passive civil features protecting the SSF will not apply to operability under TS LCO 3.10.1, 'Standby Shutdown Facility.'" The SSF satisfies criterion 4 of 10 CFR 50.36(c)(2)(ii), which is not related to design basis accidents or transients. Criterion 4 is for SSCs which operating experience or probabilistic risk assessment has shown to be significant to public health and safety. The NRC staff requests the licensee to provide a more substantial discussion and justification for why degradation of passive civil features protecting the SSF will not apply to operability under TS LCO 3.10.1, "Standby Shutdown Facility."

RAI 3 (APLB)

The LAR does not include references to official calculations that document support for the assumptions made in the success criteria for the TORMIS Boolean logic. These references need to be provided on the docket to support the decision of the safety evaluation and to provide traceability, auditability, and inspectability.

A. The NRC staff requests the licensee to provide a reference (i.e., title(s), revision number(s), and date(s)) for the official calculation (or calculations) that support the following statement from the LAR concerning the CCW surge lines [emphasis added]:

> The surge piping targets are evaluated for crushing or crimping failure that would prevent adequate vent flow. An evaluation showed that only 44% of the flow area of only one of the 24 inch pipe (one of two for success) is required to provide an adequate vent path.

B. The NRC staff requests the licensee to provide a reference (i.e., title(s), revision number(s), and date(s)) for the official calculation (or calculations) that support the following statement from the LAR concerning the Main Steam Relief Valves:

> The assumed success criteria for the MSRVs for tornado mitigation is that one of two lowest pressure relief valves opens (either 1/2/3MS-8 on the 'A' Header or 1/2/3MS-16 on the 'B' Header), and that one relief valve (any one of eight) on the opposite header opens for overpressure protection.

RAI 4 (EMIB)

The application is crediting many conservatisms in the TORMIS modeling that offset the simplification and limitations of TORMIS computer code. One source of conservatism is the choice of worst case missiles (i.e., concrete block) to derive damage velocity values for the CCW surge lines. The application states:

> The finite element analysis supporting the damage velocity values for the CCW surge lines for concrete block, wood plank, and metal siding missiles are based on missile impacts at the worst-case location and at the worst-case angle of incidence. This combination represents only a small fraction of the potential missile interactions and is very conservative for estimating the frequency of damage to the CCW surge lines.

According to OSC-11760, "FINITE ELEMENT ANALYSIS [FEA] OF ONS CCW SURGE PIPES," the concrete block missile is modeled with smooth particle hydrodynamics (SPH) as oppose to finite elements. However, the distance chosen between particles can affect the failure property of the aggregate structure hence the actual energy delivered to the target and the subsequent deformation. The NRC staff requests the licensee to explain the basis for how the particle distances are chosen and benchmarked.

RAI 5 (EMIB)

The defined missile types in the current licensing basis, as defined in UFSAR Table 9-17, includes a utility pole, which is usually the most conservative in terms of damage. Section 5.3 of the LAR does state the dominant missile types striking safety targets are wood plank and metal

siding types; however, the NRC staff notes that the wood plank may not bound a utility pole. While the TORMIS analysis contains defined missile types of about 23 missiles, the FEA analysis for OSC-11760 includes site-specific missiles (i.e., concrete block and aluminum siding). The NRC staff requests the licensee to justify why the dominant missiles do not bound the utility pole and explain the justification for the missile set chosen for the FEA.

RAI 6 (SRXB)

The LAR requests "Approval for elimination of the Spent Fuel Pool (SFP) to High Pressure Injection (HPI) flow path for Reactor Coolant Makeup (RCMU)," which implies that the flow path will be physically removed. The technical justification for this change in Section 3.7, "Elimination of SFP Suction for HPI," of the Enclosure to the LAR, could also be read that the line is being physically removed as it is no longer necessary. However, in Section 4.3, "No Significant Hazards Consideration," of the Enclosure to the LAR, it states, "The spent fuel pool suction path to the HPI system currently described in UFSAR Section 3.2.2 is being deleted from the licensing basis. The existing piping configuration that connects the spent fuel pool suction path to the HPI system will remain, but will no longer be credited." The NRC staff requests the licensee confirm that this request is specifically to eliminate the flow path from the tornado licensing basis and not to make any changes to the plant itself. If this is not the case, then the NRC staff requests the licensee provide information on when this flow path is currently used and if it is credited in any analysis.

RAI 7 (SRXB)

Page 21 of the Enclosure to the LAR states that the tornado initial conditions are defined for the unit(s) as MODE 1, 102% rated thermal power at end of core life (690 effective full-power days). Given that this initial condition may not be bounding, the NRC staff requests the licensee to provide justification for assuming a single initial condition and no consideration of other initial conditions (i.e., low power/low decay heat) which could be more limiting for overcooling events.

RAI 8 (SRXB)

Page 20 of the Enclosure to the LAR states, "The ONS RELAP5/MOD2-B&W model and analysis methods are described in Duke Energy's NRC approved methodology report DPC-NE-3003-PA (Reference 15) and have been modified, as described in Attachment 5, to include additional detail and features required to perform these analyses." On page 2 of the March 15, 1995 SE in Reference 15, it states, "RELAP5/MOD2-B&W has been reviewed by the NRC staff and is the subject of a safety evaluation (Ref.: Letter from A. Thadani to J. Taylor, dated April 18, 1990). The NRC staff found the code acceptable for use, subject to specified limitations, for calculation of transient response for reload analyses of large and small break LOCAs and operational transients *for plants having recirculating steam generators. The NRC staff is currently evaluating its use, for those purposes, for once-through steam generator (OTSG) plants* [emphasis added]."

Given that the approved methodology report is for use in the Oconee Updated Final Safety Analysis Report (UFSAR) Chapter 6 Loss of Coolant Accident (LOCA) mass and energy release analyses, the NRC staff requests the licensee to provide details on the approval of the RELAP5/MOD2-B&W code for use in analyzing overcooling (main steam line break) and overheating (loss of feedwater) transients. If the code has not been approved for use for these transients, provide justification for its use. In addition, the NRC staff requests the licensee

describe any limitations and conditions as well as how they are met for use of the code for the selected transients.

LAR Reference 15: Duke Energy Methodology Report DPC-NE-3003-PA, Revision 1, "Mass and Energy Release and Containment Response Methodology," dated September 2004 (Safety Evaluations dated March 15, 1995; September 24, 2003, ADAMS Accession No. ML050320034)

RAI 9 (SRXB)

Page 17 of the Enclosure to the LAR describes revisions to the SSF Tornado Design Criteria in UFSAR, Section 9.6.2, and lists the following five criteria to ensure that the integrity of the core and RCS remains unchallenged:

- The core must remain intact and in a coolable core geometry during the credited strategy period.
- RCS must not exceed 2750 psig (110% of design).
- Minimum Departure from Nucleate Boiling Ratio (DNBR) meets specified acceptable fuel design limits.
- Steam Generator tubes remain intact.
- RCS remains within acceptable pressure and temperature limits.

Page 21 of the Enclosure to the LAR states, "In addition to the criteria specified above, the following criteria are validated for the overcooling analysis to demonstrate acceptable results:

- The steam generator tubes remain intact.
- RCS remains within acceptable pressure and temperature limits."

The above implies that these last two criteria are examined only for the overcooling analysis and not the overheating analysis. The NRC staff requests the licensee clarify whether the last two criteria are validated for the overheating analysis. If they are not, then the NRC staff requests the licensee to also justify why it used different criteria between the two analyses (overheating and overcooling) and why this distinction is not made clear in the proposed revisions to the UFSAR section.

RAI 10 (SRXB)

Chapter 9.6.1 of the Oconee UFSAR states that the SSF is designed to:

1. Maintain a minimum water level above the reactor core, with an intact Reactor Coolant System, and maintain Reactor Coolant Pump Seal cooling.
2. Assure natural circulation and core cooling by maintaining the primary coolant system filled to a sufficient level in the pressurizer while maintaining sufficient secondary side cooling water.
3. Transfer decay heat from the fuel to an ultimate heat sink.
4. Maintain the reactor 1% shutdown with the most reactive rod stuck fully withdrawn, after all normal sources of RCS makeup have become unavailable, by providing makeup via the Reactor Coolant Makeup Pump System which always supplies makeup of a sufficient boron concentration.

The above criteria are different than the acceptance criteria given on Page 17 of the Enclosure to the LAR. The NRC staff requests the licensee clarify whether the current UFSAR SSF criteria are applicable and met by the existing analysis described in the LAR. If the current criteria are not applicable to tornado events, then the NRC staff requests the licensee to also justify why these criteria are no longer needed.

RAI 11 (SRXB)

Page 6 of Attachment 6 to the LAR states, "The steam line ADVs [Atmospheric Dump Valves] (or other steam flow paths) are included in the overcooling analysis for examining long term recovery actions for single MSLB cases, and are not credited in the mitigation phase of the analysis."

Previously (in 2008) one of the licensee commitments was to protect the ADVs from tornado, but the commitment was withdrawn. LAR reference No. 41 (i.e., Letter to the U.S. Nuclear Regulatory Commission from Thomas D. Ray, Vice President, Oconee Nuclear Station, Duke Energy Carolinas, LLC, "Revision to Tornado/HELB Mitigation Strategies and Regulatory Commitments," dated November 15, 2017" (ML17333A120)) clarifies the Duke Energy decision to not install MSIVs nor tornado protect the ADVs. In addition, the ADVs are not included in the TORMIS analysis to justify probabilistically. The NRC staff requests the licensee to justify use of the ADVs in the analysis given they are not protected from tornado or considered in the TORMIS analysis.

RAI 12 (SRXB)

Page 4 of Attachment 7 to the LAR states that the goal of the operator guidance assumed in the analysis is to stabilize the plant by maintaining RCS temperature between 325°F - 350°F and pressure between 650 psig - 700 psig. The NRC staff requests the licensee to confirm if this can be accomplished without the use of the ADVs, as they are unprotected and may be damaged in the tornado (see RAI-11 above). If these conditions cannot be met without use of the ADVs, then the NRC staff requests the licensee to also explain how the RCS would respond, what conditions would be achieved, and how the acceptance criteria are still met.

RAI 13 (SCPB)

The licensee's LAR summary describes the future use of TORMIS. The licensee notes that modifications are being performed under 10 CFR 50.59 and that their approval is not a part of this LAR. The licensee credits some plant modifications to be physically protected or evaluated in the TORMIS model. The licensee appears to have proposed allowing the option to evaluate the future plant modifications in the TORMIS model. However, the TORMIS methodology is only to be used on existing plant structures' and components' nonconformances. RIS 2008-14 states, "TORMIS acceptance criteria are based on the cumulative effects of tornado missile damage to all safety-related SSCs that are not provided positive protection. Therefore, when using TORMIS to address any additional tornado missile vulnerabilities that are identified in the future, the analysis should include those SSCs that were previously analyzed."

The TORMIS safety evaluation report (SER) (i.e., Letter from L. S. Rubenstein (U. S. NRC) to F. J. Miraglis (U. S. NRC), "Safety Evaluation Report – Electric Power Research Institute (EPRI) Topical Reports Concerning Tornado Missile Probabilistic Risk Assessment (PRA) Methodology," dated October 26, 1983, ADAMS Accession No. ML080870291) stated that the

use of TORMIS should be limited to the evaluation of specific plant features where additional costly tornado missile protective barriers or alternative systems are under consideration.

Therefore, to evaluate whether the use of TORMIS will be consistent with the position that was stated in the TORMIS SER, the NRC staff requests the licensee to:

(1) confirm that TORMIS will not be used to temporarily or permanently eliminate existing barriers that are credited for providing tornado missile protection,

(2) confirm that the use of TORMIS will be limited to demonstrating adequate protection for existing SSCs that were originally required to be protected from tornado missiles in accordance with the plant design basis due to some oversight, are not adequately protected,

(3) describe how the cumulative effects of newly found non-conforming SSCs will be incorporated into TORMIS, and

(4) provide draft updates to the UFSAR based on these responses.

RAI 14 (SCPB)

In the NRC staff's TORMIS SER dated October 26, 1983 (ADAMS Accession No. ML080870281), Section III, "Conclusion," states, "Further, use of the EPRI PRAs or any tornado missile probabilistic study should be limited to the evaluation of specific plant features where additional costly tornado missile protective barriers or alternative systems are under consideration." RIS 2008-14 identifies issues raised by NRC staff during reviews of TORMIS applications, including that licensees did not fully address the fifth point identified in the SER nor explain how the methodology was implemented when the parameters used differed from those specified in the TORMIS methodology (e.g., inappropriately limiting the number of targets modeled).

In its application, the licensee provided a list of the revised tornado licensing basis and committed modifications, which include:

1. LAR Item 2.5.1 references Commitment 18T identified in the Tornado/HELB Commitment letter submitted to the NRC on November 15, 2017.
2. LAR Item 2.5.2 references commitment 19T previously identified in the Tornado/HELB Commitment letter submitted to the NRG on November 15, 2017
3. LAR Item 2.5.4 indicates to provide missile protection for the outdoor SSF diesel fuel oil tank fill and vent lines to prevent shear/perforation of the piping and subsequent rain water intrusion into the underground tank.
4. LAR Item 2.5.5 and 2.5.6 indicates to credit new pulsation dampener and letdown line.
5. LAR Item 2.5.7 references new QA-1 instrumentation to provide.

Other commitments or noted changes discussed in the application include:

6. Various instrumentation is credited for tornado damage stabilization (Section 3.2 table), but LAR Attachment 1 commitments are not yet installed. The Table located in Section 3.2 of LAR contains a note stating, "Note this will be upgraded or newly installed instrumentation."

7. In response to RIS 2008-14 documented in LAR Attachment 4, Section 8.3, Item 3.c, "proposing plant modifications," the licensee clarified that TORMIS is not being used as a justification to modify plant features to reduce, eliminate, or otherwise engineer the design of existing or new tornado missile protection features. However, the licensee indicated that additional modifications will be implemented that could impact the TORMIS analysis and results further when it stated, "Duke is enhancing the SSF capabilities through modifications implemented by 10 CFR 50.59. The routing of those modifications has been or will be included in the TORMIS evaluation as required."

8. RIS 2008-14 provides a discussion for including limiting the number of targets modeled, as indicated in Attachment 1, "Regulatory Commitments" of the LAR. The licensee proposed to provide missile protection for the outdoor SSF diesel fuel oil tank fill and vent lines to prevent shear/perforation of the piping and subsequent rain water intrusion into the underground tank. The licensee has proposed to complete this within 3 years after issuance of the SER. Therefore, the tank and main tank capacity will remain unprotected until the commitment is completed.

While these proposed modifications are presented as commitments in the LAR, the NRC staff requests the licensee to clarify whether and how these commitments are credited or may impact TORMIS results for the NRC staff to decide whether to escalate the commitments to requirements (e.g., new license conditions). Additionally, the NRC staff requests the licensee to discuss whether and how any of these unprotected components will be required or credited for a plant shutdown.

RAI 15 (SCPB)

UFSAR Section 3.2.2, "Tornado," clearly requires ability to shut down all three units in the event of a tornado. The UFSAR states that the Reactor Coolant System will not be damaged by a tornado, a loss of Reactor Coolant Pump (RCP) seal integrity was not postulated as part of the tornado design basis, and capability is provided to shutdown safely all three units. The UFSAR further states, "Capability is provided to shutdown safely all three units," which was intended to be supported by a qualitative assessment that, after a tornado, normal shutdown systems will remain available, or alternate systems will be available to allow shutdown of the plant.

In its application, the licensee requests approval for crediting the Standby Shutdown Facility (SSF) as the assured mitigation path following a tornado with the assumed initial conditions of loss of all Alternating Current (AC) power to-all units with significant tornado damage to one unit.

A. The NRC staff requests the licensee to define "significant damage" and to clarify whether a damaged unit includes failure of all unprotected components on an affected unit, or a single worst case/bounding failure of exposed components on a damaged unit.

B. The NRC staff requests the licensee to describe any failure from a tornado event that might impact safe shutdown of all units. If one exists, the NRC staff requests the licensee to describe how it is analyzed.

C. The current licensing basis provides the option to credit other undamaged units for secondary makeup. The NRC staff requests the licensee to discuss whether any function or feature of the undamaged units would be credited to assist the degraded state of damaged unit for tornado mitigation recovery.

D. The NRC staff requests the licensee to discuss whether any systems shared between units are modeled in TORMIS and how an impact on multiple units is accounted for in TORMIS.

RAI 16 (SCPB)

The existing licensing basis defined in the UFSAR for tornado mitigation following a tornado provides redundancy, independence, and diversity with reliance on the combined capabilities of the tornado-protected station ASW system, EFW from the unaffected units, and the SSF ASW system. However, the proposed tornado mitigating strategy includes reliance on the use of SSF ASW alone, which degrades the level of defense-in-depth and subsequently increases risk. Additional risk results from the TSs allowing the SSF to be inoperable for 45 days.

The defense-in-depth philosophy has traditionally been applied in plant design and operation to provide multiple means to accomplish safety functions. System redundancy, independence, and diversity result in high availability and reliability of the function and also help ensure that system functions are not reliant on any single feature of the design. In the event of tornado, damage (ie.fallen trees, blocked access roads, etc…) could occur at the site resulting in limited ability for movement throughout the site. By relying only on a manually-operated SSF ASW system as the assured means of providing SSHR following a tornado, redundancy and diversity are lost. Eliminating the redundancy and diversity of the SSHR capability and RCMU makeup path provided under the existing licensing basis for tornado mitigation eliminates defenses-in-depth and increases risk related to achieving safe shutdown (SSD) following a damaging tornado. While the combination of physical protection and use of TORMIS to justify SSF meets the criteria for a fully protected system, additional information is needed to demonstrate that the planned use of the SSF alone is enough to overcome the loss of redundancy and diversity that would result from the proposed change.

The NRC staff requests the licensee to:

A. Discuss actions to retain tornado mitigation capability during the SSF 45-day inoperable periods of maintenance.

B. Discuss whether SSF is the only credited method to mitigate a tornado and shutdown all units. Discuss other protected systems or methods available to mitigate impacts of tornado.

C. Describe how defense-in-depth is maintained in the event of the SSF and related components being unavailable.

D. Describe post-72-hour actions and the long-term strategy.

RAI 17 (SCPB)

Section III, “Conclusion,” of the NRC staff’s SER dated October 26, 1983, ADAMS Accession No. ML080870291), appoving the TORMIS methodology states: “... Further, use of the EPRI PRAs or any tornado missile probabilistic study should be limited to the evaluation of specific plant features where additional costly tornado missile protective barriers or alternative systems are under consideration.” As discussed in RIS 2008-14, the NRC staff noted that licensees did not fully address the fifth point identified in the SER nor explain how the methodology was

implemented when the parameters used differed from those specified in the TORMIS methodology.

Section 3.1, “RCS T-H Analysis,” of the LAR states, “The Main Feedwater and Main Steam piping located outside containment are not protected from tornado missiles. Therefore, these piping systems may or may not remain intact following a tornado strike.”

Section 5.2 “Determination of Safety Targets,” of Attachment 4 of the LAR references the following components that are “Unprotected SSCs that if damaged could fail the SSF Mitigation Strategy”:

- Main Steam Relief Valves (MSRVs) - damage preventing adequate steam relief for SSDHR,
- Main Steam header in EPR - damage causing pipe rupture affecting SSF equipment in WPR, and
- Main Feedwater headers in EPA - damage causing pipe rupture affecting SSF equipment in WPR.

The NRC staff requests the licensee to discuss whether the complete portion of the exposed components on the main steam and feedwater systems referenced in Section 3.1 are included and analyzed in the TORMIS analysis.