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RA-22-0159 May 27, 2022

> 10 CFR 50.4 10 CFR Part 54

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

Subject: Duke Energy Carolinas, LLC (Duke Energy) Oconee Nuclear Station (ONS), Units 1, 2, and 3 Docket Numbers 50-269, 50-270, 50-287 Renewed License Numbers DPR-38, DPR-47, DPR-55 Subsequent License Renewal Application Response to ONS SLRA Request for Additional Information (RAI) 3.1.2-1

# References:

- 1. Duke Energy Letter (RA-21-0132) dated June 7, 2021, Application for Subsequent Renewed Operating Licenses, (ADAMS Accession Number ML21158A193)
- NRC Letter dated July 22, 2021, Oconee Nuclear Station, Units 1, 2, and 3 Determination of Acceptability and Sufficiency for Docketing, Proposed Review Schedule, and Opportunity for a Hearing Regarding Duke Energy Carolinas' Application for Subsequent License Renewal (ADAMS Accession Number ML21194A245)
- 3. NRC E-mail dated September 22, 2021, Oconee SLRA Request for Additional Information B2.1.27-1 (ADAMS Accession Number ML21271A586)
- Duke Energy Letter (RA-21-0281) dated October 22, 2021, Subsequent License Renewal Application, Response to Request for Additional Information B2.1.27-1 (ADAMS Accession Number ML21295A035)
- NRC E-mail dated November 23, 2021, Oconee SLRA Request for Additional Information Set 1 and Second Round Request for Additional Information RAI B2.1.27-1a (ADAMS Accession Number ML21327A277)
- Duke Energy Letter (RA-21-0332) dated January 7, 2022, Subsequent License Renewal Application Responses to NRC Request for Additional Information Set 1 and Second Round Request for Additional Information B2.1.27-1a (ADAMS Accession Number ML22010A129)
- NRC E-mail dated January 11, 2022, Oconee SLRA Request for Additional Information Set 2 (ADAMS Accession Numbers ML22012A043 and ML22012A042)
- Duke Energy Letter (RA-22-0036) dated February 14, 2022, Subsequent License Renewal Application Responses to NRC Request for Additional Information Set 2 (ADAMS Accession Number ML22045A021)
- 9. NRC E-mail dated January 18, 2022, Oconee SLRA Request for Additional Information Set 3 (ADAMS Accession Numbers ML22019A103 and ML22019A104)

- Duke Energy Letter (RA-22-0040) dated February 21, 2022, Subsequent License Renewal Application Responses to NRC Request for Additional Information Set 3 (ADAMS Accession Numbers ML22052A002)
- 11. NRC E-mail dated March 16, 2022, Oconee SLRA Request for Additional Information Set 4 (ADAMS Accession Numbers ML22080A077 and ML22080A079)
- 12. NRC E-mail dated March 21, 2022, Oconee SLRA 2<sup>nd</sup> Round RAI B4.1-3 (ADAMS Accession Numbers ML22080A077 and ML22080A079)
- 13. NRC E-mail dated March 29, 2022, Oconee SLRA 2<sup>nd</sup> Round RAI 4.6.1-1a (ADAMS Accession Number ML22091A091 and ML22091A092)
- 14. Duke Energy Letter (RA-22-0129) dated April 20, 2022, Subsequent License Renewal Application Responses to Oconee SLRA - 2nd Round RAI B4.1-3 (ADAMS Accession Number ML22110A207)
- 15. NRC E-mail dated April 20, 2022, Oconee SLRA Request for Additional Information 3.1.2-1 (ADAMS Accession Numbers ML22113A008 and ML22113A009)
- Duke Energy Letter (RA-22-0124) dated April 22, 2022, Subsequent License Renewal Application Responses to NRC Request for Additional Information Set 4 (ADAMS Accession Numbers ML22112A016)
- 17. Duke Energy Letter (RA-22-0137) dated May 20, 2022, Response to ONS SLRA Second Round RAI 4.6.1-1a (ADAMS Accession Number ML22140A016)

By letter dated June 7, 2021 (Reference 1), Duke Energy Carolinas, LLC (Duke Energy) submitted an application for the subsequent license renewal of Renewed Facility Operating License Numbers DPR-38, DPR-47, and DPR-55 for the Oconee Nuclear Station (ONS), Units 1, 2, and 3 to the U.S. Nuclear Regulatory Commission (NRC). On July 22, 2021 (Reference 2), the NRC determined that ONS subsequent license renewal application (SLRA) was acceptable and sufficient for docketing. In emails from the NRC to Steve Snider (Duke Energy) dated September 22, 2021, November 23, 2021, January 11, 2022, January 18, 2022, March 16, 2022, March 21, 2022, and March 29, 2022 (References 3, 5, 7, 9, 11, 12, and 13), the NRC transmitted specific requests for additional information (RAI) to support completion of the Safety Review. The responses were provided to the NRC on October 22, 2021, January 7, 2022, February 14, 2022, February 21, 2022, April 20, 2022, April 22, 2022, and May 20, 2022 (References 4, 6, 8, 10, 14, 16, and 17).

In an email from Marieliz Johnson (NRC) to Steve Snider (Duke Energy) dated April 20, 2022 (Reference 15), the NRC transmitted RAI 3.1.2-1 also to support completion of the Safety Review. Enclosure 1 contains the response for RAI 3.1.2-1. SLRA changes are provided along with the affected SLRA section(s), SLRA page number(s), and SLRA mark-ups. For clarity, deletions are indicated by strikethroughs and inserted text by underlined red font.

As directed by the NRC Project Manager, the revised due date for this response is May 27, 2022. This submittal contains no new or revised regulatory commitments.

Should you have any questions regarding this submittal, please contact Paul Guill at (704) 382-4753 or by email at <u>paul.guill@duke-energy.com</u>.

I declare under penalty of perjury that the foregoing is true and correct. Executed on May 27, 2022.

Sincerely,

Minda

Steven M. Snider Site Vice President Oconee Nuclear Station

# Enclosure:

1. Response to Oconee SLRA Request for Additional Information 3.1.2-1

CC: W/O Enclosures:

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BCC: W/O Enclosures:

T.P. Gillespie K. Henderson S.D. Capps T.M. Hamilton P.V. Fisk H.T. Grant S.A. Dalton M.C. Nolan L. Grzeck S.M. Snider R.K. Nader G.D. Robison T.M. LeRoy P.F. Guill R.V. Gambrell File: (Corporate) Electronic Licensing Library (ELL) **ENCLOSURE 1** 

OCONEE NUCLEAR STATION, UNITS 1, 2, AND 3 SUBSEQUENT LICENSE RENEWAL APPLICATION RESPONSE TO OCONEE SLRA – REQUEST FOR ADDITIONAL INFORMATION 3.1.2-1

## Enclosure 1 Response to Oconee SLRA Request for Additional Information 3.1.2-1

# Request for Additional Information (RAI) 3.1.2-1:

## **Regulatory Basis:**

Title 10 of the *Code of Federal Regulations* (CFR) Section 54.21(a)(3) requires an applicant to demonstrate that the effects of aging for each structure and component identified in 10 CFR 54.21(a)(1) will be adequately managed so that the intended function(s) will be maintained consistent with the current licensing basis for the period of extended operation. One of the findings that the U.S. Nuclear Regulatory Commission (NRC) staff must make to issue a renewed license (10 CFR 54.29(a)) is that actions have been identified and have been or will be taken with respect to managing the effects of aging during the period of extended operation on the functionality of structures and components that have been identified to require review under 10 CFR 54.21, such that there is reasonable assurance that the activities authorized by the renewed license will continue to be conducted in accordance with the current licensing basis.

In order to complete its review and enable making a finding under 10 CFR 54.29(a), the staff requires additional information in regard to the matters described below.

## Background:

The applicant includes the following three plant-specific AMR items for reactor pressure vessel (RPV) bottom head instrument guide tubes and RPV support skirts in Oconee SLRA Table 3.1.2-1:

- A plant-specific AMR item for managing cracking in the Nickel-Alloy RPV bottom head instrument guide tubes, as given on SLRA page 3-99; the line item cites use of Note H for the AMR item, which indicates the aging effect for the component is not in NUREG-2191 (the GALL-SLR Report) for this component, material, and environment combination. The AMR item credits the use of a time-limited aging analysis (TLAA) for managing cracking in the RPV bottom head instrument guide tubes.
- A plant-specific AMR item for managing loss of material in the steel RPV support skirts, as given on SLRA page 3-103; the line item cites use of Note J for the AMR item, which indicates the aging effect for the component is not in NUREG-2191 (the GALL-SLR Report) for this component, material, and environment combination. The AMR item cites generic note J, which indicates that neither component nor the material and environment combination are evaluated in NUREG-2191 (i.e., in the GALL-SLR report). The AMR item credits the use of SLRA AMP B2.1.1, "ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD" Program to manage loss of material in the RPV support skirts.
- A plant-specific AMR item for the steel RPV support skirts on SLRA page 3-103 that cites "None" in the "Aging Effect" column entry of the line item and "None" in the "Aging Management Program" column entry of the line item. The AMR item cites generic note J, which indicates that neither component nor the material and environment combination are evaluated in NUREG-2191 (i.e., in the GALL-SLR report). The AMR Item also cites use of plant-specific Note 1, which states:

"The RPV support skirt is the critical location of the RPV support assembly and is not susceptible to irradiation embrittlement based on the NDT evaluation report. The RPV

support intended function will be maintained consistent with the CLB during the SPEO when considering damage to irradiation."

## Issues:

- 1. SLRA Chapter 4 does not identify a TLAA that indicates that the RPV bottom instrument guide tubes are within the scope of the TLAA and is used for management of cracking in the instrument guide tubes. Thus, it is unclear which TLAA in is being credited for management of cracking in the RPV bottom head instrument guide tubes.
- 2. The basis for the inclusion of the "None-None" AMR item for the RPV support skirts (SLRA Page 3-103) is unclear because the use of such an item would only apply if the applicant had identified that there are no aging effects requiring management for the steel RPV support skirts under exposure to an external, uncontrolled indoor air environment; however, in SLRA Table 3.1.2-1, the applicant indicates there are applicable aging effects requiring management for the RPV support skirt surfaces exposed to an uncontrolled indoor air environment through the inclusion of AMR items on cumulative fatigue damage and loss of material in the RPV support skirts (as given on SLRA page 3-103).

## Requests:

- Identify the specific TLAA in SLRA Chapter 4 that is referenced by the plant-specific NEI Note H-based AMR item in SLRA Table 3.1.2-1 for the RPV bottom head instrument guide tubes. Explain why the analysis basis of the TLAA is considered to form a sufficient analytical basis for managing cracking in the RPV bottom head instrument guide tubes during the subsequent period of extended operation (SPEO).
- 2. Justify the basis for including a NEI Note J-based "None-None" AMR item for the RPV support skirts in SLRA Table 3.1.2-1 when the table includes other AMR items (i.e. those on cumulative fatigue damage and loss of material) for the RPV support skirts that indicates there are aging effects of the RPV support skirts that require management during the SPEO.

# Response to RAI 3.1.2-1:

1. The specific TLAA in SLRA Chapter 4 that is referenced by the plant-specific NEI Note H-based AMR item in the Oconee SLRA Table 3.1.2-1 for the component type "Instrument Tubes (bottom head)" is flow-induced vibration (FIV) and is addressed in Section 4.7.1.2 of the Oconee SLRA (ADAMS Accession Number ML21158A193). As described in Oconee SLRA Section 4.7.1.2, the source references that were used to justify the B&W reactor pressure vessel internals FIV endurance limit assumptions for 60 years were reviewed and updated for applicability to 80 years. This review and evaluation for FIV is contained in Section 3.0 of ANP-3899P, which was submitted with the Oconee SLRA, and addresses FIV of the reactor vessel (RV) internals, which includes the Incore Instrumentation Nozzles. The conclusion of this evaluation determined that the thermal shield upper support bolts were the components with the least margin. The stress for these components is below the endurance limit; therefore, the maximum fatigue usage factor associated with FIV for the RV internals is below the endurance limit for an 80 year life. The TLAA was dispositioned in accordance with 10 CFR 54.21(c)(1)(ii).

A plant-specific note will be added to the NEI Note H-based AMR Item for the RPV instrument tubes. The plant-specific note will state, "The TLAA associated with this AMR item is flow-induced vibration of the instrument tubes and is addressed in SLRA Section 4.7.1.2 and Section 3.0 of ANP-3899P."

2. The NEI Note J-based "None-None" AMR item for the RPV support skirts in the Oconee SLRA Table 3.1.2-1 is based on irradiation embrittlement of the RPV support skirts. As described in SLRA Table 3.1.2-1, plant specific note 1, "The RPV support skirt is the critical location of the RPV support assembly and is not susceptible to irradiation embrittlement based on the NDT evaluation reported. The RPV support intended function will be maintained consistent with the CLB during the SPEO when considering damage due to irradiation." To clarify this AMR item the aging effect will be revised to show "loss of fracture toughness."

#### **SLRA Revisions:**

SLRA Table 3.1.2-1 (page 3-99) is revised as follows:

Component Type	Intended Function	Material	Environment	Aging Effect	Aging Management Program	NUREG-2191 Item	NUREG- 2192 Table 1	Notes
Instrument Tubes (bottom head)	Pressure Boundary	Nickel Alloy	Air with Borated Water Leakage (External)	None	None	IV.E.RP-378	3.1.1- 106	A
			Reactor Coolant (Internal)	Cracking	ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD (B2.1.1)	IV.A2.RP-59	3.1.1- 045	A
					Cracking of Nickel Alloy Components and Loss of Material due to Boric Acid-Induced Corrosion in RCPB Components (B2.1.5)	IV.A2.RP-59	3.1.1- 045	A
					TLAA	None	None	H <u>. 3</u>
					Water Chemistry (B2.1.2)	IV.A2.RP-59	3.1.1- 045	A
				Cumulative Fatigue Damage	TLAA	IV.A2.R-219	3.1.1-010	A
				Loss of Material	Water Chemistry (B2.1.2)	IV.A2.RP-28	3.1.1-088	A

#### Table 3.1.2-1 Reactor Vessel, Reactor Internals, and Reactor Coolant System - Reactor Vessel - Aging Management Evaluation

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SLRA Table 3.1.2-1 (Page 3-103) is revised as follows:

#### Table 3.1.2-1 Reactor Vessel, Reactor Internals, and Reactor Coolant System – Reactor Vessel – Aging Management Evaluation

Component Type	Intended	Material	Environment	Aging Effect	Aging Management Program	NUREG-2191 Item	NUREG- 2192 Table 1	Notes
Support Skirt	Structural Support	Steel	Air – Indoor Uncontrolled (External)	Cumulative Fatigue Damage	TLAA	IV.A2.R-70	3.1.1-004	A
				Loss of Material	ASME Section XI, Subsection IWF (B2.1.30)	III.B1.1.T-24	3.5.1-091	A
				None Loss of Fracture Toughness	None	None	None	J, 1
			Air with Borated Water Leakage (External)	Loss of Material	Boric Acid Corrosion (B2.1.4)	IV.A2.R-17	3.1.1- 049	A

SLRA Table 3.1.2-1 (Page 3-109) is revised as follows:

#### Plant Specific Notes:

3. <u>The TLAA associated with this AMR item is flow-induced vibration of the instrument tubes and is addressed in SLRA Section</u> <u>4.7.1.2 and Section 3.0 of ANP-3899P.</u>

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