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Serial: RA-23-0136
July 20, 2023

10 CFR 50.55a

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

Catawba Nuclear Station, Unit Nos. 1 and 2
Docket Nos. 50-413, 50-414 / Renewed License Nos. NPF-35 and NPF-52

Shearon Harris Nuclear Power Plant, Unit 1
Docket No. 50-400 / Renewed License No. NPF-63

McGuire Nuclear Station, Unit Nos. 1 and 2
Docket Nos. 50-369, 50-370 / Renewed License Nos. NPF-9 and NPF-17

Oconee Nuclear Station, Unit Nos. 1, 2, and 3
Docket Nos. 50-269, 50-270, and 50-287 / Renewed License Nos. DPR-38, DPR-47, and DPR-55

H. B. Robinson Steam Electric Plant, Unit No. 2
Docket No. 50-261 / Renewed License No. DPR-23

SUBJECT: Response to Request for Additional Information Regarding Proposed Alternative for Steam Generator Welds in Accordance with 10 CFR 50.55a(z)(1)

REFERENCES:

1. Duke Energy letter, *Proposed Alternative for Steam Generator Welds in Accordance with 10 CFR 50.55a(z)(1)*, dated January 23, 2023 (ADAMS Accession No. ML23023A093)
2. NRC email, *Duke Fleet - Request for Additional Information RE: Proposed Alternative for Steam Generator Welds in Accordance with 10 CFR 50.55a(z)(1) (EPID L-2023-LLR-0003)*, dated May 22, 2023 (ADAMS Accession No. ML23142A273)

Ladies and Gentlemen:

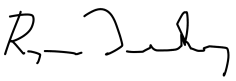
In Reference 1, Duke Energy Carolinas, LLC and Duke Energy Progress, LLC (collectively referred to as Duke Energy) requested U.S. Nuclear Regulatory Commission (NRC) approval of a proposed alternative to certain requirements of the American Society of Mechanical Engineers (ASME) Code, Section XI for certain Steam Generator welds at Catawba Nuclear Station Units 1 and 2 (CNS), McGuire Nuclear Station Units 1 and 2 (MNS), Oconee Nuclear Station Units 1, 2, and 3 (ONS), Shearon Harris Nuclear Power Plant, Unit 1 (HNP), and H. B. Robinson Steam Electric Plant, Unit 2 (RNP).

In Reference 2, the NRC staff provided a request for additional information (RAI) regarding Reference 1. Enclosure 1 provides Duke Energy's response to the Reference 2 RAI.

Should you have any question concerning this letter and its enclosure, please contact Ryan Treadway, Director – Nuclear Fleet Licensing at (980) 373-5873.

No new regulatory commitments have been made in this submittal.

Sincerely,



Ryan Treadway
General Manager (Acting) - Nuclear Regulatory Affairs, Policy & Emergency Preparedness

Enclosure:
1. Response to Request for Additional Information

cc:
L. Dudes, USNRC, Region II Regional Administrator
N. Jordan, USNRC NRR Project Manager for Duke Fleet
M. Mahoney, USNRC NRR Project Manager for HNP
J. Klos, USNRC NRR Project Manager for MNS
S. Williams, USNRC NRR Project Manager for ONS and CNS
L. Haeg, USNRC NRR Project Manager for RNP
D. Rivard, USNRC Senior Resident Inspector for CNS
P. Boguszewski, USNRC Senior Resident Inspector for HNP
C. Safouri, USNRC Senior Resident Inspector for MNS
J. Nadel, USNRC Senior Resident Inspector for ONS
J. Zeiler, USNRC Senior Resident Inspector for RNP

Enclosure 1
Response to Request for Additional Information

Request for Additional Information (RAI)-1

Issue

The licensee referenced probabilistic and deterministic analyses in the above EPRI reports to estimate potential fatigue crack growth in the subject SG welds and to justify application of these analyses to the proposed examination elimination for the welds and nozzle inner radius locations. The licensee presented plant-specific information to demonstrate that the referenced analyses in the EPRI reports would bound the subject SG welds, including the ISI history of the welds.

Leveraging PFM analyses to define the basis for risk-informing inspection requirements requires knowledge of both the current and future behavior of the material degradation and the associated uncertainties applicable to the subject SG welds. Confidence in the results of these analyses hinges on the assurance that the PFM model adequately represents, and will continue to represent, the degradation behavior in the subject SG welds. The NRC staff has determined that, when considering proposed elimination of examinations, adequate performance monitoring through inspections is needed to ensure that the assumptions of the PFM model remain valid, and that novel or unexpected degradation is detected and dispositioned in a timely fashion. Further, the staff has communicated concepts that licensees can implement on a fleet-wide basis to develop a performance monitoring plan and bolster the technical basis for alternative requests (see slide packages dated January 30, 2023, and April 27, 2023 at ML23033A667 and ML23114A034, respectively). In Section 5.0 of the submittal, the licensee described the various plant-specific examination scenarios and the proposed elimination of examinations. The licensee stated that the proposed alternative results in a maximum time period of approximately 20 years from the end of the interval in which the Section XI requirements were met in full until the end of the proposed alternative. The licensee did not provide a performance monitoring schema for the subject welds and nozzle inner radius locations.

The licensee discusses the system leakage test as “providing further assurance of safety” for the proposed alternative. However, the NRC staff notes that the visual examinations performed during system leakage tests may not provide sufficient information to ensure that the PFM model continues to predict the material behavior and that emergent degradation is discovered and dispositioned in a timely fashion. Specifically, visual examinations may not directly detect the presence or extent of degradation; may not provide direct detection of aging effects prior to potential loss of structure or intended function; and do not provide sufficient validating data necessary to confirm the modeling of degradation behavior in the subject welds and nozzle inner radius locations.

Request

a. Describe the performance monitoring that will be implemented with this proposed alternative to ensure that the PFM model adequately represents, and will continue to represent the degradation behavior in the subject components commensurate with the duration of the requested alternative.

b. Explain how this performance monitoring will provide, over the extended examination interval, (1) direct evidence of the presence and extent of degradation, (2) validation and confirmation of the continued adequacy of the PFM model; and (3) timely detection of novel or unexpected degradation.

c. If through this performance monitoring indications are detected that exceed the acceptance standards of ASME Code, Section XI, IWB-3500, confirm that they will be evaluated as required by ASME Code, Section XI (which includes requirements for successive inspections and additional examinations) and describe other actions (if any) specified in the plant's corrective action program to ensure that the integrity of the component is adequately maintained.

d. If through this performance monitoring indications are detected that exceed the acceptance standards of ASME Code, Section XI, IWB-3500, then scope expansion may be appropriate to assess extent of condition. Furthermore, if this performance monitoring plan or industry-wide operating experience indicates that a new or novel degradation mechanism is possible in SG welds or nozzle inner radii, scope expansion may be appropriate to ensure that no such mechanism is occurring in the subject plants. Discuss the detailed scope expansion plans for these scenarios.

Duke Energy Response to RAI-1:

a. Performance monitoring supporting this Alternative Request began with the Fourth Inspection Intervals for Catawba, Units 1&2, McGuire, Units 1&2, and Shearon Harris, Unit 1 and with the Fifth Inspection Intervals for H.B. Robinson, Unit 2 and Oconee, Units 1, 2, &3. As documented in Table 1-2 below, the requested deferral lengths for Catawba, Units 1&2, McGuire, Units 1 &2, and Shearon Harris, Unit 1 range from 12.9 years up to 28.3 years. Therefore, a performance monitoring plan for these plants is described in detail below. All ASME code required exams have been completed for the 5th Intervals at H.B. Robinson, Unit 2 and Oconee, Units 1 & 3. Oconee Unit 2 has completed all required exams except for one C-A, C1.30 exam scheduled for the upcoming Fall 2023 outage (last outage the 5th Interval). The requested deferral lengths between exams for H.B. Robinson, Unit 2 and Oconee, Units 1, 2, & 3 range from 9.7 years to 16.2 years. Therefore, requested deferrals for all welds and components associated with H.B. Robinson, Unit 2 and Oconee, Units 1, 2, &3 are below 20 years between examinations and as such do not require any performance monitoring. This is consistent with prior precedent where U.S. licensees have sought examination relief from prescriptive ASME Section XI requirements.

   As shown in the Inspection History Tables from Reference 1, a significant number of 4th Interval examinations have been completed across Catawba, Units 1&2 and Shearon Harris, Unit 1. Specifically, 10 of the required 19 Steam Generator Welds for the interval have been inspected with no relevant indications identified. All of these 4th Interval examinations utilized phased array ultrasonic testing (UT) techniques with component specific Non-Destructive Examination (NDE) modeling (when available) to maximum coverage obtained. These modern UT techniques are far superior at detecting near surface or surface breaking flaws and obtained greater coverage compared to earlier interval PSI/ISI exams. These completed examinations (10/19 ≈ 53% of the total number of required exams) across all three stations are credited for performance monitoring during remainder of the current 4th Intervals at Catawba, Units 1&2 and Shearon Harris, Unit 1.

   Additionally, the 6-inch nominal diameter Auxiliary Feedwater nozzle-to-shell welds have been examined during the current 4th Intervals at Catawba, Units 1&2 and Shearon Harris, Unit 1. These examinations consisted of volumetric UT and magnetic particle testing (MT) examinations in accordance with code requirements (Item No. C2.21). Full 100% coverage was obtained for each exam and no rejectable indications were identified. Although the

Auxiliary Feedwater nozzles were not included in the scope of Alternative RA-22-0256, these completed examinations ensure direct detection of aging affects prior to the potential loss of structure or intended function. The UT/MT exams provide additional validating data to confirm the absence of degradation behavior in Steam Generator welds.

The performance monitoring plan covering the 5th Interval for Catawba, Units 1&2, and Shearon Harris, Unit 1 and the 5th/6th Intervals at McGuire, Units 1&2 will examine one weld from each Item Number across all five Units. Specifically, over a given inspection interval a total of five (5) Steam Generators would be examined comprised of 29 welds/component exams. The proposed performance monitoring plan is to inspect a total of seven (7) different welds/components across all five Units that covers each Item No. and weld/component configuration. Note, the design of the CNS2 Steam Generators differs from CNS1, MNS1, MNS2, and HNP, since CNS2 has original Westinghouse Model D-5 Steam Generators. Therefore, only CNS2 has C1.10 welds and a Main Steam (MS) nozzle-to-shell (C2.21) weld. The proposed performance monitoring plan ensures those weld configurations unique to CNS2 are selected. Finally, at least one weld/component at each Unit is selected for examination for even distribution. This ensures a diverse sampling across the Duke PWR Fleet rather than monitoring individual welds on a repetitive basis or a single Steam Generator at only one Unit. The proposed performance monitoring plan selects the most time-limited welds since the last inspection, to the extent practical. The components to be examined are described in Table 1-1 below. Also, a visual representation of the past inspection interval history including the proposed performance monitoring schedule is shown in Figure 1-1.

Table 1-1: Proposed Performance Monitoring Plan

Station/Unit	ASME Category	ASME Item No.	Description	Number and Type of Exam	Proposed Schedule (Year)[2]	Approximate Length of Time Since Last Exam (Years)
Catawba / Unit 1	C-B	C2.21	FW Nozzle-to-Shell Weld	1 Volumetric (UT) & 1 Surface (MT or PT)	Interval 5, Period 1 (Spring 2029)	18
Catawba / Unit 1	C-B	C2.22	FW Inside Radius	1 Volumetric (UT)	Interval 5, Period 1 (Spring 2029)	10.5
[1]Catawba / Unit 2	C-A	C1.10	Shell Circumferential Weld	1 Volumetric (UT)	Interval 5, Period 3 (Fall 2034)	16.5
[1]Catawba / Unit 2	C-B	C2.21	MS Nozzle-to-Shell Weld	1 Volumetric (UT) & 1 Surface (MT or PT)	Interval 5, Period 2 (Fall 2031)	16.5
McGuire / Unit 1	C-A	C1.20	Head Circumferential Weld	1 Volumetric (UT)	Interval 5, Period 3 (Fall 2029)	16.5
McGuire / Unit 2	C-A	C1.30	Tubesheet-to-Shell Weld	1 Volumetric (UT)	Interval 5, Period 3 (Fall 2033)	18
Shearon Harris / Unit 1	B-B	B2.40	Tubesheet-to Head Weld	1 Volumetric (UT)	Interval 5, Period 2 (Fall 2031)	19

Notes:

1. Catawba Unit 2 has original Westinghouse Model D-5 Steam Generators. Therefore, it is the only Unit from the performance monitoring plan with C1.10 welds and a Main Steam nozzle-to-shell weld.
2. The proposed year is subject to change in accordance with IWA-2430(c)(1) or ± one outage from the proposed schedule not to exceed the overall end date of 2035. This allows for possible unit transitions from an 18-month fuel cycle to a 24-month fuel cycle or other unforeseen plant radiation exposure limits or exam support issues. The proposed performance monitoring plan will be completed by the end of 2035.

Replacement Steam Generator Year	Plant \ Year	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046
1996	**Catawba 1**	3rd Interval			4th Interval								4th Interval		5th Interval				X[1]							6th Interval - ASME Code SG Requirements Resume								12/5/2043			
Original SGs	**Catawba 2**	3rd Interval			4th Interval								4th Interval				5th Interval			X			X			6th Interval - ASME Code SG Requirements Resume								12/5/2043			
1984	**H.B Robinson 2**	5th Interval											6th Interval						7/31/2030																		
1997	**McGuire 1**	4th Interval									5th Interval								X			6th Interval									6/12/2041						
1997	**McGuire 2**	3rd Interval		4th Interval									5th Interval										X			6th Interval							3/3/2043			
2003 - 2004	**Oconee 1, 2, 3**	4th Interval		5th Interval									6th Interval										#														
2001	**Shearon Harris 1**	3rd Interval					4th Interval						4th Interval					5th Interval			X					6th Interval - ASME Code SG Requirements Resume								10/24/2046		

Notes:

1. Two exams item numbers are scheduled, to ensure both the Main Feedwater nozzle-to-shell weld (C2.21) and associated inner radius (C2.22) exams are performed during the same refueling outage.

LEGEND	
	Inspection Interval prior to Alternative RA-22-0256
X	Scheduled Performance Monitoring Exam
	Deferral Period per RA-22-0256
	Subsequent Inspection Interval: Reverts Back to ASME Code Requirements
	Current License Period End Date
#	Oconee Current License Period End Date: Unit 1 - 2/6/2033; Unit 2 - 10/6/2033; Unit 3 - 7/19/2034

Figure 1-1: Inservice Inspection Interval History and Performance Monitoring Schedule

The proposed performance monitoring plan for Duke Energy, will be performed by the end of 2035. This will ensure that no more than 20 years elapses between the performance of an ASME Code, Section XI, examination for each weld/component item number on a Steam Generator subject to examination requirements. Following completion of the proposed performance monitoring plan by 2035, none of the Duke Energy units covered by the proposed alternative will have operated more than 20 years between exams of each item number being performed at least once amongst the fleet. Following completion of the performance monitoring plan and the Fifth Inspection Intervals at Catawba, Units 1&2 and Shearon Harris, Unit 1, ASME Section XI Code required Steam Generator examinations for these plants will resume with the start of the Sixth Inspection Intervals as required per 10 CFR 50.55a(g)(4)(ii). These code required examinations satisfy the performance monitoring for McGuire, Units 1&2 thru the end of its current operating license.

Table 1-2: Summary of Inspection Deferrals in Proposed Alternative RA-22-0256

Station	Unit	ASME Category	Item No.	Description	Date of Last Inspection	End of Proposed Alternative	Length of Time[1] (Years)
Catawba	1	B-B	B2.40	Steam generators (primary side), tubesheet-to-head weld	05/09/2017	End of 5th Interval, Scheduled to End 06/28/2035	18.2
		C-A	C1.20	Steam generators (secondary side), Head circumferential welds	05/06/2011		24.2
		C-A	C1.30	Steam generators (secondary side), Tubesheet-to-shell weld	05/09/2017		18.2
		C-B	C2.21	FW Nozzle-to-shell weld	05/12/2011		24.1
		C-B	C2.22	FW Nozzle inside radius section	11/25/2018		16.6
Catawba	2	B-B	B2.40	Steam generators (primary side), tubesheet-to-head weld	04/19/2021	End of 5th Interval, Scheduled to End 08/18/2036	14.3
		C-A	C1.10	Steam generators (secondary side), Shell circumferential welds	03/25/2018		17.4
		C-A	C1.10	Steam generators (secondary side), Shell circumferential welds	03/27/2009		26.4
		C-A	C1.10	Steam generators (secondary side), Shell circumferential welds	03/25/2009		26.4
		C-A	C1.20	Steam generators (secondary side), Head circumferential welds	09/25/2022		12.9
		C-A	C1.30	Steam generators (secondary side), Tubesheet-to-shell weld	03/23/2018		17.4
		C-B	C2.21	FW Nozzle-to-shell weld	03/25/2018		17.4
		C-B	C2.21	MS Nozzle-to-shell weld	03/10/2015		20.5
		C-B	C2.22	FW Nozzle inside radius section	03/17/2015		20.4

Station	Unit	ASME Category	Item No.	Description	Date of Last Inspection	End of Proposed Alternative	Length of Time[1] (Years)
H.B Robinson	2	B-B	B2.40	Steam generators (primary side), tubesheet-to-head weld	06/01/2015	End of Current Licensed Period, 07/31/2030	15.2
		C-A	C1.10	Steam generators (secondary side), Shell circumferential welds	10/09/2018		11.8
		C-A	C1.10	Steam generators (secondary side), Shell circumferential welds	10/11/2018		11.8
		C-A	C1.10	Steam generators (secondary side), Shell circumferential welds	11/25/2020		9.7
		C-A	C1.20	Steam generators (secondary side), Head circumferential welds	11/24/2020		9.7
		C-A	C1.30	Steam generators (secondary side), Tubesheet-to-shell weld	06/02/2015		15.2
		C-B	C2.21	FW Nozzle-to-shell weld	05/26/2015		15.2
		C-B	C2.21	MS Nozzle-to-shell weld	06/01/2015		15.2
		C-B	C2.22	FW Nozzle inside radius section	11/17/2020		9.7
		C-B	C2.22	MS Nozzle inside radius section	10/11/2018		11.8
McGuire	1	B-B	B2.40	Steam generators (primary side), tubesheet-to-head weld	03/31/2019	End of Current Licensed Period, 06/12/2041	22.2
		C-A	C1.20	Steam generators (secondary side), Head circumferential welds	03/24/2013		28.2
		C-A	C1.30	Steam generators (secondary side), Tubesheet-to-shell weld	03/20/2013		28.3
		C-B	C2.21	FW Nozzle-to-shell weld	10/03/2014		26.7
		C-B	C2.22	FW Nozzle inside radius section	10/03/2014		26.7
McGuire	2	B-B	B2.40	Steam generators (primary side), tubesheet-to-head weld	03/29/2020	End of Current Licensed Period, 03/03/2043	22.9
		C-A	C1.20	Steam generators (secondary side), Head circumferential welds	03/04/2023		20.0
		C-A	C1.30	Steam generators (secondary side), Tubesheet-to-shell weld	09/23/2015		27.5
		C-B	C2.21	FW Nozzle-to-shell weld	09/24/2015		27.5
		C-B	C2.22	FW Nozzle inside radius section	04/07/2017		25.9
Oconee	1	B-B	B2.40	Steam generators (primary side), tubesheet-to-head weld	11/3/2018	End of Current	14.3

Station	Unit	ASME Category	Item No.	Description	Date of Last Inspection	End of Proposed Alternative	Length of Time[1] (Years)
		B-B	B2.40	Steam generators (primary side), tubesheet-to-head weld	11/21/2016	Licensed Period, 02/06/2033	16.2
		C-A	C1.30	Steam generators (secondary side), Tubesheet-to-shell weld	10/30/2020		12.3
		C-A	C1.30	Steam generators (secondary side), Tubesheet-to-shell weld	10/29/2020		12.3
		C-B	C2.21	MS Nozzle-to-shell weld	11/13/2016		16.2
		C-B	C2.21	MS Nozzle-to-shell weld	10/29/2018		14.3
Oconee	2	B-B	B2.40	Steam generators (primary side), tubesheet-to-head weld	11/21/2019	End of Current Licensed Period, 10/06/2033	13.9
		B-B	B2.40	Steam generators (primary side), tubesheet-to-head weld	11/21/2019		13.9
		C-A	C1.30	Steam generators (secondary side), Tubesheet-to-shell weld	11/16/2021		13.9
		C-A	C1.30	Steam generators (secondary side), Tubesheet-to-shell weld	10/23/2013, Scheduled for O2R31 (Fall 2023)[2]		10.0
		C-B	C2.21	MS Nozzle-to-shell weld	11/19/2019		13.9
		C-B	C2.21	MS Nozzle-to-shell weld	11/19/2019		13.9
Oconee	3	B-B	B2.40	Steam generators (primary side), tubesheet-to-head weld	5/21/2022	End of Current Licensed Period, 07/19/2034	12.2
		B-B	B2.40	Steam generators (primary side), tubesheet-to-head weld	4/20/2020		14.3
		C-A	C1.30	Steam generators (secondary side), Tubesheet-to-shell weld	5/20/2022		12.2
		C-A	C1.30	Steam generators (secondary side), Tubesheet-to-shell weld	4/20/2020		14.3
		C-B	C2.21	MS Nozzle-to-shell weld	4/29/2018		16.2
		C-B	C2.21	MS Nozzle-to-shell weld	4/30/2018		16.2
Shearon Harris	1	B-B	B2.40	Steam generators (primary side), tubesheet-to-head weld	5/4/2012	End of 5th Interval, Scheduled to	25.0
		C-A	C1.20	Steam generators (secondary side), Head circumferential welds	4/23/2015		22.0

Station	Unit	ASME Category	Item No.	Description	Date of Last Inspection	End of Proposed Alternative	Length of Time[1] (Years)
		C-A	C1.30	Steam generators (secondary side), Tubesheet-to-shell weld	4/18/2015	End 05/01/2037	22.0
		C-B	C2.21	FW Nozzle-to-shell weld	5/3/2021		16.0
		C-B	C2.22	FW Nozzle inside radius section	5/5/2012		25.0

Notes:

1. This column represents the length of time between the date of the last completed code inspection and the end of the proposed alternative.

2. This C1.30 is scheduled for O2R31 (Fall 2023) and required to be completed for ASME 5th Interval code compliance (last outage of the 5th Interval for ONS Unit 2). This alternative is only applicable to Oconee 6th Interval exams through the current licensed period for Oconee Units 1, 2, and 3.

b. (1) The performance monitoring plan provided in the response above includes sampled inspections using Volumetric/Surface exam methods that will provide direct evidence of the presence and extent of any degradation over the extended examination interval for these welds.

(2) The components in the proposed alternative have operated for a minimum of 21.8 years and up to a maximum of 36.9 years without the identification through inspection of any service-induced degradation. This excellent operating history is validation and confirmation of the conservative nature of the PFM and DFM models used in the EPRI Technical Reports 3002015906 and 3002014590 (References 2 & 3). This also shows that the models will predict future behavior conservatively. The proposed performance monitoring plan includes sampling of examinations across different weld types located at different plants. This ensures the inspection data is representative of the Duke Fleet and is sufficient to demonstrate continued adequacy of the modeling.

(3) The performance monitoring schedule described above will provide timely detection of any novel or unexpected degradation in these components.

c. If during the performance monitoring schedule described above, indications are detected that exceed the applicable ASME Code, Section XI acceptance standards of IWB-3500 or IWC-3500, then the indications will be addressed as required by ASME Code Section XI, and the Duke Energy Corrective Action Program. The additional examination and successive inspection requirements of ASME Code, Section XI, also apply during the current outage. The number of additional exams shall be the number of performance monitoring exams included in the inspection item number that were scheduled to be performed during the present inspection period. If additional examinations reveal indications exceeding acceptance standards of IWB-3500 or IWC-3500, the examinations shall be further extended to include all remaining welds/components in the inspection item number.

d. Additionally, any unacceptable indication(s) identified as part of the performance monitoring plan will result in the same number of weld(s) to be examined at all the remaining plants (Catawba, Units 1&2, McGuire, Units 1&2, and Shearon Harris, Unit 1). The expanded scope shall include the same rejected weld/component[1]. These exams shall be completed no later than the first or second refueling outage following discovery of the initial indication(s). This expanded scope is performed in addition to the established performance monitoring plan and cannot be dual credited. Additional and successive inspection requirements of ASME Code, Section XI apply for all newly identified unacceptable indications.

[1] The same rejected weld shall be examined at each of the remaining plants. For example, if a C2.21 Main Feedwater nozzle-to-shell weld at CNS1 was found with a rejectable indication exceeding the acceptance standard of IWC-3500, then the same Main Feedwater nozzle-to-shell weld at CNS2, MNS1&2, and HNP1 shall be examined in either the 1st or 2nd outage following the initial indication. However, if a C1.10 shell circumferential weld at CNS2 was found with a rejectable indication exceeding the acceptance standard of IWC-3500, then similar welds C1.20 or C1.30 welds at CNS1, MNS1&2, and HNP1 shall be examined in either the 1st or 2nd outage following the initial indication. CNS2 has original Westinghouse Model D-5 Steam Generators and the only Steam Generators within the Performance Monitoring Plan scope with C1.10 shell circumferential welds.

In addition to the direct evidence provided by the proposed Duke Energy performance monitoring plan, examination of steam generator welds and components is expected to continue to be performed by other units across the domestic and international PWR fleet. Any new unacceptable indications identified will be entered into the Duke Energy Corrective Action Program to evaluate operating experience and determine if additional examinations are required across the Duke Fleet. If a new degradation mechanism is identified during continued industry examinations, Duke Energy will follow the industry guidance to address the new degradation mechanism.

RAI-1 References:

1. Letter from K.M. Ellis (Duke Energy) to the U.S. NRC, “Proposed Alternative for Steam Generator Welds in Accordance with 10 CFR 50.55a(z)(1),” Serial No. RA-22-0256, dated January 23, 2023, ADAMS Accession No. ML23023A093.

2. ADAMS Accession No. ML20225A141, EPRI Technical Report 3002015906, "Technical Bases for Inspection Requirements for PWR Steam Generator Class 1 Nozzle-to-Vessel Welds and Class 1 and Class 2 Vessel Head, Shell, Tubesheet-to-Head and Tubesheet-to-Shell Welds," Palo Alto, California, 2019.

3. ADAMS Accession No. ML19347B107, EPRI Technical Report 3002014590, "Technical Bases for Inspection Requirements for PWR Steam Generator Feedwater and Main Steam Nozzle-to-Shell Welds and Nozzle Inside Radius Sections," Palo Alto, California, 2019.

RAI-2

Issue

Table 6-4 in Attachment 6 of the submittal noted “Value not available” for the 60-year projected cycles for the Loss of Power transient at H.B. Robinson Steam Electric Plant.

Request

Confirm that the 60 cycles analyzed in EPRI report 14590 for the Loss of Power transient reasonably bound any occurrence of the transient that might occur or could have occurred at H.B. Robinson Steam Electric Plant.

Duke Energy Response to RAI-2:

The Loss of Power transient at H.B. Robinson Steam Electric Plant (Robinson) is tracked by the site Fatigue Monitoring Program, which is administered by plant procedure PLP-109, *Cycle and Transient Monitoring*. PLP-109 Attachment 1, *Transient Accounting Summary* is routinely completed by the Program Owner to update the records of primary system cycles and transients resulting from normal, test, and upset operating conditions. The most recently-performed (completed and vaulted as QA record) Transient Accounting Summary which included the period up to Robinson refueling outage 31 (30 September 2018) indicates that two (2) Loss of Power transients occurred in the period from 1970 to 9/30/2018 (a total of 48 years). Projecting to 60 years of plant operation will result in a total of three (3) Loss of Power transient cycles. Therefore, the 60 cycles analyzed in EPRI report 14590 (Reference 1) for the Loss of Power transient conservatively bound the projected Loss of Power transient cycles at H.B. Robinson over 60-year period.

RAI-2 References:

1. ADAMS Accession No. ML19347B107, EPRI Technical Report 3002014590, "Technical Bases for Inspection Requirements for PWR Steam Generator Feedwater and Main Steam Nozzle-to-Shell Welds and Nozzle Inside Radius Sections," Palo Alto, California, 2019.

RAI-3

Issue

An ISI interval at a particular plant site may be extended, within certain limitations, per IWA-2430 or similar provisions of Section XI. As such, interval dates may extend beyond the end of the operating license for the plant. The NRC may not approve a proposed alternative beyond the end of the current license.

Request

Confirm that the proposed alternative does not apply beyond the current licenses of the subject plants.

Duke Energy Response to RAI-3:

The duration for the proposed alternative does not apply beyond the current licenses of the subject plants listed in Table 3-1 below.

Table 3-1: Plants Included in This Request for Alternative and Their Current License End Date

Plant/Unit	Duration of Proposed Alternative[1]	Current License Period End Date
Catawba Nuclear Station, Unit 1	Remainder of 4th Interval through the end of the 5th Interval, scheduled to end on 06/28/2035	12/05/2043
Catawba Nuclear Station, Unit 2	Remainder of 4th Interval through the end of the 5th Interval, scheduled to end on 08/18/2036	12/05/2043
H.B. Robinson Steam Electric Plant, Unit 2	6th Interval not to exceed current License Period End Date	07/31/2030
McGuire Nuclear Station, Unit 1	5th and 6th Intervals not to exceed current License Period End Date	06/12/2041
McGuire Nuclear Station, Unit 2	5th and 6th Intervals not to exceed current License Period End Date	03/03/2043
Oconee Nuclear Station, Unit 1	6th Interval not to exceed current License Period End Date	02/06/2033
Oconee Nuclear Station, Unit 2	6th Interval not to exceed current License Period End Date	10/06/2033
Oconee Nuclear Station, Unit 3	6th Interval not to exceed current License Period End Date	07/19/2034
Shearon Harris Nuclear Plant, Unit 1	Remainder of 4th Interval through the end of the 5th Interval, scheduled to end on 05/01/2037.	10/24/2046

Notes:

1. The Interval End Date is subject to change in accordance with IWA-2430(c)(1) or an NRC endorsed ASME Code Case. In no case will the proposed alternative exceed the current license period end date.