From:	Perry Buckberg
To:	Duc, Joshua Brian
Cc:	Treadway, Ryan I; David Wrona
Subject:	Request for Additional Information - Brunswick Torus ISI Alternative L-2022-LLR-0089
Date:	Wednesday, July 19, 2023 1:07:00 PM
Attachments:	RAI - Brunswick Torus Alt. Rqst. L-2022-LLR-0089 7-19-23.pdf Draft RAI - Brunswick Torus Liner ISI Alternative L-2022-LLR-0089.msg

Dear Mr. Duc,

By letter dated December 15, 2022 (ADAMS Accession No. ML22209A002), Duke Energy submitted a Request for an Alternative for the Brunswick Steam Electric Plant, Unit Nos. 1 and 2, related to inspection of the metallic torus liner.

Once reviewing your request, the U.S. Nuclear Regulatory Commission (NRC) staff requested that a regulatory audit be held. The audit was held June 5, 2023, through June 8, 2023. The NRC staff identified areas where additional docketed information is needed to complete its review. A draft request for additional information (RAI) was transmitted to you by the attached email dated July 10, 2023. Duke reviewed the draft RAI and during a July 19, 2022, clarification call minor edits to the request were agreed.
Attached is the final RAI. Duke Energy agreed to respond to the attached final RAI within 30 days.

The NRC staff considers that timely responses to RAIs help ensure sufficient time is available for staff review and contribute toward the NRC's goal of efficient and effective use of staff resources. If circumstances result in the need to revise the requested response date, please contact Perry Buckberg at (301) 415-1383 or via email at Perry.Buckberg@nrc.gov.

Thanks,

Perry Buckberg
Senior Project Manager / Agency 2.206 Petition Coordinator
U.S. Nuclear Regulatory Commission
Office of Nuclear Reactor Regulation
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REQUEST FOR ADDITIONAL INFORMATION L-2022-LLR-0089
ALTERNATIVE REQUEST FOR EXAMINATION OF TORUS METALLIC LINERS
DUKE ENERGY PROGRESS, LLC
BRUNSWICK STEAM ELECTRIC PLANT, UNITS 1 AND 2
DOCKET NOS. 50-325 AND 50-324

1.0 INTRODUCTION

By letter dated December 15, 2022 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML22349A655), Duke Energy Progress, LLC (the licensee) proposed alternatives to certain requirements of the 2007 Edition through 2008 Addenda of American Society of Mechanical Engineers (ASME) Boiler and Pressure Vessel Code, Section XI, Subsection IWE at the Brunswick Steam Electric Plant (Brunswick), Units 1 and 2.

Pursuant to Title 10, Code of Federal Regulations (CFR), Part 50, 10 CFR 50.55a(z)(1), the licensee submitted for the U.S. Nuclear Regulatory Commission (NRC) review and approval Relief Request Serial # RA-22-0308 regarding examinations of the torus metallic liners during the third 10-year containment inservice inspection (CISI) interval.

The NRC staff requests the following additional information (RAI) to complete its review of the alternative request.

2.0 REGULATORY EVALUATION

In accordance with 10 CFR 50.55a(g)(4), components that are classified as Class MC [metal containment] pressure retaining components and their integral attachments, and components that are classified as Class CC [concrete containment] pressure retaining components and their integral attachments, must meet the requirements set forth in Section XI of the ASME Code, *Rules for Inservice Inspection of Nuclear Power Plant Components*. The regulations require that all inservice inspection conducted during the first 10-year interval, and subsequent intervals, comply with the requirements in the latest edition and addenda of Section XI of the ASME Code, incorporated by reference into 10 CFR 50.55a(b), on the date 18 months prior to the start of the 10-year interval, subject to the conditions in 10 CFR 50.55a to the extent practical within the limitation of design, geometry, and materials of construction of the components.

For Brunswick, the code of record for the third 10-year CISI interval is the 2007 Edition and 2008 Addenda of Section XI of the ASME Code.

3.0 REQUEST FOR ADDITIONAL INFORMATION

NVIB-RAI-1

Issue
The licensee submitted the alternative request pursuant to 10 CFR 50.55a(z)(1). The regulation of 10 CFR 50.55a(z)(1) states that the proposed alternative would provide an acceptable level of quality and safety. It is not evident that the proposed alternative will provide an acceptable level of quality and safety.

Request
Discuss how the proposed alternative satisfies 10 CFR 50.55a(z)(1).

NVIB-RAI-2

Issue
Section 4.1 of the relief request states that "…The Brunswick Unit 1 and 2 Suppression Chamber (torus) containment metallic liner plate is 3/8-inch (375 mils) nominal thickness and backed by reinforced concrete…". Attachment 1 to the relief request presents two diagrams of the torus arrangement. However, the diagrams do not show how the reinforced concrete is joined with the torus wall metal plates. Thus, it is not clear how the torus liner plates are joined with the reinforced concrete.

Requests
(1) Discuss whether a gap or annulus exists between the torus wall and the reinforced concrete such that leaking coolant could be drained away from the torus.
(2) If a through wall leak does occur at a torus wall, discuss how the leakage can be detected and how soon the operator would be notified.
(3) Discuss the consequence if the torus coolant leaks into the annulus between the metal wall and the reinforced concrete without timely detection.

NVIB-RAI-3

Issue
Section 4.1 of the relief request states that "…The torus metallic liner remains fully capable of performing its intended design function with local substrate "pit" corrosion that does not result in a remaining wall thickness of less than 187 mils (t_{min}=3/16" or 50% nominal wall thickness) and with general area corrosion that does not result in a remaining wall thickness of less than 250 mils (t_{min} = 1/4" or 66% nominal wall thickness) …". The proposed alternative does not provide technical basis to support the claim that 50% and 66% nominal wall thickness for the local substrate pit corrosion and the general area corrosion, respectively, would maintain the design function. Also, the proposed alternative does not provide the definition of a local pit corrosion and general corrosion e.g., what is the dimension of the surface area that would be considered as a local pit corrosion vs. a general area corrosion.

Requests
(1) Provide the Calculation that provides the minimum acceptable liner thickness for pitting and general corrosion that supports the design function of the torus.
(2) Define the general area corrosion and local substrate pit corrosion in term of surface area of the torus.
(3) Discuss the technical basis that demonstrates the acceptability of the proposed acceptance criteria.

NVIB-RAI-4

Issue
Section 4.2.2 of the relief request states, in part, that the licensee applied protective coating on the submerged surface of all 16 torus bays at Unit 2 during the second CISI interval inspection in March 2015. Section 4.3.2 of the relief request states, in part, that in the third CISI interval inspection which began in May 2018, a corroded area that exceeded the 10% metal loss acceptance criterion was detected in a torus bay. It appears that the protective coating that applied to the torus interior surface in 2015 did not arrest the corrosion at that corroded area. In addition, the proposed alternative does not provide data on the corrosion rate (mils per month or year).

Request
(1) Discuss the effectiveness of the protective coating restoration, e.g., how many years the protective coating can protect the torus wall from growth of an existing corroded area or from new corrosion to occur?
(2) Provide the maximum and average corrosion rate (mils per month or year) of the corroded areas detected in torus wall at Units 1 and 2.
(3) Specify the corrosion rate in torus wall used in the proposed acceptance criteria.

NVIB-RAI-5

Issue
Section 4.4.2 of the relief request states, in part, that "…For Brunswick Unit 1 torus submerged surfaces with substrate "pit" corrosion areas left uncoated during the second inspection interval (Brunswick Unit 1, March 2016), the engineering evaluation, proposed alternative visual (VT-3) examination acceptance criteria (Section 5.1), and the scheduled visual examinations during the next two refueling outages of the current third containment inspection interval…" It is not clear why the corroded areas have not been applied with protective recoating restoration during the second CISI interval at Unit 1 even though protective coating restoration was applied on the torus bays at Unit 2. It is not clear whether the uncoated corroded areas will be visually examined during each of the next two refueling outages or will be divided between the next two refueling outages in the third CISI interval.

Requests
(1) Discuss why protective coating was not applied during the second CISI interval to minimize further corrosion to the uncoated corroded areas at the Unit 1 torus.
(2) If the uncoated corroded areas on the Unit 1 torus walls were to further degrade during the next two refueling outages of the third CISI interval, discuss the corrective actions.
(3) Discuss whether all the uncoated corroded areas in Unit 1 torus will be visually examined in each of the next two refueling outages or will be divided between the two refueling outages in the third CISI interval.

NVIB-RAI-6

Issue
Section 4.4.2 of the relief request states, in part, that "…During Brunswick Unit 1 third containment inspection interval, there are three (3) remaining refueling outages. With the conservatism applied by the engineering evaluation to establish visual (VT-3) examination acceptance criteria and design minimum allowable thickness for the torus metallic liner, additional remaining service life may be attained and applied through additional design analysis. This additional analysis may allow extending the current scheduled visual examinations and protective coating restorations to the third remaining refueling outage of the current Brunswick Unit 1 current third containment inspection interval…".

Section 5.2 of the relief request states, in part, that "…On Brunswick Unit 1, visual (VT-3) examinations and protective coatings restoration of submerged surfaces in the remaining twelve (12) torus bays will continue during the current third inspection interval in accordance with Table IWE-2500-1, Examination Category E-A, Item Number E1.12. These twelve torus bays did not receive protective coating restoration during the third period of the previous second containment inspection interval. Visual (VT-3) examinations during the current third containment inspection interval and engineering evaluation facilitate the monitoring of degradation of these torus

metallic liner submerged surfaces. Duke Energy proposes that the engineering evaluation provides reasonable assurance that these torus submerged surfaces remain fully capable of performing its intended design function(s) during the current third containment inspection interval and until the next visual (VT-3) examination during the next two refueling outages of the current inspection interval…".

The staff is not clear on the following items:
(1) whether a third remaining refueling outage is scheduled in the third CISI interval,
(2) whether corroded areas were or were not detected in the 12 torus bays at Unit 1 such that protective coating restoration was not needed, or there were corroded areas detected but the licensee decided not to restore the coating,
(3) whether the 16 torus bays, including the 12 bays mentioned above, have received applied protective coating restoration at Unit 1 torus,
(4) whether the proposed torus examination extension at Unit 1 is predicated on the application of the protective coating restoration of the Unit 1 torus bays,
(5) whether the entirety of Unit 1 torus bays have been restored with protective coating,
(6) whether the proposed torus examination extension is requested for approval before the protective coating is being restored in the Unit 1 torus.

Requests
(1) For the Unit 1 torus, discuss whether corroded areas were detected in the 12 torus bays during the inspection performed in the third period of the second CISI interval. If yes, discuss why the protective coating restoration was not applied to the corroded areas in the 12 torus bays.
(2) Clarify whether these remaining 12 torus bays at Unit 1 were re-examined during the first period of the third CISI interval. If yes, discuss whether the existing corroded areas have grown and whether new corroded areas were detected. If not examined, discuss when the next examination of the 12 bays will be performed.
(3) Discuss whether the protective coating restoration will be applied to all 16 torus bays or only the corroded locations at Unit 1 during the remaining refueling outages of the third CISI interval. If not, provide justification.
(4) Discuss and/or provide the design analysis and corrosion test data that allow examination extension and protective coating restorations of the uncoated corroded areas for the remaining refueling outages of the third CISI interval for the Unit 1 torus.
(5) Discuss why the examination extension (inspection every three periods) could be applied to the Unit 1 torus bays that have not had protective coating restoration applied.

ESEB/NVIB-RAI-7

Issue
Section 5.1 states, in part, that "…As an alternative to the 10% loss of nominal wall thickness specified in IWE-3513(a), Duke Energy proposes visual (VT-3) examinations revealing substrate pitting or other corrosive degradation that results in a remaining wall thickness of less than 145% of the design minimum allowable for substrate "pit" corrosion of the metallic liner nominal wall thickness will be considered relevant conditions…"

Subarticle IWE-3513(a) of the 2007 Edition of the ASME Code, Section XI discusses relevant conditions include corrosion that exceeds 10% of the nominal wall thickness. The NRC staff notes that 10% loss of nominal torus wall thickness is 0.0375 inches for the torus at Units 1 and 2. The NRC staff notes that the relief request does not provide the design minimum allowable thickness. Therefore, it is not clear how the proposed alternative acceptance criteria criterion of

145% of the design minimum allowable thickness is compared to the acceptance criterion of IWE-3513(a).

Requests
(1) Provide the acceptance criteria in terms of the percentage of material loss of the torus nominal wall thickness.
(2) Provide the technical basis in detail, including analyses and corrosion test data, of the acceptance criterion of 145% of the design minimum allowable.
(3) Provide the minimum allowable thicknesses of torus wall (e.g., general, and pitting corrosions).
(4) Discuss the corrective actions that will be taken if a corroded area exceeds the proposed acceptance criterion.
(5) If the size (depth and surface corroded area) of an indication is within the proposed acceptance criterion, discuss whether any actions will be taken.

NVIB-RAI-8

Issue
Section 5.1 of the relief request states, in part, that "…This visual (VT-3) reexamination shall be performed during the successive inspection interval at a frequency not to exceed every third inspection period from the previously visual (VT-3) examination…". The submerged torus walls at Units 1 and 2 contain corroded areas that have been and have not been recoated, and potential new corroded areas. It is not clear whether inspecting the torus wall every third inspection period (i.e., every 10 years) is adequate to monitor corroded areas with various degree of degradation. In addition, the relief request does not provide the corrosion test and operating experience data and analyses to justify the proposed examination extension.

Requests
(1) Discuss the technical basis to support the proposed inspection frequency (VT-3) of every third period for each of the following degradations:
(a) previously detected corroded areas that are not repaired (e.g., no coating restoration),
(b) the repaired of corroded areas,
(c) the new detected corroded areas and,
(d) areas that may degrade during every third period.
The technical basis should include analyses, corrosion test, and operating experience data to demonstrate the adequacy of the proposed every three periods.
(2) Clarify whether the proposed examination extension (every three periods) applies only to the recoated corroded areas that have been repaired with the protective coating restoration or applies to all areas (i.e., cases in items a, b, c, and d).
(3) During the upcoming Unit 1, 2026 refueling outage and Unit 2, 2025 refueling outages, will the licensee examine previously detected indications in torus bays to determine whether those indications have degraded further?
(4) Provide the inspection frequency for the detected indications that do not receive protective coating restoration under the proposed alternative?
(5) Discuss whether any indications that have not been repaired with the protective coating restoration. If yes, discuss whether coating will be restored at those indications during the Unit 1, 2026 refueling outage and Unit 2, 2025 refueling outage of the third CISI interval.

NVIB-RAI-9

Issue
Section 5.2 of the relief request states, in part, that "…On Brunswick Unit 2, visual (VT-3) examinations and protective coating restoration were performed on five (5) torus bays during the first period of the third containment inspection interval. Augmented visual (VT-1) examinations were neither required nor performed during these containment liner inspections… For these five torus bays on Brunswick Unit 2, Duke Energy proposes that successive visual (VT-1) examination during the next inspection period will not be performed, and the next scheduled visual (VT-3) examination will be performed during the fourth containment inspection interval…".

The NRC staff notes that:
(1) The 2007 edition of the ASME Code, Section XI, Table IWE-2500-1, Examination Category E-C, Item No. E4.11 requires a VT-1 examination be performed for the surface areas identified by IWE-1242 which refers to surface areas identified by IWE-1240, *Surface Areas Requiring Augmented Examination*. It is not clear why the VT-1 examination is not performed when a detected corroded area exceeds the 10% metal loss acceptance criterion of IWE-3513(a) during the first period of the third CISI interval at Unit 2.
(2) It is not clear why the VT-1 examination will not be performed on the corroded areas during the inspection that will be performed in the fourth CISI interval at Unit 2.

Requests
(1) Discuss why augmented VT-1 examinations were not performed during the first period of the third CISI interval when corrosion areas were detected on the torus bays at Unit 2.
(2) Discuss why the VT-1 examination will not be performed on the corroded areas during the inspection for the fourth CISI interval at Unit 2.

NVIB-RAI-10

Issue
Sections 4 and 5 of the relief-request discuss activities that have been and will be performed in various refueling outages and periods of the third CISI interval. However, it is not clear the exact timing of the activities that have been and will be performed with respect to the refueling outages and periods of the third CISI interval. Also, Section 6 of the request states, in part, that the duration of the relief request is for the third CISI interval only.

Requests
(1) For Units 1 and 2, provide a table and/or timeline showing the examination and repair activities with respect to the refueling outages and periods of the third CISI interval. Specifically
(a) provide the month and year of every refueling outage in the third CISI interval,
(b) indicate activities (examination and/or coating restoration) that have been and will be performed in the refueling outages in the third CISI interval,
(c) indicate which refueling outage belongs to which period of the third CISI interval,
(d) indicate the examination and potential repair activities that are scheduled for the refueling outage in the first period of the fourth CISI interval,
(e) confirm that the torus examination and repair activities beyond the third CISI interval are not covered by the subject relief request.
(2) Clarify whether the protective coating restoration is applied specifically to the corroded areas, not the entire submerged surface of the liners in all 16 torus bays at Units 1 and 2.

(3) Discuss how much material loss at the corroded location will the protective coating restoration be applied.
(4) Discuss whether protective coating restoration will be applied to those corroded areas that were detected in previous refueling outages and whose coating was not restored at the time of the detection.
(5) Discuss whether the protective coating restoration will be applied to the exposed substrate areas even if those areas are not degraded in the Units 1 and 2 torus.

From: Perry Buckberg
To: Duc, Joshua Brian
Cc: Luke Haeg
Subject: Draft RAI - Brunswick Torus Liner ISI Alternative L-2022-LLR-0089
Date: Monday, July 10, 2023 2:35:00 PM
Attachments: Draft RAI - Brunswick Torus Alt. Rqst. L-2022-LLR-0089 7-10-23.pdf

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Good afternoon Josh.

Attached is a draft Request for Additional Information (RAI) regarding the Duke Energy December 15, 2022, request or an alternative regarding the Brunswick torus liner ISI. Please review to ensure that there is no proprietary information contained in the draft RAI, that the questions are understandable, that the regulatory basis is clear and if the information was previously docketed.

Please let me know if TVA would like to schedule a clarification call to discuss the draft RAI.

Thanks,

Perry Buckberg
Senior Project Manager / Agency 2.206 Petition Coordinator
Office of Nuclear Reactor Regulation
(301)415-1383 O-08D02

REQUEST FOR ADDITIONAL INFORMATION L-2022-LLR-0089
ALTERNATIVE REQUEST FOR EXAMINATION OF TORUS METALLIC LINERS
DUKE ENERGY PROGRESS, LLC
BRUNSWICK STEAM ELECTRIC PLANT, UNITS 1 AND 2
DOCKET NOS. 50-325 AND 50-324

1.0 INTRODUCTION

By letter dated December 15, 2022 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML22349A655), Duke Energy Progress, LLC (the licensee) proposed alternatives to certain requirements of the 2007 Edition through 2008 Addenda of American Society of Mechanical Engineers (ASME) Boiler and Pressure Vessel Code, Section XI, Subsection IWE at the Brunswick Steam Electric Plant (Brunswick), Units 1 and 2.

Pursuant to Title 10, Code of Federal Regulations (CFR), Part 50, 10 CFR 50.55a(z)(1), the licensee submitted for the U.S. Nuclear Regulatory Commission (NRC) review and approval Relief Request Serial # RA-22-0308 regarding examinations of the torus metallic liners during the third 10-year containment inservice inspection (CISI) interval.

The NRC staff requests the following additional information (RAI) to complete its review of the alternative request.

2.0 REGULATORY EVALUATION

In accordance with 10 CFR 50.55a(g)(4), components that are classified as Class MC [metal containment] pressure retaining components and their integral attachments, and components that are classified as Class CC [concrete containment] pressure retaining components and their integral attachments, must meet the requirements set forth in Section XI of the ASME Code, *Rules for Inservice Inspection of Nuclear Power Plant Components*. The regulations require that all inservice inspection conducted during the first 10-year interval, and subsequent intervals, comply with the requirements in the latest edition and addenda of Section XI of the ASME Code, incorporated by reference into 10 CFR 50.55a(b), on the date 18 months prior to the start of the 10-year interval, subject to the conditions in 10 CFR 50.55a to the extent practical within the limitation of design, geometry, and materials of construction of the components.

For Brunswick, the code of record for the third 10-year CISI interval is the 2007 Edition and 2008 Addenda of Section XI of the ASME Code.

3.0 REQUEST FOR ADDITIONAL INFORMATION

NVIB-RAI-1

Issue
The licensee submitted the alternative request pursuant to 10 CFR 50.55a(z)(1). The regulation of 10 CFR 50.55a(z)(1) states that the proposed alternative would provide an acceptable level of quality and safety. It is not evident that the proposed alternative provides extensive analyses and testing to demonstrate the level of quality and safety. Therefore, it is not clear why the proposed alternative was submitted under 10 CFR 50.55a(z)(1).

Request
Discuss how the proposed alternative satisfies 10 CFR 50.55a(z)(1).

NVIB-RAI-2

Issue
Section 4.1 of the relief request states that "…The Brunswick Unit 1 and 2 Suppression Chamber (torus) containment metallic liner plate is 3/8-inch (375 mils) nominal thickness and backed by reinforced concrete…". Attachment 1 to the relief request presents two diagrams of the torus arrangement. However, the diagrams do not show how the reinforced concrete is joined with the torus wall metal plates. Thus, it is not clear how the torus liner plates are joined with the reinforced concrete.

Requests
(1) Discuss whether a gap or annulus exists between the torus wall and the reinforced concrete such that leaking coolant could be drained away from the torus.
(2) If a through wall leak does occur at a torus wall, discuss how the leakage can be detected and how soon the operator would be notified.
(3) Discuss the consequence if the torus coolant leaks into the annulus between the metal wall and the reinforced concrete without timely detection.

NVIB-RAI-3

Issue
Section 4.1 of the relief request states that "…The torus metallic liner remains fully capable of performing its intended design function with local substrate "pit" corrosion that does not result in a remaining wall thickness of less than 187 mils (t_{min}=3/16" or 50% nominal wall thickness) and with general area corrosion that does not result in a remaining wall thickness of less than 250 mils (t_{min} = 1/4" or 66% nominal wall thickness) …". The proposed alternative does not provide technical basis to support the claim that 50% and 66% nominal wall thickness for the local substrate pit corrosion and the general area corrosion, respectively, would maintain the design function. Also, the proposed alternative does not provide the definition of a local pit corrosion and general corrosion e.g., what is the dimension of the surface area that would be considered as a local pit corrosion vs. a general area corrosion.

Requests
(1) Discuss the technical basis of 50% and 66% nominal wall thickness for the local pit corrosion and the general area corrosion, respectively, that would support the design function of the torus.
(2) Define the general area corrosion and local substrate pit corrosion in term of surface area of the torus.
(3) Submit the calculations that demonstrate the acceptability of the proposed acceptance criteria for the flaw depth.

NVIB-RAI-4

Issue
Section 4.2.2 of the relief request states, in part, that the licensee applied protective coating on the submerged surface of all 16 torus bays at Unit 2 during the second CISI interval inspection in March 2015. Section 4.3.2 of the relief request states, in part, that in the third CISI interval inspection which began in May 2018, a corroded area that exceeded the 10% metal loss acceptance criterion was detected in a torus bay. It appears that the protective coating that applied to the torus interior surface in 2015 did not arrest the corrosion at that corroded area. In

addition, the proposed alternative does not provide data on the corrosion rate (mils per month or year).

Request
(1) Discuss the effectiveness of the protective coating restoration, e.g., how many years the protective coating can protect the torus wall from growth of an existing corroded area or from new corrosion to occur?
(2) Provide the maximum and average corrosion rate (mils per month or year) of the corroded areas detected in torus wall at Units 1 and 2.
(3) Specify the corrosion rate in torus wall used in the proposed acceptance criteria.

NVIB-RAI-5

Issue
Section 4.4.2 of the relief request states, in part, that "…For Brunswick Unit 1 torus submerged surfaces with substrate "pit" corrosion areas left uncoated during the second inspection interval (Brunswick Unit 1, March 2016), the engineering evaluation, proposed alternative visual (VT-3) examination acceptance criteria (Section 5.1), and the scheduled visual examinations during the next two refueling outages of the current third containment inspection interval…" It is not clear why the corroded areas have not been applied with protective recoating restoration during the second CISI interval at Unit 1 even though protective coating restoration was applied on the torus bays at Unit 2. It is not clear whether the uncoated corroded areas will be visually examined during each of the next two refueling outages or will be divided between the next two refueling outages in the third CISI interval.

Requests
(1) Discuss why protective coating was not applied during the second CISI interval to minimize further corrosion to the uncoated corroded areas at the Unit 1 torus.
(2) If the uncoated corroded areas on the Unit 1 torus walls were to further degrade during the next two refueling outages of the third CISI interval, discuss the corrective actions.
(3) Discuss whether all the uncoated corroded areas in Unit 1 torus will be visually examined in each of the next two refueling outages or will be divided between the two refueling outages in the third CISI interval.

NVIB-RAI-6

Issue
Section 4.4.2 of the relief request states, in part, that "…During Brunswick Unit 1 third containment inspection interval, there are three (3) remaining refueling outages. With the conservatism applied by the engineering evaluation to establish visual (VT-3) examination acceptance criteria and design minimum allowable thickness for the torus metallic liner, additional remaining service life may be attained and applied through additional design analysis. This additional analysis may allow extending the current scheduled visual examinations and protective coating restorations to the third remaining refueling outage of the current Brunswick Unit 1 current third containment inspection interval…".

Section 5.2 of the relief request states, in part, that "…On Brunswick Unit 1, visual (VT-3) examinations and protective coatings restoration of submerged surfaces in the remaining twelve (12) torus bays will continue during the current third inspection interval in accordance with Table IWE-2500-1, Examination Category E-A, Item Number E1.12. These twelve torus bays did not receive protective coating restoration during the third period of the previous second containment

inspection interval. Visual (VT-3) examinations during the current third containment inspection interval and engineering evaluation facilitate the monitoring of degradation of these torus metallic liner submerged surfaces. Duke Energy proposes that the engineering evaluation provides reasonable assurance that these torus submerged surfaces remain fully capable of performing its intended design function(s) during the current third containment inspection interval and until the next visual (VT-3) examination during the next two refueling outages of the current inspection interval…".

The staff is not clear on the following items:
(1) whether a third remaining refueling outage is scheduled in the third CISI interval,
(2) whether corroded areas were or were not detected in the 12 torus bays at Unit 1 such that protective coating restoration was not needed, or there were corroded areas detected but the licensee decided not to restore the coating,
(3) whether the 16 torus bays, including the 12 bays mentioned above, have received applied protective coating restoration at Unit 1 torus,
(4) whether the proposed torus examination extension at Unit 1 is predicated on the application of the protective coating restoration of the Unit 1 torus bays,
(5) whether the entirety of Unit 1 torus bays have been restored with protective coating,
(6) whether the proposed torus examination extension is requested for approval before the protective coating is being restored in the Unit 1 torus.

Requests
(1) For the Unit 1 torus, discuss whether corroded areas were detected in the 12 torus bays during the inspection performed in the third period of the second CISI interval. If yes, discuss why the protective coating restoration was not applied to the corroded areas in the 12 torus bays.
(2) Clarify whether these remaining 12 torus bays at Unit 1 were re-examined during the first period of the third CISI interval. If yes, discuss whether the existing corroded areas have grown and whether new corroded areas were detected. If not examined, discuss when the next examination of the 12 bays will be performed.
(3) Discuss whether the protective coating restoration will be applied to all 16 torus bays or only the corroded locations at Unit 1 during the remaining refueling outages of the third CISI interval. If not, provide justification.
(4) Discuss and/or provide the design analysis and corrosion test data that allow examination extension and protective coating restorations of the uncoated corroded areas for the remaining refueling outages of the third CISI interval for the Unit 1 torus.
(5) Discuss why the examination extension (inspection every three periods) could be applied to the Unit 1 torus bays that have not had protective coating restoration applied.

ESEB/NVIB-RAI-7

Issue
Section 5.1 states, in part, that "…As an alternative to the 10% loss of nominal wall thickness specified in IWE-3513(a), Duke Energy proposes visual (VT-3) examinations revealing substrate pitting or other corrosive degradation that results in a remaining wall thickness of less than 145% of the design minimum allowable for substrate "pit" corrosion of the metallic liner nominal wall thickness will be considered relevant conditions…"

Subarticle IWE-3513(a) of the 2007 Edition of the ASME Code, Section XI discusses relevant conditions include corrosion that exceeds 10% of the nominal wall thickness. The NRC staff notes that 10% loss of nominal torus wall thickness is 0.0375 inches for the torus at Units 1 and

2. The NRC staff notes that the relief request does not provide the design minimum allowable thickness. Therefore, it is not clear how the proposed alternative acceptance criteria criterion of 145% of the design minimum allowable thickness is compared to the acceptance criterion of IWE-3513(a).

Requests
(1) Provide the acceptance criteria in terms of the percentage of material loss of the torus nominal wall thickness.
(2) Provide the technical basis in detail, including analyses and corrosion test data, of the acceptance criterion of 145% of the design minimum allowable.
(3) Provide the minimum allowable thicknesses of torus wall (e.g., general, and pitting corrosions).
(4) Discuss the corrective actions that will be taken if a corroded area exceeds the proposed acceptance criterion.
(5) If the size (depth and surface corroded area) of an indication is within the proposed acceptance criterion, discuss whether any actions will be taken.

NVIB-RAI-8

Issue
Section 5.1 of the relief request states, in part, that "…This visual (VT-3) reexamination shall be performed during the successive inspection interval at a frequency not to exceed every third inspection period from the previously visual (VT-3) examination…". The submerged torus walls at Units 1 and 2 contain corroded areas that have been and have not been recoated, and potential new corroded areas. It is not clear whether inspecting the torus wall every third inspection period (i.e., every 10 years) is adequate to monitor corroded areas with various degree of degradation. In addition, the relief request does not provide the corrosion test and operating experience data and analyses to justify the proposed examination extension.

Requests
(1) Discuss the technical basis to support the proposed inspection frequency (VT-3) of every third period for each of the following degradations:
(a) previously detected corroded areas that are not repaired (e.g., no coating restoration),
(b) the repaired of corroded areas,
(c) the new detected corroded areas and,
(d) areas that may degrade during every third period.
The technical basis should include analyses, corrosion test, and operating experience data to demonstrate the adequacy of the proposed every three periods.
(2) Clarify whether the proposed examination extension (every three periods) applies only to the recoated corroded areas that have been repaired with the protective coating restoration or applies to all areas (i.e., cases in items a, b, c, and d).
(3) During the upcoming Unit 1, 2026 refueling outage and Unit 2, 2025 refueling outages, will the licensee examine previously detected indications in torus bays to determine whether those indications have degraded further?
(4) Provide the inspection frequency for the detected indications that do not receive protective coating restoration under the proposed alternative?
(5) Discuss whether any indications that have not been repaired with the protective coating restoration. If yes, discuss whether coating will be restored at those indications during the Unit 1, 2026 refueling outage and Unit 2, 2025 refueling outage of the third CISI interval.

NVIB-RAI-9

Issue
Section 5.2 of the relief request states, in part, that "…On Brunswick Unit 2, visual (VT-3) examinations and protective coating restoration were performed on five (5) torus bays during the first period of the third containment inspection interval. Augmented visual (VT-1) examinations were neither required nor performed during these containment liner inspections… For these five torus bays on Brunswick Unit 2, Duke Energy proposes that successive visual (VT-1) examination during the next inspection period will not be performed, and the next scheduled visual (VT-3) examination will be performed during the fourth containment inspection interval…".

The NRC staff notes that:
(1) The 2007 edition of the ASME Code, Section XI, Table IWE-2500-1, Examination Category E-C, Item No. E4.11 requires a VT-1 examination be performed for the surface areas identified by IWE-1242 which refers to surface areas identified by IWE-1240, *Surface Areas Requiring Augmented Examination*. It is not clear why the VT-1 examination is not performed when a detected corroded area exceeds the 10% metal loss acceptance criterion of IWE-3513(a) during the first period of the third CISI interval at Unit 2.
(2) It is not clear why the VT-1 examination will not be performed on the corroded areas during the inspection that will be performed in the fourth CISI interval at Unit 2.

Requests
(1) Discuss why augmented VT-1 examinations were not performed during the first period of the third CISI interval when corrosion areas were detected on the torus bays at Unit 2.
(2) Discuss why the VT-1 examination will not be performed on the corroded areas during the inspection for the fourth CISI interval at Unit 2.

NVIB-RAI-10

Issue
Sections 4 and 5 of the relief-request discuss activities that have been and will be performed in various refueling outages and periods of the third CISI interval. However, it is not clear the exact timing of the activities that have been and will be performed with respect to the refueling outages and periods of the third CISI interval. Also, Section 6 of the request states, in part, that the duration of the relief request is for the third CISI interval only.

Requests
(1) For Units 1 and 2, provide a table and/or timeline showing the examination and repair activities with respect to the refueling outages and periods of the third CISI interval. Specifically
(a) provide the month and year of every refueling outage in the third CISI interval,
(b) indicate activities (examination and/or coating restoration) that have been and will be performed in the refueling outages in the third CISI interval,
(c) indicate which refueling outage belongs to which period of the third CISI interval,
(d) indicate the examination and potential repair activities that are scheduled for the refueling outage in the first period of the fourth CISI interval,
(e) confirm that the torus examination and repair activities beyond the third CISI interval are not covered by the subject relief request.
(2) Clarify whether the protective coating restoration is applied specifically to the corroded areas, not the entire submerged surface of the liners in all 16 torus bays at Units 1 and 2.

(3) Discuss how much material loss at the corroded location will the protective coating restoration be applied.
(4) Discuss whether protective coating restoration will be applied to those corroded areas that were detected in previous refueling outages and whose coating was not restored at the time of the detection.
(5) Discuss whether the protective coating restoration will be applied to the exposed substrate areas even if those areas are not degraded in the Units 1 and 2 torus.