



UNITED STATES  
NUCLEAR REGULATORY COMMISSION  
WASHINGTON, D.C. 20555-0001

May 30, 2024

Mr. Ronald Gaston  
Vice President, Regulatory Assurance  
Entergy Services, LLC  
M-ECH-29  
1340 Echelon Parkway  
Jackson, MS 39213

SUBJECT: GRAND GULF NUCLEAR STATION, UNIT 1; RIVER BEND STATION, UNIT 1;  
AND WATERFORD STEAM ELECTRIC STATION, UNIT 3 – RE:  
AUTHORIZATION OF PROPOSED ALTERNATIVE EN-RR-22-001 TO USE  
ASME CODE CASE N-752, "RISK-INFORMED CATEGORIZATION AND  
TREATMENT FOR REPAIR/REPLACEMENT ACTIVITIES IN CLASS 2 AND 3  
SYSTEMS, SECTION XI, DIVISION 1" (EPID L-2022-LLR-0054)

Dear Ronald Gaston:

By letter dated June 30, 2022, as supplemented by letters dated April 21, 2023; January 12, 2024; and April 10, 2024, Entergy Operations, Inc. (Entergy, the licensee) requested authorization of a proposed alternative in Relief Request No. EN-RR-22-001 to the requirements of the American Society of Mechanical Engineers (ASME) Boiler and Pressure Vessel Code (ASME Code), Section XI, "Rules for Inservice Inspection of Nuclear Power Plant Components," for Grand Gulf Nuclear Station, Unit 1; River Bend Station, Unit 1; and Waterford Steam Electric Station, Unit 3. Specifically, Entergy requested to use ASME Code Case N-752, "Risk-Informed Categorization and Treatment for Repair/Replacement Activities in Class 2 and 3 Systems Section XI, Division 1," for determining the risk-informed categorization and for implementing alternative treatment for repair/replacement activities on moderate and high energy Class 2 and 3 items in lieu of certain ASME Code, Section XI, articles IWA-1000, IWA-4000, and IWA-6000 requirements.

Entergy submitted the request pursuant to Title 10 of the *Code of Federal Regulations* (10 CFR) Section 50.55a "Codes and Standards," on the basis that the proposed alternative would provide an acceptable level of quality and safety in accordance with 10 CFR 50.55a(z)(1).

ASME Code Case N-752 has not been approved by the U.S. Nuclear Regulatory Commission (NRC) staff or incorporated by reference for generic use. Therefore, the NRC staff reviewed the Entergy submittals as plant-specific requests for Grand Gulf Nuclear Station, Unit 1; River Bend Station, Unit 1; and Waterford Steam Electric Station, Unit 3.

The NRC staff has reviewed proposed alternative EN-RR-22-001, and concludes, as set forth in the enclosed safety evaluation, that the licensee has adequately addressed the regulatory requirements set forth in 10 CFR 50.55a(z)(1). Therefore, the NRC staff authorizes proposed alternative EN-RR-22-001 for the remainder of the fourth inservice inspection intervals at Grand Gulf Nuclear Station, Unit 1; River Bend Station, Unit 1; and Waterford Steam Electric Station, Unit 3, which started on December 1, 2017.

All other ASME Code, Section XI, requirements for which an alternative was not specifically requested and authorized in this alternative remain applicable, including third party review by the Authorized Nuclear Inservice Inspector.

If you have any questions, please contact the Entergy Fleet Project Manager, Mahesh Chawla, at 301-415-8371 or by email at [Mahesh.Chawla@nrc.gov](mailto:Mahesh.Chawla@nrc.gov).

Sincerely,

Jennivine K. Rankin, Chief  
Plant Licensing Branch IV  
Division of Operating Reactor Licensing  
Office of Nuclear Reactor Regulation

Docket Nos. 50-416, 50-458,  
and 50-382

Enclosure:  
Safety Evaluation

cc: Listserv



UNITED STATES  
NUCLEAR REGULATORY COMMISSION  
WASHINGTON, D.C. 20555-0001

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

PROPOSED ALTERNATIVE REQUEST EN-RR-22-001

"RISK-INFORMED CATEGORIZATION AND TREATMENT FOR REPAIR/REPLACEMENT

ACTIVITIES IN CLASS 2 AND 3 SYSTEMS, SECTION XI, DIVISION 1"

ENTERGY OPERATIONS, INC.

GRAND GULF NUCLEAR STATION, UNIT 1

RIVER BEND STATION, UNIT 1

WATERFORD STEAM ELECTRIC STATION, UNIT 3

DOCKET NOS. 50-416, 50-458, AND 50-382

1.0 INTRODUCTION

By letter dated June 30, 2022 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML22181B114), as supplemented by letters dated April 21, 2023 (ML23111A213); January 12, 2024 (ML24012A196); and April 10, 2024 (ML24101A388), Entergy Operations, Inc. (Entergy, the licensee) requested authorization of a proposed alternative in Relief Request No. EN-RR-22-001 to the requirements of the American Society of Mechanical Engineers (ASME) Boiler and Pressure Vessel Code (ASME Code), Section XI, "Rules for Inservice Inspection of Nuclear Power Plant Components," for Grand Gulf Nuclear Station, Unit 1 (Grand Gulf); River Bend Station, Unit 1 (River Bend); and Waterford Steam Electric Station, Unit 3 (Waterford 3). Specifically, Entergy requested to use ASME Code Case N-752, "Risk-Informed Categorization and Treatment for Repair/Replacement Activities in Class 2 and 3 Systems, Section XI, Division 1," for determining the risk-informed categorization and for implementing alternative treatment for repair/replacement activities on moderate and high energy Class 2 and 3 items in lieu of certain ASME Code, Section XI, articles IWA-1000, IWA-4000, and IWA-6000 requirements.

Entergy submitted the request pursuant to Title 10 of the *Code of Federal Regulations* (10 CFR) Section 50.55a "Codes and Standards," on the basis that the proposed alternative would provide an acceptable level of quality and safety in accordance with 10 CFR 50.55a(z)(1). ASME Code Case N-752 has not been approved by the U.S. Nuclear Regulatory Commission (NRC) or incorporated by reference for generic use. Therefore, the NRC staff reviewed the Entergy submittals as plant-specific requests for Grand Gulf, River Bend, and Waterford 3.

Enclosure

## 2.0 REGULATORY EVALUATION

### 2.1 Regulations

The regulations in 10 CFR 50.55a(g)(4), "Inservice inspection standards requirement for operating plants," state, in part, that ASME Code Class 1, 2, and 3 components must meet the requirements, except the design and access provisions and the preservice examination requirements, set forth in the Section XI of editions and addenda of the ASME Code and that are incorporated by reference.

The regulations in 10 CFR 50.55a(z), "Alternatives to codes and standards requirements," state, in part:

Alternatives to the requirements of [10 CFR 50.55a](b) through (h) of this section or portions thereof may be used, when authorized by the Director, Office of Nuclear Reactor Regulation. A proposed alternative must be submitted and authorized prior to implementation." The applicant or licensee must demonstrate that:

(1) *Acceptable level of quality and safety.* The proposed alternative would provide an acceptable level of quality and safety; or

(2) *Hardship without a compensating increase in quality and safety.* Compliance with the specified requirements of this section would result in hardship or unusual difficulty without a compensating increase in the level of quality and safety.

The licensee submitted this request pursuant to 10 CFR 50.55a(z)(1) on the basis that the proposed alternative would provide an acceptable level of quality and safety.

The regulation in 10 CFR 50.54 "Conditions of licenses," paragraph (a)(3), states, in part:

Each licensee described in paragraph (a)(1) of this section may make a change to a previously accepted quality assurance program description included or referenced in the Safety Analysis Report without prior NRC approval, provided the change does not reduce the commitments in the program description as accepted by the NRC. Changes to the quality assurance program description that do not reduce the commitments must be submitted to the NRC in accordance with the requirements of § 50.71(e). In addition to quality assurance program changes involving administrative improvements and clarifications, spelling corrections, punctuation, or editorial items, the following changes are not considered to be reductions in commitment:

... (ii) The use of a quality assurance alternative or exception approved by an NRC safety evaluation, provided that the bases of the NRC approval are applicable to the licensee's facility; ...

Appendix B to 10 CFR Part 50, "Quality Assurance Criteria for Nuclear Power Plants and Fuel Reprocessing Plants," establishes quality assurance (QA) requirements for the design, fabrication, construction, and testing of structures, systems, and components (SSCs).

## 2.2 Regulatory Guidance

Regulatory Guide (RG) 1.178, Revision 2, "Plant-Specific, Risk-Informed Decisionmaking for Inservice Inspections of Piping," dated April 2021 (ML21036A105).

RG 1.174, Revision 3, "An Approach for Using Probabilistic Risk Assessment in Risk-Informed Decisions on Plant-Specific Changes to the Licensing Basis," dated January 2018 (ML17317A256).

RG 1.177, Revision 2, "Plant-Specific Risk-Informed Decisionmaking: Technical Specifications," dated January 2021 (ML20164A034).

## 3.0 TECHNICAL EVALUATION

### 3.1 Applicable Code Edition and Addenda

The applicable ASME Code editions and addenda for the current inservice inspection (ISI) intervals are specified in the table below for Grand Gulf, River Bend, and Waterford 3:

<b>Plant</b>	<b>ISI Interval</b>	<b>ASME Section XI Code of Record</b>	<b>Interval Start</b>	<b>Interval End</b>
Grand Gulf	4 <sup>th</sup>	2007 Edition through 2008 Addenda	December 1, 2017	November 30, 2026
River Bend	4 <sup>th</sup>	2007 Edition through 2008 Addenda	December 1, 2017	November 30, 2027
Waterford 3	4 <sup>th</sup>	2007 Edition through 2008 Addenda	December 1, 2017	November 30, 2027

### 3.2 ASME Code Components Affected

As stated in the licensee's application dated June 30, 2022, the affected components are all ASME Class 2 and 3 items or components except the following:

- (a) Class CC<sup>1</sup> and MC<sup>2</sup> items
- (b) Piping within the break exclusion region [ $>$  Nominal Pipe Size (NPS) 4 (DN 100)] for high energy piping systems as defined by the Owner.
- (c) That portion of the Class 2 feedwater system [ $>$  NPS 4 (DN 100)] of pressurized water reactors (PWRs) from the steam generator (SG), including the SG, to the outer containment isolation valve.

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<sup>1</sup> Class CC items are concrete containment items for which the requirements are in ASME Code, subsection IWL of Section XI defined by Section III, Division 2, article CC-1000.

<sup>2</sup> Class MC items are metal containment or liners of concrete containments for which the requirements are in ASME Code, subsection IWE of Section XI described in Section III, subsection NE, article NE-1110.

### 3.3 Applicable Code Requirements

ASME Code, Section XI, subsection IWA provides the requirements for repair/replacement activities, including the following:

- IWA-1320 specifies group classification criteria for applying the rules of ASME Section XI to various Code Classes of components. For example, the rules in IWC apply to items classified as ASME Code Class 2 and the rules in IWD apply to items classified as ASME Code Class 3.
- IWA-1400(f) requires Owners to possess or obtain an arrangement with an Authorized Inspection Agency (AIA). (See note.)
- IWA-1400(j) requires Owners to perform repair/replacement activities in accordance with written programs and plans. (See note.)
- IWA-1400(n) requires Owners to maintain documentation of a quality assurance program in accordance with 10 CFR Part 50 or ASME NQA-1, Parts II and III. (See note.)
- IWA-4000 specifies requirements for performing ASME Section XI repair/replacement activities on pressure-retaining items or their supports.
- IWA-6210(d) and (e), specify Owner reporting responsibilities such as preparing Form NIS-2, Owner's Report for Repair/Replacement Activity. (See note.)
- IWA-6350 specifies that the following ASME Section XI repair/replacement activity records must be retained by the Owner: evaluations required by IWA-4160 and IWA-4311, Repair/Replacement Programs and Plans, reconciliation documentation, and NIS-2 Forms.

Note: In its application dated June 30, 2022, the licensee stated that ASME Code Case N-752 is based on the 2017 Edition of ASME Section XI, while Entergy's Code of record for Grand Gulf, River Bend, and Waterford 3 is the 2007 Edition/2008 Addenda, and provided the following cross-reference for affected code paragraphs:

- IWA-1400(g), (k), and (o) in the 2017 Edition are IWA-1400(f), (j), and (n) in the 2007 Edition/2008 Addenda.
- IWA-6211(d) and (e) in the 2017 Edition are IWA-6210(d) and (e) in the 2007 Edition/2008 Addenda.
- IWA-6211(f) and IWA 6212 in the 2017 Edition do not exist in or apply to the 2007 Edition/2008 Addenda.

### 3.4 Proposed Alternative

Entergy proposes to use ASME Code Case N-752 as an alternative for the ASME Code requirements specified in section 3 of the enclosure to its application dated June 30, 2022. The licensee stated, in part, that Code Case N-752 provides a process for determining the risk-

informed categorization and treatment requirements for Class 2 and 3 pressure retaining items or the associated supports and that the process may be applied on a system basis or on individual items within selected systems. In section 5.1, "Overview of Code Case N-752," of its application dated June 30, 2022, the licensee stated, in part:

Code Case N-752 categorization methodology relies on the conditional core damage and large early release probabilities associated with postulated ruptures. Safety significance is generally measured by the frequency and the consequence of the event. However, the risk-informed process categorizes components solely based on consequence, which measures the safety significance of the component given that it ruptures (component failure is assumed with a probability of 1.0). This approach is conservative compared to including the rupture frequency in the categorization as this approach will not allow the categorization of SSCs to be affected by any changes in frequency due to changes in treatment. It additionally applies deterministic considerations (e.g., defense in depth, safety margins) in determining safety significance. Additional detail is provided [in] Section 5.2 [of the application].

The risk-informed process categorizes components as either high safety-significant (HSS) or LSS [low safety-significant]. HSS components must continue to meet ASME Section XI rules for repair/replacement activities. LSS components are exempt from ASME Section XI repair/replacement requirements and can be repaired/replaced in accordance with treatment requirements established by the Owner. The treatment requirements must provide reasonable confidence that each LSS item remains capable of performing its safety-related functions under design basis conditions. Component supports, if categorized, are assigned the same safety significance, HSS or LSS, as the highest passively ranked segment within the bounds of the associated analytical pipe stress model. The categorization and treatment requirements of Code Case N-752 are consistent with those in 10 CFR 50.69.

It should be noted that Code Case N-752 is based on ANO-2 [Arkansas Nuclear One (ANO), Unit 2] relief request ANO2-R&R-004, Revision 1, dated April 17, 2007 (Reference 4 [ML071150108]). The NRC approved relief request ANO2-R&R-004, Revision 1, in a safety evaluation dated April 22, 2009 (Reference 1 [ML090930246]). The ANO-2 relief request was developed to serve as an industry pilot for implementing a risk-informed repair/replacement process that included a risk-informed categorization process and treatment requirements.

Entergy is not requesting NRC approval to implement 10 CFR 50.69 in this relief request. This process would not apply to Class 1 items and systems. The process requires the Owner to define alternative treatment requirements and confirm with reasonable confidence that each LSS item remains capable of performing its safety-related function. These treatment requirements must cover items such as design control, procurement, installation, configuration control, and corrective actions.

The NRC staff authorized the ANO licensee to utilize Request for Alternative ANO2-R&R-004, Revision 1, for determining the risk-informed categorization and for implementing alternative treatment for repair/replacement activities on moderate and high energy Class 2 and 3 items at ANO-2. By letter dated April 22, 2009, the NRC staff authorized the alternative.

After ASME approval of Code Case N-752 in June 2019, Entergy submitted a proposed alternative in Relief Request No. EN-RR-20-001, Revision 1, for ANO, Units 1 and 2, which was subsequently approved by the NRC in a safety evaluation (SE) dated May 19, 2021 (ML21118B039). In its application dated June 30, 2022, Entergy stated that this request for Grand Gulf, River Bend and Waterford 3 is based upon and consistent with approved ANO alternative EN-RR-20-001, Revision 1.

### 3.5 NRC Staff Evaluation

The NRC evaluated the licensee's application, as supplemented, to determine if the proposed alternative met an acceptable level of quality and safety, as required by the regulations, and described in section 2.0 of this SE.

#### 3.5.1 Probabilistic Risk Assessment Technical Acceptability

The proposed plant-specific approach for Grand Gulf, River Bend, and Waterford 3 takes advantage of the ANO precedents and utilizes the risk-informed categorization process in appendix I of Code Case N-752 for ASME Class 2 and 3 systems. The process requires confirmation of the technical adequacy of the probabilistic risk assessment (PRA) model for its risk-informed ISI (RI-ISI) program to confirm the applicability for categorization, including verification of assumptions on equipment reliability. The alternative authorized for ANO2-R&R-004, Revision 1 for ANO, Unit 2, demonstrated adequate PRA technical requirements, as outlined in the NRC staff's SE dated April 22, 2009, and has been used by numerous nuclear power plants for risk-informed categorization and treatment of Class 2 and 3 systems.

The NRC staff's review of the Grand Gulf, River Bend, and Waterford 3 PRAs was based on staff's previous determination that the PRA models were found acceptable to support issuance of amendments to adopt Technical Specifications Task Force (TSTF) traveler TSTF-425, Revision 3, "Relocate Surveillance Frequencies to Licensee Control – RITSTF [Risk-Informed TSTF] Initiative 5b," dated June 11, 2019, April 29, 2019, and July 26, 2016, respectively (ML19094A799, ML19066A008, and ML16159A419). The license amendment requests note for Grand Gulf and River Bend, that all open facts and observations (F&Os) were found to be closed by an independent F&O closure review team per Nuclear Energy Institute (NEI) 05-04/07-12/12-06 Appendix X, "Close-Out of Facts and Observations (F&Os)" (Package ML17086A431), in August 2017. In response to Request for Additional Information (RAI) 1 in its letter dated January 12, 2024, the licensee stated that a closure review was done utilizing NEI 17-07, Revision 2, "Performance of PRA Peer Reviews Using the ASME/ANS [American Nuclear Society] PRA Standard" (ML19241A615), for Waterford 3, and there are no remaining open findings.

In its application dated June 30, 2022, the licensee stated, in part:

Entergy intends to review and assess the existing [Grand Gulf, River Bend, and Waterford 3] PRAs used to support the evaluations required by Code Case N-752 to verify their technical adequacy.

Entergy shall review changes to the plant, operational practices, applicable plant and industry operational experience, and, as appropriate, update the PRA and categorization and treatment processes. Entergy shall perform this review in a timely manner but no longer than once every two refueling outages. This



approach is consistent with the feedback and adjustment process of 10 CFR 50.69(e).

Although the passive methodology proposed in alternative EN-RR-22-001 is similar to that used in the RI-ISI program, the licensee confirmed that it will continue to review and assess the existing PRAs to verify that they support the evaluations required by the proposed alternative as part of its program to maintain a feedback and process adjustment process. This is consistent with that of 10 CFR 50.69(e) to update the PRA categorization and treatment processes based on review of changes to the plant, operational practices, and applicable plant and industry operational experiences. The NRC finds this approach for PRA technical adequacy, feedback, and process adjustment to be acceptable.

#### Active Function Evaluation

In its response to RAI No. 4b in the letter dated April 21, 2023, the licensee stated that for pressure retaining components that have a passive function as well as an active function, the proposed alternative categorization process only applies to the pressure boundary function of these components, and no treatment changes will be applied to the active function as a result of implementing the proposed alternative. The consequence evaluation methodology of the proposed alternative must address not only the postulated failure of the subject pressure boundary component (e.g., loss of a flow path) but also other direct and indirect failures including any effects of the active function. Therefore, while treatment requirements for the active portion of the pressure retaining components are not within the scope of the proposed alternative, the assessment of the impact to the active function is required by the proposed plant-specific methodology.

The proposed categorization methodology is the consequence evaluation portion of Electric Power Research Institute Topical Report (TR)-112657 Revision B-A, "Revised Risk-Informed Inservice Inspection Procedure" (ML013470102), which is the foundational methodology for several risk-informed applications related to SSCs that perform pressure boundary functions. These applications include ASME Code Case 660, "Risk-Informed Safety Classification for Use in Risk-Informed Repair/Replacement Activities Section XI, Division I"; RI-ISI programs; and alternative ANO-R&R-004, Revision 1. Relative risk measures such as Fussell-Vesely (F-V) and Risk Reduction Worth (RRW) are not applied for these applications, in part, because passive components and pressure retaining portion of active components typically have very low failure rates/probabilities; and common cause failure probabilities are also very low and would reach orders of magnitude below the truncation levels of the PRA. As such, using relative importance measures such as F-V and RRW identifies the vast majority of pressure boundary components and pressure retaining functions of active components as low safety significant. The F-V and RRW importance measures are often used for the selection of candidates for improvement and enhanced maintenance, whereas the conditional core damage probability (CCDP) criteria, applied in Code Case N-752, and thus Entergy plant-specific requests EN-RR-22-001, is useful for identifying components that should be prevented from failing using repair/replacement, planned maintenance and other treatment requirements. Section -1420(c), of ASME Code Case 752 states:

(c) Changes in configuration, design, materials, fabrication, examination, and pressure-testing requirements used in the repair/replacement activity shall be evaluated, as applicable, to ensure the structural integrity and leak tightness of the system are sufficient to support the design bases functional requirements of the system.

These requirements, in addition to those outlined in the proposed alternative as explained in this safety evaluation, provide reasonable confidence that passive components and pressure retaining functions of active components will continue to perform their design basis functions, and, therefore, would not impact the basis for not using F-V.

### Risk Tables

The proposed alternative references ASME Code Case N-752, which allows for the use of risk tables as identified in tables I-1, I-2, I-3 and I-4 in lieu of CCDP or conditional large early release probability. As explained in both alternative ANO-R&R-004, Revision 1, and Code Case N-752, differences in consequence rank between the use of risk tables and quantitative indices shall be reviewed, justified, and documented or the higher consequence rank assigned.

### Review of Key Principles

The NRC staff evaluated the application with respect to the RG 1.174 Key Principles. These key principles are:

- Principle 1: The proposed licensing basis change meets the current regulations unless it is explicitly related to a requested exemption (i.e., a specific exemption under 10 CFR 50.12).
- Principle 2: The proposed licensing basis change is consistent with the defense-in-depth philosophy.
- Principle 3: The proposed licensing basis change maintains sufficient safety margins.
- Principle 4: When the proposed licensing basis change results in an increase in risk, the increases should be small and consistent with the intent of the Commission's policy statement on safety goals for the operations of nuclear power plants.
- Principle 5: The impact of the proposed licensing basis change should be monitored by using performance measures strategies.

#### Key Principle 1:

The proposed change would authorize the licensee to use the provisions in ASME Code Case N-752 as an alternative to certain requirements of ASME Code, Section XI, pursuant to 10 CFR 50.55a(z)(1).

The NRC staff's evaluation of this request in section 3.5 of this SE provides the staff's basis for its determination that the proposed alternative provides an acceptable level of quality and safety in accordance with the regulations with respect to PRA technical acceptability, alternative code and standards acceptability, and QA.

In addition, the NRC staff finds that the licensee's adherence to the elements covered in Code Case N-752 for repair/replacement activities, discussed in section 3.5.2 of this SE, provides reasonable confidence that each LSS item will remain capable of performing its safety-related

function. The repair/replacement program quality elements will ensure that the LSS items remain capable of performing their design safety function.

While the NRC staff believes that a clearly defined code or standard is preferable for the predictability and clarity of the alternative treatment to be implemented, the staff concludes that the proposed alternative permits acceptable flexibility in treatment alternatives, specifically for Class 2 and 3 LSS components, through a methodology based on the NRC-approved alternative ANO2 R&R-004 precedent and Entergy's plant-specific evaluation. Because the proposed alternative treatment is limited to LSS components, with defined treatment requirements (e.g., design control, corrective action, etc.) described in the enclosure to the licensee's application, the NRC staff finds that the codes and standards, as described, provide an acceptable level of quality and safety.

#### Key Principle 2:

In its supplemental letter dated April 21, 2023, the licensee stated that it is requesting to use ASME Code Case N-752 with no exceptions or deviations. The categorization process described in Code Case N-752 includes the consideration of defense-in-depth (DID). According to section I-3.4.2(6) of Appendix I of Code Case N-752, the categorization process demonstrates that the DID philosophy is maintained if the following requirements in Code Case N-752 are met:

- a) Reasonable balance is preserved among prevention of core damage, prevention of containment failure or bypass, and mitigation of an offsite release.
- b) There is no over-reliance on programmatic activities and operator actions to compensate for weaknesses in the plant design.
- c) System redundancy, independence, and diversity are preserved commensurate with the expected frequency of challenges, consequences of failure of the system, and associated uncertainties in determining these parameters.
- d) Potential for common cause failures is taken into account in the risk analysis categorization.
- e) Independence of fission-product barriers is not degraded.

In its application dated June 30, 2022, the licensee stated, in part:

The risk-informed methodology of Code Case N-752 may be applied on a system basis or on individual items within selected systems. Paragraph -1100 of Code Case N-752 states: "This Case may be applied on a system basis, including all pressure retaining items and their associated supports, or on individual items categorized LSS within the selected systems." While this is the case, the risk-informed methodology is, in actuality, applied to the pressure boundary function of the individual components within the system. The risk-informed methodology contained in Code Case N-752 requires that the component's pressure boundary function be assumed to fail with a probability of 1.0, and all impacts caused by the loss of the pressure boundary function be identified. This would include identifying impacts of the pressure boundary failure on the component under evaluation, identifying impacts of the pressure boundary failure of the component

on the system in which the component resides, as well as identifying impacts of the pressure boundary failure of the component on any other plant SSC. This includes direct effects (e.g., loss of the flow path) of the component failure and indirect effects of the component failure (e.g., flooding, spray, pipe whip, loss of inventory). This comprehensive assessment of total plant impact caused by a postulated individual component failure is then used to determine the final consequence ranking.

The proposed alternative does not alter any SSCs and will have no effect on layers of defense, or system redundancy. Additionally, the proposed alternative requires that the DID philosophy be maintained. Therefore, the NRC staff concludes that the proposed change is consistent with the defense-in-depth philosophy.

Key Principle 3:

In section 5.2, "Basis for Use," of the enclosure to its application dated June 30, 2022, the licensee stated, in part:

Consequence evaluation results are ranked as High, Medium, Low, or None (no change to base case). Piping segments/components ranked as High by the consequence evaluation process are considered HSS and require no further review. Piping segments/components ranked as Medium, Low, or None by the consequence evaluation shall be determined to be HSS or LSS by evaluating the additional categorization considerations or conditions outlined in paragraph I-3.4.2(b) of Code Case N-752. If any of these conditions are not met, then HSS shall be assigned. If all conditions are met, then LSS may be assigned.

In section I-3.2.2, "Classification Considerations," of the enclosure, attachment, "Comparison of the Risk-Informed Categorization Process in Relief Request ANO2-R&R-004, Revision 1 to ASME Code Case N-752," to the application dated June 30, 2022, the licensee identified the following categorization consideration applicable to ANO2-R&R-004, Revision 1, as approved by the NRC staff:

- c) If LSS has been assigned, the categorization process shall verify that there are sufficient margins to account for uncertainty in the engineering analysis and in the supporting data. Margin shall be incorporated when determining performance characteristics and parameters (e.g., piping segment, system, and plant capability or success criteria). The amount of margin should depend on the uncertainty associated with the performance parameters in question, the availability of alternatives to compensate for adverse performance, and the consequences of failure to meet the performance goals. Sufficient margins are maintained by ensuring that safety analysis acceptance criteria in the plant licensing basis are met, or proposed revisions account for analysis and data uncertainty. If sufficient margins are maintained LSS should be assigned; if not, HSS shall be assigned.

For this classification consideration, the licensee stated that these Code Case N-752 requirements are the same as those specified in ANO2-R&R-004, Revision 1.

Additionally, the design basis functions of SSCs, as described in the respective plants' licensing basis, including the Updated Final Safety Analysis Reports and Technical Specifications Bases, do not change and should continue to be met. Similarly, there is no impact to safety analysis acceptance criteria as described in the plant licensing basis. On this basis, the NRC staff concludes that the licensee's proposed categorization process ensures that sufficient safety margins will be maintained.

Key Principle 4:

The passive categorization process is driven by the consequence of failure in that the process conservatively assumes that a failure occurs with a probability of 1.0. As such, some postulated passive failures will be categorized as HSS while, from a pure risk perspective, they may be low safety significant. As an example, postulated failures with CCDF values of  $5E-04$  are HSS per the passive categorization process. However, many passive components have failure frequencies of  $1E-08$  and lower. Thus, if failure frequency were to be considered, passive components may be shown quantitatively to be low safety significant.

The NRC staff notes that the proposed changes in treatments are not expected to result in significant changes to existing low failure frequencies and there is reasonable confidence that the affected SSCs would retain the capability and reliability of the design basis function, as discussed in section 3.5.1 of this SE.

Therefore, the NRC staff concludes that the proposed change would result in at most small changes to core damage frequency or risk in accordance with the Commission's Policy Goal Statement.

Key Principle 5:

In its application dated June 30, 2022, the licensee described how the impact of the proposed changes would be monitored using performance management strategies.

The licensee stated, in part, in its application:

Entergy shall review changes to the plant, operational practices, applicable plant, and industry operational experience, and, as appropriate, update the PRA and categorization and treatment processes. Entergy shall perform this review in a timely manner but no longer than once every two refueling outages.

The licensee also stated in its application:

Baseline examination (e.g., preservice examination) of the items affected by the repair/replacement activity, if required, shall be performed in accordance with requirements of the applicable program(s) specifying periodic inspection of items.

The licensee further stated in its application:

Conditions that would prevent an LSS item from performing its safety related function(s) under design basis conditions will be corrected in a timely manner. For significant conditions adverse to quality, measures will be taken to provide reasonable confidence that the cause of the condition is determined, and corrective action taken to preclude repetition. Corrective action of adverse

conditions associated with LSS items will be identified and addressed in accordance with Entergy's existing corrective action program.

Based on the information provided in the application and above, the NRC staff concludes that that LSS items would be monitored appropriately using performance management strategies.

### Risk Conclusion

Based on the above, the NRC staff finds, with reasonable assurance, that the Grand Gulf, River Bend, and Waterford 3 PRAs reflect the as-built, as-operated plants to support the safety significance categorization of proposed alternative EN-RR-22-001, and that the feedback and process adjustments for the PRAs will be maintained in a manner to support the categorization and treatment for the repair/replacement of Class 2 and 3 items.

### 3.5.2 Alternative Treatment and Codes and Standards Acceptability

#### Alternative Treatment

In evaluating the licensee's alternative treatment requirements of proposed alternative EN-RR-22-001, the NRC staff considered the past precedent of previous NRC approved methods relating to risk-informed treatment of SSCs for nuclear power plants. As noted in the licensee's submittal dated June 30, 2022, these include previous NRC approvals of the use of ANO precedents and 10 CFR 50.69. While the licensee has not requested to implement 10 CFR 50.69 in this proposed alternative, the licensee stated that the categorization and treatment requirements applicable to repair/replacement activities in its proposed alternative, which relies on the ANO precedents and plant-specific applicability of ASME Code Case N-752, are consistent with NRC requirements specified in 10 CFR 50.69<sup>3</sup>. While Code Case N-752 has not been approved by the NRC or incorporated by reference for generic use, the NRC staff finds that it has some applicable treatment for plant-specific evaluation and use.

Licensees that have implemented 10 CFR 50.69 may specify alternative treatment for Risk-Informed Safety Class (RISC)-3 and RISC-4 SSCs to the ISI, and repair and replacement (except for fracture toughness), requirements for ASME Class 2 and Class 3 SSCs in 10 CFR 50.55a(g). As noted above, not all the plants in this review have implemented 10 CFR 50.69. However, Code Case N-752 also permits exemptions from ASME Code, Section XI, subsection IWA requirements for repair/replacement activities. The specified exemptions in Code Case N-752 are consistent with scope of the requirements for RISC-3 and RISC-4 SSCs listed in 10 CFR 50.69(b)(1) that licensees can voluntarily exempt after implementation of 10 CFR 50.69.

Code Case N-752 requires the licensees to define alternative treatment requirements that confirm with reasonable confidence that each LSS item remains capable of performing its safety-related functions under design-basis conditions. Code Case N-752, paragraph –1420,

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<sup>3</sup> By letter dated June 6, 2023 (ML23158A044), Entergy submitted a license amendment request to adopt 10 CFR 50.69 at Grand Gulf. The Grand Gulf request is currently under NRC staff review. By letters dated November 30, 2022 (ML22300A208), and May 16, 2024 (ML24093A089), the NRC staff issued Waterford 3 Amendment No. 269 and River Bend Amendment No. 214, respectively, authorizing the facilities to implement 10 CFR 50.69.

“LSS Items,” describes the characteristics that must be addressed by the licensee’s alternate treatment for these activities on LSS components. The elements covered include:

- (a) Establishing administrative controls for these repair/replacement activities.
- (b) Fracture toughness requirements of the original Construction Code and Owner’s Requirements shall be met.
- (c) Evaluation of changes in configuration, design, materials, fabrication, examination, and pressure-testing requirements of the repair/replacement activity, as applicable, to ensure the structural integrity and leak-tightness of the system are sufficient to support the design bases functional requirements of the system.
- (d) Items used for repair/replacement activities shall meet the Owner’s Requirements or revised Owner’s Requirements as permitted by the licensing basis.
- (e) Items used for repair/replacement activities shall meet the Construction Code to which the original item was constructed. Alternatively, items used for repair/replacement activities shall meet the technical requirements of a nationally recognized code, standard, or specification applicable to that item.
- (f) Repair methods of nationally recognized post construction codes and standards applicable to the item may be used.
- (g) Repair/replacement activities, and associated non-destructive examination, shall be in accordance with the Owner’s Requirements and, as applicable, the Construction Code, or post-construction code or standard, selected for the repair/replacement activity. Alternative examination methods may be used, as approved, by the Owner. Non-destructive examination personnel may be qualified in accordance with IWA-2300, in lieu of the Construction Code.
- (h) Pressure testing of the repair/replacement activity shall be performed in accordance with the requirements of the Construction Code selected for the repair/replacement activity or shall be established by the Owner.
- (i) Baseline examination of the items affected by the repair/replacement activity, if required, shall be performed in accordance with the requirements of the Owner’s program for periodic inspection of the item selected for examination.

Therefore, the NRC staff concludes that each LSS item will remain capable of performing its safety-related function based on the licensee’s adherence to the above elements covered in Code Case N-752 for repair/replacement activities.

#### Codes and Standards Alternative

The NRC staff’s review of the specific alternative codes and standards identified potential areas of uncertainty in assessing the quality of the proposed alternate treatment. In section 5.2.E in the enclosure to its application dated June 30, 2022, the licensee listed the alternative treatments related to paragraph -1420 of ASME Code Case N-752. The NRC staff found sections 5.2.E.1 through 5.2.E.10 are equivalent to subparagraphs -1420(a) through (j) of Code Case N-752. The NRC staff again notes that the Code Case N-752 has not been approved by

the NRC or incorporated by reference for generic use. Therefore, the NRC staff's review focused on the plant-specific regulatory and technical evaluation.

In reviewing the licensee's plant-specific alternative treatment wording of section 5.2.E of its application dated June 30, 2022, the NRC staff evaluated the alternative requirements in lieu of current regulatory requirements for codes and standards. The NRC staff recognizes that the general basis for the proposed alternative's approach was to replace the requirements of Section XI of the ASME Code with requirements from the original Construction Code, Owner's Requirements, and nationally recognized codes, standards, or specifications applicable to the LSS categorized item as permitted by the licensing basis.

However, the NRC staff notes that implementation of ASME Code Case N-752 only allows the licensee flexibility on ASME Section XI and QA requirements. Other programs and processes such as design control, the 10 CFR 50.59 change control process, supply chain/procurement processes, corrective action/problem identification and resolution, testing and monitoring programs (e.g. RI-ISI, in-service testing, license renewal aging management, buried pipe program, etc.), and the facility technical specification requirements (including surveillances) remain in place. These programs enable the licensee to monitor the condition of components, identify degradation, and correct the degradation in a timely manner.

In addition, ASME Code Case N-752, paragraph -1420 specifies that the Owner is responsible for confirming "with reasonable confidence that each LSS items remains capable of performing its safety related functions under design-basis conditions" when defining requirements for design, procurement, installation, etc., for LSS items. As such, Owners must select an appropriate code or standard for performing repair/replacement activities on LSS items.

While the NRC staff believes that a clearly defined code or standard is preferable for the predictability and clarity of the alternate treatment to be implemented, the staff concludes that proposed alternative EN-RR-22-001 permits acceptable flexibility in treatment alternatives, specifically for Class 2 and 3 LSS components, through a methodology based on the NRC-approved alternative ANO2 R&R-004 precedent and Entergy's plant-specific evaluation. Because the proposed alternative treatment is limited to LSS components, with defined treatment requirements (e.g., design control, corrective action, etc.) described in section 5.2.E of the enclosure to the licensee's application, the NRC staff finds that the codes and standards, as described, provide an acceptable level of quality and safety.

### 3.5.3 Quality Assurance

The proposed alternative would allow LSS items to be exempt from ASME Code, Section XI, IWA-1400(n), which requires the licensee to document repair and replacement activities via a Quality Assurance Program (QAP) in accordance with Appendix B to 10 CFR Part 50 or ASME NQA-1. In Entergy's submittal dated June 30, 2022, the licensee mentions footnote (1) in Code Case N-752, which states, "If compliance with 10 CFR 50 Appendix B or NQA-1 is required at the Owner's facility, IWA-1400(o) is not exempt."<sup>4</sup> For clarity, while the term "exempt" is used in the cited footnote, the proposed alternative does not exempt the LSS components from the requirements of Appendix B to 10 CFR Part 50, as any exemption from an NRC regulatory requirement in 10 CFR Part 50 would need to be requested and considered under 10 CFR 50.12, "Specific exemptions," or other more specific provisions, as appropriate.

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<sup>4</sup> The NRC staff notes that the reference of IWA-1400(o) vs. IWA-1400(n) is due to different editions and addenda of the ASME Code, but that the content is the same.



However, the proposed alternative allows for altering the treatment of those LSS components under the provisions of Appendix B to 10 CFR Part 50. In accordance with 10 CFR 50.54(a)(3), when the use of a QA alternative or exception is approved by an NRC SE, licensees may make changes to a previously accepted Quality Assurance Program Manual (QAPM) without prior NRC approval provided the bases of the approval are applicable to the licensee's facility. The NRC staff issued an SE approving a proposed change to the QAPM at ANO under 10 CFR 50.54(a)(4) with specific QA requirements under Appendix B to 10 CFR Part 50 for safety-related Class 2 and Class 3 components categorized as LSS when implementing Code Case N-752. The NRC approval of the changes to the QAPM at ANO are based on the specific QA requirements for safety-related LSS Class 2 and Class 3 components when implementing Code Case N-752 documented in the Entergy submittals dated October 26, 2020 (ML20300A324), April 5, 2021 (ML21095A244), and April 30, 2021 (ML21120A326). In its submittal dated October 26, 2020, Entergy proposed changes to its QAPM, which would allow sites that have been authorized to utilize Code Case N-752 to use the alternative repair/replacement categorization and treatment requirements of Code Case N-752 in lieu of the corresponding sections of ASME Code, Section XI. Further, alternate treatment of safety-related Class 2 and 3 SSCs (identified as LSS) in accordance with Code Case N-752 are not required to meet the requirements of the QAPM. Instead, Entergy would continue using current quality assurance processes and procedures, as supplemented with additional procurement requirements and controls, for the treatment of these LSS SSCs to ensure continued capability and reliability of the design-basis function. The procedures governing these treatment activities are classified as safety-related and therefore, under the jurisdiction of Appendix B to 10 CFR Part 50.

In a request for confirmation of information (RCI) by email dated March 27, 2024 (ML24088A009), the NRC staff requested Entergy to confirm that:

1. Safety-related Class 2 and 3 SSCs categorized as LSS when implementing Code Case N-752 at ANO (and thus Grand Gulf, River Bend, and Waterford 3 if the NRC staff authorizes the requested alternative) are being treated in accordance with existing QAP procedures and processes that fall under the jurisdiction of Appendix B to 10 CFR Part 50.
2. The additional supplemental requirements and controls, as described in the Entergy letter dated April 30, 2021, used to confirm with reasonable assurance that Class 2 and 3 LSS SSCs will remain capable of performing their intended safety-related functions under design basis conditions, are currently being implemented and have been incorporated into the existing ANO QAP procedures used for the procurement of safety-related Class 2 and 3 LSS SSCs and will also be incorporated into the Grand Gulf, River Bend, and Waterford 3 QAP procedures, if the NRC staff authorizes the requested alternative.

In its response to the RCI by letter dated April 10, 2024 (ML24101A388), Entergy confirms that:

- safety-related Class 2 and 3 structures, systems, and components (SSCs) categorized as Low Safety Significance (LSS) when implementing Code Case N-752 at [ANO Units 1 and 2] are being treated in accordance with existing Quality Assurance Program (QAP) procedures and processes that fall under the jurisdiction of Appendix B to 10 CFR Part 50.

- safety-related Class 2 and 3 SSCs categorized as LSS when implementing Code Case N-752 at Grand Gulf Nuclear Station (GGNS), River Bend Station (RBS), and Waterford 3 (WF3), when authorized, will be treated in accordance with existing QAP procedures and processes that fall under the jurisdiction of Appendix B to 10 CFR Part 50.
- the additional supplemental requirements and controls, as described in the Entergy letter dated April 30, 2021..., used to confirm with reasonable assurance that Class 2 and 3 LSS SSCs will remain capable of performing their intended safety-related functions under design basis conditions, are currently implemented and have been incorporated into the existing QAP procedures used for the procurement of safety-related Class 2 and 3 LSS SSCs for ANO. The existing QAP procedures will be used for the procurement of safety-related Class 2 and 3 LSS SSCs for GGNS, RBS, and WF3 following authorization.

The NRC staff reviewed the proposed change to the Entergy's QAPM and response to the RCI, and concluded that the proposed alternative, as described above, still met the requirements of Appendix B to 10 CFR Part 50, which includes the alternate treatment requirements of Code Case N-752 and the use of current safety-related procedures to address program elements of the treatment requirements of the LSS items.

### 3.6 NRC Staff Conclusion

Based on information provided, the NRC staff finds that: (1) the proposed risk categorization methodology will satisfactorily classify the affected Class 2 and 3 components as HSS or LSS, (2) the alternate treatment requirements in the proposed alternative will provide reasonable assurance that each LSS item remains capable of performing its safety-related function, (3) the current RI-ISI program will continue, (4) the licensee's corrective action program will continue to provide actions to correct conditions that could prevent an LSS item from performing its safety function, (5) the feedback and process adjustment will allow timely update of the elements of this program, (6) the licensee's PRA has sufficient technical quality to support this application, and (7) the repair/replacement program quality elements will provide reasonable assurance that the LSS items remain capable of performing their design safety function. Therefore, the NRC staff finds that the proposed alternative will provide an acceptable level of quality and safety.

### 4.0 CONCLUSION

The NRC staff has determined that the proposed alternative in the licensee's request referenced above would provide an acceptable level of quality and safety.

The NRC staff concludes that the licensee has adequately addressed the regulatory requirements set forth in 10 CFR 50.55a(z)(1).

The NRC staff authorizes the use of a proposed alternative in Relief Request No. EN-RR-22-001 at Grand Gulf, River Bend Station, and Waterford 3 for the remainder of the fourth ISI intervals for each plant, which started on December 1, 2017.

All other ASME Code, Section XI, requirements for which an alternative was not specifically requested and authorized in this alternative remain applicable, including third party review by the Authorized Nuclear Inservice Inspector.

Principal Contributors: J. Patel, NRR  
Y. Diaz-Castillo, NRR  
T. Wengert, NRR

Date: May 30, 2024

SUBJECT: GRAND GULF NUCLEAR STATION, UNIT 1; RIVER BEND STATION, UNIT 1;  
AND WATERFORD STEAM ELECTRIC STATION, UNIT 3 – RE:  
AUTHORIZATION OF PROPOSED ALTERNATIVE EN-RR-22-001 TO USE  
ASME CODE CASE N-752, “RISK-INFORMED CATEGORIZATION AND  
TREATMENT FOR REPAIR/REPLACEMENT ACTIVITIES IN CLASS 2 AND 3  
SYSTEMS, SECTION XI, DIVISION 1” (EPID L-2022-LLR-0054)  
DATED MAY 30, 2024

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MChawla, NRR  
JPatel, NRR  
YDiaz-Castillo, NRR

**ADAMS Accession Nos.:****Package, ML24151A236****Alternative, ML24060A219****NCP-2024-004 ML24151A238****\*by email**

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DATE	5/16/2024	5/16/2024	5/16/2024	5/16/2024
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