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10 CFR 50.55a

OCAN052003

May 27, 2020

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

SUBJECT: Relief Request Number EN-20-RR-001 – Proposed Alternative 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

Arkansas Nuclear One, Units 1 and 2
NRC Docket Nos. 50-313 and 50-368
Renewed Facility Operating License Nos. DPR-51 and NPF-6

Dear Sir or Madam:

Pursuant to 10 CFR 50.55a(z)(1), Entergy Operations, Inc. (Entergy) requests the Nuclear Regulatory Commission's (NRC) authorization of a proposed alternative to the American Society of Mechanical Engineers (ASME) Boiler and Pressure Vessel Code, Section XI, "Rules for Inservice Inspection of Nuclear Power Plant Components."

Authorization is requested to use the alternative requirements of 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 Boiler and Pressure Vessel Code, Section XI, IWA-1000, IWA-4000, and IWA-6000 requirements.

Use of the proposed alternative is based upon 10 CFR 50.55a(z)(1) which states: *Implementation of a proposed alternative that would provide an acceptable level of quality and safety.* The basis for the proposed alternative is provided in the enclosure to this letter. Attachment 1 of the Enclosure provides a comparison of the Entergy Risk-Informed Categorization Process to ASME Code Case N-752. The Entergy categorization process was approved by the NRC in the Safety Evaluation for Relief Request ANO2-R&R-004, Revision 1, dated April 22, 2009 (ADAMS Accession No. ML090930246).

New regulatory commitments are included in this submittal. These commitments are summarized in Attachment 2 of the Enclosure.

Entergy requests authorization by June 27, 2021, to support planning activities associated with Arkansas Nuclear One, Unit 2, refueling outage in the Fall 2021 (2R28).

If there are any questions or if additional information is needed, please contact Riley Keele, Manager, Regulatory Assurance, Arkansas Nuclear One, at 479-858-7826.

Respectfully,

ORIGINAL SIGNED BY RON GASTON

Ron Gaston

RWG/rwc

Enclosure: Relief Request EN-20-RR-1

Enclosure Attachment 1: Comparison of the Risk-Informed Categorization Process in Relief Request ANO2-R&R-004, Revision 1, to ASME Code Case N-752

Enclosure Attachment 2: List of Regulatory Commitments

cc: NRC Region IV Regional Administrator
NRC Senior Resident Inspector – Arkansas Nuclear One
NRC Project Manager – Arkansas Nuclear One

OCAN052003

ENCLOSURE

RELIEF REQUEST EN-20-RR-1

RELIEF REQUEST EN-20-RR-1

PROPOSED ALTERNATIVE TO USE ASME CODE CASE N-752

1. ASME Code Component(s) Affected

All ASME Class 2 and 3 items or components except the following:

- (a) Class CC and MC items.
- (b) Piping within the break exclusion region [$>$ Nominal Pipe Size (NPS) 4 (DN 100)] for high energy piping systems¹ 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.

2. Applicable Code Edition and Addenda

The applicable Code Editions and Addenda for the current Inservice Inspection (ISI) intervals at Arkansas Nuclear One, Unit 1 (ANO-1) and Arkansas Nuclear One, Unit 2 (ANO-2) are as specified below.

| Plant | ISI Interval | ASME Section XI Code of Record | Interval Start | Interval End |
|-------|-----------------|--|----------------|----------------|
| ANO-1 | 5 th | 2007 Edition through 2008 Addenda | May 31, 2017 | May 30, 2027 |
| ANO-2 | 5 th | 2007 Edition through 2008 Addenda ² | March 26, 2020 | March 25, 2030 |

3. Applicable Code Requirement

ASME Code, Section XI, Subsection IWA provides 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 Class 2 and the rules in IWD apply to items classified as ASME Class 3.
- IWA-1400(f)³ requires Owners to possess or obtain an arrangement with an Authorized Inspection Agency (AIA).

¹ NUREG-0800, section 3.6.2 provides a method for defining this scope of piping.

² Updating to the 2007 Edition/2008 Addenda was approved under Relief Request ANO2-ISI-021(ML19156A400).

³ Code Case N-752 is based on the 2017 Edition of ASME Section XI while Entergy's Code of record for ANO-1 and ANO-2 is the 2007 Edition/2008 Addenda. Below is a 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.

- IWA-1400(j)³ requires Owners to perform repair/replacement activities in accordance with written programs and plans.
- IWA-1400(n)³ requires Owners to maintain documentation of a Quality Assurance Program in accordance with 10 CFR 50 or ASME NQA-1, Parts II and III.
- IWA-4000 specifies requirements for performing ASME Section XI repair/replacement activities on pressure retaining items or their supports.
- IWA-6210(d)³ and (e)³, specify Owner reporting responsibilities such as preparing Form NIS-2, Owner's Report for Repair/Replacement Activity.
- 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.

4. Reason for Request

At present, Entergy Operations Inc. (Entergy) performs repair/replacement activities at ANO-1 and ANO-2 in accordance with a deterministic Repair/Replacement Program based on the 2007 Edition/2008 Addenda of ASME Section XI. Repair/Replacement Program requirements apply to procurement, design, fabrication, installation, examination, and pressure testing of items within the scope of ASME Section XI. Repair/replacement activities include welding, brazing, defect removal, metal removal using thermal processes, rerating, and removing, adding, or modifying pressure retaining items or supports. Repair/replacement activities are performed in accordance with Entergy's 10 CFR 50, Appendix B Quality Assurance (QA) Program and the ASME Section XI Code. In applying a deterministic approach to repair/replacement activities, a safety class (e.g., ASME Class 2 or 3) is assigned to every component within a system based on system function; the same treatment requirements are then applied to every component within the system without considering the risk associated with the probability that a specific item or component may or may not be functional at a time when needed.

Alternatively, a probabilistic approach to regulation enhances and extends the traditional deterministic approach by allowing consideration of a broader set of potential challenges to safety, providing a logical means for prioritizing these challenges based on safety significance, and allowing consideration of a broader set of resources to defend against these challenges. In contrast to the deterministic approach, Probabilistic Risk Assessment (PRA) addresses credible initiating events by assessing the event frequency. Mitigating system reliability is then assessed, including the potential for common cause failures. The probabilistic approach to regulation is an extension and enhancement of traditional regulation by considering risk in a comprehensive manner. In 2004, the NRC adopted a new Section 50.69 of 10 CFR relating to risk-informed categorization and treatment of structures, systems, and components (SSCs) for nuclear power plants (Reference 1). This new section permits power reactor licensees to implement an alternative regulatory framework with respect to "special treatment" (treatment beyond normal industrial practices) of low safety significant (LSS) SSCs. In May 2006, the NRC staff issued Regulatory Guide (RG) 1.201, "Guidelines for Categorizing Structures, Systems, and Components in Nuclear Power Plants According to their Safety Significance, For Trial Use," Revision 1 (Reference 2). RG 1.201 endorses a categorization method, with conditions, for categorizing active SSCs described in Nuclear Energy Institute (NEI) 00-04, "10 CFR 50.69 SSC Categorization Guideline."

Entergy is not requesting NRC approval to implement 10 CFR 50.69 in this relief request. Instead, Entergy is proposing to implement the risk-informed categorization and treatment requirements of ASME Code Case N-752 when performing repair/replacement activities on Class 2 and 3 pressure retaining items or their associated supports. Code Case N-752, which was approved by the ASME in July 2019, employs a comprehensive categorization process requiring input from both a PRA model and deterministic insights. This approach will enable evaluation, categorization, and implementation of alternative treatments for resolution of emergent issues in segments of piping having low safety significance. Use of Code Case N-752 will also allow Entergy to identify and more clearly focus engineering, maintenance, and operations resources on critical components with high safety-significance, thus, enabling Entergy to make more informed decisions and increase the safety of the plant.

5. Proposed Alternative and Basis for Use

Pursuant to 10 CFR 50.55a(z)(1), Entergy proposes to implement ASME Code Case N-752 as an alternative to the ASME Code requirements specified in Section 3. 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 as delineated in Section 1. Code Case N-752 may be applied on a system basis or on individual items within selected systems. Code Case N-752 does not apply to Class 1 items.

The use of this proposed alternative is requested on the basis that requirements in Code Case N-752 will provide an acceptable level of quality and safety.

5.1 Overview of Code Case N-752

Code Case N-752 provides for risk-informed categorization and treatment requirements for performing repair/replacement activities on Class 2 and 3 pressure retaining items or their associated supports. Code Case N-752 is not applicable to the following:

- Class CC and MC items.
- Piping within the break exclusion region [$>$ NPS 4 (DN 100)] for high energy piping systems as defined by the Owner.
- That portion of the Class 2 feedwater system [$>$ NPS 4 (DN 100)] of PWRs from the SG, including the SG, to the outer containment isolation valve.

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 Section 5.2.

The risk-informed process categorizes components as either high safety-significant (HSS) or LSS. 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 relief request ANO2-R&R-004, Revision 1, dated April 17, 2007 (Reference 3), as supplemented by Entergy. The NRC approved relief request ANO2-R&R-004, Revision 1, in a safety evaluation dated April 22, 2009 (Reference 4). 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.

5.2 Basis for Use

The information below is provided as a basis or justification for Entergy's proposed alternative to implement the risk-informed categorization and treatment requirements of Code Case N-752 on Class 2 and 3 pressure retaining items or the associated supports as delineated in Section 1.

A. Application to Individual Items Within a System

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. As such, the final consequence rank of the individual component would be the same regardless of whether the entire system or only the individual component is subject to the risk-informed methodology.

B. Categorization Process

The categorization process of Code Case N-752 is delineated in Appendix I of the Code Case. This categorization process is technically identical to the process approved by the NRC under Relief Request ANO2-R&R-004, Revision 1 (Reference 4), which, in turn, is based on founding principles in EPRI Report TR-112657, Revision B-A, "Revised Risk-Informed Inservice Inspection Evaluation Procedure," and the categorization process of Code Case N-660, but with improvements and lessons learned from trial applications. Attachment 1 of this enclosure provides a comparison of the categorization processes of Code Case N-752 and Relief Request ANO2-R&R-004, Revision 1, as approved by the NRC (Reference 4). Note that the Attachment 1 comparison does not address editorial differences or clarifications. However, it does demonstrate that the two categorization processes are technically identical.

The Code Case N-752 risk-informed categorization evaluation is performed by an Owner-defined team that includes experts with expertise in PRA, plant operations, system design, and safety or accident analysis. The risk-informed categorization process is based on the conditional consequence of failure, given that a postulated failure has occurred. A consequence category for each piping segment or component is determined via a failure modes and effects analysis (FMEA) and impact group assessment. The FMEA considers pressure boundary failure size, isolability of the break, indirect effects, initiating events, system impact or recovery, and system redundancy. The results of the FMEA for each system, or portion thereof, are partitioned into core damage impact groups based on postulated piping failures that cause an (1) initiating event, (2) disable a system/train/loop without causing an initiating event, or (3) cause an initiating event and disable a system/train/loop. Failures are also evaluated for their importance relative to containment performance. In addition, the consequence rank is reviewed and adjusted to reflect the pressure boundary failure's impact on plant operation during shutdown and on the mitigation of external events. Credit may be taken for plant features and operator actions to the extent these would not be adversely affected by failure of the piping segment or component under consideration.

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. Finally, if LSS is assigned, the categorization process shall verify that there are sufficient margins to account for uncertainty in the engineering analysis and supporting data. If sufficient margin exists, then LSS should be assigned. If sufficient margin does not exist, then HSS shall be assigned.

C. PRA Technical Adequacy

Appendix I, Section I-3.2 of Code Case N-752 requires that the plant-specific PRA shall be assessed to confirm it is applicable to the safety significant categorization of Code Case N-752 including verification of assumptions on equipment reliability for equipment not within the scope of the code case.

ANO-2, using the ANO-2 PRA, was the PWR Fullscope (Class 1, 2, 3 and Non-Class piping) pilot plant for application of EPRI Report TR-112657, "Risk-Informed Inspection Evaluation Procedure, Interim Report," which was approved by the NRC in a safety evaluation dated December 29, 1998 (Reference 6). Additionally, as discussed above, ANO-2, using the ANO-2 PRA, was the pilot plant for what became ASME Code Case N-752 and was approved by the NRC in Reference 4.

Likewise, ANO-1, using the ANO-1 PRA, was the PWR pilot plant for application of TR-112657 to Class 1 piping. It was approved by the NRC in a safety evaluation dated August 25, 1999 (Reference 7). This application also used the RI-ISI methodology contained in EPRI Report TR-112657, including the consequence evaluation portion of the RI-ISI methodology.

Thus, both ANO-1 and ANO-2 have previously demonstrated that the unit specific PRA is applicable to the safety significant categorization of Code Case N-752 including verification of assumptions on equipment reliability for equipment not within the scope of the code case. Since that time, each PRA has been updated, maintained, further used, and approved by the NRC to support other risk-informed applications at both ANO-1 and ANO-2 including transitioning to the following:

- EPRI streamlined RI-ISI methodology of Code Case N-716 which was approved by the NRC for ANO-1 and ANO-2 in safety evaluations dated June 2, 2010 (Reference 8) and January 5, 2011 (Reference 9)
- Risk-Informed Technical Specification Task Force Initiative 5b for ANO-1 and ANO-2 based on NRC approval in safety evaluations dated May 22, 2019 (Reference 10) and April 23, 2019 (Reference 11).

As such, both ANO-1 and ANO-2 continue to demonstrate that the unit specific PRA is applicable to the safety significant categorization of Code Case N-752 including verification of assumptions on equipment reliability for equipment not within the scope of the code case. While this is the case, Entergy intends to review and assess the existing ANO-1 and ANO-2 PRA used to support the evaluations required by Code Case N-752 to verify their technical adequacy.

D. Feedback and Process Adjustment

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(b)(1)(v).

E. Treatment Requirements for LSS Items

Code Case N-752 exempts LSS items, which have been categorized as LSS in accordance with the code case, from having to comply with the repair/replacement requirements of ASME Section XI. Exempted ASME Code requirements for LSS items are outlined in Section 3, above. In lieu of these requirements, Code Case N-752, Paragraph -1420 requires the Owner to define alternative treatment requirements which confirm with reasonable confidence that each LSS item remains capable of performing its safety-related functions under design basis conditions. These Owner treatment requirements must address or include all of the provisions stipulated in Paragraphs -1420(a) through (j) of the code case. This approach to treatment is consistent with RISC-3 treatment requirements specified in 10 CFR 50.69(d)(2).

To comply with the above, Entergy will develop new and/or revise existing procedures and documents to define treatment requirements for performing repair/replacement activities on LSS items in accordance with Code Case N-752. Entergy defined treatment requirements will address design control, procurement, installation, configuration control, and corrective action. Entergy procedures and documents will also include provisions which address/implement the following requirements:

1. Administrative controls for performing these repair/replacement activities.
2. The fracture toughness requirements of the original Construction Code and Owner's Requirements shall be met.
3. 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.
4. Items used for repair/replacement activities shall meet the Owner's Requirements or revised Owner's Requirements as permitted by the licensing basis.
5. 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 as permitted by the licensing basis.
6. The repair methods of nationally recognized post construction codes and standards (e.g., PCC-2, API-653) applicable to the item may be used.
7. Performance of repair/replacement activities, and associated non-destructive examination (NDE), 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. NDE personnel may be qualified in accordance with IWA-2300 in lieu of the Construction Code.

8. 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.
9. 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. See paragraph 5.2.E.11, below, for additional details.
10. Implementation of Code Case N-752 does not negate or affect Entergy commitments to regulatory and enforcement authorities having jurisdiction at ANO-1 and ANO-2.
11. Periodic ISI and inservice testing (IST) of LSS items at ANO-1 and ANO-2 will continue to be performed as follows:
 - ISI of LSS pressure retaining items or their associated supports will be performed in accordance with each site's ISI program implemented in accordance with 10 CFR 50.55a.
 - IST of pumps and valves that have been classified as LSS will be performed in accordance with each site's IST program implemented in accordance with 10 CFR 50.55a.
 - IST of snubbers that have been classified as LSS will be performed in accordance with each site's Snubber Testing program implemented in accordance with 10 CFR 50.55a.
 - Inspections of LSS items performed under other plant programs, such as the Flow Accelerated Corrosion and Microbiologically Induced Corrosion programs, will continue to be performed under those programs for each site.
12. 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. Finally, this approach to corrective action of LSS items is consistent with the NRC position on corrective action of RISC-3 SSCs as specified in 10 CFR 50.69(d)(2)(ii).
13. As permitted by Code Case N-752, Entergy intends to implement the exemption on IWA-1400(f) and IWA-4000 applicable to utilization of an AIA and Authorized Nuclear Inservice Inspector (ANII) when performing repair/replacement activities on LSS items. In lieu of ANII inspection services, Entergy believes that its proposed treatment requirements, as described herein, provide reasonable confidence that LSS systems and items remains capable of performing their safety-related functions when repair/replacement activities are performed without the inspection services of an ANII. It should also be noted that the

exemption of ANII services is not unique to Code Case N-752. Utilization of ANII inspection services is already exempt by ASME Section XI for certain items and activities such as small items (IWA-4131) and rotation of items for testing or preventative maintenance (IWA-4132). Finally, exemption of AIA/ANII services for this code case application is consistent with the NRC's position on risk-informed programs as specified in 10 CFR 50.69(b)(1)(v).

14. As permitted by Code Case N-752, Entergy intends to implement the QA Program exemption applicable to IWA-1400(n) and IWA-4000 when performing repair/replacement activities on LSS items. That said, this code case exemption only applies if compliance with 10 CFR 50, Appendix B, or NQA-1 is not required by the NRC at the Owner's facility. To address this issue, Entergy intends to submit an exemption request for the NRC's approval to exempt ANO-1 and ANO-2 from having to comply with Entergy's 10 CFR 50, Appendix B, QA Program when performing repair/replacement activities on LSS items in accordance with Code Case N-752. This request (Reference 5) will be submitted in accordance with 10 CFR 50.12, "Specific exemptions". Entergy's proposed QA Program exemption for this code case application is consistent with the NRC's position on risk-informed programs as specified in 10 CFR 50.69(b)(1)(ix). However, if the exemption is not approved by the NRC, then this QA Program exemption will not and cannot be implemented by Entergy when performing repair/replacement activities in accordance with this code case.
15. As permitted by Code Case N-752, Entergy intends to implement the exemptions on IWA-1400(j) and IWA-4000 applicable to repair/replacement programs and plans. In lieu of these ASME Section XI administrative controls, Entergy will establish Owner defined administrative controls as required by paragraph -1420(a) of Code Case N-752. Entergy will utilize its existing work management processes for planning and documenting the performance of repair/replacement activities and supplement those process requirements as necessary to comply with Code Case N-752. These controls will ensure that repair/ replacement activities on LSS items are performed in accordance with work instructions that have been appropriately, planned, reviewed, and implemented. It should also be noted that the exemption of Repair/Replacement Plans as required by IWA-1400(j) and IWA-4150 is not unique to Code Case N-752. Repair/Replacement Plans are already exempt by ASME Section XI for certain items and activities such as small items (IWA-4131) and rotation of items for testing or preventative maintenance (IWA-4132). Finally, the exemption of ASME Section XI programs and plans and the alternative use of Owner-defined administrative requirements on LSS items is consistent with the NRC's position on risk-informed programs as specified in 10 CFR 50.69(b)(1)(v).
16. As permitted by Code Case N-752, Entergy intends to implement the exemption on IWA-4000 applicable to repair/replacement activities. Article IWA-4000 of the ASME Section XI Code specifies administrative, technical, and programmatic requirements for performing repair/replacement activities on pressure retaining items and their supports. As specified in IWA-4110(b), repair/replacement activities "include welding, brazing, defect removal, metal

removal by thermal means, rerating, and removing, adding, and modifying items or systems. These requirements are applicable to procurement, design, fabrication, installation, examination, and pressure testing of items within the scope of this Division". In lieu of these IWA-4000 requirements, Entergy will perform repair/replacement activities on LSS items in accordance with an Owner defined program that complies with paragraph -1420 of Code Case N-752. The Entergy program will utilize existing Entergy processes such as those applicable to procurement, design, re-rating, fabrication, installation, modifications, welding, defect removal, metal removal by thermal processes and supplement those process requirements as necessary to comply with Code Case N-752. Entergy believes this program will ensure, with reasonable confidence, that LSS items remain capable of performing their safety-related functions under design basis conditions. Finally, the exemption of IWA-4000 requirements and the alternative use of Owner-defined treatment requirements for LSS items is consistent with the NRC's position on risk-informed programs as specified in 10 CFR 50.69(b)(1)(v) and (d)(2).

17. As permitted by Code Case N-752, Entergy intends to implement the documentation exemptions on IWA-6210(d), IWA-6210(e), and IWA-6350. These ASME Section XI paragraphs address preparation and retention of various ASME Section XI records such as Form NIS-2, IWA-4160 verification of acceptability evaluations, IWA-4311 evaluations, Repair/Replacement Plans, and reconciliation documentation. In lieu of these ASME Section XI forms and evaluations, the following repair/replacement activity records shall be retained in accordance with Entergy's Owner-defined program for performing repair/replacement activities on LSS items.
 - Repair/replacement activity documentation.
 - Evaluations of LSS items that do not comply with requirements of the applicable Construction Code, standard, specification, and/or design specification. See also paragraph 5.2.E.12.
 - Evaluations and documentation of design and configuration changes including material changes.

In addition to the above, Entergy will also revise applicable ANO-1 and ANO-2 licensing basis documents (e.g., Safety Analysis Report), as appropriate, to identify systems, subsystems, or individual items that have been categorized as LSS and address alternative treatment requirements. Changes to licensing basis documents will be performed in accordance with 10 CFR 50.59.

F. Conclusion

Code Case N-752 specifies requirements for performing risk-informed categorization and treatment for performing repair/replacement activities on Class 2 and 3 pressure retaining items or associated supports. The Code Case N-752 categorization process provides a comprehensive methodology for determining the safety significance of items – HSS or LSS. This categorization process is technically identical to that approved by the NRC under relief request ANO2-R&R-004, Revision 1 (Reference 4). Repair/replacement activities performed on items determined to be HSS must

continue to comply with the ASME Section XI Code. Repair/replacement activities performed on LSS items may comply with alternative treatment requirements that are defined by the Owner but must comply with all provisions of paragraph -1420 of Code Case N-752. Entergy's proposed treatment requirements, as described herein, meet these criteria and provide reasonable confidence that LSS systems and items remains capable of performing their safety-related functions under design basis conditions. Finally, categorization and treatment requirements of Code Case N-752 applicable to repair/replacement activities are consistent with NRC requirements specified in 10 CFR 50.69.

6. Duration of Proposed Alternative

The duration of this proposed alternative for ANO-1 is for the remainder of the 5th ISI interval which started on May 31, 2017.

The duration of this proposed alternative for ANO-2 is for the remainder of the 5th ISI interval which started on March 26, 2020.

7. Precedent

- 1 Entergy Relief Request ANO2-R&R-004, Revision 1 (References 3 and 4).
- 2 Several domestic nuclear power plants have sought and obtained approval to apply the risk-informed evaluation and categorization (classification) process of Relief Request ANO2-R&R-004, Revision 1, for repair/replacement activities for Class 2 and Class 3 pressure-retaining items or their associated supports. These include Vogtle Electric Generating Plant, as documented in the Safety Evaluation dated December 17, 2014 (ADAMS Accession No. ML14237A034), and subsequent Safety Evaluations issued for Limerick Generating Station (ML18165A172), Palo Verde Nuclear Generating Station (ML18243A280), Point Beach Nuclear Station (ML18289A378), Braidwood Station and Byron Station (ML18264A092), and Peach Bottom Atomic Power Station (ML18263A232).

8. References

1. 10 CFR 50.69, "Risk-Informed Categorization and Treatment of Structures, Systems, and Components for Nuclear Power Reactors," USNRC, 69 FR 68047, Nov. 22, 2004.
2. U.S. Nuclear Regulatory Commission, Regulatory Guide 1.201, Revision 1, "Guidelines for Categorizing Structures, Systems, and Components in Nuclear Power Plants according to their Safety Significance, For Trial Use," May 2006.
3. Entergy Letter to NRC dated April 17, 2007, "Relief for Alternative ANO2-R&R-004, Revision 1, Request to Use Risk-Informed Safety Classification and Treatment for Repair/Replacement Activities in Class 2 and 3 Moderate Energy Systems," (ML071150108) as supplemented by letters dated August 6, 2007 (ML072220160), February 20, 2008 (ML080520186), and January 12, 2009 (ML090120620).

4. Safety Evaluation Report (SER) by the Office of Nuclear Reactor Regulation "Request for Alternative ANO2-R&R-004, Revision 1, Request to Use Risk-informed Safety Classification and Treatment for Repair/Replacement Activities in Class 2 and 3 Moderate and High Energy Systems, Third and Fourth 10-Year In-service Inspection Intervals," dated April 22, 2009 (ML090930246).
5. Entergy Operations, Inc. (Entergy) letter to the U. S. Nuclear Regulatory Commission (NRC), "Request for Exemption from 10 CFR 50, Appendix B Requirements to Support Application of ASME Code Case N-752, 'Risk-Informed Categorization and Treatment for Repair/Replacement Activities in Class 2 and 3 Systems, Section XI, Division 1'", (OCAN052004), dated May 27, 2020.
6. Safety Evaluation by the Office of Nuclear Reactor Regulation, "Proposal to Use ASME Code Case N-578 as an Alternative to ASME Code Section XI, Table IWX-2500, Entergy Operations Inc., Arkansas Nuclear One, Unit 2, Docket No. 50-368" dated December 29, 1998
7. Safety Evaluation by the Office of Nuclear Reactor Regulation; "Request to Use ASME Code Case N-560 as an Alternative to ASME Code, Section XI, Table IWB-2500-1," Arkansas Nuclear One Unit 1, Docket # 50-313" dated August 25, 1999
8. Safety Evaluation by the Office of Nuclear Reactor Regulation; "Risk-Informed Inservice Inspection Program, Request for Alternative ANO1-ISI-014, Entergy Operations Inc., Arkansas Nuclear One, Unit 1, Docket # 50-313" dated June 2, 2010
9. Safety Evaluation by the Office of Nuclear Reactor Regulation; "Risk-Informed Inservice Inspection Program, Request for Alternative ANO2-ISI-006, Entergy Operations Inc., Arkansas Nuclear One, Unit 2, Docket # 50-368" dated January 5, 2011
10. Arkansas Nuclear One, Unit 1 – Issuance of Amendment No 264 Re: Adoption of Technical Specification Task Force (TSTF) Traveler TSTF-425, Revision 3 (EPID L-2018-LLA-0063), (ML19098A955), dated May 22, 2019
11. Arkansas Nuclear One, Unit 2 – Issuance of Amendment No 315 Re: Adoption of Technical Specification Task Force (TSTF) Traveler TSTF-425, Revision 3 (EPID L-2018-LLA-0047), (ML19063B948), dated April 23, 2019

9. **Attachments**

Attachment 1: Comparison of the Risk-Informed Categorization Process in Relief Request ANO2-R&R-004, Revision 1 to ASME Code Case N-752

Attachment 2: List of Regulatory Commitments

OCAN052003

ENCLOSURE, ATTACHMENT 1

RELIEF REQUEST EN-20-RR-1

**COMPARISON OF THE RISK-INFORMED CATEGORIZATION PROCESS IN
RELIEF REQUEST ANO2-R&R-004, REVISION 1, TO ASME CODE CASE N-752**

**Comparison of the Risk-Informed Categorization Process in
 Relief Request ANO2-R&R-004, Revision 1, to ASME Code Case N-752**

| Attachment 1 of ANO2-R&R-004, Revision 1 as Approved by the NRC (ML090930246) | Appendix 1 of Code Case N-752 |
|--|---|
| I-1.0 INTRODUCTION | I-1 INTRODUCTION |
| <p>This attachment describes the risk-informed process that will be used by Entergy to determine the risk-informed safety classification (RISC) for Class 2 and 3 moderate energy systems. This RISC evaluation process is based on the conditional consequence of failure given that the postulated failure has occurred. Piping segments are categorized based on the conditional consequence of failure. This process divides each selected system into piping segments that are determined to have similar consequences of failure. Once categorized, the safety significance of each piping segment is identified.</p> <ul style="list-style-type: none"> • Note: Entergy's original submittal dated April 17, 2007 (ML071150108) was limited to moderate energy systems. Applicability of the relief request was extended to include high energy systems in a later submittal dated January 12, 2009 (ML090120620). | <p>Code Case N-752 requirements are the same as those in ANO2-R&R-004, Revision 1.</p> |
| I-2.0 SCOPE IDENTIFICATION | I-2 SCOPE IDENTIFICATION |
| <p>Entergy will define the boundaries included in the scope of the risk evaluation categorization process consistent with the previously approved Risk-Informed Inservice Inspection (RI-ISI) application.</p> | <p>Code Case N-752 requirements are the same as those in ANO2-R&R-004, Revision 1. In both cases, the Owner must define the boundaries.</p> |
| I-3.0 CONSEQUENT EVALUATION | I-3 CONSEQUENT EVALUATION |
| I-3.0.1 Introduction | I-3.1 Introduction |
| <p>Pressure-retaining items shall be evaluated by defining piping segments that are grouped based on similar conditional consequences (i.e., given failure of the piping segment). To accomplish this grouping, direct and indirect effects shall be assessed for each piping segment. A consequence category for each piping segment is determined from the failure modes and effects analysis (FMEA) and impact group assessment as defined in Sections I-3.1.1 and I-3.1.2, respectively. The failure consequence can be quantified using the available probabilistic risk assessment(s) (PRA) to support the impact group assessment of Section I-3.1.2. Throughout the evaluations specified in Sections I-3.0, I-3.1, and I-3.2, credit may be taken for plant features and operator actions to the extent these would not be affected by failure of the segment under consideration. When crediting operator action, Section I-3.0.1 specifies various requirements that must be met.</p> | <p>Code Case N-752 requirements are the same as those in ANO2-R&R-004, Revision 1.</p> |

| Attachment 1 of ANO2-R&R-004, Revision 1 as Approved by the NRC (ML090930246) | Appendix 1 of Code Case N-752 |
|--|--|
| I-3.0.2 PRA Scope and technical Adequacy | I-3.2 PRA Scope and technical Adequacy |
| <p>The technical adequacy of the PRA used to support the evaluations required by this attachment shall be assessed. The PRA technical adequacy basis for the ANO-2 RI-ISI program application shall be reviewed to confirm it is applicable to the safety significant categorization of this application, including verifying assumptions on equipment reliability for equipment not within the scope of this request.</p> | <p>Code Case N-752 requirements applicable to PRA scope and technical adequacy are the same as those in ANO2-R&R-004, Revision 1. However, Case N-752 includes the following additional requirement:</p> <p>"If there is no RI-ISI program at the plant, the Owner shall review the results of previous independent reviews (e.g., peer review in accordance with ASME/ANS RA-S, regulatory) of the PRA including verification of assumptions on equipment reliability for equipment not within the scope of this Case and ensure that any comments that could influence the results of the categorization are incorporated or otherwise dispositioned."</p> |

| Attachment 1 of ANO2-R&R-004, Revision 1 as Approved by the NRC (ML090930246) | Appendix 1 of Code Case N-752 |
|--|---|
| I-3.1 ANALYSIS AND ASSESSMENTS | I-3.3 ANALYSIS AND ASSESSMENTS |
| I-3.1.1 Failure Modes and Effects Analysis | I-3.3.1 Modes and Effects Analysis |
| <p>Potential failure modes for each system or piping segment shall be identified, and their effects shall be evaluated. This evaluation shall consider the following:</p> <ul style="list-style-type: none"> a) Pressure boundary failure size¹ b) Isolability of the break c) Indirect effects d) Initiating events e) System impact or recovery f) System redundancy g) System configuration <p>Note:</p> <p>1. Regarding pressure boundary failure size, Entergy's original submittal dated April 17, 2017 (ML071150108) stated that the consequence evaluation would be performed assuming a small leak which (1) was determined by analytical evaluations that include relevant design basis conditions; or (2) ensured that the documented physical configuration precluded the possibility of a large pressure-boundary failure; or (3) in lieu of (1) or (2), evaluated for a spectrum of pressure-boundary failure sizes (i.e., small to large). As a result of an NRC RAI, Entergy revised its proposed alternative in a later submittal dated January 12, 2009 (ML090120620) stating it would consider large pipe breaks in the consequence evaluation by assessing a spectrum of postulated pipe sizes (i.e., small to large).</p> | <p>Potential failure modes for each system, piping segment, or individual item shall be identified, and their effects shall be evaluated.</p> <p>Code Case N-752 requirements applicable to the failure modes affects analysis are the same as those in ANO2-R&R-004, Revision 1.</p> |

| Attachment 1 of ANO2-R&R-004, Revision 1 as Approved by the NRC (ML090930246) | Appendix 1 of Code Case N-752 |
|---|---|
| I-3.1.2 Impact Group Assessment | I-3.3.2 Impact Group Assessment |
| <p>The results of the FMEA for each system, or portion thereof, shall be classified into one of the following three core damage impact groups: (1) Initiating Event, (2) System, or (3) Combination. In addition, failures shall also be evaluated for their importance relative to containment performance. Each system, or portion thereof, shall be partitioned into postulated piping failures that cause an initiating event, disable a system/train/loop without causing an initiating event, or cause an initiating event and disable a system/train/loop. The consequence category assignment (HIGH, MEDIUM, LOW, or NONE) for each piping segment within each impact group shall be selected in accordance with criteria defined in Paragraphs I-3.1.2(a) thru (f) for the following events:</p> <ul style="list-style-type: none"> a) Initiating Event Impact Group Assessment b) System Impact Group Assessment c) Combination Impact Group Assessment d) Containment Performance Impact Group Assessment e) Shutdown Operation Evaluation f) External Events Evaluation | <p>Code Case N-752 requirements applicable to impact group assessment are the same as those specified in ANO2-R&R-004, Revision 1.</p> |
| I-3.2 CLASSIFICATION | I-3.4 CATEGORIZATION |
| I-3.2.1 Final Risk-Informed Safety Classification | I-3.4.1 Final Risk-Informed Categorization |
| <p>Piping segments may be grouped together within a system if the analysis and assessment performed in Section I-3.1 determine the effect of the postulated failures to be the same. The risk-informed safety classification definitions shall be:</p> <ul style="list-style-type: none"> • HSS – Piping segment considered high-safety-significant • LSS – Piping segment considered low-safety-significant | <p>Code Case N-752 requirements applicable to risk-informed categorization are the same as those specified in ANO2-R&R-004, Revision 1.</p> |

| Attachment 1 of ANO2-R&R-004, Revision 1 as Approved by the NRC (ML090930246) | Appendix 1 of Code Case N-752 |
|---|--|
| I-3.2.2 Classification Considerations | I-3.2.2 Categorization Considerations |
| <p>This section specifies requirements for determining whether piping segments are to be categorized as HSS or LSS. These requirements are summarized below:</p> <ul style="list-style-type: none"> a) Piping segments determined to be a High consequence category in any table by the analysis and assessment in Section I-3.1 shall be considered HSS. b) Piping segments determined to be a Medium, Low, or None (no change to base case) consequence category in any table by the consequence evaluation in Section I-3.1 shall be determined to be HSS or LSS by considering information provided in I-3.2.2(b)(1) thru (10). 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. d) A component support, hanger, or snubber shall have the same categorization as the highest-ranked piping segment within the piping analytical model in which the support is included. | <p>Code Case N-752 requirements applicable to categorization considerations are the same as those specified in ANO2-R&R-004, Revision 1.</p> |

| Attachment 1 of ANO2-R&R-004, Revision 1 as Approved by the NRC (ML090930246) | Appendix 1 of Code Case N-752 |
|---|---|
| Tables Supporting Failure Modes Analysis and Impact Group Assessment | Tables Supporting Failure Modes Analysis and Impact Group Assessment |
| <ul style="list-style-type: none"> • Table I-1: Consequence Categories for Initiating Event Impact Group • Table I-2: Guidelines for Assigning Consequence Categories to Failures Resulting in System or Train Loss • Table I-3: Consequence Categories for Combination Impact Group • Table I-4: Consequence Categories for Failures Resulting in Increased Potential for an Unisolated LOCA Outside of Containment • Table I-5: Quantitative Indices for Consequence Categories • Table I-6: Definition of Consequence Impact Groups and Configurations | <p>Tables in Code Case N-752 are the same as those in ANO2-R&R-004, Revision 1.</p> |

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ENCLOSURE, ATTACHMENT 2

LIST OF REGULATORY COMMITMENTS

LIST OF REGULATORY COMMITMENTS

The following table identifies those actions committed to by Entergy in this document specific to the Arkansas Nuclear One, Units 1 (ANO-1) and 2 (ANO-2) stations. Any other statements in this submittal are provided for information purposes and are not considered to be regulatory commitments.

| COMMITMENT | TYPE (check one) | | SCHEDULED COMPLETION DATE |
|--|------------------|-----------------------|---|
| | ONE-TIME ACTION | CONTINUING COMPLIANCE | |
| Entergy shall review changes to the plant, operational practices, applicable plant and industry operational experience, and, as appropriate, update the Probabilistic Risk Assessment (PRA) and categorization and treatment processes. Entergy shall perform this review in a timely manner but no longer than once every two refueling outages. | | ✓ | No longer than once every two refueling outages after initial implementation of Code Case N-752 |
| Entergy will implement the exemption on IWA-1400(f) and IWA-4000 applicable to utilization of an Authorized Inspection Agency (AIA) and Authorized Nuclear Inservice Inspector (ANII) when performing repair/replacement activities on Low Safety Significant (LSS) items. In lieu of ANII inspection services, Entergy believes that its proposed treatment requirements, as described herein, provide reasonable confidence that LSS systems and items remains capable of performing their safety-related functions when repair/replacement activities are performed without the inspection services of an ANII. | | ✓ | June 1, 2021 |

| COMMITMENT | TYPE (check one) | | SCHEDULED COMPLETION DATE |
|--|------------------|-----------------------|---------------------------|
| | ONE-TIME ACTION | CONTINUING COMPLIANCE | |
| <p>Entergy will implement the Quality Assurance (QA) Program exemption applicable to IWA-1400(n) and IWA-4000 when performing repair/replacement activities on LSS items. That said, this code case exemption only applies if compliance with 10 CFR 50, Appendix B, or NQA-1 is not required by the NRC at the Owner's facility. To address this issue, Entergy intends to submit an exemption request for the NRC's approval to exempt ANO-1 and ANO-2 from having to comply with Entergy's 10 CFR 50, Appendix B, QA Program when performing repair/replacement activities on LSS items in accordance with Code Case N-752. This request (Reference 5) will be submitted in accordance with 10 CFR 50.12, "Specific exemptions". Entergy's proposed QA Program exemption for this code case application is consistent with the NRC's position on risk-informed programs as specified in 10 CFR 50.69(b)(1)(ix). However, if the exemption is not approved by the NRC, then this QA Program exemption will not and cannot be implemented by Entergy when performing repair/replacement activities in accordance with this code case.</p> | | ✓ | June 1, 2021 |
| <p>Entergy will implement the exemptions on IWA-1400(j) and IWA-4000 applicable to repair/replacement programs and plans. In lieu of these ASME Section XI administrative controls, Entergy will establish Owner defined administrative controls as required by paragraph -1420(a) of Code Case N-752.</p> | | ✓ | June 1, 2021 |

| COMMITMENT | TYPE (check one) | | SCHEDULED COMPLETION DATE |
|--|------------------|-----------------------|---------------------------|
| | ONE-TIME ACTION | CONTINUING COMPLIANCE | |
| <p>Entergy will implement the exemption on IWA-4000 applicable to repair/replacement activities. Article IWA-4000 of the ASME Section XI Code specifies administrative, technical, and programmatic requirements for performing repair/replacement activities on pressure retaining items and their supports. As specified in IWA-4110(b), repair/replacement activities "include welding, brazing, defect removal, metal removal by thermal means, rerating, and removing, adding, and modifying items or systems. These requirements are applicable to procurement, design, fabrication, installation, examination, and pressure testing of items within the scope of this Division". In lieu of these IWA-4000 requirements, Entergy will perform repair/replacement activities on LSS items in accordance with an Owner defined program that complies with paragraph -1420 of Code Case N-752.</p> | | ✓ | June 1, 2021 |

| COMMITMENT | TYPE (check one) | | SCHEDULED COMPLETION DATE |
|--|------------------|-----------------------|---------------------------|
| | ONE-TIME ACTION | CONTINUING COMPLIANCE | |
| <p>Entergy will implement the documentation exemptions on IWA-6210(d), IWA-6210(e), and IWA-6350. These ASME Section XI paragraphs address preparation and retention of various ASME Section XI records such as Form NIS-2, IWA-4160 verification of acceptability evaluations, IWA-4311 evaluations, Repair/Replacement Plans, and reconciliation documentation. In lieu of these ASME Section XI forms and evaluations, the following repair/replacement activity records shall be retained in accordance with Entergy's Owner-defined program for performing repair/replacement activities on LSS items.</p> <ul style="list-style-type: none"> • Repair/replacement activity documentation. • Evaluations of LSS items that do not comply with requirements of the applicable Construction Code, standard, specification, and/or design specification. See also paragraph 5.2.E.12. • Evaluations and documentation of design and configuration changes including material changes. | | ✓ | June 1, 2021 |