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

June 8, 2018

Mr. Keith Jury
Vice President, Regulatory Assurance
Entergy Services, Inc.
M-ECH-61
1340 Echelon Parkway
Jackson, MS 39213

SUBJECT: ARKANSAS NUCLEAR ONE, UNITS 1 AND 2; GRAND GULF NUCLEAR STATION, UNIT 1; INDIAN POINT NUCLEAR GENERATING UNIT NOS. 2 AND 3; PALISADES NUCLEAR PLANT; PILGRIM NUCLEAR POWER STATION; RIVER BEND STATION, UNIT 1; AND WATERFORD STEAM ELECTRIC STATION, UNIT 3 – RELIEF REQUEST NO. EN-17-RR-1, ALTERNATIVE TO USE ASME CODE CASE N-513-4 (EPID L-2017-LLR-0141)

Dear Mr. Jury:

By application dated November 17, 2017 (Agencywide Documents Access and Management System Accession No. ML17321B081), Entergy Operations, Inc. and Entergy Nuclear Operations, Inc. (Entergy, the licensee), submitted Relief Request No. EN-17-RR-1 in accordance with paragraph 50.55a(z)(2) of Title 10 of the *Code of Federal Regulations* (10 CFR) for a proposed alternative to the requirements of Section XI, "Rules for Inservice Inspection of Nuclear Power Plant Components," of the American Society of Mechanical Engineers Boiler and Pressure Vessel Code (ASME Code) at Arkansas Nuclear One, Units 1 and 2; Grand Gulf Nuclear Station, Unit 1; Indian Point Nuclear Generating Unit Nos. 2 and 3; Palisades Nuclear Plant; Pilgrim Nuclear Power Station; River Bend Station, Unit 1; and Waterford Steam Electric Station, Unit 3. The proposed alternative would allow the licensee to use ASME Code Case N-513-4, "Evaluation Criteria for Temporary Acceptance of Flaws in Moderate Energy Class 2 or 3 Piping Section XI, Division 1," in lieu of specified ASME Code requirements.

Specifically, pursuant to 10 CFR 50.55a(z)(2), Entergy requested to use an alternative on the basis that complying with the specified requirement would result in hardship or unusual difficulty without a compensating increase in the level of quality and safety.

The U.S. Nuclear Regulatory Commission (NRC) staff has reviewed the proposed alternative and concludes, as set forth in the enclosed safety evaluation, that the proposed alternative provides reasonable assurance of structural integrity of the subject piping segments, and complying with the specified requirements of the ASME Code, Section XI, would result in hardship or unusual difficulty without a compensating increase in the level of quality and safety. Accordingly, the NRC staff concludes that the licensee has adequately addressed all of the regulatory requirements set forth in 10 CFR 50.55a(z)(2).

Therefore, the NRC staff authorizes the use of the proposed alternative described in the licensee's application, for each plant's current 10-year inservice inspection (ISI) interval, as specified in the application, or until such time as the NRC approves ASME Code Case N-513-4 for general use through revision of NRC Regulatory Guide 1.147, "Inservice Inspection Code Case Acceptability, ASME Section XI, Division 1," or other NRC document. If the proposed alternative is applied to a flaw near the end of the authorized 10-year ISI interval, and the next refueling outage is in the subsequent interval, the licensee is authorized to continue to apply the proposed alternative to the flaw until the next refueling outage.

All other requirements of the ASME Code, Section XI, for which relief has not been specifically requested and authorized by NRC staff remain applicable, including a third party review by the Authorized Nuclear Inservice Inspector. The NRC staff notes that approval of this alternative does not imply NRC approval of ASME Code Case N-513-4 for generic use.

If you have any questions, please contact the Entergy fleet Project Manager, Margaret O'Banion, at 301-415-1233 or via e-mail at Margaret.O'Banion@nrc.gov.

Sincerely,

Robert J. Pascarelli, Chief
Plant Licensing Branch IV
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

Docket Nos. 50-313, 50-368, 50-416, 50-247,
50-286, 50-255, 50-293, 50-458, 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

RELIEF REQUEST NO. EN-17-RR-1

PROPOSED ALTERNATIVE TO USE ASME CODE CASE N-513-4

ENTERGY OPERATIONS, INC.

ENTERGY NUCLEAR OPERATIONS, INC.

ARKANSAS NUCLEAR ONE, UNITS 1 AND 2

GRAND GULF NUCLEAR STATION, UNIT 1

RIVER BEND STATION, UNIT 1

WATERFORD STEAM ELECTRIC STATION, UNIT 3

INDIAN POINT NUCLEAR GENERATING UNIT NOS. 2 AND 3

PALISADES NUCLEAR PLANT

PILGRIM NUCLEAR POWER STATION

DOCKET NOS. 50-313, 50-368, 50-416, 50-458, 50-382, 50-247, 50-286, 50-255, AND 50-293

1.0 INTRODUCTION

By application dated November 17, 2017 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML17321B081), Entergy Operations, Inc. and Entergy Nuclear Operations, Inc. (Entergy, the licensee), submitted Relief Request No. EN-17-RR-1 in accordance with paragraph 50.55a(z)(2) of Title 10 of the *Code of Federal Regulations* (10 CFR) for a proposed alternative to the requirements of Section XI, "Rules for Inservice Inspection of Nuclear Power Plant Components," of the American Society of Mechanical Engineers Boiler and Pressure Vessel Code (ASME Code) at Arkansas Nuclear One, Units 1 and 2; Grand Gulf Nuclear Station, Unit 1; Indian Point Nuclear Generating Unit Nos. 2 and 3; Palisades Nuclear Plant; Pilgrim Nuclear Power Station; River Bend Station, Unit 1; and Waterford Steam Electric Station, Unit 3. The proposed alternative would allow the licensee to use ASME Code Case N-513-4, "Evaluation Criteria for Temporary Acceptance of Flaws in Moderate Energy Class 2 or 3 Piping Section XI, Division 1," for the evaluation and temporary

acceptance of flaws in moderate energy Class 2 and 3 piping in lieu of specified ASME Code requirements.

Specifically, pursuant to 10 CFR 50.55a(z)(2), the licensee requested to use the alternative on the basis that complying with the specified requirement would result in hardship or unusual difficulty without a compensating increase in the level of quality and safety.

2.0 REGULATORY EVALUATION

The U.S. Nuclear Regulatory Commission (NRC) staff considered the following regulatory requirements and guidance in its evaluation.

Adherence to Section XI of the ASME Code is mandated by 10 CFR 50.55a(g)(4), "Inservice inspection standards requirement for operating plants," which states, in part, that ASME Code Class 1, 2, and 3 components (including supports) will meet the requirements, except the design and access provisions and the preservice examination requirements, set forth in the ASME Code, Section XI, to the extent practical within the limitations of design, geometry, and materials of construction of the components. The licensee's application proposes an alternative to the requirements of ASME Code, Section XI, Articles IWC-3000 and IWD-3000, as they relate to the evaluation, repair, and replacement of ASME Code Class 2 and 3 moderate energy piping systems with flaws.

The regulation, 10 CFR 50.55a(z), "Alternatives to codes and standards," states, in part, that alternatives to the requirements of paragraph (g) of 10 CFR 50.55a may be used, when authorized by the NRC, if the licensee demonstrates that (1) the proposed alternative provides an acceptable level of quality and safety, or (2) compliance with the specified requirements would result in hardship or unusual difficulty without a compensating increase in the level of quality and safety.

ASME Code Case N-513-3 (i.e., Revision 3 to Code Case N-513) is approved for generic use by licensees in NRC Regulatory Guide (RG) 1.147, "Inservice Inspection Code Case Acceptability, ASME Section XI, Division 1," Revision 18 (ADAMS Accession No. ML16321A336), with one condition. This RG is incorporated into NRC regulations by reference in 10 CFR 50.55a, "Codes and standards." ASME Code Case N-513 provides criteria, which allows licensees to temporarily accept flaws, including through-wall flaws, in moderate energy Class 2 or 3 piping without performing repair or replacement activities. ASME Code Case N-513-4 contains several revisions including expanding the applicability of the code case beyond straight pipe to include elbows, bent pipe, reducers, expanders, and branch tees. ASME Code Case N-513-4 has not been approved by the NRC for generic use by licensees.

3.0 TECHNICAL EVALUATION

3.1 The Licensee's Request for Alternative

3.1.1 ASME Code Components Affected

The affected components are ASME Code Class 2 and 3 moderate energy piping systems, as described in ASME Code Case N-513-4, Section 1, "Scope," whose maximum operating temperature does not exceed 200 degrees Fahrenheit and whose operating pressure does not exceed 275 pounds per square inch gauge.

3.1.2 Applicable Code Editions and Addenda

The licensee provided the applicable ASME Code editions and addenda for each plant as shown in the table below. In addition, the table shows the applicable inservice inspection (ISI) 10-year intervals, including the start and end dates.

PLANT	ISI INTERVAL	ASME CODE EDITION	START	END
Arkansas Nuclear One, Unit 1	5th	2007 Edition through 2008 Addenda	5/31/2017	5/30/2027
Arkansas Nuclear One, Unit 2	4th	2001 Edition through 2003 Addenda	3/26/2010	3/25/2020
Grand Gulf Nuclear Station, Unit 1	4th	2007 Edition through 2008 Addenda	12/1/2017	11/30/2027
Indian Point Nuclear Generating Unit No. 2	5th	2007 Edition through 2008 Addenda	6/1/2016	5/31/2026
Indian Point Nuclear Generating Unit No. 3	4th	2001 Edition through 2003 Addenda	7/21/2009	7/20/2020
Palisades Nuclear Plant	5th	2007 Edition through 2008 Addenda	12/13/2015	12/12/2025
Pilgrim Nuclear Power Station	5th	2007 Edition through 2008 Addenda	7/1/2015	6/30/2025
River Bend Station, Unit 1	4th	2007 Edition through 2008 Addenda	12/1/2017	11/30/2027
Waterford Steam Electric Station, Unit 3	4th	2007 Edition through 2008 Addenda	12/1/2017	11/30/2027

3.1.3 Applicable Code Requirement

For ASME Code Class 2 components, Subarticles IWC-3120 and IWC-3130 of ASME Code, Section XI, require that flaws exceeding the specified acceptance criteria be corrected by repair or replacement activities or determined to be acceptable by analytical evaluation. For ASME Code Class 3 components, paragraph IWD-3120(b) of ASME Code, Section XI, requires that components exceeding the acceptance standards of IWD-3400 be subject to supplemental examination, or to a repair or replacement activity.

3.1.4 Reason for Request

The licensee stated that moderately degraded piping could require a plant shutdown within the required action statement timeframes to repair observed degradation. In addition, the licensee stated that plant shutdown activities result in additional dose and plant risk that would be inappropriate when a degraded condition is demonstrated to retain adequate margin to complete the component's function. The licensee contends that compliance with the current code requirements results in a hardship without a compensating increase in the level of quality and safety.

The licensee's proposed alternative, to use ASME Code Case N-513-4, would allow temporary acceptance of flaws in components currently not addressed in ASME Code Case N-513-3, such as elbows, bent pipe, reducers, expanders, branch tees, and heat exchanger tubing.

3.1.5 Licensee's Proposed Alternative and Basis for Use

The licensee's proposed alternative is to use ASME Code Case N-513-4 for the evaluation and temporary acceptance of flaws, including through-wall flaws, in moderate energy Class 2 and 3 piping in lieu of specified ASME Code, Section XI requirements. The licensee's proposed alternative permits the temporary acceptance of flaws, meeting the requirements of the code case, until the next scheduled refueling outage or prior to exceeding the allowable flaw size (whichever comes first), at which time an ASME Code, Section XI compliant repair or replacement will be completed. In addition, the licensee's proposed alternative includes the determination of an allowable leakage rate by dividing the critical leakage rate by a safety factor of four.

The licensee stated that the limitations in ASME Code Case N-513-3, related to its use on piping components, such as elbows, bent pipe, reducers, expanders, branch tees, and external tubing or piping attached to heat exchangers, have been addressed in ASME Code Case N-513-4. The licensee provided a high level overview of the differences between ASME Code Case N-513-3 and ASME Code Case N-513-4 in its application dated November 17, 2017, listed below:

1. Revised the maximum allowable time of use from no longer than 26 months to the next refueling outage.

2. Added applicability to piping elbows, bent pipe, reducers, expanders, and branch tees where the flaw is located more than $(R_0t)^{1/2}$ from the centerline of the attaching circumferential piping weld [(R_0 is the outside pipe radius and t is the evaluation wall thickness surrounding the degraded area)].

3. Expanded use to external tubing or piping attached to heat exchangers.

4. Revised to limit the use to liquid systems.

5. Revised to clarify treatment of Service Level load combinations.

6. Revised to address treatment of flaws in austenitic pipe flux welds.

7. Revised to require minimum wall thickness acceptance criteria to consider longitudinal stress in addition to hoop stress.

8. Other minor editorial changes to improve the clarity of the Code Case.

The licensee provided technical basis document, "Technical Basis for Proposed Fourth Revision to ASME Code Case N-513," from the *Proceedings of the ASME 2014 Pressure Vessels & Piping Conference,* July 20-24, 2014, Anaheim, California, in Enclosure 3 of its application.

The licensee's application dated November 17, 2017, stated, in part:

> The effects of leakage [from the flaw] may impact the operability determination or the plant flooding analyses specified in paragraph 1(f) of Code Case N-513-4. For a leaking flaw, the allowable leakage rate will be determined by dividing the

> critical leakage rate by a safety factor of four (4). The critical leakage rate is determined as the lowest leakage rate that can be tolerated and may be based on the allowable loss of inventory or the maximum leakage that can be tolerated relative to room flooding, among others.

The licensee contends that the proposed allowable leakage rate provides quantitative measurable limits, which ensure the operability of the system and early identification of issues that could erode defense-in-depth and lead to adverse consequences.

The licensee's application further stated:

> Code Case N-513-4 utilizes technical evaluation approaches that are based on principals that are accepted in other Code documents already acceptable to the NRC. The application of this code case, in concert with safety factors on leakage limits, will maintain acceptable structural and leakage integrity while minimizing plant risk and personnel exposure by minimizing the number of plant transients that could be incurred if degradation is required to be repaired based on ASME Section XI acceptance criteria only.

3.1.6 Hardship Justification (as stated in the licensee's application)

> Moderately degraded piping could require a plant shutdown within the required action statement timeframes to repair observed degradation. Plant shutdown activities result in additional dose and plant risk that would be inappropriate when a degraded condition is demonstrated to retain adequate margin to complete the component's function. The use of an acceptable alternative analysis method in lieu of immediate action for a degraded condition will allow Entergy to perform additional extent of condition examinations on the affected systems while allowing time for safe and orderly long term repair actions if necessary. Actions to remove degraded piping from service could have a detrimental overall risk impact by requiring a plant shutdown, thus requiring use of a system that is in standby during normal operation. Accordingly, compliance with the current code requirements results in a hardship without a compensating increase in the level of quality and safety.

3.1.7 Duration of Proposed Alternative

The licensee requested use of the proposed alternative for the ISI intervals for each unit, as stated in Section 3.1.2 above, or until such time as the NRC approves ASME Code Case N-513-4 in RG 1.147, or other document. The licensee stated that when using its proposed alternative, a Section XI compliant repair or replacement will be completed prior to exceeding the next refueling outage or allowable flaw size, whichever comes first. The licensee stated that if a flaw is evaluated near the end of an ISI interval, and the next refueling outage is in the subsequent interval, the flaw may remain in service until the next refueling outage.

3.2 NRC Staff Evaluation

The NRC staff evaluated the adequacy of the proposed alternative in maintaining the structural integrity of piping components identified in ASME Code Case N-513-4. ASME Code Case N-513-3, which is conditionally approved for use in RG 1.147, Revision 18, provides alternative evaluation criteria for temporary acceptance of flaws, including through-wall flaws, in

moderate energy Class 2 and 3 piping. However, ASME Code Case N-513-3 contains limitations that the licensee considers restrictive and could result in an unnecessary plant shutdown. ASME Code Case N-513-3 is limited to straight pipe with provisions for flaws that extend for a short distance, at the pipe to fitting weld, into the fitting. Evaluation criteria for flaws in elbows, bent pipe, reducers, expanders, branch tees, and heat exchanger tubing and piping are not included within the scope of ASME Code Case N-513-3. ASME Code Case N-513-4 addresses these aforementioned limitations. Given that the previous revision of this code case (ASME Code Case N-513-3) is conditionally approved for use in RG 1.147, Revision 18, which is incorporated by reference in 10 CFR 50.55a, the NRC staff focused its review on the differences between ASME Code Cases N-513-3 and N-513-4.

The NRC staff's review of the proposed alternative included the following significant changes in ASME Code Case N-513-4, which are discussed in subsections of this safety evaluation below:

1. Revised temporary acceptance period (Section 3.2.1)

2. Added flaw evaluation criteria for elbows, bent pipe, reducers/expanders, and branch tees (Section 3.2.2)

3. Expanded applicability to heat exchanger tubing or piping (Section 3.2.3)

4. Limited use to liquid systems (Section 3.2.4)

5. Clarified treatment of service load combinations (Section 3.2.5)

6. Revised treatment of flaws in austenitic pipe flux welds (Section 3.2.6)

7. Revised minimum wall thickness acceptance criteria to consider longitudinal stress in addition to hoop stress (Section 3.2.7)

8. Revised leakage monitoring requirements (Section 3.2.8)

The NRC staff also evaluated the licensee's proposed limitation on the leakage rate (Section 3.2.9) and its hardship justification (Section 3.2.10).

3.2.1 Temporary Acceptance Period

ASME Code Case N-513-3 specifies a temporary acceptance period of a maximum of 26 months. ASME Code Case N-513-3 is accepted for use in RG 1.147, Revision 18, with the following condition:

> The repair or replacement activity temporarily deferred under the provisions of this Code Case shall be performed during the next scheduled outage.

ASME Code Case N-513-4 includes wording that limits the use of the code case to the next refueling outage. The NRC staff finds that ASME Code Case N-513-4 appropriately addresses the NRC condition on ASME Code Case N-513-3, and is, therefore, acceptable.

3.2.2 Flaw Evaluation Criteria for Elbows, Bent Pipe, Reducers/Expanders, and Branch Tees

Evaluation and acceptance criteria have been added to ASME Code Case N-513-4 for flaws in elbows, bent pipe, reducers, expanders, and branch tees using a simplified approach, which are based on the Second International Piping Integrity Research Group (IPIRG-2) program reported in NUREG/CR-6444, BMI-2192, "Fracture Behavior of Circumferentially Surface-Cracked Elbows," published December 1996.

The flaw evaluation methodology approach in ASME Code Case N-513-4 for piping components is conducted as if in straight pipe by scaling hoop and axial stresses using ASME piping design code stress indices and stress intensification factors to account for the stress variations caused by the geometric differences. Equations used in the code case are consistent with the piping design by rule approach in ASME Code Section III, NC/ND-3600. NUREG/CR-6444 shows that this approach is conservative for calculating stresses used in flaw evaluations in piping elbows and bent pipe. The code case also applies this methodology to reducers, expanders, and branch tees.

The NRC staff finds that the flaw evaluation and acceptance criteria in ASME Code Case N-513-4 for elbows, bent pipe, reducers, expanders, and branch tees are acceptable, because the flaw evaluation methods in the code case are consistent with ASME Code Section XI, ASME Code Section III design by rule approach and provide a conservative approach as confirmed by comparing the failure moments predicted using this approach to the measured failure moments from the elbow tests for through-wall circumferential flaws conducted as part of the IPIRG-2 program.

3.2.3 Flaw Evaluation in Heat Exchanger Tubing or Piping

ASME Code Case N-513-4 has been revised to include heat exchanger external tubing or piping, provided that the flaw is characterized in accordance with Section 2(a) of the code case and leakage is monitored. Section 2(a) requires that the flaw geometry be characterized by volumetric inspection or physical measurement.

The NRC staff determined that the flaw evaluation criteria in ASME Code Case N-513-4 for straight or bent piping, as appropriate, can be applied to heat exchanger external tubing or piping. The staff determined the methods for evaluating flaws in straight pipe are acceptable since they are currently allowed in ASME Code Case N-513-3. For bent pipe, the acceptability is described in Section 3.2.2 above. Therefore, the NRC staff finds inclusion of heat exchanger external tubing or piping in the code case to be acceptable because only heat exchanger tubing flaws that are accessible for characterization and leakage monitoring may be evaluated in accordance with the code case and the code case provides acceptable methods for the evaluation of flaws.

3.2.4 Limit Use to Liquid Systems

Use of ASME Code Case N-513-4 is specifically limited to liquid systems. The NRC staff finds this change acceptable since ASME Code Case N-513 is not intended to apply to air or other compressible fluid systems.

3.2.5 Treatment of Service Load Combinations

Modifications in ASME Code Case N-513-4 now make clear that all service load combinations must be considered in flaw evaluations to determine the most limiting condition. Although previously implied in ASME Code Case N-513-3, Code Case N-513-4 makes this requirement clear. Therefore, the NRC staff finds this change acceptable.

3.2.6 Treatment of Flaws in Austenitic Pipe Flux Welds

Paragraph 3.1(b) of ASME Code Case N-513-4 contains modifications that include a reference to ASME Code Section XI, Appendix C, C-6320, to address flaws in austenitic stainless steel pipe flux welds. The ASME Code, Section XI, Appendix C, C-6000, permits the use of elastic plastic fracture mechanics criteria in lieu of limit load criteria to analyze flaws in stainless steel pipe flux welds. Equation 1 of the code case was also revised to be consistent with ASME Code, Section XI, Appendix C, C-6320, so the equation can be used for flaws in austenitic stainless steel pipe flux welds. The NRC staff finds this acceptable because the modification to the code case now includes the appropriate methods for the evaluation of stainless steel pipe flux welds in accordance with Section XI of the ASME Code.

3.2.7 Minimum Wall Thickness Acceptance Criteria to Consider Longitudinal Stress

Although it is unlikely that a minimum wall thickness calculated based on the longitudinal stress would be limiting when compared to a minimum wall thickness calculated based on hoop stress, ASME Code Case N-513-4 includes revisions that require consideration of longitudinal stress in the calculation of minimum wall thickness. Previous versions of the code case only required the use of hoop stress. The NRC staff finds this acceptable because it will ensure that the more limiting of the longitudinal or hoop stress is used to determine minimum wall thickness.

3.2.8 Leakage Monitoring for Through-Wall Flaws

ASME Code Case N-513-3 required through-wall leakage to be observed via daily walkdowns to confirm the analysis conditions used in the evaluation remain valid. ASME Code Case N-513-4 modifies this requirement by continuing to require that leakage be monitored daily, but now allows other techniques to be used to monitor leakage such as using visual equipment or leakage detection systems to determine if leakage rates are changing. The NRC staff finds this change acceptable because the code case continues to require through-wall leaks to be monitored daily and the expanded allowable monitoring methods should have no adverse impact.

3.2.9 Leakage Rate

ASME Code Case N-513-3, paragraph 1(d) states:

> The provisions of this Case demonstrate the integrity of the item and not the consequences of leakage. It is the responsibility of the Owner to demonstrate system operability considering effects of leakage.

ASME Code Case N-513-4 modified the last sentence, now located in paragraph (f), to state:

> It is the responsibility of the Owner to consider effects of leakage in demonstrating system operability and performing plant flooding analyses.

In its application, the licensee stated that the allowable leakage rate will be determined by dividing the critical leakage rate by a safety factor of four. The licensee contends that applying a safety factor of four to the critical leakage rate provides quantitative measurable limits, which ensure the operability of the system and early identification of issues that could erode defense-in-depth and lead to adverse consequences.

ASME Code Cases N-513-3 and N-513-4 do not contain leakage limits for components with through-wall flaws. The NRC staff finds that the licensee's approach of applying a safety factor of four to the critical leakage rate is acceptable because it will provide sufficient time for corrective measures to be taken before significant increases in leakage erodes defense-in-depth, which could lead to adverse consequences.

3.2.10 Hardship Justification

The NRC staff finds that performing a plant shutdown to repair the subject piping would unnecessarily cycle the units, resulting in an increase in personnel exposure and plant risk. Additionally, performing certain ASME Code repairs during normal operation may challenge a Technical Specification Completion Time and place the plant at higher safety risk than warranted. Therefore, the NRC staff determined that compliance with the specified ASME Code repair requirements would result in hardship or unusual difficulty without a compensating increase in the level of quality and safety.

3.3 Summary

The NRC staff finds that the proposed alternative will provide reasonable assurance of the structural integrity because: (1) ASME Code Case N-513, Revision 4, addresses the NRC condition in RG 1.147, Revision 18, for Revision 3 of ASME Code Case N-513; (2) flaw evaluations in component types added to Revision 4 of ASME Code Case N-513 are based on acceptable methodologies; and (3) the method for determining the allowable leakage rate is adequate to provide early identification of a significant increase in leakage. In addition, complying with ASME Code, Section XI requirements would result in hardship or unusual difficulty without a compensating increase in the level of quality and safety.

4.0 CONCLUSION

As set forth above, the NRC staff has determined that the proposed alternative provides reasonable assurance of structural integrity of the subject piping segments, and that complying with IWC-3120, IWC-3130, IWD-3120(b), and IWD-3400 of the ASME Code, Section XI, would result in hardship or unusual difficulty without a compensating increase in the level of quality and safety. Accordingly, the NRC staff concludes that the licensee has adequately addressed all of the regulatory requirements set forth in 10 CFR 50.55a(z)(2).

Therefore, the NRC staff authorizes the use of the proposed alternative described in the licensee's application for the remainder of each plant's current 10-year ISI interval, as specified in Section 3.1.2 of this safety evaluation, or until such time as the NRC approves ASME Code Case N-513-4 for general use through revision of NRC RG 1.147 or other document. If the proposed alternative is applied to a flaw near the end of the authorized 10-year ISI interval, and the next refueling outage is in the subsequent interval, the licensee is authorized to continue to apply the proposed alternative to the flaw until the next refueling outage.

All other requirements of the ASME Code, Section XI, for which relief has not been specifically requested and authorized by NRC staff remain applicable, including a third party review by the Authorized Nuclear Inservice Inspector. The NRC staff notes that approval of this alternative does not imply NRC approval of ASME Code Case N-513-4 for generic use.

Principal Contributor: Robert Davis, NRR/DMLR/MPHB

Date: June 8, 2018

SUBJECT: ARKANSAS NUCLEAR ONE, UNITS 1 AND 2; GRAND GULF NUCLEAR STATION, UNIT 1; INDIAN POINT NUCLEAR GENERATING UNIT NOS. 2 AND 3; PALISADES NUCLEAR PLANT; PILGRIM NUCLEAR POWER STATION; RIVER BEND STATION, UNIT 1; AND WATERFORD STEAM ELECTRIC STATION, UNIT 3 – RELIEF REQUEST NO. EN-17-RR-1, ALTERNATIVE TO USE ASME CODE CASE N-513-4 (EPID L-2017-LLR-0141) DATED JUNE 8, 2018

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