



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

June 21, 2023

ANO Site Vice President
Arkansas Nuclear One
Entergy Operations, Inc.
N-TSB-58
1448 S.R. 333
Russellville, AR 72802

SUBJECT: ARKANSAS NUCLEAR ONE, UNIT 1 – REQUEST FOR RELIEF ANO1-ISI-036
REGARDING VOLUMETRIC EXAMINATION REQUIREMENTS
(EPID L-2022-LLR-0063)

Dear Sir or Madam:

By letter dated August 24, 2022 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML22236A500), as supplemented by the letter dated September 8, 2022 (ML22251A091), Entergy Operations, Inc. (the licensee) submitted Relief Request (RR) ANO1-ISI-036 to the U.S. Nuclear Regulatory Commission (NRC) for the fifth 10-year inservice inspection (ISI) interval at Arkansas Nuclear One, Unit 1 (ANO-1).

In RR ANO1-ISI-036, the licensee requested relief from the examination coverage 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), applicable to certain ASME Code Class 1 and non-class component welds. Specifically, pursuant to Title 10 of the *Code of Federal Regulations* (10 CFR) 50.55a(g)(5)(iii), the licensee requested relief on the basis that achieving the ASME Code-required examination coverage for the subject welds in RR ANO1-ISI-036 is impractical.

As set forth in the enclosed safety evaluation, the NRC staff determined that granting relief pursuant to 10 CFR 50.55a(g)(6)(i) is authorized by law and will not endanger life or property or the common defense and security, and is otherwise in the public interest giving due consideration to the burden upon the licensee that could result if the requirements were imposed on the facility. Furthermore, the NRC staff concluded that the examinations performed to the extent practical provide reasonable assurance of structural integrity of the subject components. Accordingly, the NRC staff concludes that the licensee has adequately addressed all of the regulatory requirements set forth in 10 CFR 50.55a(g)(5)(iii). Therefore, the NRC staff grants relief from the ASME Code examination requirements for the welds included in RR ANO1-ISI-036 for ANO-1, for the fifth 10-year ISI interval.

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

If you have any questions, please contact the ANO-1 Project Manager, Thomas Wengert at (301) 415-4037 or by email at Thomas.Wengert@nrc.gov.

Sincerely,

Jennifer L. Dixon-Herrity, Chief
Plant Licensing Branch IV
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

Docket No. 50-368

Enclosure:
Safety Evaluation

cc: Listserv



UNITED STATES
NUCLEAR REGULATORY COMMISSION
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SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

RELIEF REQUEST ANO1-ISI-036

REGARDING VOLUMETRIC EXAMINATION REQUIREMENTS

FOR THE FIFTH 10-YEAR INSERVICE INSPECTION INTERVAL

ENTERGY OPERATIONS, INC.

ARKANSAS NUCLEAR ONE, UNIT 1

DOCKET NO. 50-313

1.0 INTRODUCTION

By letter dated August 24, 2022 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML22236A500), as supplemented by the letter dated September 8, 2022 (ML22251A091), Entergy Operations, Inc. (the licensee) submitted Relief Request (RR) ANO1-ISI-036 to the U.S. Nuclear Regulatory Commission (NRC) for the fifth 10-year inservice inspection (ISI) interval at Arkansas Nuclear One, Unit 1 (ANO-1). In RR ANO1-ISI-036, the licensee requested relief from the examination coverage 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), applicable to certain ASME Code Class 1 and non-class component welds. Specifically, pursuant to Title 10 of the *Code of Federal Regulations* (10 CFR) 50.55a(g)(5)(iii), "ISI program updated: Notification of impractical ISI Code requirements," the licensee requested relief on the basis that achieving the ASME Code-required examination coverage for the subject welds in RR ANO1-ISI-036 is impractical.

2.0 REGULATORY EVALUATION

Pursuant to 10 CFR 50.55a(g)(4), "Inservice inspection standards requirement for operating plants," components (including supports) that are classified as ASME Code Class 1, Class 2, and Class 3 must meet the requirements in 10 CFR 50.55a, "Codes and standards," throughout the service life of a boiling or pressurized water reactor. Pursuant to 10 CFR 50.55a(g)(4)(ii), "Applicable ISI code: Successive 120-month intervals," inservice examination of components and system pressure tests conducted during successive 120-month inspection intervals must comply with the requirements of the latest edition and addenda of the ASME Code incorporated by reference in paragraph (a) of 10 CFR 50.55a, 18 months before the start of the 120-month inspection interval or the optional ASME Code Cases listed in NRC Regulatory Guide (RG) 1.147 "Inservice Inspection Code Case Acceptability, ASME Section XI, Division 1," when using ASME Code, Section XI, as incorporated by reference in paragraph (a)(3)(ii) of 10 CFR 50.55a, subject to the conditions listed in paragraph (b) of 10 CFR 50.55a.

Pursuant to 10 CFR 50.55a(g)(5)(iii), “[i]f the licensee has determined that conformance with a Code requirement is impractical for its facility, the licensee must notify the NRC and submit, as specified in § 50.4, information to support the determinations. Determinations of impracticality in accordance with [10 CFR 50.55a(g)(5)(iii)] must be based on the demonstrated limitations experienced when attempting to comply with the Code requirements during the inservice inspection interval for which the request is being submitted. Requests for relief made in accordance with [10 CFR 50.55a(g)(5)(iii)] must be submitted to the NRC no later than 12 months after the expiration of the initial or subsequent 120-month inspection interval for which relief is sought.”

Pursuant to 10 CFR 50.55a(g)(6)(i), “Impractical ISI requirements: Granting of relief,” “[t]he Commission will evaluate determinations under paragraph (g)(5) of [10 CFR 50.55a] that Code requirements are impractical. The Commission may grant such relief and may impose such alternative requirements as it determines are authorized by law, will not endanger life or property or the common defense and security, and are otherwise in the public interest giving due consideration to the burden upon the licensee that could result if the requirements were imposed on the facility.”

Based on the above, and subject to the following technical evaluation, the NRC staff finds that regulatory authority exists for the licensee to request and the NRC to grant the relief requested by the licensee.

3.0 TECHNICAL EVALUATION

3.1 Summary of Request

The RR ANO1-ISI-036 is for six ASME Code, Class 1 welds for the fifth 10-year ISI Interval. In its application dated August 24, 2022, the licensee stated that, due to the geometric configurations and material types of the components, it was impractical to meet the ASME Code-required examination volumes for the welds described in RR ANO1-ISI-036. Code conformance would require structural modification and/or replacement of the components.

The licensee further stated that “[a]lthough insonification was extended to the far side of the welds to the extent practical, this portion of the examination is not included in the reported examination coverage....” The licensee stated that it “used the best available and EPRI [Electric Power Research Institute] approved techniques to examine the subject piping welds.” Due to physical limitations, there are no viable alternative examination techniques currently available to increase the coverage. Pursuant to 10 CFR 50.55a(g)(5)(iii), the licensee requested relief on the basis that achieving the ASME Code required volumetric examination coverage for the subject components in RR ANO1-ISI-036 is impractical.

Applicable Code Requirements

The welds described in RR ANO1-ISI-036 are governed by the Risk Informed ISI Program Plan that was developed using ASME Code Case N-716-1, “Alternative Classification and Examination Requirements, Section XI, Division 1,” Examination Category R-A. ASME Code Case N-716 is approved for use in RG 1.147. The welds are assigned category R-A, Items R1.11, R1.16, and R1.20, and require ultrasonic examination. Four welds classified as Examination Category R-A, Item R1.20, “Welds Not Subject to a Degradation Mechanism,” require “essentially 100 percent” coverage. One weld was classified as Examination Category R-A, Item R1.11, “Elements Subject to Thermal Fatigue,” and one weld was dual classified as

R1.11/16 with R1.16 being “Welds Subject to Intergranular or Transgranular Stress Corrosion Cracking (IGSCC or TGSCC).”

Components Covered in Relief Request

The welds covered RR ANO1-ISI-036 are described in table 1. The only recordable indications in any of the welds were caused by geometry.

Table 1: Welds Covered by Relief Request ANO1-ISI-036

Weld ID	Examination Item Number	Description	Coverage Obtained	Access Limitation
36-028	R1.20	Elbow to Valve Circumferential Weld	50	Single Sided Access
36-056	R1.20	Pipe to Valve Circumferential Weld	50	Single Sided Access
19-006	R1.20	Valve to Pipe Circumferential Weld	50	Single Sided Access
19-038	R1.20	Valve to Elbow Circumferential Weld	48	Single Sided Access
22-060	R1.11/16	Pipe to Valve Circumferential Weld	50	Single Sided Access
22-064	R1.11	Pipe to Elbow Circumferential Weld	87.4	Access Limited by Adjacent Pipe

ASME Code of Record

The licensee used the ASME Code, Section XI, 2007 Edition through 2008 Addenda for the fifth 10-year ISI interval. The interval started on May 31, 2017. The first inspection period ended May 30, 2021.

Licensee’s Reason for Request

The licensee stated that, due to the geometric configuration and material type of the components, it was not practical to obtain essentially 100 percent of the ASME Code-required examination coverage for volumetric examinations for the subject piping welds. Code conformance would require structural modification and/or replacement of the components.

3.2 NRC Staff Evaluation

The NRC staff has evaluated RR ANO1-ISI-036 pursuant to 10 CFR 50.55a(g)(6)(i). The NRC staff’s evaluation focused on: (1) whether a technical justification exists to support the determination that the ASME Code requirement is impractical; (2) that imposition of the Code-required examinations would result in a burden to the licensee; and (3) that the licensee’s proposed alternative (accepting the reduced inspection coverage in this case) provides reasonable assurance of structural integrity and leak tightness of the subject welds. The NRC staff finds that if these three criteria are met, the requirements of 10 CFR 50.55a(g)(6)(i) (i.e., granting the requested relief will not “endanger life or property or the common defense and

security, and is otherwise in the public interest giving due consideration to the burden upon the licensee that could result if the requirements were imposed on the facility”) will also be met.

RR ANO1-ISI-036 contains risk information for each weld and a risk evaluation to show compliance with ASME Code Case N-716-1. However, this information was not used by the NRC staff to evaluate the impracticality or adequacy of the examinations; rather, the evaluation was judged against the standard of reasonable assurance of structural integrity and leak tightness of the subject welds, not the risk impacts. In addition, an assessment of compliance with ASME Code Case N-716-1 is beyond the scope of the NRC staff’s evaluation under 10 CFR 50.55a(g)(6)(i).

Impracticality of Compliance

As described in the relief request, the physical limitations that prevented the licensee’s ultrasonic testing (UT) to achieve essentially 100 percent coverage of the ASME Code-required volume were the configurations that limited the examinations to one side of the weld or full access was limited by interference from an adjacent pipe. The NRC staff confirmed that the weld configurations prevented the licensee from scanning essentially 100 percent of the welds. As shown in the sketches provided in the enclosure to the letter dated August 24, 2022, the subject components have access limitations that result in reduced volumetric examination coverage. The NRC staff finds that due to these geometric limitations associated with the aforementioned welds, it was impractical to meet the ASME Code-required volumetric examination coverage of “essentially 100 percent” for the subject welds during its fifth 10-year ISI Interval.

Burden of Compliance

Obtaining essentially 100 percent coverage would require extensive modification or replacement of components with a design that would allow full examination from both sides of the weld. The NRC staff finds that replacing or reconfiguring the components of the subject welds is the only reasonable means to achieve dual-sided coverage of these welds and that replacement or reconfiguration of the components constitutes a burden on the licensee.

Structural Integrity and Leak Tightness

Based on its review of the relief request, the NRC staff verified that:

- The welds were examined using the appropriate equipment, ultrasonic modes of propagation, probe angles, frequencies, and scanning directions to obtain maximum coverage;
- The coverage was calculated in a reasonable manner;
- The personnel and UT procedures utilized for the volumetric examination were qualified, as required by the regulation;
- The coverage was limited by physical limitations or access (i.e., the configuration of one side of the weld did not permit access for scanning);
- No unacceptable indications were identified.

The volumetric examinations were performed using UT, which facilitated volumetric coverage of the weld joint at the root area located at the inner diameter of the components. The UT examinations were performed using personnel, equipment and procedures qualified in

accordance with ASME Code, Section XI, Appendix VIII, as implemented by the Performance Demonstration Initiative (PDI). If there were to be any active aging degradation in the weld joint, it would have been identified in the PDI-qualified UT examinations.

For the single-sided examinations of welds 36-028, 36-056, 19-006, 19-038, and 22-060, although the ASME Code-required coverage could not be obtained, the ultrasonic techniques employed provided full volumetric coverage from the near side of the welds, which also facilitated some limited volumetric coverage for the weld materials on the opposite (far) side of these welds. Therefore, the NRC staff concluded that the licensee had demonstrated its capability of adequately monitoring aging degradation using single-sided UT examinations for these welds.

For the dual-sided examination of weld 22-064, although the ASME Code-required coverage could not be obtained, the operating experience and the UT techniques employed have the capability of adequately monitoring degradation for this weld.

Based on the coverage obtained for the subject components, the extent of the examinations, and considering the licensee's coverage for the accessible portions of these welds, it is reasonable to conclude that, had significant flaws been present in these welds, some evidence of unacceptable flaws would have been detected by the licensee.

Therefore, the NRC staff finds that the volumetric examinations performed to the extent practical provide a reasonable assurance of structural integrity and leak tightness of the subject welds, and that compliance with the ASME Code requirements for these welds would be a burden on the licensee.

4.0 CONCLUSION

As set forth above, the NRC staff determines that granting relief pursuant to 10 CFR 50.55a(g)(6)(i) is authorized by law and will not endanger life or property or the common defense and security and is otherwise in the public interest giving due consideration to the burden upon the licensee that could result if the requirements were imposed on the facility. Furthermore, the NRC staff concluded that the examinations performed to the extent practical provide reasonable assurance of structural integrity of the subject components. Accordingly, the NRC staff concludes that the licensee has adequately addressed all the regulatory requirements set forth in 10 CFR 50.55a(g)(5)(iii). Therefore, the NRC staff grants relief from the ASME Code examination requirements for the welds included in RR ANO1-ISI-036 for Arkansas Nuclear One, Unit 1, for the fifth 10-year ISI interval.

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

Principal Contributor: S. Cumblidge, NRR

Date: June 21, 2023

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REGARDING VOLUMETRIC EXAMINATION REQUIREMENTS
(EPID L-2022-LLR-0063) DATED JUNE 21, 2023

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