



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

April 23, 2020

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 - RELIEF REQUEST ANO1-ISI-033
RELATED TO ASME CODE CASE N-729-4 SUPPLEMENTAL EXAMINATION
REQUIREMENTS OF REACTOR VESSEL CLOSURE HEAD PENETRATION
NOZZLES (EPID L-2019-LLR-0100)

Dear Sir or Madam:

By letter dated October 31, 2019 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML19304A290), as supplemented by letter dated November 7, 2019 (ADAMS Accession No. ML19311C822), Entergy Operations, Inc. (the licensee), submitted Relief Request ANO1-ISI-031, proposing an alternative to the requirements of the American Society of Mechanical Engineers Boiler and Pressure Vessel Code (ASME Code) Case N-729-4, "Alternative Examination Requirements for PWR [Pressurized Water Reactor] Reactor Vessel Upper Heads with Nozzles Having Pressure-Retaining Partial-Penetration Welds Section XI, Division 1," as conditioned by Title 10 of the *Code of Federal Regulations* (10 CFR) paragraph 50.55a(g)(6)(ii)(D), for Arkansas Nuclear One, Unit 1 (ANO-1).

Specifically, pursuant to 10 CFR 50.55a(z)(2), the licensee requested to use the proposed alternative in ANO1-ISI-033 on the basis that compliance with the specified ASME Code requirements would result in hardship or unusual difficulty without a compensating increase in the level of quality and safety.

On November 13, 2019 (ADAMS Accession No. ML19318D042), the U.S. Nuclear Regulatory Commission (NRC) verbally authorized the use of ANO1-ISI-033 at ANO-1, during operating Cycle 21, which ends in the spring of 2021. The enclosed safety evaluation describes the technical basis for the NRC's verbal authorization.

The NRC staff reviewed the licensee's submittals and determined that the proposed alternative in Relief Request ANO1-ISI-033 provides reasonable assurance of structural integrity of the subject components and that complying with the specified ASME Code requirements 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 the regulatory requirements set forth in 10 CFR 50.55a(z)(2). Therefore, the NRC staff authorizes the use of ANO1-ISI-033 for one cycle of operation, until refueling outage 1R29, which is scheduled for May 2021.

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

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

Sincerely,

/RA/

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

Docket No. 50-313

Enclosure:
Safety Evaluation

cc: Listserv



UNITED STATES
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SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION
RELIEF REQUEST ANO1-ISI-033 REGARDING ALTERNATIVE INSPECTION OF
REACTOR PRESSURE VESSEL CLOSURE HEAD PENETRATION NOZZLES

ENTERGY OPERATIONS, INC.

ARKANSAS NUCLEAR ONE, UNIT NO. 1

DOCKET NO. 50-313

1.0 INTRODUCTION

By letter dated October 31, 2019 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML19304A290), as supplemented by letter dated November 7, 2019 (ADAMS Accession No. ML19311C822), Entergy Operations, Inc. (the licensee) proposed an alternative in Relief Request ANO1-ISI-033 to the requirements of Title 10 of the *Code of Federal Regulations* (10 CFR) paragraph 50.55a(g)(6)(ii)(D), "Augmented ISI [inservice inspection] requirements: Reactor vessel head inspections," which requires American Society of Mechanical Engineers Boiler and Pressure Vessel (ASME Code) Case N-729-4, "Alternative Examination Requirements for PWR [Pressurized Water Reactor] Reactor Vessel Upper Heads with Nozzles Having Pressure-Retaining Partial-Penetration Welds Section XI, Division 1," for inspection of the reactor vessel closure head (RVCH) at Arkansas Nuclear One, Unit 1 (ANO-1).

Specifically, pursuant to 10 CFR 50.55a(z)(2), "Hardship without a compensating increase in quality and safety," the licensee requested authorization of its proposed alternative on the basis that compliance with the specified requirements would result in hardship or unusual difficulty without a compensating increase in the level of quality and safety.

On November 13, 2019 (ADAMS Accession No. ML19318D042), the U.S. Nuclear Regulatory Commission (NRC) staff verbally authorized the use of ANO1-ISI-033 at ANO-1, during operating Cycle 21, which ends in the spring of 2021. This safety evaluation describes the technical basis for the NRC's verbal authorization.

2.0 REGULATORY EVALUATION

The ISI of ASME Code Class 1, 2, and 3 components is to be performed in accordance with ASME Code, Section XI, "Rules for Inservice Inspection of Nuclear Power Plant Components," and applicable editions and addenda as required by 10 CFR 50.55a(g), "Preservice and inservice inspection requirements," except where specific written relief has been granted by the NRC.

Enclosure

The regulation, 10 CFR 50.55a(g)(6)(ii), "Augmented ISI program," states that "The Commission may require the licensee to follow an augmented inservice inspection program for systems and components for which the Commission deems that added assurance of structural reliability is necessary." In accordance with 10 CFR 50.55a(g)(6)(ii)(D), all licensees of PWRs must augment their ISI program with ASME Code Case N-729-4, subject to conditions specified in paragraphs (g)(6)(ii)(D)(2) through (4)."

Section 50.55a(z), "Alternatives to codes and standards requirements," of 10 CFR states, in part, that "Alternatives to the requirements of [paragraph (g) of 10 CFR 50.55a] or portions thereof may be used, when authorized by the Director, Office of Nuclear Reactor Regulation. A proposed alternative must be submitted and authorized prior to implementation." The licensee must demonstrate that: (1) the proposed alternatives provide an acceptable level of quality and safety, or (2) compliance with the specified requirements of this section would result in hardship or unusual difficulty without a compensating increase in the level of quality and safety.

Based on the above, and subject to the following technical evaluation, the NRC staff finds that regulatory authority exists for the licensee to request the use of an alternative and the NRC to authorize the proposed alternative.

3.0 TECHNICAL EVALUATION

3.1 ASME Code Components Affected

The affected components are ASME Code Class 1 PWR RVCH nozzles and associated J-groove partial-penetration attachment welds fabricated with Alloy 690/52/152 materials. Each of these nozzles and associated welds is categorized as Item B4.30 in ASME Code Case N-729-4, Table 1.

3.2 ISI Interval and Applicable Code Edition and Addenda

ANO-1 is currently in its fifth 10-year ISI interval, which began May 31, 2017, and is scheduled to end on May 30, 2027. The ASME Code of record for the fifth 10-year inservice inspection interval is the 2007 Edition with 2008 Addenda.

3.3 Code Requirement for Which Relief is Requested

The regulation in 10 CFR 50.55a(g)(6)(ii)(D)(1), "Implementation," requires that licensees augment their ISI programs in accordance with ASME Code Case N-729-4, subject to the conditions specified in paragraphs (2) through (4) of 10 CFR 50.55a(g)(6)(ii)(D). ASME Code Case N-729-4, paragraph 3142.1(c) requires that either a repair/replacement activity or a supplemental examination be performed if a visual examination (VE) identifies nozzles with relevant conditions indicative of possible nozzle leakage.

3.4 Licensee's Proposed Alternative

The licensee submitted a proposed alternative to performing supplemental examinations of the ANO-1 RVCH in accordance with ASME Code Case N-729-4, due to the hardship identified in the submittal.

The licensee's proposed alternative was to perform a VE on the bare metal surface of the ANO-1 RVCH during refueling outage 1R29 in accordance with the latest revision of ASME Code Case N-729 endorsed in 10 CFR 50.55a, "Codes and standards." The examination will be conducted in accordance with paragraph 3140, and the results will be evaluated in accordance with paragraph 3142. Subsequent VE examinations will be conducted in accordance with Table 1 Item No. B4.30.

3.5 Licensee's Basis for the Proposed Alternative

During the last outage at ANO-1 (1R28), the licensee performed a RVCH VE. The licensee discovered that an intermediate cooling water system leak following refueling outage 1R27 had left deposits on the RVCH, which masked approximately half of the examination surface area of the RVCH. The licensee stated that the deposits around the nozzle penetrations limited the effectiveness of the VE for some nozzles. Therefore, the licensee proposed an alternative to perform a VE of the bare metal RVCH during the next refueling outage, 1R29, in accordance with the latest revision of ASME Code Case N-729 in 10 CFR 50.55a. This was based on having completed a best-effort VE of the RVCH during the current refueling outage, 1R28, taking chemistry samples of deposits on the RVCH to evaluate the source of the deposits, and performing a second VE after the RVCH had been cleaned to verify no corrosion on the RVCH.

3.6 Licensee's Proposed Duration of Relief Request

The licensee proposed this alternative during the fall 2019 refueling outage for one cycle of operation, until refueling outage 1R29, which is scheduled for May 2021.

3.7 NRC Staff Review

The NRC staff reviewed the licensee's proposed alternative in accordance with 10 CFR 50.55a(z)(2) to determine if compliance with the specified requirements would result in hardship or unusual difficulty without a compensating increase in the level of quality and safety.

The NRC staff reviewed photographs of leakage trails and confirmed that the deposits found on the RVCH could have been attributed to the intermediate cooling water system leak. Further, the NRC staff reviewed the chemistry sample analysis results and found that the deposits from the sampled areas were consistent with those found in the intermediate cooling water system. The NRC staff also confirmed that the licensee performed a second VE during the 1R28 refueling outage, which confirmed that there was no significant corrosion of the low alloy steel RVCH surface. While these actions were insufficient to disposition all the nozzles as being free from reactor coolant pressure boundary leakage, they support a conclusion that no significant degradation of the RVCH due to any possible leakage occurred prior to the outage.

In addition, the NRC staff noted that the licensee's RVCH nozzles and attachment welds are fabricated from Alloy 690/52/152 materials, which are less susceptible to the initiation and growth of primary water stress corrosion cracking flaws. This contributes to the NRC staff finding reasonable assurance that structural integrity of the RVCH will be maintained over the next operating cycle. Accordingly, the NRC staff finds that the licensee's proposed alternative to perform a VE of the bare metal RVCH in accordance with N-729-4 during the next refueling outage will enable either confirmation that no leakage from the reactor vessel pressure boundary is occurring or will identify any possible leakage before it could challenge the structural integrity of the RVCH at ANO-1.

Without the proposed alternative, in accordance with ASME Code Case N-729-4, paragraph 3142.1(c), the licensee would have been required to perform supplemental volumetric and/or surface examinations to disposition any nozzles for which an absence of reactor coolant pressure boundary leakage had not been demonstrated. This activity would have required additional work in a high radiation area that was not previously planned for this refueling outage. Therefore, the NRC staff finds that the licensee's identified hardship is acceptable, as required by 10 CFR 50.55a(z)(2).

Therefore, based on the above evaluation, the NRC staff finds that the licensee's proposed alternative meets the requirements for authorization under 10 CFR 50.55a(z)(2) and provides reasonable assurance of structural integrity of the RVCH at ANO-1 until the next refueling outage, 1R29.

4.0 CONCLUSION

As set forth above, the NRC staff determines that the licensee has demonstrated that the proposed alternative in Relief Request ANO1-ISI-033 provides reasonable assurance of structural integrity of the subject components and that complying with the specified ASME Code requirements 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 the regulatory requirements set forth in 10 CFR 50.55a(z)(2). Therefore, the NRC staff authorizes the use of ANO1-ISI-033 for one cycle of operation, until refueling outage 1R29, which is scheduled for May 2021.

All other ASME Code, Section XI and 10 CFR 50.55a(g)(6)(ii)(D) requirements for which relief was not specifically requested and approved in the subject request for relief remain applicable, including third-party review by the Authorized Nuclear Inservice Inspector.

Principal Contributor: J. Collins

Date: April 23, 2020

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