



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

May 17, 2018

Vice President, Operations
Entergy Operations, Inc.
River Bend Station
5485 U.S. Highway 61N
St. Francisville, LA 70775

SUBJECT: RIVER BEND STATION, UNIT 1 – REQUEST FOR ALTERNATIVE RBS-ISI-015
FROM THE REQUIREMENTS OF THE ASME CODE REGARDING REACTOR
PRESSURE VESSEL WELD INSPECTIONS (EPID L-2018-LLR-0009)

Dear Sir or Madam:

By letter dated February 13, 2018, as supplemented by letter dated April 12, 2018, Entergy Operations, Inc. (the licensee) submitted a request to the U.S. Nuclear Regulatory Commission (NRC) for the use of an alternative to certain American Society of Mechanical Engineers Boiler and Pressure Vessel Code (ASME Code), Section XI requirements at River Bend Station, Unit 1 (RBS). The proposed alternative would allow reduced requirements for nozzle-to-vessel weld and inner radius examinations.

Specifically, pursuant to Title 10 of the *Code of Federal Regulation* (10 CFR) paragraph 50.55a(z)(1), the licensee requested approval to use the proposed alternative based on ASME Code Case N-702, "Alternative Requirements for Boiling Water Reactor (BWR) Nozzle Inner Radius and Nozzle-to-Shell Welds, Section XI, Division 1," on the basis that the alternative provides an acceptable level of quality and safety.

The NRC staff has reviewed the subject request regarding an alternative to ASME Code based on ASME Code Case N-702. The NRC staff determined that the licensee has adequately addressed the Regulatory Guide 1.147, Revision 17, condition for ASME Code Case N-702 to the end of the fourth inservice inspection (ISI) interval. Therefore, the NRC staff concludes that the licensee's proposed alternative is in compliance with the ASME Code requirements and provides an acceptable level of quality and safety.

Accordingly, the NRC staff concludes, as set forth in the enclosed safety evaluation, that the licensee has adequately addressed all of the regulatory requirements set forth in 10 CFR 50.55a(z)(1) and authorizes the licensee's proposed alternative for inspection of nozzle-to-vessel shell welds and nozzle inner radii for the requested reactor pressure vessel nozzles at RBS for the fourth ISI interval from December 1, 2017, to August 29, 2025.

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

If you have any questions, please contact the RBS Project Manager, Lisa Regner, at 301-415-1906 or via e-mail at Lisa.Regner@nrc.gov.

Sincerely,



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

Docket No. 50-458

Enclosure:
Safety Evaluation

cc: Listserv



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

REQUEST FOR ALTERNATIVE RBS-ISI-015

ENTERGY OPERATIONS, INC.

RIVER BEND STATION, UNIT 1

DOCKET NO. 50-458

1.0 INTRODUCTION

By letter dated February 13, 2018 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML18045A028), as supplemented by letter dated April 12, 2018 (ADAMS Accession No. ML18106A068), Entergy Operations, Inc. (the licensee) submitted request for alternative, RBS-ISI-015, to the U.S. Nuclear Regulatory Commission (NRC) for relief from the requirements of the American Society of Mechanical Engineers (ASME) Boiler and Pressure Vessel Code (ASME Code), Section XI, regarding the inservice inspection (ISI) program for the fourth 10-year inspection interval for River Bend Station, Unit 1 (RBS).

Specifically, pursuant to Title 10 of the *Code of Federal Regulations* (10 CFR) paragraph 50.55a(z)(1), the licensee proposed an alternative to inspect reactor pressure vessel (RPV) nozzles based on ASME Code Case N-702, "Alternative Requirements for Boiling Water Reactor (BWR) Nozzle Inner Radius and Nozzle-to-Shell Welds, Section XI, Division 1." This alternative allows inspection of 25 percent of RPV nozzles (nozzle-to-vessel shell welds and nozzle inner radii) each ISI interval instead of the ASME Code, Section XI required 100 percent.

2.0 REGULATORY EVALUATION

The ISI of ASME Code Class 1, 2, and 3 components is performed in accordance with Section XI of the ASME Code and applicable addenda. This is required by 10 CFR 50.55a(g), "Preservice and inservice inspection requirements," except where specific relief has been granted by the Commission pursuant to 10 CFR 50.55a(g)(6)(i), "Impractical ISI requirements: Granting of relief." Section 50.55a(z) of 10 CFR states that alternatives to the requirements of paragraphs (b) through (h) of 10 CFR 50.55a, "Codes and standards," or portions thereof, may be used when authorized by the NRC. A proposed alternative must be submitted and authorized prior to implementation. Pursuant to 10 CFR 50.55a(z)(1), the licensee must demonstrate that the proposed alternative would provide an acceptable level of quality and safety.

ASME Code Case N-702 was conditionally approved in Regulatory Guide (RG) 1.147, Revision 17, "Inservice Inspection Code Case Acceptability, ASME Section XI, Division 1," dated August 2014 (ADAMS Accession No. ML13339A689), with the following condition to be addressed by the applicants:

The applicability of Code Case N-702 must be shown by demonstrating that the criteria in Section 5.0 of NRC Safety Evaluation regarding BWRVIP [BWR Vessel and Internals Project]-108 ["Technical Basis for the Reduction of Inspection Requirements for the Boiling Water Reactor Nozzle-to-Vessel Shell Welds and Nozzle Blend Radii"] dated December [19], 2007 ([ADAMS Accession No. ML073600374]) or Section 5.0 of NRC Safety Evaluation regarding BWRVIP-241 ["Probabilistic Fracture Mechanics Evaluation for the Boiling Water Reactor Nozzle-to-Vessel Shell Welds and Nozzle Blend Radii"] dated April 19, 2013 ([ADAMS Accession No. ML13071A240]) are met. The evaluation demonstrating the applicability of the Code Case shall be reviewed and approved by the NRC prior to the application of the Code Case.

The ASME Code of record for RBS for the fourth 10-year interval ISI program is the 2007 Edition of the ASME Code, Section XI, through the 2008 Addenda.

3.0 TECHNICAL EVALUATION

3.1 Licensee's Request for Alternative

Component(s) for which Alternative is Requested

The affected components are:

- ASME Code Class 1 Reactor Vessel Nozzles N01, N02, N03, N05, N06, N07, N08, N09, and N16 as specified in Attachment 2 of the licensee's February 13, 2018, submittal;
- Examination Category B-D, "Full Penetration Welded Nozzles in Vessels";
- Examination Item Nos. B3.90, "Nozzle-to-Vessel Welds" and B3.100, "Nozzle Inside Radius Section."

ASME Code Requirement for which Alternative is Requested

ASME Section XI, 2007 Edition with the 2008 Addenda, Table IWB-2500-1, Examination Category B-D, Inspection Program B requires a volumetric examination of all nozzles with full penetration welds to the vessel shell (or head) and integrally cast nozzles each 10-year interval.

Licensee's Proposed Alternative to the ASME Code

Pursuant to 10 CFR 50.55a(z)(1), an alternative based on ASME Code Case N-702 is requested to examine 25 percent of the nozzle-to-vessel shell welds and nozzle inner radii, including one nozzle from each system and nominal pipe size, in lieu of the ASME Code, Section XI, required 100 percent.

In relief, RBS-ISI-015, the licensee proposed the VT-1 examination as an alternative for the nozzle inner radii. In the letter dated April 12, 2018, the licensee clarified that for VT-1

examinations, it has adopted ASME Code Case N-648-1, "Alternative Requirements for Inner Radius Examination of Class 1 Reactor Vessel Nozzles," with the provisions stipulated in RG 1.147, Revision 17.

Licensee's Bases for Alternative

Consistent with the condition for ASME Code Case N-702 specified in RG 1.147, Revision 17, the licensee addressed in Attachment 3 of its February 13, 2018, submittal, the five criteria in Section 5.0 of the NRC staff's safety evaluation (SE) for BWRVIP-108. Based on the plant-specific RPV operating information, RPV geometry, and the bounding RPV nozzle geometry, the licensee presented calculated results to compare with the five criteria. Since the calculated results are bounded by the five SE criteria, the licensee concludes that request for alternative RBS-ISI-015 has met the RG 1.147, Revision 17, condition for ASME Code Case N-702 and this alternative provides an acceptable level of quality and safety for RBS.

Period of Applicability for Alternative

This alternative is requested for the duration of the RBS fourth ISI interval beginning on December 1, 2017, and scheduled to end on August 29, 2025.

3.2 NRC Staff Evaluation

The condition for ASME Code Case N-702 that is specified in RG 1.147, Revision 17, requires that the applicability of ASME Code Case N-702 is shown by demonstrating that the five criteria in the SE for BWRVIP-108 or the SE for BWRVIP-241 are met. These criteria were developed to ensure that the probabilities of failure from the supporting probabilistic fracture mechanics results for RPV nozzles are below the NRC safety goal of 5×10^{-6} occurrences per year. In this application, the licensee applied the criteria in the SE for BWRVIP-108.

The licensee's evaluation presented in Section 3.1 of this SE indicated that the bounding RPV nozzle-to-shell welds and nozzle inner radii met the criteria for applying ASME Code Case N-702, and thus, provided an acceptable level of quality and safety. This evaluation is identical to that used to support a similar application for the third ISI interval.¹ Since the plant-specific RPV operating information, RPV geometry, and the bounding RPV nozzle geometry remain unchanged from the third ISI to the fourth ISI interval, the NRC staff determined that ASME Code Case N-702 can be applied to the requested RBS RPV nozzles for the fourth ISI interval.

ASME Code Case N-702 also stipulates that VT-1 examination may be used in lieu of the volumetric examination for the nozzle inner radii. The licensee's supplement states that it will utilize ASME Code Case N-648-1, with associated required conditions specified in RG 1.147, Revision 17, if a VT-1 examination is performed in lieu of a volumetric examination. This is permissible because the licensee proposed to use the NRC-approved VT-1 examination for the nozzle inner radii when it is performed.

¹ The NRC staff's SE for the RBS third interval alternative request is dated August 2, 2010, and can be found at ADAMS Accession No. ML101440097.

4.0 CONCLUSION

The NRC staff has reviewed the submittal regarding the licensee's request to apply ASME Code Case N-702 per RG 1.147, Revision 17. The NRC staff determined that the licensee has adequately addressed the RG 1.147, Revision 17, condition for ASME Code Case N-702 to the end of the fourth ISI interval, and, therefore, the licensee's proposed alternative is in compliance with the ASME Code requirements and provides an acceptable level of quality and safety.

Accordingly, the NRC staff concludes, as set forth above, that the licensee has adequately addressed all of the regulatory requirements set forth in 10 CFR 50.55a(z)(1) and authorizes the licensee's proposed alternative for inspection of nozzle-to-vessel shell welds and nozzle inner radii for the requested reactor pressure vessel nozzles at RBS for the fourth ISI interval from December 1, 2017, to August 29, 2025.

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

Principal Contributor: S. Sheng

Date: May 17, 2018

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