



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

January 22, 2019

Ms. Cheryl A. Gayheart
Regulatory Affairs Director
Southern Nuclear Operating Company, Inc.
P. O. Box 1295, Bin 038
Birmingham, AL 35201-1295

**SUBJECT: EDWIN I. HATCH NUCLEAR PLANT, UNIT NOS. 1 AND 2 – PROPOSED
ALTERNATIVE HNP-ISI-ALT-05-04 FOR THE IMPLEMENTATION OF BWRVIP
GUIDELINES (EPID L-2018-LLR-0099)**

Dear Ms. Gayheart:

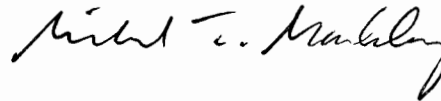
By letter dated June 21, 2018, (Agencywide Documents Access and Management System (ADAMS) Accession No. ML18172A281), as supplemented by letters dated November 29, 2018 and January 8, 2019 (ADAMS Accession Nos. ML18333A382 and ML19009A112), Southern Nuclear Operating Company (the licensee) requested relief from the requirements of the American Society of Mechanical Engineers (ASME) Boiler and Pressure Vessel Code (B&PV Code) for the Edwin I. Hatch Nuclear Plant (HNP), Unit Nos. 1 and 2. The licensee proposed to use Boiling Water Reactor Vessel and Internals Project (BWRVIP) guidelines as an alternative to certain requirements of Section XI of the ASME B&PV Code for the inservice inspection (ISI) of reactor pressure vessel interior surfaces, attachments, and core support structures. Pursuant to Title 10 of the *Code of Federal Regulations* (10 CFR) Part 50.55a(z)(1), the licensee requested to use the proposed alternative on the basis that the alternative provides an acceptable level of quality and safety.

The U.S. Nuclear Regulatory Commission (NRC) staff has completed its review of request for alternative HNP-ISI-ALT-05-04. As described in the enclosed safety evaluation, the NRC staff has determined that the licensee has adequately addressed all of the regulatory requirements set forth in 10 CFR 50.55a(z)(1). Accordingly, the NRC staff concludes that the licensee's proposed alternative provides an acceptable level of quality and safety. Therefore, the NRC staff authorizes the use of alternative HNP-ISI-ALT-05-04 at HNP Unit Nos. 1 and 2. The subject alternative is authorized for the duration of the fifth 10-year ISI interval for both units.

All other requirements of the ASME Code, Section XI, for which an alternative has not been specifically requested remain applicable, including third party review by the Authorized Nuclear Inservice Inspector.

If you have any questions, please contact the Project Manager, Randy Hall, at 301-415-4032 or by e-mail at Randy.Hall@nrc.gov.

Sincerely,

A handwritten signature in black ink, appearing to read "Michael T. Markley". The signature is fluid and cursive, with a large, stylized "M" and "K".

Michael T. Markley, Chief
Plant Licensing Branch II-1
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

Docket Nos. 50-321 and 50-366

Enclosure:
Safety Evaluation

cc: Listserv



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

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

REQUEST FOR ALTERNATIVE HNP-ISI-ALT-05-04

FOR FIFTH 10-YEAR INTERVAL INSERVICE INSPECTION

EDWIN I. HATCH NUCLEAR PLANT, UNIT NOS. 1 AND 2

SOUTHERN NUCLEAR OPERATING COMPANY

DOCKET NOS. 50-321 AND 50-366

1.0 INTRODUCTION

By letter dated June 21, 2018, (Agencywide Documents Access and Management System (ADAMS) Accession No. ML18172A281) as supplemented by letters dated November 29, 2018 and January 8, 2019 (ADAMS Accession Nos. ML18333A382 and ML19009A112), Southern Nuclear Operating Company (the licensee) requested relief from the requirements of the American Society of Mechanical Engineers (ASME) Boiler and Pressure Vessel Code (B&PV Code) for the Edwin I. Hatch Nuclear Plant (HNP), Unit Nos. 1 and 2. The licensee proposed to use the Boiling Water Reactor Vessel and Internals Project (BWRVIP) guidelines as an alternative to certain requirements of Section XI of the ASME B&PV Code for the inservice inspection (ISI) of reactor pressure vessel interior surfaces, attachments, and core support structures. Pursuant to Title 10 of the *Code of Federal Regulations* (10 CFR) Part 50.55a(z)(1), the licensee requested to use the proposed alternative on the basis that the alternative provides an acceptable level of quality and safety.

2.0 REGULATORY REQUIREMENTS

The regulations in 10 CFR 50.55a(g)(4) state, in part, that ASME B&PV Code Class 1, 2, and 3 components (including supports) must meet the requirements, except the design and access provisions and the preservice examination requirements, set forth in Section XI of the applicable editions and addenda of the ASME B&PV Code to the extent practical within the limitations of design, geometry, and materials of construction of the components. The interior accessible areas, welded attachments, and the welded core support structures in the reactor pressure vessel (RPV) are categorized as ASME B&PV Code Class 1 components. Therefore, per 10 CFR 50.55a(g)(4), ISI of these areas and components must be performed in accordance with Section XI of the applicable edition and addenda of the ASME B&PV Code.

The regulations in 10 CFR 50.55a(z), "Alternatives to codes and standards requirements," state:

"Alternatives to the requirements of paragraphs (b) through (h) of this section [50.55a] or portions thereof may be used when authorized by the Director, Office

Enclosure

of Nuclear Reactor Regulation... A proposed alternative must be submitted and authorized prior to implementation. The applicant or licensee must demonstrate that:

- (1) *Acceptable level of quality and safety.* The proposed alternative would provide an acceptable level of quality and safety; or
- (2) *Hardship without a compensating increase in quality and safety.* Compliance with the specified requirements of this section [50.55a] 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 U.S. Nuclear Regulatory Commission (NRC) staff finds that the licensee may propose an alternative to ASME B&PV Code, Section XI, and that the NRC staff has the regulatory authority to authorize the licensee's proposed alternative.

3.0 LICENSEE'S EVALUATION

In this safety evaluation (SE), the term "RVI [reactor vessel internal] components" includes reactor pressure vessel interior surfaces, attachments, and core support structures.

Components for Which an Alternative is Requested

ASME Code, Section XI, Class 1, Examination Categories B-N-1 and B-N-2, Code Item Numbers B13.10 (Vessel Interior), B13.20 (Interior Attachments within Beltline Region), B13.30 (Interior Attachments beyond Beltline Region), and B13.40 (Core Support Structure).

Applicable ASME B&PV Code Edition and Addenda

The applicable Code of Record for the fifth 10-year ISI interval for Hatch, is the ASME B&PV Code, Section XI, 2007 Edition through 2008 Addenda.

Examination Requirements for Which an Alternative is Requested

ASME Code, Section XI requires the visual examination (VT) of certain RVI components. These examinations are included in Table IWB-2500-1, Categories B-N-1 and B-N-2, and identified with the following item numbers:

- B13.10 - Examine accessible areas of the reactor vessel interior each period using a technique which meets the requirements for a VT-3 examination. This includes only those spaces above and below the core made accessible by removal of components during normal refueling outages.
- B13.20 - Examine interior attachment welds within the beltline region each interval using a technique which meets the requirements for a VT-1 examination.
- B13.30 - Examine interior attachment welds beyond the beltline region each interval using a technique which meets the requirements for a VT-3 examination.

- B13.40 - Examine surfaces of the core support structure each interval using a technique which meets the requirements for a VT-3 examination

These examinations are performed to assess the structural integrity of the reactor pressure vessel interior surfaces, its welded attachments, and the welded core support structures.

Licensee's Basis for Requesting an Alternative and Justification for Granting Relief

In Proposed Alternative Request HNP-ISI-ALT-05-04, the licensee, in lieu of ASME Section XI, Code requirements, submitted an alternative inspection program per the BWRVIP guidelines for Categories B-N-1 and B-N-2 reactor pressure vessel interior surfaces, attachments, and core support structures at HNP. The licensee stated that implementation of the alternative inspection program will maintain an acceptable level of quality and safety of the affected welds and components. The proposed alternative includes examination methods, examination volume, frequency, training, successive and additional examinations, flaw evaluations, and reporting. The BWRVIP guidelines were developed based on inspection data gathered during many inspections across the BWR industry.

Alternative Examination

In lieu of the requirements of the applicable Edition and Addenda of the ASME Code, Section XI, the licensee proposed to examine the HNP RVI components in accordance with the BWRVIP guidelines listed below. If new guidance approved by the Executive Committee includes changes to NRC-approved BWRVIP guidance, that guidance shall be implemented in accordance with the NEI 03-08, Revision 3, screening process, as described in Enclosure 2 of Alternative Request No. HNP-ISI-ALT-05-04. The following reports include BWRVIP inspection and evaluation (I&E) guidelines for the reactor pressure vessel interior surfaces, attachments, and core support structures, although the licensee clarified that not all RVI components listed in the following BWRVIP reports are ASME Code, Section XI components.

BWRVIP-03, "Reactor Pressure Vessel and Internals Examination Guidelines"
BWRVIP-18, Revision 2-A, "BWR Core Spray Internals Inspection and Flaw Evaluation Guidelines"
BWRVIP-25, "BWR Core Plate Inspection and Flaw Evaluation Guidelines"
BWRVIP-26-A, "BWR Top Guide Inspection and Flaw Evaluation Guidelines"
BWRVIP-38, "BWR Shroud Support Inspection and Flaw Evaluation Guidelines"
BWRVIP-41, Revision 4, "BWR Jet Pump Assembly Inspection and Flaw Evaluation Guidelines"
BWRVIP-47-A, "BWR Lower Plenum Inspection and Flaw Evaluation Guidelines"
BWRVIP-48-A, "Vessel ID Attachment Weld Inspection and Flaw Evaluation Guidelines"
BWRVIP-76, Revision 1-A, "BWR Core Shroud Inspection and Flaw Evaluation Guidelines"
BWRVIP-94, "BWR Vessel and Internals Project, Program Implementation Guide"

The licensee further indicated that the BWRVIP has established a reporting protocol for examination results and deviations, and that the NRC staff has agreed with the BWRVIP approach in principle and has issued SEs for many of these guidelines.

In Enclosure 1, Table 1, of Alternative Request No. HNP-ISI-ALT-05-04, the licensee provided a comparison of the ASME Code, Section XI, examination requirements for Categories B-N-1 and B-N-2 reactor pressure vessel interior surfaces, attachments, and core support structures with

the above current BWRVIP I&E Guidelines. In Enclosure 1, Attachment 1, of the alternative request, the licensee provided additional information regarding the BWRVIP inspection guidelines for the applicable components of the reactor pressure vessel interior surfaces, attachments, and core support structures and their subcomponents, corresponding to the following ASME Code, Section XI requirements (Item Numbers in parentheses):

- Reactor Vessel Interior (B13.10)
- Interior Attachments within Beltline (B13.20)
- Interior Attachments beyond Beltline (B13.30)
- Core Support Structure (B13.40)

The licensee stated that the examples for each of the above components demonstrated that the inspection techniques that are recommended by the BWRVIP inspection guidelines for Category B-N-1 meet or exceed the inspection techniques mandated by the ASME Code, Section XI ISI program. For some Category B-N-2 inspections, such as the jet pump riser braces, the licensee stated that BWRVIP techniques provide enhanced detection capabilities, although with less frequent examinations. For other Category B-N-2 inspections, such as the core spray piping bracket welds, the licensee stated that the inspection frequency is increased. The licensee also stated the BWRVIP guidelines focus on specific and susceptible components, specify appropriate inspection methods capable of identifying known or potential degradation mechanisms, and require reexamination at appropriate intervals. The licensee concluded that implementation of the BWRVIP inspection guidelines for the HNP reactor pressure vessel interior surfaces, attachments, and core support structures would provide an acceptable level of quality and safety.

The licensee noted the following exceptions to the BWRVIP inspection guidelines related to core shroud inspection:

- BWRVIP-76, Revision 1-A requires ultrasonic examination (UT) or enhanced VT-1 (EVT-1) inspection of core shroud horizontal welds H1 through H7, as applicable. However, since the licensee has installed tie rods, which replace the structural function provided by the horizontal welds, the licensee proposes to examine the tie rods in lieu of examining the core shroud horizontal welds. BWRVIP-76, Revision 1-A requires UT or EVT-1 inspection of core shroud vertical welds at an interval based on the inspection of core shroud horizontal welds. However, since the licensee proposes to examine tie rods in lieu of core shroud horizontal welds, the licensee has established inspection intervals for all vertical welds with a maximum 10-year interval.

4.0 NRC STAFF EVALUATION

The NRC staff reviewed the information provided by the licensee in its submittal and supplements, including the technical bases supporting its proposed alternative to the ASME Code, Section XI ISI requirements for the subject components. The NRC staff finds the application of the referenced BWRVIP reports to be acceptable, contingent upon any additional conditions associated with the implementation of the subject BWRVIP reports, as described in the corresponding NRC staff SE for each of those reports. In addition, the NRC staff finds the use of the NEI 03-08, Revision 3, screening process acceptable, as outlined in Enclosure 2 of Alternative Request No. HNP-ISI-ALT-05-04. That process stipulates that for new BWRVIP guidance approved by the Executive Committee and determined to require NRC approval, the

guidance shall be implemented in accordance with BWRVIP-94 implementation requirements after receiving NRC approval. If the NEI 03-08, Revision 3, screening process determines that NRC approval is not required, then the new guidance shall be implemented upon Executive Committee approval in accordance with BWRVIP-94 implementation requirements.

Examination of Reactor Vessel Interior (Item B13.10)

The ASME Code requires a VT-3 examination of the reactor vessel interior areas above and below the core beltline made accessible during normal refueling outages. For the first inspection interval, the ASME Code requires inspection at the first refueling outage and at approximately 3-year intervals thereafter. For the second and successive inspection intervals, the ASME Code requires inspection once each inspection period.

Portions of the various examinations required by the applicable BWRVIP Guidelines (referenced in Section 3.0 of this SE) require access to the accessible areas of the reactor vessel during each refueling outage. According to the licensee, BWRVIP examinations of core spray piping and spargers, core plate, top guide, jet pump welds and components, and lower plenum components meets the access provisions for the reactor vessel interior as specified in ASME Code Item B13.10. Also according to the licensee, the remote camera systems used in these BWRVIP examinations provide an equivalent method of visual examination on a more frequent basis than that required by the ASME Code. Through the BWRVIP examinations, evidence of wear, structural degradation, loose or missing or displaced parts, foreign materials, and corrosion product buildup can be observed. The licensee states that the specified BWRVIP Guideline requirements meet or exceed the ASME Code requirements for Item B13.10 examination of the reactor vessel interior.

The NRC staff verified that the specified BWRVIP Guideline requirements meet or exceed the ASME Code requirements for Item B13.10 examination of the reactor vessel interior, and finds that the licensee's proposed alternative provides an acceptable level of quality and safety for the Item B13.10 components.

Examination of Interior Attachments within Beltline (Item B13.20)

The ASME Code requires a VT-1 examination of accessible reactor vessel interior attachment welds within the vessel beltline region during each inspection interval.

The licensee specifically listed the jet pump riser braces and lower surveillance specimen holder brackets as Item B13.20 components which are to be examined in accordance with BWRVIP-48-A. BWRVIP-48-A requires the lower surveillance specimen holder bracket attachment to be examined by VT-1 each inspection interval, which is the same level of inspection and frequency as required by the ASME Code. However, for the jet pump riser brace attachments, BWRVIP-48-A requires an enhanced VT-1 (EVT-1) examination of 100% of those locations during the first 12 years, and then 25% reexamination of those locations using EVT-1 during each subsequent 6 years. Thus, the examinations of these components would not be as frequent as those required by the ASME Code. The BWRVIP EVT-1 exams require the same character resolution as the ASME Code VT-1 exams, but with a more stringent viewing angle for remote video examination and the performance of a cleaning assessment and cleaning as necessary. The licensee states that the BWRVIP required examination provides an acceptable level of quality and safety for the Item B13.20 components despite the lesser frequency of the BWRVIP examination versus the ASME Section XI required examination.

The NRC staff finds that the licensee's proposed alternative provides an acceptable level of quality and safety for the Item B13.20 components, because the proposed alternative provides for equivalent or superior flaw detection and characterization than the ASME Code requirements, despite the reduced examination frequency.

Examination of Interior Attachments beyond Beltline (Item B13.30)

The ASME Code requires a VT-3 examination of accessible reactor vessel interior attachment welds beyond the vessel beltline region during each inspection interval.

The licensee specifically listed the steam dryer hold-down brackets, guide rod brackets, steam dryer support brackets, feedwater sparger brackets, core spray piping brackets, and upper surveillance specimen holder brackets as Item B13.30 components, which are to be examined in accordance with BWRVIP-48-A. The licensee also listed the shroud support weld (including gussets) as an Item B13.30 component, which is to be examined in accordance with BWRVIP-38. For the steam dryer hold-down brackets, the guide rod brackets, and the upper surveillance specimen holders, the BWRVIP requires a VT-3 examination each inspection interval, which is the same level and frequency as required by the ASME Code. For the steam dryer support brackets and the feedwater sparger brackets, the BWRVIP requires an EVT-1 examination each inspection interval, which is an enhanced level of inspection but the same frequency as compared to the ASME Code. For the core spray piping brackets, the BWRVIP requires an EVT-1 examination every four cycles, which is an enhanced level of inspection and an increased frequency as compared to the ASME Code. For the shroud support weld (including gussets), the BWRVIP requires either an EVT-1 examination every 6 years, or a UT examination, which is an enhanced level of inspection and the same or increased frequency as compared to the ASME Code. The licensee states that the BWRVIP required examination provides a level of quality and safety equivalent or superior to the ASME Code requirements for the Item B13.30 components.

The NRC staff finds that the licensee's proposed alternative provides an acceptable level of quality and safety for the Item B13.30 components, because the proposed alternative provides for equivalent or superior flaw detection and characterization, with an examination frequency that is equivalent or more frequent than the ASME Code requirements.

Examination of Core Support Structure (Item B13.40)

The ASME Code requires a VT-3 examination of accessible surfaces of the core support structure during each inspection interval.

The licensee specifically listed the integrally welded core support structure, and the core shroud horizontal and vertical welds as Item B13.40 components, which are to be examined according to the BWRVIP. For the integrally welded core support structure, BWRVIP-38 requires either EVT-1 or UT based on as-found conditions, at a maximum of every 6 years for EVT-1, every 10 years for UT where accessible. For the core shroud horizontal welds H1-H7, BWRVIP-76-R1-A requires either EVT-1 or UT based on as-found conditions, at a maximum of every 10 years for UT when inspected from both sides of the welds. Since the licensee has installed tie rods, which replace the structural function provided by the core shroud horizontal welds at HNP, the licensee proposes to examine the tie rods in lieu of examining the core shroud horizontal welds. A portion of horizontal weld H4 was examined in 2016 and 2018 as a result of conditions noted in the vertical weld during the Unit No. 1 refueling outage in 2014 (1R26). All newly discovered flaws in 2016 and 2018 were determined by the licensee to be bounded by the

structural evaluation of 2014 and leakage evaluation of 2016. The licensee has further stated that re-inspection frequencies for previously identified flaws will be determined consistent with and bounded by the results of those evaluations.

For the core shroud vertical welds, BWRVIP-76-R1-A requires either EVT-1 or UT, at a maximum of every 10 years based on inspection of horizontal welds. Since the licensee proposes to examine the tie rods in lieu of the core shroud horizontal welds, the licensee has established inspection intervals for all core shroud vertical welds with a maximum 10-year interval. Where the BWRVIP requires EVT-1 or UT examination of these components, these examination methods are more effective in identifying defects than the VT-3 examination prescribed in the ASME Code. For Item B13.40 components, the BWRVIP examination frequency is equivalent or more frequent than that provided by the ASME Code. The licensee states that the superior flaw detection and characterization capability, with an equivalent or more frequent examination frequency and the comparable flaw evaluation criteria, provides a level of quality and safety equivalent or superior to the ASME Code requirements for the Item B13.40 components. Through-wall indications in vertical welds that were found during the 1R26 refueling outage in 2014 were evaluated structurally and for leakage and determined by the licensee to be acceptable. These indications were reevaluated in 2016 and determined by the licensee to be acceptable with a 6-year reexamination requirement (from 2014). The licensee has further stated that re-inspection frequencies for previously identified flaws will be determined consistent with and bounded by the results of those evaluations.

The NRC staff finds that the licensee's proposed alternative provides an acceptable level of quality and safety for the Item B13.40 components, because the proposed alternative provides for equivalent or superior flaw detection and characterization with an examination frequency that is equivalent or more frequent than the ASME Code requirements.

5.0 CONCLUSION

As set forth above, the NRC staff determined that the licensee's proposed alternative provides an acceptable 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)(1). Therefore, the NRC staff authorizes the use of Alternative Request No. HNP-ISI-ALT-05-04 at HNP Unit Nos. 1 and 2 for the duration of the fifth 10-year ISI interval.

All other requirements of the ASME Code, Section XI for which an alternative has not been specifically requested remain applicable, including third party review by the Authorized Nuclear Inservice Inspector. Any ASME Code, Section XI RVI components that are not included in this request for alternative will continue to be inspected in accordance with the ASME Code, Section XI requirements. If not specifically addressed in this SE, the inspection and evaluation guidelines addressed in the relevant BWRVIP reports should be implemented as described in the corresponding NRC staff SE for each of those reports.

Principal Contributor: J. Jenkins, NRR

Date: January 22, 2019

SUBJECT: EDWIN I. HATCH NUCLEAR PLANT, UNIT NOS. 1 AND 2 – PROPOSED
ALTERNATIVE HNP-ISI-ALT-05-04 FOR THE IMPLEMENTATION OF BWRVIP
GUIDELINES (EPID L-2018-LLR-0099) DATED JANUARY 22, 2019

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