



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

August 2, 2019

Ms. Cheryl A. Gayheart
Regulatory Affairs Director
Southern Nuclear Operating Company, Inc.
3535 Colonnade Parkway
Birmingham, AL 35243

SUBJECT: JOSEPH M. FARLEY NUCLEAR PLANT, UNITS 1 AND 2 – RE: RELIEF
FROM IMPRACTICAL ASME CODE REQUIREMENTS (FNP-ISI-RR-03)
(EPID L-2018-LLR-0196)

Dear Ms. Gayheart:

By letter dated November 30, 2018, as supplemented by letter dated April 23, 2019, Southern Nuclear Operating Company (SNC, the licensee), requested relief to the inservice inspection (ISI) requirements of the American Society of Mechanical Engineers (ASME) Boiler and Pressure Vessel Code (BPV Code), Section XI, "Rules for Inservice Inspection (ISI) of Nuclear Power Plant Components," at the Joseph M. Farley Nuclear Plant, Units 1 and 2, for the fourth 10-year ISI interval, that commenced on December 1, 2007, and ended November 30, 2017.

The licensee submitted the request pursuant to Title 10 of the *Code of Federal Regulations* (10 CFR) Part 50, Section 50.55a(g)(5)(iii), for which the licensee requested relief and to use alternative requirements for ISI items on the basis that the code requirement is impractical.

The U.S. Nuclear Regulatory Commission (NRC) staff reviewed the subject request and has determined, as set forth in the enclosed safety evaluation, that it is impractical for the licensee to comply with the ASME Code, Section XI. The NRC staff concludes that complying with the ASME Code requirements would result in undue burden to the licensee. The NRC staff concludes that granting the relief request 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. The NRC staff concludes reasonable assurance the structural integrity of the subject welds is maintained.

Accordingly, the NRC staff concludes that the licensee has adequately addressed all of the regulatory requirements set forth in 10 CFR 50.55a(g)(6)(i). Therefore, the NRC staff grants the use of relief request FNP-ISI-RR-03 for the fourth 10-year ISI interval, that commenced on December 1, 2007, and ended November 30, 2017.

All other ASME BPV Code, Section XI, requirements for which relief has not been 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 Senior Project Manager, Shawn Williams, at 301-415-1009 or by email at Shawn.Williams@nrc.gov.

Sincerely,

/RA/

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

Docket Nos. 50-348 and 50-364

Enclosure:
Safety Evaluation

cc: Listserv



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

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION
PROPOSED ALTERNATIVE FOR THE FOURTH INTERVAL INSERVICE INSPECTION

FNP-ISI-RR-03, VERSION 1.0

SOUTHERN NUCLEAR OPERATING COMPANY, INC.

JOSEPH M. FARLEY NUCLEAR PLANT, UNITS 1 AND 2

DOCKET NOS. 50-348 AND 50-364

1.0 INTRODUCTION

By letter dated November 30, 2018 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML18334A032), as supplemented by letter dated April 23, 2019 (ADAMS Accession No. ML19113A143), Southern Nuclear Operating Company (SNC, the licensee), requested relief to the inservice inspection (ISI) requirements of the American Society of Mechanical Engineers Boiler and Pressure Vessel Code (ASME Code), Section XI, "Rules for Inservice Inspection (ISI) of Nuclear Power Plant Components," at the Joseph M. Farley Nuclear Plant, Units 1 and 2, for the fourth 10-year ISI interval, that commenced on December 1, 2007, and ended November 30, 2017.

The licensee submitted the request pursuant to Title 10 of the *Code of Federal Regulations* (10 CFR) Part 50, Section 50.55a(g)(5)(iii), for which the licensee requested relief and to use alternative requirements (if necessary) for ISI items on the basis that the code requirement is impractical.

2.0 REGULATORY EVALUATION

Paragraph 10 CFR 50.55a(g)(4), *Inservice inspection standards requirement for operating plants*, states, in part:

Throughout the service life of a boiling or pressurized water-cooled nuclear power facility, components (including supports) that are classified as ASME Code Class 1, Class 2, and Class 3 must meet the requirements, except design and access provisions and preservice examination requirements, set forth in Section XI, ... to the extent practical within the limitations of design, geometry, and materials of construction of the components....

The regulation in 10 CFR 50.55a(g)(5)(iii), states that:

If 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 Section 50.4, information to support the determinations. Determinations of impracticality in accordance with this section 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 this section 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.

The regulation at 10 CFR 50.55a(g)(6)(i), states that:

The Commission will evaluate determinations under paragraph (g)(5) of this section that code requirements are impractical. The Commission may grant such relief and may impose such alternative requirements as it determines is authorized by law and 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 staff to grant the relief requested by the licensee.

3.0 TECHNICAL EVALUATION

3.1 The Licensee's Request for Relief

3.1.1 ASME Code Components Affected

The affected components are ASME Code Class 1 and 2 piping welds listed in Tables RR-03.1 and RR-03.2, of the licensee's submittal dated November 30, 2018. These welds are examined in accordance with Tables IWB-2500-1 and IWC-2500-1 of the ASME Code, Section XI, Examination Categories: B-F, B-J, C-F-1, and R-A, Item numbers: B5.70, B9.11, C5.11, R1.11, R1.16, and R1.20.

The licensee also listed Category B-J, Item Number B9.21, as an affected component; however, per SNC's response to Request for Additional Information (RAI) 4, there were no limited exams in the Category B-J, Item Number B9.21.

3.1.2 Applicable Code Edition and Addenda

The Code of record for the fourth 10-year ISI Program interval is the ASME Code, Section XI, 2001 Edition through the 2003 Addenda.

The licensee stated that the examinations were performed in accordance with the requirements of ASME Code, Section XI, Appendix VIII, "Performance Demonstration for Ultrasonic Examination Systems," as amended and mandated by 10 CFR 50.55a and as modified by the Performance Demonstration Initiative Program description.

3.1.3 Applicable Code Requirements

The licensee stated:

The extent of examination requirement for Examination Category 8-F, Item Number 85.70, per Table IWB-2500-1, requires a volumetric examination of 100% of the weld.

The extent of examination requirement for Examination Category 8-J, Item Numbers 89.11 and 89.21, per Table IWB-2500-1, requires a surface and volumetric examination of essentially 100% of the weld length.

The extent of examination requirement for Examination Category C-F-1, Item Number C5.11, per Table IWC-2500-1, requires a surface and volumetric examination of essentially 100% of the weld length.

The extent of examination requirement for Examination Category A-A, Item No. R1.11, per Code Case N-716 Table 1, requires a volumetric examination of High Safety Significant (HSS) pressure-retaining welds of Class 1 and 2 welds subject to Thermal Fatigue.

The extent of examination requirement for Examination Category A-A, Item No. R1.16, per Code Case N-716 Table 1, requires a volumetric examination of HHS pressure-retaining welds of Class 1 and 2 welds subject to Intergranular or Transgranular Stress Corrosion Cracking (IGSCC or TGSCC).

The extent of examination requirement for Examination Category A-A, Item No. R1.20, per Code Case N-716 Table 1, requires a volumetric examination of HHS pressure-retaining welds of Class 1 and 2 welds not subject to a degradation method.

During the Fourth ISI Interval, no recordable indications were identified during examination of the Examination Category A-A components listed in Tables RR-03.1 and RR-03.2.

FNP, Units 1 and 2 adopted ASME Code Case N-460 ("Alternative Examination Coverage for Class 1 and Class 2 Welds, Section XI, Division 1"), which defines "essentially 100%" as greater than 90% coverage of the examination volume or surface area, as applicable. The 90% minimum coverage was applied to all surface and volumetric examinations required by ASME Section XI.

3.1.4 Impracticality of Compliance

The licensee stated:

Pursuant to 10CFR50.55a(g)(5)(iii), relief is requested on the basis that conformance with these code requirements is impractical since conformance would require extensive structural modifications to the component or surrounding structure.

Due to the original design of these components, it is not feasible to effectively perform the examinations to the extent required for welds and welded attachments (greater than 90% of the volume or area) due to physical obstructions, plant location, and/or component geometry.

FNP is unable to satisfy the ASME Section XI Code requirements to perform a surface or volumetric examination of these components due to the physical component configuration, interference from permanent plant equipment, single-sided access, etc. FNP would incur significant engineering, material, and installation costs to perform such modifications without a compensating increase in the level of quality and safety. Therefore, relief is requested on the basis that the ASME Section XI Code requirements to examine these components are impractical.

For the RI-ISI weld population, Examination Category R-A welds, submitted in this relief request, a case by case review was performed to determine whether additional or alternative welds could have been examined to supplement the reduced volumetric coverage examination. Below summarize the additional examinations performed:

For item number R1.11, six (6) additional examinations were performed.

For item number R1.20, 147 additional examinations were performed with this degradation method. 138 of these examinations are in the Break Exclusion Region and required by Technical Specifications to inspect every 10 years under an augmented program.

For the Category B-F Item B5.70 welds, Steam Generator Nozzle-to-Safe-End, the steam generator was replaced in the 3rd Interval for Units 1 and 2. The materials of construction for these welds are as follows: Safe End- SA-336 F316LN, Nozzle- SA-508 Class 3, Weld Filler- SFA-5.11 CL ENiCrFe-7. Per the Westinghouse Design Reports, WNEP-9830 (Unit 1) and WCAP-15601(Unit 2), the peak stress ratio in the inspectable section of the exam volume is similar in magnitude to the area that is unable to be inspected. No recordable indications were found with these examinations. This gives reasonable assurance of structural integrity or leak tightness continues to exist.

Tables RR-03.1 and RR-03.2 provide a summary of the examination limitations for each component for which relief is requested. The tables also indicate the outage the component was examined, the coverage percentage obtained for each component, and other pertinent design information. These tables are the cumulative lists of the limited ASME Section XI examinations performed during the Fourth ISI Interval. Figures 3-1 through 3-30 provide coverage plots which were extracted from the non-destructive examination (NDE) summary sheets that detail the examination limitations.

Based on the above explanation, SNC requests relief to perform examinations without achieving ASME Section XI Code compliance coverage when the required coverage is impractical.

3.1.5 Proposed Alternative and Basis for Use

The licensee stated:

FNP has performed the ASME Section XI Code required examinations to the maximum extent practical (Code Coverage), which are documented in Tables RR-03.1 and RR-03.2. Due to the physical interferences causing these limitations, there are no alternative examination techniques currently available to increase coverage.

3.1.6 Duration of Proposed Alternative

The proposed alternative is applicable for the fourth 10-year ISI interval, that commenced on December 1, 2007, and ended November 30, 2017.

3.2 NRC Staff Evaluation

The NRC staff verified the percentages of examination coverage and impracticality for the licensee to achieve the required coverage, applicable code requirements for ISI, and potential degradation mechanisms of the subject welds in Table RR-03.1 and Table RR-03.2. The NRC staff reviewed the licensee's submittals to determine whether structural integrity of these welds can be ensured, given that the licensee could not achieve the required examination coverage for all subject welds. The NRC staff notes that ASME Code Case N-460 permits examination coverage of less than 100 percent but greater than 90 percent to satisfy the examination coverage requirement of Table IWB-2500-1 of the ASME Code, Section XI.

For the ultrasonic testing (UT) examination of the subject welds, the licensee used 0, 34, 40, 45, 60, and 70 degree shear and longitudinal waves and the transducers ranged in frequencies of 1, 1.5, 2, 2.25, 4, and 5 MegaHertz (MHz). The B-F, B-J, and C-F-1 welds were supplemented with magnetic particle testing and liquid penetrant testing examinations. The NRC staff has reviewed the diagrams of sonification of the UT beams in the examination of the subject welds and confirmed the licensee's examination coverage.

Category B-F, Item Number B5.70

The licensee claimed 52.1 percent examination coverage for the steam generator SG Safe-End to Nozzle welds based on Figures 3-1 of the relief request. The licensee attributed the limitations in obtaining further coverage to component configuration.

The NRC staff confirmed that the licensee obtained 52.1 percent examination coverage and further coverage is not feasible. The NRC staff confirmed that no recordable indications were observed during the examinations. The NRC staff finds that it is impractical to meet the ASME Code, Section XI, requirements due to physical component configuration and that it would be a burden to the licensee to perform modifications to obtain 100% coverage without a compensating increase in the level of quality and safety.

Category B-J, Item Number B9.11

The licensee claimed to obtain between 45.5 percent and 50 percent examination coverage for the Valve-to-Pipe Welds based on Figures 3-2, 3-2a, 3-3, 3-4, 3-12, 3-14, 3-20, 3-23, and 3-26 of the relief request. The licensee attributed the limitations in obtaining further coverage primarily to component configuration. Additional inspections were performed on certain welds for topical report, MRP-146 "Materials Reliability Program: Management of Thermal Fatigue in Normally Stagnant Non-Isolable Reactor Coolant System Branch Lines," Electric Power Research Institute.

The NRC staff reviewed the diagrams of sonification of the UT beams in the examination of the subject welds and confirmed the licensee's examination coverage. The NRC staff finds that the percentage of examination coverage is calculated reasonably and further coverage is not feasible. The NRC staff confirmed no recordable indications were observed during the exams. The NRC staff finds that it is impractical to meet the ASME Code, Section XI, requirements due

to physical component configuration and that it would be a burden to the licensee to perform modifications to obtain 100% coverage without a compensating increase in the level of quality and safety.

Category C-F-1, Item Number C5.11

The licensee claimed to obtain 50 percent examination coverage for the Flange-to-Pipe, Pipe-to-Valve and Tee-to-Elbow Welds based on Figures 3-27, 3-28, and 3-29 of the relief request. The licensee attributed the limitations in obtaining further coverage to component configuration.

The NRC staff reviewed the diagrams of sonification of the UT beams in the examination of the subject welds and confirmed the licensee's examination coverage. The NRC staff finds that the percentage of examination coverage is calculated reasonably and further coverage is not feasible. The NRC staff confirmed no recordable indications were observed during the exams. The NRC staff finds that it is impractical to meet the ASME Code, Section XI, requirements due to physical component configuration and that it would be a burden to the licensee to perform modifications to obtain 100% coverage without a compensating increase in the level of quality and safety.

Category R-A, Item Number R1.11

The licensee claimed to obtain between 22.3 percent and 75 percent examination coverage for the Pipe-to-Branch Connection welds, Valve-to-Pipe welds, Pipe-to-Elbow welds and Pipe-to-Valve welds based on Figures 3-5, 3-7, 3-7a, 3-8, 3-8a, 3-9, 3-9a, 3-15, 3-15a, 3-16, 3-17, 3-18, 3-19, 3-24, and 3-25 of the relief request. The licensee attributed the limitations in obtaining further coverage primarily to component configuration as well as thickness changes, welded plates, weld supports and inside diameter pad obstruction. Additional inspections were performed on certain welds for MRP-146.

The NRC staff reviewed the diagrams of sonification of the UT beams in the examination of the subject welds and confirmed the licensee's examination coverage. The NRC staff finds that the percentage of examination coverage is calculated reasonably and further coverage is not feasible. The NRC staff confirmed no recordable indications were observed during the exams. The NRC staff finds that it is impractical to meet the ASME Code, Section XI, requirements due to physical component configuration and that it would be a burden to the licensee to perform modifications to obtain 100% coverage without a compensating increase in the level of quality and safety.

Category R-A, Item Number R1.16

The licensee claimed to obtain 50 percent examination coverage for the Pipe-to-Valve weld based on Figures 3-10 and 3-10a of the relief request. The licensee attributed the limitations in obtaining further coverage to component configuration.

The NRC staff reviewed the diagrams of sonification of the UT beams in the examination of the subject welds and confirmed the licensee's examination coverage. The NRC staff finds that the percentage of examination coverage is calculated reasonably and further coverage is not feasible. The NRC staff confirmed no recordable indications were observed during the exams. The NRC staff finds that it is impractical to meet the ASME Code, Section XI, requirements due to physical component configuration and that it would be a burden to the licensee to perform

modifications to obtain 100% coverage without a compensating increase in the level of quality and safety.

Category R-A, Item Number R1.20

The licensee claimed to obtain between 48 percent and 87 percent examination coverage for the Tee-to-Pipe weld, Flange-to-Pump weld, Pipe-to-Pipe weld, Elbow-to-Pipe weld, and Pipe-to-Elbow weld based on Figures 3-6, 3-11, 3-12, 3-13, 3-21a, 3-21b, 3-21c, 3-22, 3-22a, 3-22b, and 3-22c of the relief request. The licensee attributed the limitations in obtaining further coverage primarily to component configuration as well as thickness changes, welded plates, weld supports, and inside diameter pad obstruction. Additional inspections were performed on certain welds for MRP-146.

The NRC staff reviewed the sonification diagrams of the UT beams in the examination of the subject welds and confirmed the licensee's examination coverage. The NRC staff finds that the percentage of examination coverage is calculated reasonably and further coverage is not feasible. The NRC staff confirmed no recordable indications were observed during the exams. The NRC staff finds that it is impractical to meet the ASME Code, Section XI, requirements due to physical component configuration and that it would be a burden to the licensee to perform modifications to obtain 100% coverage without a compensating increase in the level of quality and safety.

Defense-in-Depth Measures

In letter dated April 23, 2019, the licensee noted several defense-in-depth measures to ensure that the unexamined regions do not pose a significant safety concern to the structural integrity of the subject welds. The licensee stated that it implemented the following compensatory measures to monitor structural integrity:

- Performing Class 1 pressure testing per IWB-5000 during startup from refueling outages.
- Performing Class 2 pressure testing per IWC-5000 once per period.
- In accordance with the Boric Acid Corrosion Control Program, performing boric acid walkdowns inside containment early in the refueling outage to identify potential leakage areas in both Class 1 and Class 2 components.
- MRP-192 programs ("Materials Reliability Program: Assessment of Residual Heat Removal Mixing Tee Thermal Fatigue in PWR Plants," Electric Power Research Institute) inspect additional locations on Class 2 E11 (low head safety injection/residual heat removal) system.
- Performing online monitoring and trending on the identified and unidentified leakage in the reactor coolant system for Class 1 components per Technical Specification Surveillance Requirement 3.4.13.1.

The NRC staff finds that there is reasonable assurance that (1) the boric acid corrosion control program, (2) the online monitoring and trending system, (3) the system leakage testing per the ASME Code, Section XI, IWB-5000 and IWC-5000, and (4) the MRP-192 program will detect any potential leakage from the subject welds. These measures will adequately monitor structural integrity of the subject welds and are acceptable.

In summary, the NRC staff finds that the licensee has examined the subject welds to the maximum practical extent and that there are no indications detected in the subject welds. For

the weld volumes that could not be examined, the licensee has implemented compensatory measures to effectively monitor the subject welds. The NRC staff finds that the licensee has demonstrated reasonable assurance that structural integrity of the subject welds is maintained.

4.0 CONCLUSION

As set forth above, the NRC staff concludes that it is impractical for the licensee to comply the ASME Code, Section XI. The NRC staff concludes that complying with the ASME Code requirements would result in undue burden to the licensee. The NRC staff concludes that granting the relief request 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. The NRC staff concludes reasonable assurance the structural integrity of the subject welds is maintained.

Accordingly, the NRC staff concludes that the licensee has adequately addressed all of the regulatory requirements set forth in 10 CFR 50.55a(g)(6)(i). Therefore, the NRC staff grants the use of relief request FNP-ISI-RR-03 for the fourth 10-year ISI interval, that commenced on December 1, 2007, and ended November 30, 2017.

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

Principal Contributor: Austin Young, NRR

Date: August 2, 2019

SUBJECT: JOSEPH M. FARLEY NUCLEAR PLANT, UNITS 1 AND 2 – RE: RELIEF FROM IMPRACTICAL ASME CODE REQUIREMENTS (FNP-ISI-RR-03) (EPID L-2018-LLR-0196) DATED AUGUST 2, 2019

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