



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

August 24, 2009

Mr. Preston D. Swafford
Chief Nuclear Officer and
Executive Vice President
Tennessee Valley Authority
6A Lookout Place
1101 Market Street
Chattanooga, TN 37402-2801

SUBJECT: BROWNS FERRY NUCLEAR PLANT, UNIT 1, THE SECOND 10-YEAR
INTERVAL INSERVICE INSPECTION PROGRAM RELATED TO THE
EXAMINATION OF PIPING WELD OVERLAYS (TAC NO. ME0172)

Dear Mr. Swafford:

By a letter dated November 26, 2008, the Tennessee Valley Authority (TVA, the licensee) submitted Relief Request (RR) 1-ISI-21 requesting relief from the requirements specified in the American Society of Mechanical Engineers Code (ASME), Section XI for inspecting piping weld overlays using ultrasonic testing under Title 10, *Code of Federal Regulations* (10 CFR), Section 50.55a(a)(3)(i) for the Browns Ferry Nuclear Plant (BFN), Unit 1. The request proposed that in lieu of the requirements of the ASME Code, Section XI, Appendix VIII, Supplement 11 requirements, the procedures, personnel, and equipment qualified to meet the requirements of ASME Section XI, Appendix VIII, Supplement 11 as stated in the 2001 Edition, as administered by the Electric Power Research Institute's Performance Demonstration Initiative processes be used to conduct the required examinations for piping weld overlays.

The U.S. Nuclear Regulatory Commission (NRC) staff has completed its review of the information provided in TVA's November 26, 2008, letter. The NRC staff concluded that the proposed alternative to the requirements of Section XI, 2001 Edition as amended by 10 CFR 50.55a(b)(2)(xxiv), Appendix VIII, Supplement 11 of the ASME Code described in the licensee's letter provides an acceptable level of quality and safety. Therefore, RR-1-ISI-21 is authorized pursuant to 10 CFR 50.55a(a)(3)(i) for Browns Ferry Nuclear Plant, Unit 1. All other requirements of the ASME Code, Section XI 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.

P. Swafford

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This relief is authorized for the remainder of the second 10-year inservice inspection interval at BFN, Unit 1 that is scheduled to end June 1, 2017.

Sincerely,

A handwritten signature in black ink, appearing to read 'T. H. Boyce', with a long horizontal flourish extending to the right.

Thomas H. Boyce, Chief
Plant Licensing Branch II-2
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

Docket No. 50-259

Enclosure:
Safety Evaluation

cc w/encl: Distribution via Listserv



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

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

INSERVICE INSPECTION PROGRAM

RELIEF REQUEST 1-ISI-21

TENNESSEE VALLEY AUTHORITY

BROWNS FERRY NUCLEAR PLANT, UNIT 1

DOCKET NO. 50-259

1.0 INTRODUCTION

By letter dated November 26, 2008 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML083360196), the Tennessee Valley Authority (TVA, the licensee) submitted a relief request from certain qualification requirements of the American Society of Mechanical Engineers (ASME) Boiler and Pressure Vessel Code (ASME Code) at the Browns Ferry Nuclear Plant (BFN), Unit 1. Specifically, the licensee proposed in Relief Request 1-ISI-21 to use the ASME Code, Section XI, Appendix VIII, Supplement 11, "Qualification Requirements for Full Structural Overlaid Wrought Austenitic Piping Welds," as administered by the Electric Power Research Institute (EPRI), Performance Demonstration Initiative (PDI) program. The request is for the remainder of the second 10-year inservice inspection (ISI) interval that is scheduled to end June 1, 2017.

The safety evaluation is being issued to document the decision made by the U.S. Nuclear Regulatory Commission (NRC) staff to grant the licensee's request by verbal authorization on November 26, 2008. The NRC staff's memorandum dated December 12, 2008 (ADAMS Accession No. ML083390526), reflects the basis for verbal approval.

2.0 REGULATORY EVALUATION

The ISI of the ASME Code Class 1, 2, and 3 components is to be performed in accordance with Section XI of the ASME Code and applicable edition and addenda as required by Title 10 *Code of Federal Regulations* (10 CFR) Section 50.55a(g), except where specific relief has been granted by the Commission pursuant to 10 CFR 50.55a(g)(6)(i). It states, in part, in 10 CFR 50.55a(a)(3) that alternatives to the requirements of paragraph (g) may be used when authorized by the NRC, if the applicant demonstrates that: (i) the proposed alternatives would provide an acceptable level of quality and safety, or (ii) compliance with the specified requirements would result in hardship or unusual difficulty without a compensating increase in the level of quality and safety.

Enclosure

Pursuant to 10 CFR 50.55a(g)(4), ASME Code Class 1, 2, and 3 components (including supports) will meet the requirements, except the design and access provisions and the preservice examination requirements, set forth in the ASME Code, Section XI, *Rules for Inservice Inspection of Nuclear Power Plant Components*, to the extent practical within the limitations of design, geometry, and materials of construction of the components. The regulations require that inservice examination of components and system pressure tests conducted during the first 10-year interval and subsequent intervals comply with the requirements in the latest edition and addenda of Section XI of the ASME Code incorporated by reference in 10 CFR 50.55a(b) 12 months prior to the start of the 120-month interval, subject to the limitations and modifications listed therein. As stated in 10 CFR 50.55a(g)(4)(iv), inservice examination of components and system pressure tests may meet the requirements set forth in subsequent editions and addenda that are incorporated by reference in paragraph 10 CFR 50.55a(b), subject to the limitations and modification listed in 10 CFR 50.55a(b) and subject to Commission approval. Portions of editions or addenda may be used provided that all related requirements of the respective editions or addenda are met. The code of record for the second 10-year ISI interval for Unit 1 is the 2001 Edition through 2003 Addenda of the ASME Code.

3.0 TECHNICAL EVALUATION

3.1 Affected Component

WELD-NO: N-11B-1 OL
SYSTEM: FW
PIPE SIZE: 2-inches
CATEGORY: N/A

3.2 Applicable Code

The 2001 Edition of ASME Section XI, as required by 10 CFR 50.55a(b)(2)(xxiv). The ultrasonic testing (UT) examination must be performed using personnel, procedures, and equipment qualified in accordance with Appendix VIII, Supplement 11. The selected paragraphs in Supplement 11 affected by this request for relief are:

1.1(b), 1.1(d)(1), 1.1(e)(1), 1.1(e)(2), 1.1(e)(2)(a)(1), 1.1(e)(2)(a)(2), 1.1(e)(2)(a)(3), 1.1(e)(2)(b)(1), 1.1(e)(2)(b)(2), 1.1(e)(2)(b)(3), 1.1(f)(1), 1.1(f)(3), 1.1(f)(4), 2.0, 2.1, 2.2(d), 2.3, 3.1, 3.2(a), and 3.2(b).

3.3 Proposed Alternative

In lieu of the requirements of ASME Section XI, 2001 Edition, Appendix VIII, Supplement 11, the PDI Program shall be used. The licensee proposes to utilize personnel, procedures, and equipment qualified in accordance with ASME Section XI, Appendix VIII, Supplement 11, as amended by Attachment 1-ISI-21 to the licensee's letter dated November 26, 2008, which is administered under the PDI Program.

3.4 Licensee Basis for the Alternative

The requirements of ASME Section XI, Appendix VIII, Supplement 11, as stated in the 2001

Enclosure

Edition, as required by 10 CFR 50.55a(b)(2)(xxiv), were implementable. The EPRI sponsored PDI amendments to Supplement 11 for selected paragraphs.

Paragraph 1.1(d)(1), requires that all base metal flaws be cracks. Implanting a crack requires excavation of the base material on at least one side of the flaw. While this may be satisfactory for ferritic materials, it does not produce a useable axial flaw in austenitic materials because the sound beam, which normally passes only through base material, must now travel through weld material on at least one side, producing an unrealistic flaw response. To resolve this issue, the PDI Program revised this paragraph to allow use of alternative flaw mechanisms under controlled conditions. For example, alternative flaws shall be limited to when implantation of cracks precludes obtaining an effective UT response, flaws shall be semi-elliptical with a tip width of less than or equal to 0.002-inches, and the remainder shall be alternative flaws.

The licensee has requested relief to allow closer spacing of flaws, provided they didn't interfere with detection or discrimination. The existing specimens used to date for qualification to the Tri-party agreement documented in ADAMS Accession No. 8407090122 have a flaw population density greater than allowed by the current ASME Code requirements. These samples have been used successfully for all previous qualifications under the Tri-party agreement program. To facilitate their use and provide continuity from the Tri-party agreement program to Supplement 11, the PDI Program has merged the Tri-party test specimens into their weld overlay program.

For example, the requirement for using IWA-3300 for proximity flaw evaluation in paragraph 1.1(e)(1) was excluded, instead indications will be sized based on their individual merits; paragraph 1.1(d)(1) includes the statement that intentional overlay fabrication flaws shall not interfere with ultrasonic detection or characterization of the base metal flaws; paragraph 1.1(e)(2)(a)(1) was modified to require that a base metal grading unit include at least 1 inch of the length of the overlaid weld, rather than 3 inches; paragraph 1.1(e)(2)(a)(3) was modified to require sufficient unflawed overlaid weld and base metal to exist on all sides of the grading unit to preclude interfering reflections from adjacent flaws, rather than the 1-inch requirement of Supplement 11; paragraph 1.1(e)(2)(b)(1) was modified to define an overlay fabrication grading unit as including the overlay material and the base metal-to-overlay interface for a length of at least 1 inch rather than the 6 square inches requirement of Supplement 11; and paragraph 1.1(e)(2)(b)(2) states that overlay fabrication grading units designed to be unflawed shall be separated by unflawed overlay material and unflawed base metal-to-overlay interface for at least 1 inch at both ends, rather than around its entire perimeter.

Additionally, the requirement for axially oriented overlay fabrication flaws in paragraph 1.1(e)(1) was excluded from the PDI Program as an improbable scenario. Weld overlays are typically applied using automated gas tungsten arc welding techniques with the filler metal being applied in a circumferential direction. Because resultant fabrication induced discontinuities would also be expected to have major dimensions oriented in the circumferential direction axial overlay fabrication flaws are unrealistic.

The PDI Program revised paragraph 2.0 allowing the overlay fabrication and base metal flaw tests to be performed separately. The requirement in paragraph 3.2(b) for reporting all extensions of cracking into the overlay is omitted from the PDI Program because it is redundant to the [root mean square] RMS calculations performed in paragraph 3.2(c) and its presence adds

confusion and ambiguity to depth sizing as required by paragraph 3.2(c). This also makes the weld overlay program consistent with the Supplement 2 depth-sizing criteria.

To avoid confusion, several instances of the term “cracks” or “cracking” were changed to the term “flaws” because of the use of alternative flaw mechanisms. Additionally, to avoid confusion, the overlay thickness tolerance contained in paragraph 1.1(b) last sentence, was reworded and the phrase “and the remainder shall be alternative flaws” was added to the next to last sentence in paragraph 1.1(d)(1).

Based on the above the licensee contends that proposed amended requirements of Supplement 11 for the qualification of personnel, procedures, and equipment will provide an alternative with an acceptable level of quality and safety.

3.5 Licensee’s Basis for Proposed Alternative and NRC Staff Evaluation

The U.S. nuclear utilities created the PDI Program to implement performance demonstration requirements contained in Appendix VIII of Section XI of the ASME Code. To this end, PDI has developed a program for qualifying equipment, procedures, and personnel for examinations of weld overlays in accordance with the UT criteria of Appendix VIII, Supplement 11. Prior to the Supplement 11 program, EPRI maintained a performance demonstration program for weld overlay qualification under the Tri-party Agreement. Instead of having two programs with similar objectives, the NRC staff recognized the PDI Program (ADAMS Accession No. ML020160532) for weld overlay qualifications as an acceptable alternative to the Tri-party Agreement.

Pursuant to 10 CFR 50.55a(a)(3)(i), the licensee requested relief to use the EPRI PDI Program for implementation of Appendix VIII, Supplement 11 requirements. Specifically, relief is requested from Supplement 11, Paragraphs 1.1(b), 1.1(d)(1), 1.1(e)(1), 1.1(e)(2), 1.1(e)(2)(a)(1), 1.1(e)(2)(a)(2), 1.1(e)(2)(a)(3), 1.1(e)(2)(b)(1), 1.1(e)(2)(b)(2), 1.1(e)(2)(b)(3), 1.1(f)(1), 1.1(f)(3), 1.1(f)(4), 2.0, 2.1, 2.2(d), 2.3, 3.1, 3.2(a) and 3.2(b). The proposed alternative will be implemented through use of the EPRI-PDI Program weld overlay examination qualification requirements.

The licensee’s basis for the proposed alternative and the NRC staff evaluation of the differences identified in the PDI program with Supplement 11 are as follows:

Paragraph 1.1(b) of Supplement 11 states limitations to the maximum thickness for which a procedure may be qualified. The ASME Code states that, “The specimen set must include at least one specimen with overlay thickness within minus 0.10-inch to plus 0.25-inch of the maximum nominal overlay thickness for which the procedure is applicable.” The ASME Code requirement addresses the specimen thickness tolerance for a single specimen set, but is confusing when multiple specimen sets are used. The PDI proposed alternative states that, “the specimen set shall include specimens with overlay not thicker than 0.10-inch more than the minimum thickness, nor thinner than 0.25-inch of the maximum nominal overlay thickness for which the examination procedure is applicable.” The proposed alternative provides clarification on the application of the tolerance. The tolerance is unchanged for a single specimen set; however, the proposed alternative clarifies the tolerance for multiple specimen sets by providing tolerances for both the minimum and maximum thicknesses. The proposed wording eliminates confusion while maintaining the intent of the overlay thickness tolerance. Therefore, the NRC staff finds that this

PDI Program alternative maintains the intent of the Supplement 11 requirements and is acceptable.

Paragraph 1.1(d)(1) requires that all base metal flaws be cracks. PDI determined that certain Supplement 11 requirements pertaining to location and size of cracks would be extremely difficult to embed in test specimens. For example, flaw implantation requires excavating a volume of base material to allow a pre-cracked coupon to be welded into this area. This process would add weld material to an area of the specimen that typically consists of only base material, and could potentially make ultrasonic examination more difficult and not representative of actual field conditions. In an effort to satisfy the requirements, PDI developed a process for fabricating flaws that exhibit crack-like reflective characteristics. Instead of all flaws being cracks, as required by Paragraph 1.1(d)(1), the PDI Program for weld overlays contain at least 70-percent cracks with the remainder being fabricated flaws exhibiting crack-like reflective characteristics. The fabricated flaws are semi-elliptical with tip widths of less than 0.002-inches. The licensee provided further information describing a revision to the PDI Program alternative to clarify when real cracks, as opposed to fabricated flaws, will be used; "flaws shall be limited to the cases where implantation of cracks produces spurious reflectors that are uncharacteristic of actual flaws." The NRC has reviewed the flaw fabrication process, compared the reflective characteristics between actual cracks and PDI-fabricated flaws, and found that the fabricated flaws for this application provide assurance that the PDI Program meets the intent of the Supplement 11 requirements. Therefore, the NRC staff finds that the proposed alternative to the Supplement 11 requirement is acceptable.

Paragraph 1.1(e)(1) requires that at least 20 percent but not less than 40 percent of the flaws shall be oriented within plus or minus 20 degrees of the axial direction (of the piping test specimen). Flaws contained in the original base metal heat-affected zone satisfy this requirement; however, PDI excludes axial fabrication flaws in the weld overlay material. PDI has concluded that axial flaws in the overlay material are improbable because the overlay filler material is applied in the circumferential direction (parallel to the girth weld); therefore, fabrication anomalies would also be expected to have major dimensions in the circumferential direction. The NRC finds that this approach to implantation of fabrication flaws is reasonable for meeting the intent of the Supplement 11 requirement. Therefore, the NRC staff concludes that PDI's application of flaws oriented in the axial direction is acceptable.

Paragraph 1.1(e)(1) also requires that the rules of IWA-3300 shall be used to determine whether closely spaced flaws should be treated as single or multiple flaws. PDI treats each flaw as an individual flaw and not as part of a system of closely spaced flaws. PDI controls the flaws going into a test specimen set such that the flaws are free of interfering reflections from adjacent flaws. In some cases this permits flaws to be spaced closer than what is allowed for classification as a multiple set of flaws by IWA-3300, thus potentially making the performance demonstration more challenging than the existing requirement. Hence, the NRC staff concludes that PDI's application for closely spaced flaws is acceptable.

Paragraph 1.1(e)(2) requires that specimens be divided into base metal and overlay grading units. The PDI Program adds clarification with the addition of the word "fabrication" and ensures that flaw identification will not be masked by other flaws with the addition of "Flaws shall not interfere with ultrasonic detection or characterization of other flaws." PDI's alternative provides clarification and assurance that the flaws are identified. Therefore, the NRC staff finds that the PDI alternative

to the Supplement 11 requirement is acceptable.

Paragraph 1.1(e)(2)(a)(1) requires that a base grading unit shall include at least 3 inches of the length of the overlaid weld, and the base grading unit includes the outer 25-percent of the overlaid weld and base metal on both sides. The PDI Program reduced the criteria to 1 inch of the length of the overlaid weld and eliminated from the grading unit the need to include both sides of the weld. The proposed change permits the PDI Program to continue using test specimens from the existing weld overlay program which have flaws on both sides of the welds. These test specimens have been used successfully for testing the proficiency of personnel for over 16 years. The weld overlay qualification is designed to be a near-side (relative to the weld) examination, and it is improbable that a candidate would detect a flaw on the opposite side of the weld due to the sound attenuation and redirection caused by the weld microstructure. However, the presence of flaws on both sides of the original weld (outside the PDI grading unit) may actually provide a more challenging examination, as candidates must determine the relevancy of these flaws, if detected. The NRC staff has determined that PDI's use of the one inch length of the overlaid weld base grading unit and the elimination from the grading unit the need to include both sides of the weld, is an acceptable alternative to the Supplement 11 requirements. Therefore, the NRC staff finds the proposed alternative acceptable.

Paragraph 1.1(e)(2)(a)(2) requires, when base metal cracking penetrates into the overlay material, that a portion of the base grading unit shall not be used as part of the overlay grading unit. The NRC staff finds that the PDI Program adjusts for the changes in Paragraph 1.1(e)(2)(a)(2) and conservatively states that when base metal flaws penetrate into the overlay material, no portion of it shall be used as part of the overlay fabrication grading unit. The NRC staff finds that the PDI Program also provided clarification by the addition of the term "flaws" for "cracks" and the addition of "fabrication" to "overlay grading unit." The NRC staff concludes that the PDI Program alternative provides clarification and conservatism and, therefore, is acceptable.

Paragraph 1.1(e)(2)(a)(3) requires that for unflawed base grading units, at least one inch of unflawed overlaid weld and base metal shall exist on either side of the base grading unit. This is to minimize the number of false identifications of extraneous reflectors. The PDI Program stipulates that unflawed overlaid weld and base metal exists on all sides of the grading unit and flawed grading units must be free of interfering reflections from adjacent flaws which addresses the same concerns as the ASME Code. Hence, the NRC staff concludes that PDI's application of the variable flaw-free area adjacent to the grading unit meets the intent of the Supplement 11 requirements and is, therefore, acceptable.

Paragraph 1.1(e)(2)(b)(1) requires that an overlay grading unit shall include the overlay material and the base metal-to-overlay interface of at least 6 square inches. The overlay grading unit shall be rectangular, with minimum dimensions of 2 inches. The PDI Program reduces the base metal-to-overlay interface to at least one inch (in lieu of a minimum of two inches) and eliminates the minimum rectangular dimension. This change is necessary to allow use of existing examination specimens that were fabricated in order to meet NRC Generic Letter 88-01 (Tri-party Agreement, July 1984). This change will assure a viable alternate to meet than that of the ASME Code because of the variability associated with the shape of the grading unit. Therefore, the NRC staff concludes that PDI's application of the grading unit is an acceptable alternative to the Supplement 11 requirements and is acceptable.

Paragraph 1.1(e)(2)(b)(2) requires that unflawed overlay grading units shall be surrounded by unflawed overlay material and unflawed base metal-to-overlay interface for at least one inch around its entire perimeter. The PDI Program redefines the area by noting unflawed overlay fabrication grading units shall be separated by at least 1 inch of unflawed material at both ends and sufficient area on both sides to preclude interfering reflections from adjacent flaws. The NRC staff determined that the relaxation in the required area on the sides of the specimens, while still ensuring no interfering reflections, may provide a more challenging demonstration than required by ASME Code because of the possibility of having a parallel flaw on the opposite side of the weld. Therefore, the NRC staff concludes that PDI's application is an acceptable alternative to the Supplement 11 requirements.

Paragraph 1.1(e)(2)(b)(3) requirements are retained in the PDI Program. In addition, the PDI Program requires that initial procedure qualification contain three times the number of flaws required for a personal qualification. To qualify new values of essential variables, the equivalent of at least one personal qualification is required. The NRC staff concludes that PDI's additions enhance the ASME Code requirements and are, therefore, acceptable because it provides for a more stringent qualification criteria.

Paragraph 1.1(f)(1) requirements are retained in the PDI Program, with the clarification change of the term "flaws" for "cracks." In addition, the PDI Program includes the requirements that sizing sets shall contain a distribution of flaw dimensions to verify sizing capabilities. The PDI Program also requires that initial procedure qualification contain three times the number of flaws required for a personal qualification. To qualify new values of essential variables, the equivalent of at least one personal qualification is required. The NRC staff concludes that PDI's additions enhance the ASME Code requirements and are, therefore, acceptable because it provides a more stringent qualification criteria.

Paragraphs 1.1(f)(3) and 1.1(f)(4) requirements are clarified by the PDI Program by replacing the term "cracking" with "flaws" because of the use of alternative flaw mechanisms (ADAMS Accession Nos. ML010940402 and ML013330156). The PDI Program adds clarity without changing the requirement. Therefore, the NRC staff concludes that this clarification in the PDI Program meets the intent of the ASME Code requirements and is acceptable.

Paragraph 2.0 is silent on performance demonstrations for the weld metal and overlay fabrication. The PDI Program addresses the two performance demonstrations by specifying that they may be performed separately. The PDI Program adds clarity to the testing criteria without changing the requirement. Therefore, the NRC staff concludes that PDI's clarification is an enhancement to ASME Code requirement and is acceptable.

Paragraphs 2.1 and 2.2(d) requirements are clarified by the PDI Program by the addition of the terms "metal" and "fabrication." These terms were added to clarify the description of the grading units present in a specimen. Metal was added to base to read base metal and fabrication was added to overlay to read overlay fabrication. The NRC staff determined that the clarifications provide acceptable classification of the terms they are enhancing. Therefore, the NRC staff concludes that the PDI Program meets the intent of the ASME Code requirements and is acceptable.

Paragraph 2.3 requires that, for depth sizing tests, 80 percent of the flaws shall be sized at a specific location on the surface of the specimen identified to the candidate. This requires detection and sizing tests to be performed separately. The PDI revised the weld overlay program to allow sizing to be conducted either in conjunction with, or separately from, the flaw detection test. If performed in conjunction with detection and the detected flaws do not meet the Supplement 11 range criteria, additional specimens will be presented to the candidate with the regions containing flaws identified. Each candidate will be required to determine the maximum depth of the flaw in each region. For separate sizing tests, the regions of interest will also be identified and the maximum depth and length of each flaw in the region will similarly be determined. In addition, PDI stated that grading units are not applicable to sizing tests, and that each sizing region will be large enough to contain the target flaw, but small enough such that candidates will not attempt to size a different flaw. The NRC staff has determined that the above clarification provides a basis for implementing sizing tests in a systematic, consistent manner that meets the intent of Supplement 11. Therefore, the NRC staff concludes that PDI's method is acceptable.

Paragraph 3.1 requires that examination procedures, equipment and personnel (as a complete ultrasonic system) are qualified for detection or sizing of flaws, as applicable, when certain criteria are met. The PDI Program allows procedure qualification to be performed separately from personnel and equipment qualification. Historical data indicate that, if ultrasonic detection or sizing procedures are thoroughly tested, personnel and equipment using those procedures have a higher probability of successfully passing a qualification test. In an effort to increase this passing rate, PDI has elected to perform procedure qualifications separately in order to assess and modify essential variables that may affect overall system capabilities. For a procedure to be qualified, the PDI Program requires three times as many flaws to be detected (or sized) as shown in Supplement 11 for the entire ultrasonic system. The personnel and equipment are still required to meet the Supplement 11 requirement. Therefore, the PDI Program criteria exceed the ASME Code requirements for personnel, procedures, and equipment qualifications. The NRC staff concludes that the PDI Program criteria are acceptable.

Paragraph 3.2(a) refers to term the "cracking" in the base metal and flaws within the same acceptance criteria. The PDI program changed the term from "cracking" to "flaws" for consistence in the acceptance criteria and uniformity within the proposed alternative. The NRC staff concludes that PDI's change adds clarity and meets the intent of the ASME Code requirements, thus the change is acceptable.

Paragraph 3.2(b) requires that all extensions of base metal cracking into the overlay material by at least 0.10-inch are reported as being intrusions into the overlay material. The PDI Program omits this criterion because of the difficulty in actually fabricating a flaw with a 0.10-inch minimum extension into the overlay, while still knowing the true state of the flaw dimensions. However, the PDI Program requires that cracks be depth-sized to the tolerance specified in the ASME Code which is 0.125-inch. Since the ASME Code tolerance is close to the 0.10-inch value of Paragraph 3.2(b), any crack extending beyond 0.10-inch into the overlay material would be identified as such from the characterized dimensions. The NRC staff has determined that reporting of an extension in the overlay material is redundant for performance demonstration testing because of the flaw sizing tolerance. Therefore, the NRC staff concludes that PDI's omission of highlighting a crack extending beyond 0.10-inch into the overlay material is acceptable.

The PDI Program is routinely assessed by the NRC staff for consistency with the current ASME Code and proposed changes. The PDI Program does not fully comport with the existing requirements of Supplement 11. PDI presented the differences at public meetings in which the NRC participated (ADAMS Accession Nos. ML 010940402 and ML013330156). The differences are in flaw locations within test specimens and fabricated flaw tolerances. The changes in flaw location permitted using test specimens from the Tri-party Agreement, and the changes in fabricated flaw tolerances provide UT acoustic responses similar to the responses associated with intergranular stress corrosion cracking. The NRC staff is assured that the comparison of the tests provided for the Tri-party agreement performance demonstration was being represented in the PDI program for Appendix VIII, Supplement 11. Based on discussions at these meetings, the NRC staff determined that the PDI Program provides an alternative and the proposed request for the qualification of personnel, procedures, and equipment will provide reasonable assurance of structural integrity.

4.0 CONCLUSION

The NRC staff has reviewed the licensee's submittal and determined that, in accordance with 10 CFR 50.55a(a)(3)(i), use of the PDI Program alternative to select paragraphs in Supplement 11 provides an acceptable level of quality and safety. Therefore, pursuant to 10 CFR 50.55a(a)(3)(i), the alternative proposed in Relief Request 1-ISI-21 is authorized for the second 10-year ISI interval at Browns Ferry Nuclear Plant, Unit 1 that is scheduled to end June 1, 2017. This authorization is limited to those components described in Section 3.1 above.

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: D. Naujock

Date: August 24, 2009

P. Swafford

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This relief is authorized for the remainder of the second 10-year inservice inspection interval at BFN, Unit 1 that is scheduled to end June 1, 2017.

Sincerely,

/RA/

Thomas H. Boyce, Chief
Plant Licensing Branch II-2
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

Docket No. 50-259

Enclosure:
Safety Evaluation

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