



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

April 30, 2010

Mr. Jon A. Franke, Vice President
Crystal River Nuclear Plant (NA1B)
ATTN: Supervisor, Licensing & Regulatory Programs
15760 W. Power Line Street
Crystal River, Florida 34428-6708

SUBJECT: CRYSTAL RIVER NUCLEAR PLANT, UNIT NO. 3 - RELIEF REQUEST
09-004-II, REVISION 0 FOR THE INSERVICE INSPECTION PROGRAM
(TAC NO. ME2606)

Dear Mr. Franke,

By letter dated November 13, 2009, as supplemented by letter dated November 25, 2009, Florida Power Corporation (the licensee) submitted Relief Request (RR) 09-004-II, Revision 0, requesting approval of an alternative to the bare-metal visual (BMV) inspections of the reactor vessel bottom mounted instrument (BMI) nozzles per the American Society of Mechanical Engineers (ASME) Code Case N-722, "Additional Examinations for PWR Pressure Retaining Welds in Class 1 Components Fabricated with Alloy 600/82/182 Materials, Section XI, Division 1." The visual inspection of the reactor vessel BMI nozzles is required by Title 10 of the *Code Federal Regulation* (10 CFR) 50.55a(g)(6)(ii)(E). In its letter dated November 25, 2009, the licensee requested approval of the RR 09-004-II by January 20, 2010.

The licensee's request for authorization of the alternative was made pursuant to the provisions of 10 CFR 50.55a(a)(3)(ii), based on hardship or unusual difficulty without increase in level of quality or safety. However, the Nuclear Regulatory Commission (NRC) staff evaluated the licensee's submittals and the proposed alternative pursuant to 10 CFR 50.55a(a)(3)(i) and determined that the proposed alternative to the requirements of ASME Code Case N-722 would provide an acceptable level of quality and safety. Therefore, on January 20, 2010, pursuant to 10 CFR 50.55a(a)(3)(i), the NRC verbally authorized the licensee's use of RR 09-004-II, Revision 0. The enclosed safety evaluation is a written confirmation of the verbal authorization.

J. Franke

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If you have any questions regarding this issue, please contact Crystal River Project Manager, Farideh E. Saba at (301) 415-1447 or farideh.saba@nrc.gov.

Sincerely,

A handwritten signature in black ink, appearing to read "Doug Broaddus". The signature is fluid and cursive, with the first name "Doug" and last name "Broaddus" clearly distinguishable.

Douglas A. Broaddus, Acting Chief
Plant Licensing Branch II-2
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

Docket No. 50-302

Enclosure: Safety Evaluation

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SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION
CRYSTAL RIVER UNIT 3 – RELIEF REQUEST 09-004-II, REVISION 0, FOR THE
FOURTH 10-YEAR INTERVAL INSERVICE INSPECTION OF THE REACTOR VESSEL
BOTTOM MOUNTED INSTRUMENT NOZZLES
FLORIDA POWER CORPORATION
CRYSTAL RIVER NUCLEAR GENERATING PLANT, UNIT 3
DOCKET NO. 50-302

1.0 INTRODUCTION

By letter dated November 13, 2009, as supplemented by letter dated November 25, 2009, Florida Power Corporation (the licensee), now doing business as Progress Energy Florida, Inc., submitted Relief Request (RR) 09-004-II, Revision 0 for Crystal River Unit 3 (CR-3). This action requested staff approval of an alternative to the bare-metal visual (BMV) inspections of the reactor vessel (RV) bottom mounted instrument (BMI) nozzles per the American Society of Mechanical Engineers (ASME) Code Case N-722, "Additional Examinations for PWR Pressure Retaining Welds in Class 1 Components Fabricated with Alloy 600/82/182 Materials, Section XI, Division 1," which are required by Title 10 of the *Code Federal Regulation* (10 CFR) 50.55a(g)(6)(ii)(E). In its letter dated November 25, 2009, the licensee requested approval of the RR 09-004-II by January 20, 2010.

The licensee's request for authorization of the alternative was made pursuant to the provisions of 10 CFR 50.55a(a)(3)(ii), based on hardship or unusual difficulty without increase in level of quality or safety. However, the Nuclear Regulatory Commission (NRC) staff evaluated the licensee's submittals and the proposed alternative pursuant to 10 CFR 50.55a(a)(3)(i) and determined that the proposed alternative to the requirements of ASME Code Case N-722 would provide an acceptable level of quality and safety.

During a conference call on January 20, 2010, the NRC staff informed the licensee of its decision. Subsequently, the NRC pursuant to 10 CFR 50.55a(a)(3)(i) verbally authorized the licensee's use of Relief Request 09-004-II, Revision 0. The licensee has completed the visual inspection of the BMI nozzles during the fall 2009 refueling outage. This safety evaluation documents the NRC staff's evaluation of RR 09-004-II, Revision 0, and is a written confirmation of the decision made by the NRC to authorize the licensee's relief request.

Enclosure

2.0 REGULATORY REQUIREMENTS

Pursuant to 10 CFR 50.55a(g)(4), ASME 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 the ASME Code, Section XI, "Rules for Inservice Inspection (ISI) 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. In addition, the NRC may require augmented ISI by the incorporation of specific requirements into 10 CFR 50.55a. In this case, the NRC requires the inspection of RV BMI nozzles in accordance with the provisions of ASME Code Case N-722 in accordance with the augmented ISI requirements at 10 CFR 50.55a(g)(6)(ii)(E).

Pursuant to 10 CFR 50.55a(a)(3) alternatives to requirements may be authorized by the NRC if the licensee demonstrates that: (i) the proposed alternatives 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. The licensee submitted the subject relief request, which allows the licensee to take credit for the visual inspection that was conducted during the CR-3 fall 2009 RFO, as the basis for the current and future fourth 10-year ISI interval BMV inspections.

The ASME Code of record for the fourth 10-year ISI interval at the CR-3 is 2001 Edition through the 2003 Addenda.

3.0 TECHNICAL EVALUATION

3.1 ASME Code Component Affected

The ASME Code components affected by the licensee's proposed alternative are the 52 RV BMI nozzles at CR-3.

3.2 ASME Code Requirements

ASME Code Case N-722 was mandated by the NRC as an augmented ISI requirement in 10 CFR 50.55a(g)(6)(ii)(E) on September 8, 2008. ASME Code Case N-722 requires, in part, that 100 percent BMV inspection of the BMI nozzles be performed every other refueling outage. Footnote 1 to 10 CFR 50.55a(g)(6)(ii)(E) requires that the initial BMI inspections be performed at the next refueling outage after January 1, 2009.

3.3 Duration of the Alternative

The licensee requested approval of this alternative for use in the fourth 10-year ISI interval. The duration of the proposed alternative is valid for the fourth 10-year ISI interval, which ends on August 13, 2018.

3.4 Licensee's Proposed Alternatives to ASME Code Case N-722

During the CR-3 fall 2009 refueling outage (RFO), BMV inspection of the BMI nozzles were conducted per ASME Code Case N-722. The 52 BMI nozzles were inspected by a qualified Level II inspector using a visual testing (VT-2) technique. Based on the high resolution view provided at the monitor during the inspection, the Level II inspector concluded that the residual coating remnants on some of the RV's BMI nozzles and junction areas did not impede the ability to detect a small amount of reactor coolant system (RCS) leakage from any BMI. As a result, the licensee concluded that the performed inspection met the intent and requirements of the ASME code.

An NRC ISI inspector reviewed the results of the BMV inspections of the BMI nozzles and noted that remnants of paint around some of the BMI nozzles could be considered a potential obstruction to the performance of 100 percent BMV inspections. Therefore, the NRC inspector concluded that the ASME Code Case N-722 requirement to inspect the entire circumference of each BMI nozzle where it exits the RV may not be satisfied.

Therefore, by letter dated November 13, 2009, the licensee submitted its request for a proposed alternative to the ASME Code requirements in accordance with 10 CFR 50.55a(a)(3)(ii), on the basis that additional effort to remove all the residual paint to produce 100 percent bare-metal surface on the RV nozzles was considered a hardship. The licensee proposed the existing condition of the reactor vessel nozzles as an alternative for providing reasonable assurance that small amounts of reactor coolant system leakage would be detectable.

3.5 Licensee's Basis for Alternatives to ASME Code Case N-722

The licensee, in its letter dated November 13, 2009, stated that the first direct visual inspection on the BMI nozzles at CR-3 was conducted in the fall 2003. A protective paint had been applied to the exterior of the RV at the time of original manufacturing and remnants of this paint still remained on the exterior of the RV, including the locations where some BMI nozzles exit the RV. Following the inspection, the RV bottom head was cleaned to remove loose scale and flaking residual paint. The licensee's letter to the NRC dated December 17, 2003, stated that the inspection was complete with no indication of leakage or wastage. This inspection was witnessed by the NRC inspector and documented in the NRC's inspection report dated January 26, 2004, which concluded that the licensee conducted an effective visual inspection to identify potential leakage resulting from lower vessel penetrations. The licensee, in the letter dated November 13, 2009, added that subsequent inspections of the BMI nozzles were performed in 2005 and 2007 with no change from previous inspections in appearance noted and no evidence of leakage detected.

Furthermore, the licensee reiterated that the VT-2 inspections performed on October 1, 2009, used the licensee's nondestructive examination procedure that met the examination requirements for proximity and lighting of ASME Code Case N-722. The licensee stated that the inspections were performed using a high resolution view at the monitor, which provided adequate assurance for the licensee's inspector that the remnants of the paint do not impede the ability to detect any RCS leakage. The licensee also provided a lower resolution video taped recording of multiple views of each nozzle, which showed residual paint on the RV bottom head, some BMI nozzles, and their annulus regions. Based on these observations, the licensee

determined that the paint should not obstruct any RCS leakage because: (1) the paint is not covering the entire circumference of each BMI nozzle, (2) any small amount of RCS leakage would flow to the opening point of the annulus region, which will be detectable, and (3) previous work by industry suggests that the paint in the annulus region would not hide the boric acid deposits released through the pressure boundary. RCS leakage would lead to boric acid corrosion of the RV bottom head, which produces roughly twice the volume of iron oxide (scale) resulting in release of deposits from the annulus.

The licensee also stated that even though the RV bottom head was cleaned, some remnants of the paint are still visible at the annulus regions of some BMI nozzles and the RV bottom head. The licensee stated that additional effort to remove all the residual paint is considered a hardship and does not provide any increase in the level of quality and safety.

Based on this assessment, the licensee concluded that additional effort to remove all the residual paint is considered hardship and does not provide any increase in the level of quality and safety. Therefore, under the provisions of 10 CFR 50(a)(3)(ii), the licensee requested the NRC's approval of the visual inspections performed during the CR-3 fall 2009 RFO as the basis for the current and future fourth 10-year ISI interval BMV inspections.

3.6 NRC Staff Evaluation of Relief Request 09-004-II, Revision 0

The NRC staff reviewed the November 13, 2009, licensee's submittal and the lower resolution video taped recording that provided multiple views of each nozzle, including the presence of residual paint on the RV bottom head, some BMI nozzles, and their annulus regions. The review of the video recording showed presence of paint in a number of BMI nozzles, which could obstruct the RCS leakage. Therefore, the NRC staff requested that the licensee provide additional information regarding the extent of paint around the RV nozzles and the nozzle annulus.

The licensee, by letter dated November 25, 2009, responded that based on the high resolution view at the monitor none of the 52 BMI nozzles was identified with any remnants of paint around the entire circumference of the BMI nozzle. The licensee further stated that 49 out of the 52 BMI nozzles did not have any paint obstructing the view of the nozzle annulus. However, for three of the BMI nozzles, 15 percent of the circumference was obstructed by paint. The staff reviewed the response and concluded that since only limited numbers of annuli of BMI nozzles were partially occluded by paint, RCS leakage from these nozzles can be detected.

The NRC staff requested that the licensee clarify whether the inspectors were trained in identifying a bulge in the paint that could be the result of a RCS leak. The licensee, by letter dated November 25, 2009, responded that the VT-2 inspectors were trained to identify bulges and blisters of the painted surfaces.

The NRC staff also asked the licensee to confirm whether any evidence of reactor cavity seal leakage was identified in the vicinity of the BMI nozzles during the past refueling outages. If so, what methods or criteria were used to disposition this RV cavity seal leakage as not being evidence of leakage from the BMI nozzles. The licensee responded that there was no evidence of RV cavity seal leakage identified in the vicinity of the BMI nozzles during the past refueling outages. The RV support skirt, which is welded around the entire base of the RV, would

prevent cavity seal leakage from reaching the RV bottom head and the BMI nozzles. The NRC staff reviewed the response and concluded that absent any complications from boric acid leakage from the RV cavity seal reaching the RV bottom head and/or BMI nozzles, the licensee's proposed alternative should be able to effectively detect leakage from the BMI nozzles.

Furthermore, the NRC staff requested that the licensee provide a discussion of how visual examination or leak detection provides a basis for ensuring that circumferential primary water stress corrosion cracking is not occurring on the outside diameter of the Alloy 600 nozzles, if the annulus is plugged and occluded by paint. The licensee, in the letter dated November 25, 2009, stated that the paint on the RV bottom head is of the same specification as paint found on the unit's pressurizer. The licensee also indicated that the paint on the pressurizer is more intact than the paint on the RV bottom head. In 2003 (License Event Report 50-302/03-003-00, Agencywide Documents Access and Management System Accession Number ML033320052), leakage from three, partially paint-occluded CR-3 pressurizer steam space instrument taps was identified by visual examination. Leakage from these steam space instrument taps would be expected to be more difficult to detect by visual examination than leakage of water through a BMI nozzle. Given that the paint on the pressurizer instrument taps did not prevent the detection of leakage by visual examination, the licensee concluded that paint on the RV would not impede leakage at the interface between the BMI nozzles and the RV, and that any RCS leakage from the BMI nozzles would be detected by the most recent BMV inspections.

The NRC staff reviewed and evaluated the licensee's relief request dated November 13, 2009, as supplemented by letter dated November 25, 2009, pursuant to 10 CFR 50.55a(a)(3)(i), to determine whether the visual examination of the existing conditions of the 52 BMI nozzles was an acceptable alternative to the requirements of ASME Code Case N-722 and would provide an acceptable level of quality and safety. The NRC staff concluded that bridging of paint between the BMI nozzles and the RV exterior surface is of limited extent and would not be expected to prevent detection of potential leakage from any of the partially occluded BMI nozzles. In addition, the operating experience with detecting leakage from aforementioned pressurizer nozzles, where essentially the same paint was applied and is in better condition than on the RV, supports the expectation that potential reactor vessel BMI leakage could be detected. Based on these discussions, the NRC staff concludes that the licensee's fall 2009, BMV inspection of the existing conditions of the RV BMI nozzles at CR-3 would be effective in detecting leakage and would provide an acceptable level of quality and safety.

4.0 CONCLUSIONS

The NRC staff has reviewed the licensee's submittals dated November 13 and 25, 2009, determined that RR 09-004-II, Revision 0 will provide an acceptable level of quality and safety. Therefore, pursuant to 10 CFR 50.55a(a)(3)(i), the NRC staff authorizes the use of the proposed alternative to the requirements of ASME Code Case N-722 for the RV BMI nozzles at CR-3. The RR 09-004-II, Revision 0, is effective for the fourth 10-year ISI interval, which began in August 2008.

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: Ganesh Cheruvenki

Date: April 30, 2010

J. Franke

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If you have any questions regarding this issue, please contact Crystal River Project Manager, Farideh E. Saba at (301) 415-1447 or farideh.saba@nrc.gov.

Sincerely,

/RA/

Douglas A. Broaddus, Acting Chief
Plant Licensing Branch II-2
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

Docket No. 50-302

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