



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

March 3, 2010

Mr. Dave Baxter
Vice President, Oconee Site
Duke Energy Carolinas, LLC
7800 Rochester Highway
Seneca, SC 29672

SUBJECT: OCONEE NUCLEAR STATION, UNITS 1, 2, AND 3, RELIEF REQUEST
09-ON-005 FOR REACTOR VESSEL CORE FLOOD NOZZLE WELD
EXAMINATIONS (TAC NOS. ME1846, ME1847, AND ME1848)

Dear Mr. Baxter:

By letter dated July 28, 2009, Duke Energy Carolinas, LLC (Duke, the licensee), submitted relief request (RR) 09-ON-005 for the fourth 10-year interval of Oconee Nuclear Station, Units 1, 2, and 3 (Oconee 1, 2, and 3) related to the Inservice Inspection (ISI) Program pertaining to examination of reactor vessel core flood nozzle welds. The licensee requested approval of a proposed alternative to the depth-sizing criteria of the American Society of Mechanical Engineers, *Boiler and Pressure Vessel Code* during the ultrasonic examination of the reactor vessel core flood nozzle to safe-end welds.

Based on the information provided by the licensee, the Nuclear Regulatory Commission (NRC) staff has determined that the licensee's compliance to the ISI Code of Record would result in hardship or unusual difficulty without a compensating increase in the level of quality and safety. Therefore, pursuant to Title 10 of the *Code of Federal Regulations*, Part 50, Section 50.55a(a)(3)(ii), the NRC authorizes the ISI Program alternative proposed in RR 09-ON-005 for the fourth 10-year ISI intervals of Oconee 1, 2, and 3 which are scheduled to end on July 14, 2013, for Oconee 1, September 8, 2014, for Oconee 2, and December 15, 2014, for Oconee 3. Enclosed is the NRC's Safety Evaluation.

D. Baxter

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If you have any questions concerning this action, please contact John Stang of my staff at 301-415-1345.

Sincerely,



Gloria Kulesa, Chief
Plant Licensing Branch II-1
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

Docket Nos. 50-269, 50-270, and 50-287

Enclosure:
Safety Evaluation

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

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

REQUEST FOR APPROVAL OF RELIEF 09-ON-005

REGARDING ALTERNATIVES FROM REACTOR VESSEL CORE FLOOD NOZZLE WELD

EXAMINATIONS

OCONEE NUCLEAR STATION, UNITS 1, 2, AND 3

DUKE ENERGY CAROLINAS, LLC

DOCKET NOS. 50 269, 50-270, AND 50-287

1.0 INTRODUCTION

By letter dated July 28, 2009, Agencywide Documents Access and Management System (ADAMS) Accession No. ML092150028), Duke Energy Carolinas, LLC (Duke, the licensee), submitted relief request (RR) 09-ON-005 for Oconee Nuclear Station, Units 1, 2, and 3 (Oconee 1, 2, and 3) for the fourth 10-year interval of Oconee 1, 2, and 3 related to the Inservice Inspection (ISI) Program . The licensee requested approval of a proposed alternative to the American Society of Mechanical Engineers (ASME), *Boiler and Pressure Vessel Code* (Code) for examinations of the reactor vessel core flood nozzles. The proposed alternative involves application of an alternative depth-sizing criteria during the ultrasonic examination of the reactor vessel core flood nozzle to safe-end (dissimilar metal) welds

The Nuclear Regulatory Commission (NRC) staff has reviewed the licensee's proposed alternative pursuant to Title 10 to *Code of Federal Regulations* (10 CFR), Part 50, Section 50.55a(a)(3)(ii) on the basis that compliance to the Code requirement would result in hardship or unusual difficulty without a compensating increase in the level of quality and safety.

2.0 REGULATORY REQUIREMENTS

Section 50.55a(g) specifies that ISI of nuclear power plant components shall be performed in accordance with the requirements of ASME Code, Section XI, except where specific written relief has been granted by the Commission pursuant to 10 CFR 50.55a(g)(6)(i). Section 50.55a(g)(6)(i) states that 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 is otherwise in the public interest, giving due consideration of the burden upon the licensee. Section 10 CFR 50.55a(a)(3) states that alternatives to the requirements of paragraph (g) may be used, when authorized by the NRC, if (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. Section 50.55a(g)(5)(iii) states that if the licensee has determined that

Enclosure

conformance with certain code requirements is impractical for its facility, the licensee shall notify the Commission and submit, as specified in §50.4, information to support the determinations.

Pursuant to 10 CFR 50.55a(g)(4), ASME Code Class 1, 2, and 3 components (including supports) shall meet the requirements, except the design and access provisions and 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 ISI 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) twelve months prior to the start of the 120-month interval, subject to the limitations and modifications listed therein. The applicable ASME Code of Record for the fourth 10-year ISI interval for Oconee 1, 2, and 3 is the 1998 Edition through the 2000 Addenda.

The information provided by the licensee in support of the relief request has been evaluated by the NRC staff and the bases for disposition are documented below.

3.0 TECHNICAL EVALUATION

3.1 Applicable Code Edition and Addenda

The Code of Record for the fourth 10-year ISI Program at Oconee 1, 2, and 3 is the ASME Code, Section XI, 1998 Edition through the 2000 addenda. In addition, volumetric examinations are to be conducted in accordance with ASME Code, Section XI, Appendix VIII, Supplement 10, 1998 Edition through the 2000 Addenda. The fourth 10-year ISI interval dates at Oconee 1, 2, and 3 are as follows:

- Oconee1 interval start date January 1, 2004, end date July 14, 2013
- Oconee 2 interval start date September 9, 2004, end date September 8, 2014
- Oconee 3 interval start date January 2, 2005, end date December 14, 2015.

3.2 Components for Which Relief is Requested

Code Class: Class 1
 System Welds: Reactor Coolant System
 Examination Categories: Category B-F for dissimilar metal welds to reactor vessel nozzle
 Code Item Numbers: B5.10 for dissimilar metal welds to reactor vessel nozzle

ONS Unit	Description	Size	DM Weld Number	Comment
1	12.25" RV Core Flood Nozzle	Nominal 12.25" ID with 1.68" wall	1-RPV-WR53 1-RPV-WR53A	LAS nozzle/Alloy 82-182 weld/SS safe-end
2	12.25" RV Core Flood Nozzle	Nominal 12.25" ID with 1.68" wall	2-RPV-WR53 2-RPV-WR53A	LAS nozzle/Alloy 82-182 weld/SS safe-end
3	12.25" RV Core Flood Nozzle	Nominal 12.25" ID with 1.68" wall	3-RPV-WR53 3-RPV-WR53A	LAS nozzle/Alloy 82-182 weld/SS safe-end

Component Materials:

1. Low Alloy Steel (LAS) nozzles are SA-508 Class 2 Low Alloy Steel (P-3)
2. Stainless Steel (SS) safe-ends are SA-336 F8M (P-8)
3. Welds are Alloy 82/182 (F-43)

3.3 Applicable Code Requirement

ASME Code, Section XI, Table IWB-2500-1, Category B-F, Item B5.10, Reactor Vessel Nozzle to Safe-end Butt Welds, specifies volumetric examination for the dissimilar metal welds. The volumetric examinations are to be conducted in accordance with the ASME Code, Section XI, Appendix VIII, Supplement 10, 1998 Edition through the 2000 Addenda. However, Regulatory Guide 1.147, "Inservice Inspection Code Case Acceptability, ASME Section XI, Division 1," Revision 15 has approved an alternative to the requirements of Appendix VIII, Supplement 10 in Section XI Code Case N-695, "Qualification Requirements for Dissimilar Metal Piping Welds."

3.4 Licensee Proposed Alternative and Basis for Use

The licensee stated that a request for relief from the required root mean square error (RMSE) in depth sizing is needed because, to date, examination vendors have not met the established RMSE of 0.125 inch for depth sizing when ultrasonic examinations are performed from the inside surface of the pipe. The licensee proposes to use a contracted examination vendor that has demonstrated ability to meet a depth-sizing qualification requirement with an RMSE of 0.224 inch instead of the 0.125 inch required for Supplement 10 to ASME Code, Section XI, Appendix VIII, for dissimilar metal welds.

The licensee states that in the event an indication is detected that requires depth sizing, the 0.099 inch difference between the required RMSE and the demonstrated RMSE for Supplement 10 will be added to the measured through-wall extent for comparison with applicable acceptance criteria. If the examination vendor demonstrates an improved depth-sizing RMSE prior to the examination, the excess of that improved RMSE over the 0.125 inch RMSE requirement, if any, will be added to the measured value for comparison with applicable acceptance criteria.

3.5 Duration of Proposed Alternative

The proposed alternative is requested for the remainder of the fourth 10-year ISI interval for Ocone 1, 2 and 3.

4.0 NRC STAFF'S EVALUATION

ASME Code, Section XI, Appendix VIII, Supplement 10 and Code Case N-695, "Qualification Requirements for Dissimilar Metal Piping Welds," require that examination procedures, equipment, and personnel be qualified for depth-sizing such that the square RSME of the flaw-depth measurements, as compared to true depths, do not exceed 0.125 inch. ASME Code, Section XI, Code Case N-695 is referenced in the licensee's ISI Program and has been determined to be an acceptable alternative to Appendix VIII, Supplement 10, per Regulatory Guide 1.147, Rev. 15, Table 1, "Acceptable Section XI Code Cases."

The nuclear industry is in the process of qualifying personnel to Supplement 10, Code Case N-695 requirements, as implemented through the Electric Power Research Institute (EPRI) Performance Demonstration Initiative (PDI) Program. However, for ultrasonic examinations performed from the inside surface of a pipe weld, personnel have been unsuccessful at achieving the ASME Code-required 0.125-inch RMSE flaw depth-sizing criterion. At this time, the staff acknowledges that achieving the 0.125 inch RMSE appears not to be feasible. The examination vendor contracted by the licensee has proposed to use an RMSE of 0.224 inch instead of the 0.125 inch required for Supplement 10 for dissimilar metal welds. In the event an indication is detected that requires depth sizing, the 0.099-inch difference between the required RMSE and the demonstrated RMSE for Supplement 10 (0.224 inch – 0.125 inch) will be added to the measured through-wall extent. This total flaw depth will then be assessed against the applicable acceptance criteria specified in Section IWB-3500 of the ASME Code for flaw evaluation. Additionally, the licensee proposes that, if the examination vendor demonstrates an improved depth-sizing RMSE prior to the examination, the excess of that improved RMSE over the 0.125-inch RMSE requirement, if any, will be added to the measured value for flaw evaluation with applicable acceptance criteria specified in Section IWB-3500 of the ASME Code.

The NRC staff finds that compliance with the ASME Code-required RMSE value is not feasible at this time. Also, the staff finds that the licensee's proposed alternative of adding the difference between the ASME Code-required RMSE and the demonstrated RMSE to the measured through-wall extent, in addition to the use of the acceptance standards specified in Section IWB-3500 of the ASME Code, provides an acceptable level of quality and safety.

5.0 CONCLUSION

Based on the above review, the NRC staff has determined that requiring the licensee to qualify procedures, personnel, and equipment to meet the maximum error of 0.125-inch RMSE for crack depth sizing is not feasible at the present time. The licensee's proposal of adding the difference between the ASME Code-required RMSE and the demonstrated RMSE to the measured through-wall extent, in addition to the use of the acceptance standards specified in Section IWB-3500 of the ASME Code, provides an acceptable level of quality and safety. Therefore, pursuant to 10 CFR 50.55a(a)(3)(i), the proposed alternative is authorized for the remainder of the fourth 10-year ISI interval for Oconee 1, 2 and 3, which ends on July 14, 2013, September 8, 2014, and December 15, 2014, respectively. All other requirements of ASME Code, Section XI for which relief has not been specifically requested remain applicable, including a third-party review by the Authorized Nuclear Inservice Inspector.

Principal Contributor: C. Nove, NRR

Date: March 3, 2010

D. Baxter

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If you have any questions concerning this action, please contact John Stang of my staff at 301-415-1345.

Sincerely,

/RA/

Gloria Kulesa, Chief
Plant Licensing Branch II-1
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

Docket Nos. 50-269, 50-270, and 50-287

Enclosure:
Safety Evaluation

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NAME	JStang	MO'Brien	TChan*	GKulesa	JStang
DATE	3/3/2010	3/3/2010	09/25/09	3/3/10	3/3/10

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