



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

August 20, 2010

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

SUBJECT: OCONEE NUCLEAR STATION, UNIT 3, RELIEF REQUEST 08-ON-002 FOR
LIMITED WELD EXAMINATIONS (TAC NOS. ME4511 AND ME4512)

Dear Mr. Baxter:

By letter dated December 29, 2008, as supplemented August 7, 2009, December 2, 2009, and May 13, 2010, Duke Energy Carolinas, LLC (Duke, the licensee), submitted relief request (RR) 08-ON-002 for the fourth 10-year interval of Oconee Nuclear Station, Unit 3 (Oconee 3), related to the Inservice Inspection (ISI) Program pertaining to the volumetric examinations of the reducer-to-valve weld in the low pressure injection system and the tee-to-pipe weld in the high pressure injection system. The licensee requested relief from the volumetric coverage requirement for weld examinations specified in 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.

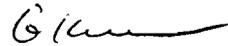
Based on the information provided by the licensee, the Nuclear Regulatory Commission (NRC) staff has determined that the licensee's compliance to the ISI Code of Record would result in hardship or unusual difficulty without a compensating increase in the level of quality and safety. Therefore, relief is granted pursuant to 10 CFR 50.55a(g)(6)(i) for the duration of the fourth 10-year ISI interval for Oconee 3, which is scheduled to end on December 16, 2014. This relief 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 if the requirements were imposed on the facility. 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 No. 50-287

Enclosure:
Relief

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SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

REGARDING RELIEF REQUEST 08-ON-002 LIMITED WELD EXAMINATION COVERAGE

OCONEE NUCLEAR STATION, UNIT 3

DUKE ENERGY CAROLINAS, LLC

DOCKET NO. 50-287

1.0 INTRODUCTION

By letter dated December 29, 2008 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML090050027), as supplemented by letters dated August 7, 2009 (ADAMS Accession No. ML092250467), December 2, 2009 (ADAMS Accession No. ML093410636), and May 13, 2010 (ADAMS Accession No. ML101380067), Duke Energy Carolinas, LLC (Duke, the licensee), submitted relief request (RR) 08-ON-002 for the Nuclear Regulatory Commission (NRC) staff's review and approval. Pursuant to Title 10 of the *Code of Federal Regulations* (10 CFR), Part 50, Section 50.55a(g)(5)(iii), the licensee requested relief from the 100 percent volumetric coverage requirement for weld examinations specified in the American Society of Mechanical Engineers, *Boiler and Pressure Vessel Code* (ASME Code), Section XI. The request pertains to the volumetric examinations of the reducer-to-valve weld in the low-pressure injection system and the tee-to-pipe weld in the high-pressure injection system. The relief is requested for Oconee Nuclear Station, Unit 3 (Oconee 3), for the remainder of the fourth 10-year inservice inspection (ISI) interval which began on January 2, 2005, and is scheduled to end on December 16, 2014.

2.0 REGULATORY REQUIREMENTS

Section 50.55a(g) specifies that ISIs 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(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 conformance with certain code requirements is impractical for its facility, the licensee shall notify the Commission and submit, as specified in Section 50.4, 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 the pre-service examination requirements, set forth in ASME Code, Section XI, "Rules for In-service Inspection of Nuclear Power Plant Components," to the extent practical within the limitations of design,

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geometry, and materials of construction of 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 of 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 code of record for the fourth 10-year ISI interval for Oconee 3 is the 1998 Edition through 2000 Addenda to ASME Code, Section XI. RR 08-ON-002 is sought for the fourth 10-year ISI interval which began on January 2, 2005, and is scheduled to end on December 16, 2014.

3.0 TECHNICAL EVALUATION

3.1 Applicable Code Edition and Addenda

The 1998 Edition through 2000 Addenda to ASME Code, Section XI is the current code of record for the ISI program at Oconee 3. In addition, the volumetric examinations are to be conducted in accordance with Appendix VIII, Supplement 2 of the 1998 Edition through 2000 Addenda to ASME Code, Section XI. Oconee 3 is currently in the fourth 10-year ISI interval which began on January 2, 2005, and is scheduled to end on December 16, 2014.

3.2 Components for Which Relief is Requested

Weld ID: 3LP-134-103
 Code Class: Class 2
 System Welds: Low-Pressure Injection System
 Examination Category: C-F-1, Pressure Retaining Welds in Austenitic Stainless Steel or High Alloy Piping
 Code Item No.: C5.11

Weld ID: 3HP-365-9C
 Code Class: Class 2
 System Welds: High-Pressure Injection System
 Examination Category: C-F-1, Pressure Retaining Welds in Austenitic Stainless Steel or High Alloy Piping
 Code Item No.: C5.21

Description	Size	Weld ID No. (Weld Item No.)	Component Material
Low-Pressure Injection System, Reducer-to-Valve Weld	10" Nominal Diameter, 1.125" Wall Thickness	3LP-134-103 (C05.011.004)	SA-351/CF8M Cast Stainless Steel Valve, SA 403/WP304 Stainless Steel Reducer
High-Pressure Injection System, Tee-to-Pipe Weld	4" Nominal Diameter, 0.674" Wall Thickness	3HP-365-9C (C05.021.052)	SA 403/WP304 or WP316 Stainless Steel Tee, SA 376/TP 304 or TP316 Stainless Steel Seamless Pipe

3.3 Applicable Code Requirement

ASME Code, Section XI requires 100-percent volumetric and surface examination coverage of the welds identified by item numbers C5.11 and C5.21 in Table IWC-2500-1, Examination Category C-F-1, and as shown in Figure IWC-2500-7(a). Oconee 3 has adopted ASME Code Case N-460, "Alternative Examination Coverage for Class 1 and Class 2 Welds," which is applicable when the entire examination volume or area cannot be examined due to interference by another component or part geometry. Under such circumstances, Code Case N-460 allows a reduction in examination coverage on any Class 1 or Class 2 weld, provided the reduction in coverage for that weld is less than 10 percent. ASME Code Case N-460 has been approved for use by the NRC in Regulatory Guide (RG) 1.147, Revision 15.

3.4 Impracticality and/or Burden Caused by Code Compliance

Relief is requested from the requirement to examine 100 percent of the required volume specified in ASME Code, Section XI. As described below, limitations or interferences from the component geometry prevented scanning the entire volume for the following welds.

Weld 3LP-134-103 (C05.011.004)

The licensee stated that, during the ultrasonic testing (UT) of weld 3LP-134-103, 37.50-percent coverage of the required examination volume was obtained. The coverage reported represents the aggregate coverage of all scans performed including the 50-percent coverage obtained from a 45° shear wave circumferential scan of the weld in the clockwise and counterclockwise directions from the reducer and the valve side, the 50-percent coverage obtained from a 60° shear wave axial scan of the weld from the reducer side, and no coverage obtained from a 60° shear wave axial scan of the weld from the valve side. The licensee stated that limitations due to taper on the valve side of weld 3LP-134-103 prevented scanning from that side. In order to scan all of the required volume of this weld, the valve would have to be redesigned to allow scanning from both sides of the weld, which is impractical. In the volume covered by the UT examinations, there were no recordable indications found in weld 3LP-134-103.

Weld 3HP-365-9C (C05.021.052)

The licensee stated that, during the UT examinations of weld 3HP-365-9C, 89.40-percent coverage of the required examination volume was obtained. The coverage reported represents the aggregate coverage from all scans performed including the 100-percent coverage obtained from a 38° shear wave circumferential scan of the weld in the clockwise and counterclockwise directions from the pipe side and the tee side, the 85.80-percent coverage obtained from a 60° shear wave axial scan of the weld from the pipe side, and the 71.60-percent coverage obtained from a 60° shear wave axial scan of the weld from the tee side. The licensee stated that the limitation from the radius on the tee side of weld 3HP-365-9C obstructed scanning for 4.0 inches from the tee side. In order to scan all of the required volume of this weld, the tee would have to be redesigned to allow scanning from both sides of the weld, which is impractical. No recordable indications were found during UT examinations of weld 3HP-365-9C.

3.5 Proposed Alternative Examination

The licensee stated that the use of radiographic testing (RT) as an alternative to UT to achieve more volumetric coverage of the subject welds was considered and evaluated. However, the licensee decided against the use of RT because RT is less sensitive to service-induced cracking and has not been subjected to the performance demonstration requirements in a manner similar to the UT method. The licensee further stated that although RT could in most cases provide more coverage, the loss of sensitivity and lack of performance demonstration militated against its use.

3.6 Justification for Granting Relief

The licensee stated that UT examinations of the subject welds were performed using personnel, equipment and procedures qualified in accordance with the 1998 Edition through 2000 Addenda of ASME Code, Section XI, Appendix VIII, Supplement 2. Additional justifications provided by the licensee for each weld are summarized below.

Weld 3LP-134-103 (C05.011.004)

The licensee stated that, in addition to the volumetric examination with limited coverage, the Code-required surface examination was performed on weld 3LP-134-103 and 100-percent coverage was achieved. The results from the surface examinations were acceptable.

The licensee stated that, in addition to weld 3LP-134-103, there was one additional C05.011 weld from the same system that the surface and volumetric examinations were performed on. The surface and volumetric examinations did not identify any recordable indications and 100-percent coverage was obtained.

The licensee stated that it did not claim credit for coverage of the far side of austenitic welds when access is limited to one side only. The austenitic weld metal attenuates and distorts the sound beam when shear waves pass through the weld. Refracted longitudinal waves provide better penetration, but cannot be used beyond the first path leg. The licensee used a combination of shear waves and longitudinal waves to examine single-sided austenitic welds when the nominal material thickness exceeds 0.5 inches. A supplemental 60° refracted longitudinal wave was used to interrogate the far side of the weld when the nominal material thickness is greater than 0.5 inches. Coverage from this supplemental scan was not included in the aggregate coverage calculation.

The licensee stated that Class 2, examination category C-H, pressure testing (i.e. VT-2 visual examination) was performed on weld 3LP-134-103 to compliment the limited examination coverage. The Code requires a pressure test to be performed after each period for Class 2 for evidence of leakage. The pressure test, performed in May 2006, did not find leakage for this segment of piping.

The licensee stated that weld 3LP-134-103 and its component were inspected by volumetric nondestructive evaluation (NDE) methods during construction and verified to be free from unacceptable fabrication defects.

leakage did occur through weld 3LP-134-103, it would be detected. Specifically, visual observations performed during operator rounds provide additional assurance that any leakage would be detected prior to gross failure of the component.

Weld 3HP-365-9C (C05.021.052)

The licensee stated that in addition to the volumetric examination with limited coverage, the Code required surface examination of weld 3HP-365-9C was performed in February 2006 and 100-percent coverage was achieved. The results from the surface examinations were acceptable.

The licensee stated that, in addition to weld 3HP-365-9C, there were ten additional C05.021 welds in the same system that the surface and volumetric examinations were performed in February 2006. The examinations didn't identify any recordable indications, and 100-percent coverage of the required surface and volume were obtained on each weld.

The licensee stated that it did not claim credit for volume coverage of the far side of austenitic welds when access is limited to one side only. The austenitic weld metal attenuates and distorts the sound beam when shear waves pass through the weld. Refracted longitudinal waves provide better penetration, but cannot be used beyond the first path leg. The licensee used a combination of shear waves and longitudinal waves to examine single sided austenitic welds when the nominal material thickness exceeds 0.5 inches. A supplemental 60° refracted longitudinal wave was used to interrogate the far side of the weld when the nominal material thickness is greater than 0.5 inches. Coverage from this supplemental scan was not included in the aggregate coverage calculation.

The licensee performed Class 2, examination category C-H, pressure testing (VT-2 visual examination) on weld 3HP-365-9C to compliment the limited volumetric examinations coverage. The Code requires a pressure test to be performed after each period for Class 2 for evidence of leakage. The pressure test, performed in May 2006, did not find leakage for this segment of piping.

The licensee stated that weld 3HP-365-9C and its component were inspected by volumetric NDE methods during construction and verified to be free from unacceptable fabrication defects.

The licensee stated that, in addition to the above Code-required examinations (volumetric, surface, and pressure test) there are other activities which provide confidence that, in the event leakage did occur through weld 3HP-365-9C, it would be detected. Specifically, operations perform a daily leakage calculation to assure system leak rate limitations imposed by Technical Specifications 3.4.13, "Reactor Coolant System Leakage," are not exceeded. Operations also conduct rounds during which evidence of leakage would be detected prior to gross failure of the component.

3.7 Duration of Relief

The relief was submitted for approval for the duration of the fourth 10-year ISI interval which began on January 2, 2005, and is scheduled to end on December 16, 2014.

4.0 NRC STAFF'S EVALUATION

The NRC staff has evaluated the information provided by the licensee in its letter dated December 29, 2008, and as supplemented by letters dated August 7, 2009, December 2, 2009 and May 13, 2010. Pursuant to 10 CFR 50.55a(g)(5)(iii), the licensee requested relief from the 100-percent volumetric coverage requirement for weld examinations specified in ASME Code, Section XI. The request pertains to weld 3LP-134-103 which is the reducer to valve connection weld in the low-pressure injection system and weld 3HP-365-9C which is the tee-to-pipe connection weld in the high-pressure injection system.

The NRC staff has determined that the licensee's best effort volumetric examinations with limited access to the subject welds achieved volumetric coverage of 37.5 percent for weld 3LP-134-103 and 89.4 percent for weld 3HP-365-9C. In the volume covered by the UT examinations, there were no indications reported by the licensee.

The ASME Code, Section XI, requires 100-percent volumetric and surface examination coverage of the subject welds. ASME Code Case N-460, which has been approved for use by the NRC in RG 1.147, Revision 15, allows a reduction in examination coverage provided the reduction in coverage for that weld is less than 10 percent, and is applicable only when the entire examination volume or area cannot be examined due to interference by another component or part geometry.

For weld 3LP-134-103, the licensee stated that limitations due to taper on the valve side prevented full coverage of the required volume. In order to scan all of the required volume of weld 3LP-134-103, the valve would have to be redesigned, which is impractical. For weld 3HP-365-9C, the licensee stated that the limitation from the radius on the tee side obstructed scanning and prevented full coverage of the required volume. In order to scan all of the required volume of weld 3HP-365-9C, the tee would have to be redesigned, which is impractical.

The NRC staff has determined that the examination coverage of the subject welds was reduced due to component configuration and geometries which restricted scanning to the percentages identified above. The NRC staff has also determined that, in addition to the volumetric examinations, the licensee performed full surface examinations of the subject welds where the results of the examinations were acceptable. Further, the NRC staff has determined that the licensee performed pressure testing and VT-2 visual examinations of the subject welds to supplement the applicable limited examination coverage. There was no through-wall leakage observed for the subject welds during the pressure testing performed in February 2006.

Therefore, the NRC staff has determined that the licensee's limited volumetric examination coverage of the subject welds as supplemented by additional examinations provide reasonable assurance of structural integrity. In order to meet the Code requirements, the components would have to be redesigned, fabricated, and installed in the systems, which would impose an undue burden on the licensee. Based on the access limitations, it is impractical for the licensee to meet the Code-coverage requirements.

5.0 CONCLUSION

The NRC staff concludes that compliance with the Code requirements for volumetric coverage of the subject welds is impractical due to component configuration. If the Code requirements were to be imposed on the licensee, the components must be redesigned, which would impose a significant burden on the licensee. The NRC staff finds that the examination coverage of the accessible weld volume as supplemented by the additional examinations performed by the licensee, provide reasonable assurance of structural integrity of the subject welds. Therefore, relief is granted pursuant to 10 CFR 50.55a(g)(6)(i) for the duration of the fourth 10-year ISI interval of Oconee 3, which is scheduled to end on December 16, 2014. This relief 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 if the requirements were imposed on the facility.

All other ASME Code, Section XI, requirements for which relief was not specifically requested and authorized herein by the NRC staff remain applicable, including the third-party review by the Authorized Nuclear Inservice Inspector.

Principal Contributor: A. Rezai

Date: August 20, 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 No. 50-287

Enclosure:
Relief

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