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

February 4, 2013

Mr. Preston Gillespie
Site Vice President
Oconee Nuclear Station
Duke Energy Carolinas, LLC
7800 Rochester Highway
Seneca, SC 29672-0752

SUBJECT: OCONEE NUCLEAR STATION, UNITS 2 AND 3, RELIEF FROM THE REQUIREMENTS OF THE ASME CODE (TAC NOS. ME8433 AND ME8434)

Dear Mr. Gillespie:

By letter dated February 29, 2012, as supplemented by letter dated September 21, 2012, Duke Energy Carolinas, LLC (Duke or the licensee) submitted a request to the Nuclear Regulatory Commission (NRC) for relief from certain American Society of Mechanical Engineers Boiler and Pressure Vessel Code, Section XI requirements at Oconee Nuclear Station, Units 2 and 3. Pursuant to Title 10 of the *Code of Federal Regulations* (10 CFR), Part 50, Section 50.55a(g)(6)(i), the licensee requested relief for certain in-service inspection items on the basis that the code requirement is impractical.

As set forth in the enclosed safety evaluation, the NRC staff has determined that granting relief 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 given due consideration to the burden upon the licensee that could result if the requirements were imposed on the facility. Furthermore, the staff concluded that the examinations performed to the extent practical provide reasonable assurance of structural integrity of the subject components. 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 relief for the subject examinations of the components as stated in the attached safety evaluation for the fourth 10-year in-service inspection interval for Oconee Nuclear Station, Units 2 and 3.

If you have any questions, please contact the Project Manager, John Boska, at 301-415-2901, or via email at John.Boska@nrc.gov.

Sincerely,

Robert J. Pascarelli, Chief
Plant Licensing Branch II-1
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

Docket Nos. 50-270, and 50-287

Enclosure:
As stated

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

RELIEF REQUEST NO. RR-11-ON-002

DUKE ENERGY CAROLINAS, LLC

OCONEE NUCLEAR STATION, UNITS 2 AND 3

DOCKET NOS. 50-270, AND 50-287

1.0 INTRODUCTION

By letter dated February 29, 2012, Agencywide Documents Access and Management System (ADAMS) Accession No. ML12066A175, as supplemented by letter dated September 21, 2012, ADAMS Accession Number ML12270A372, Duke Energy Carolinas, LLC (the licensee), submitted Request for Relief (RR) 11-ON-002. RR 11-ON-002 requested relief from the requirements of the American Society of Mechanical Engineers (ASME) Boiler and Pressure Vessel Code (Code) for certain weld examination coverage requirements for several components due to access limitations caused by design for Oconee Nuclear Station, Units 2 and 3 (ONS, Units 2 and 3).

Specifically, pursuant to Title 10 of the *Code of Federal Regulations* (10 CFR), Part 50, Section 50.55a(g)(5)(iii), the licensee requested relief and to use alternative requirements (if necessary), for certain in-service inspection items on the basis that the code requirements are impractical.

2.0 REGULATORY EVALUATION

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 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, which was 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.

10 CFR 50.55a(g)(5)(iii), states, in part, that licensees may determine that conformance with certain ASME Code requirements is impractical and that the licensee shall notify the Commission and submit information in support of the determination. A Determination of Impracticality, in

Enclosure

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 Nuclear Regulatory Commission (NRC) no later than 12 months after the expiration of the initial 120-month inspection interval or subsequent 120-month inspection interval for which relief is sought.

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 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 licensee has requested relief from ASME Code requirements pursuant to 10 CFR 50.55a(g)(5)(iii). The ASME Code of record for ONS, Units 2 and 3, fourth 10-year interval inservice inspection program is the 1998 Edition, including the 2000 Addenda, of Section XI of the ASME Code. The fourth 10-year ISI intervals for ONS, Units 2 and 3 are projected to end on July 15, 2014.

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 Commission to grant the relief requested by the licensee.

3.0 TECHNICAL EVALUATION

The information provided by the licensee in support of the request for relief from ASME Code requirements has been evaluated and the basis for disposition is documented below. For clarity, the request has been evaluated in several parts according to their ASME Code Section XI Examination Categories.

3.1 Request for Relief 11-ON-002, Part A, ASME Code, Section XI, Examination Category B-B, Item B2.51, Pressure Retaining Welds in Vessels Other than Reactor Vessels, ONS, Unit 3

ASME Code Requirement

ASME Code, Section XI, Examination Category B-B, Item B2.51, requires essentially 100 percent volumetric examination, as defined by ASME Code, Section XI, Figures IWB-2500-1 and IWB-2500-3, of the length of heat exchanger (primary side) circumferential head welds. "Essentially 100 percent", as clarified by ASME Code Case N-460, *Alternative Examination Coverage for Class 1 and Class 2 Welds,* is greater than 90 percent coverage of the examination volume, or surface area, as applicable. ASME Code Case N-460 has been approved for use by the NRC in Regulatory Guide 1.147, Revision 16, *Inservice Inspection Code Case Acceptability* (RG 1.147, Revision 16).

Licensee's ASME Code Relief Request

In accordance with 10 CFR 50.55a(g)(5)(iii), the licensee requested relief from the ASME Code-required volumetric examination for Letdown Cooler Inlet Channel Body-to-Chemical Connector Welds N32389-3 WJ-32 and N32389-3 WJ-35.

Licensee's Basis for Relief Request (as stated)

> The ultrasonic examinations of the Inlet Channel Body to Chemical Connector welds obtained 87.7[percent] coverage of the required examination volume. ASME [Code,] Section XI, Appendix III, III-4420 requires coverage of the examination volume in two beam path directions and [ASME Code, Section XI,] Appendix III, III-4430 requires scanning on the weld crown in two directions. Because of the weld configuration, these requirements could not be met.
>
> The component limitations were caused by the taper configuration of the chemical connectors and the proximity of a nozzle within the scan areas from the channel body. In order to scan all of the required volume for these components, the chemical connector and location of the adjacent nozzles would have to be redesigned to allow complete scanning from both sides of the welds, which is impractical.

Licensee's Proposed Alternative Examination

The licensee did not propose any alternative examinations for the subject welds. However, the licensee's examinations were performed to the maximum extent practical.

Staff Evaluation

The ASME Code requires essentially 100 percent volumetric examination of heat exchanger circumferential head welds. However, for the subject welds at ONS, Unit 3, complete UT examinations are restricted by weld geometric configuration and scan limitations caused by an adjacent nozzle. In order to effectively increase the examination coverage, the heat exchanger and adjacent nozzle would require design modifications or replacement. This would place a burden on the licensee; thus, examining 100 percent of the ASME Code-required volume is considered impractical.

As shown in the sketches and technical descriptions included in the licensee's submittals, examination of the welds N32389-3 W-32 and N32389-3 WJ-35 have been performed to the extent practical, with the licensee obtaining coverage of 87.7 percent of the ASME Code-required inspection volume. The taper configuration of the chemical connector-to-the channel body and the close proximity of a nozzle on the channel body side limited the ASME Code-required volumetric examination for the stainless steel letdown cooler circumferential head welds. The letdown cooler inlet channel body-to-chemical connector welds were examined with UT techniques using 45-degree shear and 45-, 60-, and 70-degree longitudinal waves in accordance with applicable requirements of the ASME Code, Section XI, Appendix III. Three indications were observed on each of the subject welds. All indications were evaluated and determined to be reflections from geometric sources, i.e., from the weld root and inside diameter (ID) surface offset. No indications of service degradation were observed.

The subject welds were new welds on a replacement vessel installed during the fourth 10-year inservice inspection interval. The licensee's request for relief is for volumetric limitations experienced on these replacement welds during preservice examinations. The vessel manufacturer performed radiographic and hydrostatic examinations, during the construction activities. These fabrication examinations were performed in accordance with ASME Code, Section III 1998 Edition, including the 2000 Addenda. There were no indications observed during

fabrication and preservice examinations that are known to interfere with the preservice examinations or inservice UT examinations to be performed in the future.

The licensee has shown that it is impractical to meet the ASME Code, Section XI-required preservice volumetric examination coverage for the subject replacement welds due to the design geometry of the letdown cooler and adjacent components. Based on the UT results and the significant volumetric coverage obtained, it is reasonable to conclude that the subject welds will meet their intended design functions, and that the preservice examinations provide an adequate baseline for comparison of future inservice examinations.

3.2 Request for Relief 11-ON-002, Part B, ASME Code, Section XI, Examination Category B-D, Items B3.110 and B3.150, Full Penetration Welded Nozzles in Vessels, ONS 2 and 3

ASME Code Requirement

ASME Code, Section XI, Examination Category B-D, Items B3.110 and B3.150 require 100 percent volumetric examination, as defined by ASME Code, Section XI, Figures IWB-2500-7 (a) through (d), as applicable, of full penetration Class 1 pressurizer (PZR) and heat exchanger (primary side) nozzle-to-vessel welds, respectively. ASME Code Case N-460, as an alternative approved for use by the NRC in RG 1.147, Revision 16, states that a reduction in examination coverage due to part geometry or interference for any Class 1 and 2 weld is acceptable provided that the reduction is less than 10 percent, i.e., greater than 90 percent examination coverage is obtained.

Licensee's ASME Code Relief Request

In accordance with 10 CFR 50.55a(g)(5)(iii), the licensee requested relief from the ASME Code-required volumetric examinations for the PZR and letdown cooler nozzle-to-vessel welds listed below in Tables 3.2.1 (ONS, Unit 2) and 3.2.2 (ONS, Unit 3).

Table 3.2.1- ASME Code, Section XI, Examination Category B-D (ONS, Unit 2)

ASME Code Item	Weld ID	Weld Type	Coverage Obtained (Percent)
B3.110	2-PZR-WP26-7	PZR Heater Belt Shell-to-Sampling Nozzle Weld	37.5

Table 3.2.2- ASME Code, Section XI, Examination Category B-D (ONS, Unit 3)

ASME Code Item	Weld ID	Weld Type	Coverage Obtained (Percent)
B3.110	3-PZR-WP26-4	PZR Upper Shell-to-sampling Nozzle	34.7
B3.110	3-PZR-WP26-5	PZR Upper Shell-to-sampling Nozzle	34.7
B3.110	3-PZR-WP26-6	PZR Upper Shell-to-sampling Nozzle	34.7
B3.150	3-LDCA-IN-2V	Letdown Cooler 3A Nozzle-to-Channel Body	53.1
B3.150	3-LDCA-OUT-5V	Letdown Cooler 3A Nozzle-to-Channel Body	53.1
B3.150	N32389-3 WJ-33	Letdown Cooler Inlet Nozzle-to-Channel Body	60.6
B3.150	N32389-3 WJ-36	Letdown Cooler Outlet Nozzle-to-Channel Body	60.6

Licensee's Basis for Relief Request (as stated):

PZR Heater Belt Shell-to-Sampling Nozzle (ONS, Unit 2)

The limitation was caused by the weld taper configuration created by the attachment of the sampling nozzle to the Heater Belt shell not allowing scanning from Surface 2. In order to scan all of the required volume for this weld, the upper shell to sampling nozzle attachment weld would have to be redesigned to allow scanning from both sides of the weld, which is impractical.

PZR Upper Shell-to-Sampling Nozzle (ONS, Unit 3)

The limitation was caused by the weld taper configuration created by the attachment of the sampling nozzle to the upper shell not allowing scanning from Surface 2. In order to scan all of the required volume for this weld, the upper shell to sampling nozzle attachment weld would have to be redesigned to allow scanning from both sides of the weld, which is impractical.

Letdown Cooler Nozzle-to-Channel Body (ONS, Unit 3)

The limitation was caused by the design of the nozzle weld taper configuration created by the attachment of the channel body connection to the nozzle not allowing for scanning from Surface 2. In order to scan all of the required volume for this weld, the inlet nozzle would have to be redesigned to allow scanning from both sides of the weld, which is impractical.

Licensee's Proposed Alternative Examination

The licensee did not propose any alternative examinations for the subject welds. However, the licensee's examinations were performed to the maximum extent practical.

Staff Evaluation

The ASME Code requires 100 percent volumetric examination of Class 1 nozzle-to-vessel welds. However, the design configuration of the subject welds and curvature of the nozzle blend radii limit access for UT scanning. In order to effectively increase the examination coverage, the nozzle-to-vessel welds would require design modifications. This would place a burden on the licensee; thus, obtaining 100 percent of ASME Code-required volumetric examinations is considered impractical.

The subject PZR nozzle-to-vessel welds in ONS, Unit 2 (Table 3.2.1) and ONS, Unit 3 (Table 3.2.2) are constructed of carbon steel material with stainless steel inside diameter surface cladding to minimize corrosion. The letdown cooler nozzle-to-vessel welds listed in ONS, Unit 3 (Table 3.2.2) are constructed of wrought stainless steel material. These full penetration butt welds extend the full thickness of the vessel head, and the nozzle configurations are of the "set-in" design, which essentially makes the welds concentric rings aligned parallel with the nozzle axes in the through-wall direction of the vessel. This nozzle design geometry restricts UT scanning to only the shell side of the welds.

In addition, UT scans cannot be performed from the curved outside diameter (OD) surface on the nozzle blend radius regions, further limiting the volumetric examinations.

As shown on the sketches and technical descriptions included in the licensee's submittals, examinations of the subject PZR and letdown cooler nozzle-to-vessel welds have been completed to the extent practical with volumetric coverage ranging from approximately 34.7 to 60.6 percent (see Tables 3.2.1 and 3.2.2) of the ASME Code-required volumes. The examination volumes included the weld and base materials near the inside surface of the weld joint, which are high regions of stress, and where one would expect degradation sources to be manifested should they occur. The PZR and letdown cooler nozzle-to-vessel weld examinations were performed with UT techniques in accordance with the applicable requirements of the ASME Code, Section V, Article 4 and ASME Code, Section XI, Appendix III, respectively. The welds were examined using 35-, 45- and/or 60-degree shear, and 0-, 45-, 60-, and/or 70-degree longitudinal waves (L-waves), as applicable. No unacceptable indications were observed in these welds.

Although UT scans were primarily limited to the vessel side, studies have found that inspections conducted through carbon steel are equally effective whether the UT waves have only to propagate through the base metal, or have to also propagate through the carbon steel weldment[1]. Therefore, it is expected that the UT techniques employed by the licensee on the PZR nozzle-to-vessel welds would detect structurally significant flaws that might occur on either side of the subject welds due to the fine-grained carbon steel microstructures present in these materials.

Additionally, L-waves have been shown to provide enhanced detection on the far-side of austenitic stainless steel welds.[2,3,4] While the licensee has only taken credit for limited volumetric coverage obtained from primarily one side, it is expected that the techniques employed would have provided coverage beyond the near-side of the letdown cooler nozzle-to-vessel welds.

The licensee has shown that it is impractical to meet the ASME Code-required 100 percent volumetric examination coverage for the subject inservice PZR and letdown cooler nozzle-to-vessel welds due to nozzle design and curvature of the nozzle blend radii. Based on the volumetric coverage obtained for the subject welds, and considering the licensee's performance of UT techniques employed to maximize this coverage, it is reasonable to conclude that if significant service-induced degradation had occurred, evidence of it would have been detected by the examinations that were performed.

Additionally, welds N32389-3 WJ-33 and N32389-3 WJ-36 were new welds on a replacement vessel installed during the fourth 10-year inservice inspection interval. The licensee's request for relief is for

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1 P.G. Heasler, and S. R. Doctor, 1996. *Piping Inspection Round Robin,* NUREG/CR-5068, PNNL-10475, U.S. Nuclear Regulatory Commission, Washington, DC.

2. F.V. Ammirato, X. Edelmann, and S.M. Walker, *Examination of Dissimilar Metal Welds in BWR Nozzle-to-Safe End Joints,* 8th International Conference on NDE in the Nuclear Industry, ASM International, 1987.

3 P. Lemaitre, T.D. Koble, and S.R. Doctor, *PISC III Capability Study on Wrought-to-Wrought Austenitic Steel Welds: Evaluation at the Level of Procedures and Techniques,* Effectiveness of Nondestructive Examination Systems and Performance Demonstration, PVP-Volume 317, NDE-Volume 14, ASME, 1995.

4 M. T. Anderson, A.A. Diaz, A.D. Cinson, S.L. Crawford, S.E. Cumblidge, S.R Doctor, K.M. Denslow, and S. Ahmed, 2011. *An Assessment of Ultrasonic Techniques for Far-Side Examinations of Austenitic Stainless Steel Piping Welds,* NUREG/CR-7113, PNNL-19353, U. S. Nuclear Regulatory Commission, Washington, DC.

volumetric limitations experienced on these replacement welds during preservice examinations. The vessel manufacturer performed radiographic and hydrostatic examinations, during the construction activities. These fabrication examinations were performed in accordance with the 1998 Edition, including the 2000 Addenda, of ASME Code, Section III. There were no indications observed during fabrication and preservice examinations that are known to interfere with inservice UT examinations in the future.

The licensee has shown that it is impractical to meet the ASME Code-required preservice volumetric examination coverage for the replacement welds N32389-3 WJ-33 and N32389-3 WJ-36 due to the nozzle design and curvature of the nozzle blend radii. Based on the ultrasonic results and volumetric coverage obtained, it is reasonable to conclude that the subject welds will meet their intended design functions, and that the preservice examinations provide an adequate baseline for comparison of future inservice examinations.

3.3 Request for Relief 11 -ON-002, Part C, ASME Code, Section XI, Examination Category B-J, Item B9.11, Pressure Retaining Welds in Piping, ONS, Units 2 and 3

ASME Code Requirement

ASME Code, Section XI, Examination Category B-J, Item B9.11, requires essentially 100 percent volumetric and surface examinations, as defined by ASME Code, Section XI, Figure IWB-2500-8, for circumferential piping welds nominal pipe size (NPS) 4 or larger. "Essentially 100 percent", as clarified by ASME Code Case N-460, is greater than 90 percent coverage of the examination volume, or surface area, as applicable. ASME Code Case N-460 has been approved for use by the NRC in RG 1.147, Revision 16.

Licensee's ASME Code Relief Request

In accordance with 10 CFR 50.55a(g)(5)(iii), the licensee requested relief from the ASME Code-required volumetric examination of Class 1 stainless steel piping welds shown in Tables 3.3.1 (ONS, Unit 2) and 3.3.2 (ONS, Unit 3).

Table 3.3.1 – ASME Code, Section XI, Examination Category B-J (ONS, Unit 2)

ASME Code Item	Weld ID	Weld Type	Coverage Obtained (Percent)
B9.11	2PIB2-8	RCP 2B2 Casing Nozzle-to-Safe End	37.5
B9.11	2PIB1-8	RCP 2B1 Casing Nozzle-to-safe End	37.5
B9.11	2-53A-10-3	Pipe-to-Valve 2LP-1 Weld	37.5

Table 3.3.2 – ASME Code, Section XI, Examination Category B-J (ONS, Unit 3)

ASME Code Item	Weld ID	Weld Type	Coverage Obtained (Percent)
B9.11	3-PDA1-1	RCP 3A1 Casing Outlet Nozzle-to-Safe End	37.5
B9.11	3-PDB2-1	RCP 3B2 Casing Outlet Nozzle-to-Safe End	37.5
B9.11	3-PIA2-8	RCP 3A2 Casing Nozzle-to-Safe End	37.5
B9.11	3-PIB1-8	RCP 3B1 Casing Nozzle-to-Safe End	37.5

B9.11	3-PIB2-8	RCP 3B2 Casing Nozzle-to-Safe End	37.5
B9.11	3-PDA2-1	RCP 3A2 Casing Nozzle-to-Safe End	37.5
B9.11	3-PDB1-1	RCP 3B1 Casing Nozzle-to-Safe End	37.5

Licensee's Basis for Relief Request (as stated)

Reactor Coolant Pump (RCP) Casing Nozzle-to-Safe End Welds - The limitation was caused by the cast stainless material and the weld taper configuration created by the attachment of the nozzle to safe end configuration. In order to scan all of the required volume for this weld, the pump would have to be replaced with forged stainless steel and would have to be redesigned to allow scanning from both sides of the weld, which is impractical.

Pipe-to-Valve Weld (2LP-1) - The impracticality was caused by the taper configuration and cast stainless material of the valve body which cannot be effectively interrogated by ultrasound. There are currently no examination techniques that have been qualified through Appendix VIII for examining cast stainless steel. Therefore no coverage could be obtained by scanning from the valve side. In order to scan all of the volume for this weld, the valve would have to be redesigned and replaced, which is impractical.

The Oconee Inservice Inspection Plan allows the use of [ASME] Code Case N-460, [Revision 16] which requires greater than 90% volumetric coverage. Therefore, the available coverage will not meet the acceptance criteria of this Code Case.

Licensee's Proposed Alternative Examination

The licensee did not propose any alternative examinations for the subject welds. However, the licensee's examinations were performed to the maximum extent practical.

Staff Evaluation

The ASME Code requires essentially 100 percent volumetric and surface examinations for selected Examination Category B-J pressure retaining welds in piping. However, complete volumetric examinations are restricted by component design, materials and weld configurations. These conditions preclude the licensee from obtaining full volumetric examinations from both sides of these welds. To gain access for examination, the welds would require design modifications. Imposition of this requirement would create a burden on the licensee, therefore, the ASME Code-required volumetric examinations are considered impractical.

As shown on the sketches and technical descriptions included in the licensee's submittals, examinations of the subject welds have been performed to the extent practical with the licensee obtaining approximately 37.5 percent volumetric coverage for the RCP casing nozzle-to-safe end welds and pipe-to-valve weld (see Tables 3.3.1 and 3.3.2). The limitations encountered during the performance of the UT examinations were caused by cast austenitic stainless steel (CASS) materials, curvature of the taper of the transition region from the nozzle-to-safe end, and curvature of the valve taper in the pipe-to-valve weld configuration. These configurations limit the volumetric examinations primarily to the wrought stainless steel side of these welds.

Volumetric examinations on the subject welds were conducted with equipment, procedures and personnel that were qualified to a performance demonstration process outlined in ASME Code, Section XI, Appendix VIII. These techniques have been qualified for flaws located on the near-side of the welds; far-side detection of flaws is considered to be a "best effort." In addition, no ASME, Code, Section XI, Appendix VIII requirements currently exist for UT examinations through cast stainless steel. The licensee's UT scanning techniques included combinations of 45-, 60-, and 70-degree shear, and 60-and/or 70-degree refracted longitudinal waves (L-waves), as applicable, for ASME Code, Class 1 piping welds listed in Tables 3.3.1 and 3.3.2, from the accessible side of the welds. L-waves have been shown to provide enhanced detection on the far-side of austenitic stainless steel welds[2,3,4] therefore, while the licensee has only taken credit for obtaining less than 50 percent volumetric coverage, it is expected that the techniques employed would have provided coverage beyond the near-side of the welds. The licensee completed the ASME Code-required surface examinations (PT) on the subject welds listed in Tables 3.3.1 and 3.3.2 except for RCP Casing nozzle-to-safe end Welds 3-PIA2-8, 3PIB1 -8, and 3-PDB1 -1. For these subject welds at ONS, Unit 3, the licensee implemented ASME Code Case N-663[5], *Alternative Requirements for Classes 1 and 2 Surface Examination;* therefore, no surface examinations were required for Welds 3-PIA2-8, 3PIB1 -8, and 3-PDB1 -1. No recordable indications were observed during the ultrasonic and surface examinations.

The licensee has shown that it is impractical to meet the ASME Code-required volumetric examination coverage for the subject welds due to the design geometry of the welds and materials of construction. Based on the volumetric coverage obtained, and considering the surface examinations performed, it is reasonable to conclude that, if significant service-induced degradation had occurred in the subject welds, evidence of it would have been detected by the examinations performed.

3.4 Request for Relief 11-ON-002. Part D, ASME Code, Section XI, Examination Category C-F-1, Items C5.11 and C5.21, Pressure Retaining Welds in Austenitic Stainless Steel or High Alloy Piping, ONS, Units 2 and 3

ASME Code Requirement

ASME Code, Section XI, Examination Category C-F-1, Items C5.11 and C5.21, require 100 percent surface and volumetric examination, as defined by ASME Code, Section XI, Figure IWC-2500-7, of selected Class 2 austenitic stainless steel or high alloy circumferential piping welds. ASME Code Case N-460, as an alternative approved for use by the NRC in RG 1.147, Revision 16, states that a reduction in examination coverage due to part geometry or interference for any Class 1 and 2 weld is acceptable provided that the reduction is less than 10 percent, i.e., greater than 90 percent examination coverage is obtained.

Licensee's ASME Code Relief Request

In accordance with 10 CFR 50.55a(g)(5)(iii), the licensee requested relief from the ASME Code-required 100 percent volumetric examination of the Class 2 austenitic stainless steel welds shown in Tables 3.4.1 (ONS, Unit 2) and 3.4.2 (ONS, Unit 3).

5. ASME Code Case N-633 has been approved for general use in RG 1.147, Revision 16

Table 3.4.1 – ASME Code, Section XI, Examination Category C-F-1 (ONS, Unit 2)				
ASME Code Item	Weld ID	Weld Type	Pipe Size-Thickness (Inches)	Coverage Obtained (Percent)
C5.11	2LP-150-17	Pipe-to-Valve 2LP-48	10.0 -1.1 25	37.5
C5.11	2LP-217-8	Pipe-to-Valve2LP-178	10.0 -1.0	37.5
C5.11	2-53A-9-16	Pipe-to-Valve 2LP-48	10.0 -1.0	37.5
C5.11	2LP-189-14	Pipe-to-Elbow	10.0 -1.0	76.0
C5.11	2LP-215-17	Pipe-to- Flow Restrictor	10.0 -1.0	36.8
C5.11	2LP-218-23	Pipe-to- Valve 2LP-1 76	10.0 -1.0	37.5
C5.21	2-51A-28-15	Pipe-to-Flange	4.0 - 0.531	37.5
C5.21	2-51A-28-21	Pipe-to- Valve 2HP-1 35	4.0 - 0.531	75.0
C5.21	2HP-222-2	High Pressure Injection System Elbow-to-Valve 2HP-26	4.0 - 0.531	37.5
C5.21	2-51 A-1 7-93	Pipe-to-Tee	2.5 - 0.375	83.5
C5.21	2HP-221-22	Elbow-to-Valve2HP-410	4.0 - 0.531	37.5

Table 3.4.2 – ASME Code, Section XI, Examination Category C-F-1 (ONS, Unit 3)				
ASME Code Item	Weld ID	Weld Type	Pipe Size-Thickness (Inches)	Coverage Obtained (Percent)
C5.21	3-51A-52-44	Pipe-to-Valve 3HP-1 05	3.0 - 0.438	75.0
C5.21	3HP-365-40	Valve 3HP027-to-Elbow	4.0 - 0.674	37.5
C5.21	3HP-498-14	Pipe-to-Reducer	2.0 -0.461	70.1

Licensee's Basis for Relief Request: (as stated)

Pipe-to-Valve and Elbow-to-Valve Welds (2LP-150-17, 2-53A-9-16, 2HP-222-2, and 2HP-221-22, ONS 2 and 3HP-365-40, ONS, Unit 3)

The impracticality was caused by the taper configuration and cast stainless steel material of the valve body which cannot be effectively interrogated by [UT]. There are currently no examination techniques that have been qualified through [ASME Code, Section XI,] Appendix VIII for examining cast stainless steel. Therefore, no coverage could be obtained by scanning from the valve side. In order to scan all the volume for this weld, the valve would have to be redesigned and replaced, which is impractical.

Pipe-to-Valve Welds (2LP-217-8 and 2LP-218-23, ONS, Unit 2 and 3-51A-52-44, ONS, Unit 3)

The impracticality was caused by the taper configuration of the valve body which cannot be effectively interrogated by ultrasound. Therefore, no coverage could be obtained by scanning from the valve side. In order to scan all of the volume for this weld, the valve would have to be redesigned and replaced which is impractical.

Pipe-to-Elbow Weld (2LP-189-14, ONS, Unit 2)

The impracticality was caused by a hanger that did not allow scanning from the elbow side in one axial direction and only partial scanning in the circumferential direction. Therefore full coverage could not be obtained by scanning from the elbow side in the areas where the hanger obstructed scanning. In order to scan all of the volume for this weld, the hanger would have to be redesigned and replaced which is impractical.

Pipe-to-Flow Restrictor Weld (2LP-215-17, ONS, Unit 2)

The impracticality was caused by the taper configuration and cast stainless steel material of the flow restrictor which cannot be effectively interrogated by [UT]. There are currently no examination techniques that have been qualified through [ASME Code, Section XI,] Appendix VIII for examining cast stainless steel. Therefore, no coverage could be obtained by scanning from the flow restrictor side. In order to scan all the volume for this weld, the flow restrictor would have to be redesigned and replaced, which is impractical.

Pipe-to-Flange Weld (2-51A-28-15, ONS, Unit 2)

The impracticality was caused by the taper configuration of the flange which cannot be effectively interrogated by [UT]. Therefore, no coverage could be obtained by scanning from the flange side. In order to scan all of the volume for this weld, the valve would have to be redesigned and replaced which is impractical.

Pipe-to-Valve Weld (2-51A-28-21, ONS, Unit 2)

The impracticality was caused by the taper configuration of the valve body which only allowed partial scanning in the circumferential direction to effectively interrogate by [UT]. Therefore, no coverage could be obtained by scanning from the valve side. In order to scan all of the volume for this weld, the valve would have to be redesigned and replaced which is impractical.

Pipe-to-Tee Weld (2-51A-17-93, ONS, Unit 2)

The impracticality was caused by the radius configuration that did not allow scanning from the tee side for a partial length of the weld. Therefore, full coverage could be obtained by scanning from the tee side in the areas where the radius configuration was present. In order to scan all of the volume for this weld, the tee would have to be redesigned and replaced which is impractical.

Pipe-to-Reducer Weld (3HP-498-14, ONS, Unit 3)

The limitation of the component was caused by the taper configuration of the reducer. In order to scan all of the required volume for this weld, the component would have to be redesigned and replaced which is impractical.

The Oconee Inservice Inspection Plan allows the use of [ASME] Code Case N-460, [Revision 16] which requires greater than 90% volumetric coverage. Therefore, the available coverage will not meet the acceptance criteria of this Code Case.

Licensee's Proposed Alternative Examination

The licensee did not propose any alternative examinations for the subject welds. However, the licensee's examinations were performed to the maximum extent practical.

Staff Evaluation

The ASME Code requires 100 percent volumetric and surface examination for selected Class 2 pressure-retaining circumferential welds in austenitic stainless steel or high alloy piping. However, volumetric examinations are limited by the design geometry, material of the welds, and associated piping configurations. To gain access for examination, the welds and piping would require design modifications. Imposition of this requirement would create a burden on the licensee, therefore, the ASME Code-required 100 percent volumetric examinations of the welds are considered impractical.

As shown on the sketches and technical descriptions included in the licensee's submittals, access for examination of the subject welds is limited to primarily one side of these welds due to the presence of cast stainless steel materials, hanger obstruction, valve, flange, reducer, and flow restrictor taper configurations, and/or radius on tee configuration (see Tables 3.4.1 and 3.4.2 for specific weld configurations). The ultrasonic techniques employed for these welds have been qualified through the industry's Performance Demonstration Initiative (PDI), which meets ASME Code Section XI, Appendix VIII requirements. These techniques have been qualified for flaws located on the near-side of the welds; far-side detection of flaws is considered to be a "best effort." In addition, no Appendix VIII requirements currently exist for UT examinations through cast stainless steel. For these reasons, the licensee has only taken credit for obtaining limited volumetric examination coverage. The licensee completed the ASME Code-required PT surface examinations on the subject welds listed in Tables 3.4.1 and 3.4.2 except for valve 3HP027-to-elbow Weld 3HP-365-40 and pipe-to-reducer Weld 3HP-498-14. For these subject welds at ONS 3, the licensee implemented ASME Code Case N-663; therefore, no surface examinations were required for Welds 3HP-365-40 and 3HP-498-14. There were four indications detected during volumetric examinations of pipe-to-valve Welds 2LP-150-17 and 2-53A-9-16, and pipe-to-flange Weld 2-51A-28-15 that were evaluated to be non-relevant internal geometrical reflections and were accepted without further evaluation.

The licensee's UT techniques included 30-, 42-, 45-, 60-, and 70- degree shear waves, and 60-degree refracted longitudinal waves (L-waves), as applicable. L-waves have been shown to provide enhanced detection on the far-side of austenitic stainless steel welds[2,3,4]. While the licensee has only taken credit for limited volumetric coverage obtained from primarily one side, it is expected that the techniques employed would have provided coverage beyond the near-side of the welds.

The licensee has shown that it is impractical to meet the ASME Code-required 100 percent volumetric examination coverage for the subject piping welds due to their design configurations and fabrication materials. Although 100 percent of the ASME Code-required coverage could not be obtained, the UT techniques employed would have provided full volumetric coverage for the near-side of the welds and limited volumetric coverage for the weld fusion zone and base materials on the opposite side of the welds. Based on the aggregate coverage obtained for the subject welds, and considering the licensee's performance of surface examinations on many of the welds, it is reasonable to conclude that if significant service-induced degradation had occurred, evidence of it would have been detected.

4.0 CONCLUSION

As set forth above, the NRC staff has determined that granting relief 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 given due consideration to the burden upon the licensee that could result if the requirements were imposed on the facility. Furthermore, the staff concluded that the examinations performed to the extent practical provide reasonable assurance of structural integrity of the subject components. 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 relief for the subject examinations of the components contained in RR 11-ON-002, Sections 2 through 35, for the fourth 10-year ISI interval at ONS, Units 2 and 3.

All other ASME Code, Section XI requirements for which relief was not specifically requested and approved in the subject requests for relief remain applicable, including third-party review by the Authorized Nuclear Inservice Inspector.

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Date: February 4, 2013

If you have any questions, please contact the Project Manager, John Boska, at 301-415-2901, or via email at John.Boska@nrc.gov.

Sincerely,

/RA/

Robert J. Pascarelli, Chief
Plant Licensing Branch II-1
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

Docket Nos. 50-270, and 50-287

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