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

August 14, 2014

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

SUBJECT: OCONEE NUCLEAR STATION, UNIT 3 – FOURTH 10-YEAR INTERVAL INSERVICE INSPECTION PROGRAM PLAN REQUEST FOR RELIEF NO. 13-ON-001 (TAC NO. MF2836)

Dear Mr. Batson:

By letter dated September 26, 2013, as supplemented by letter dated April 10, 2014, Duke Energy Carolinas, LLC (Duke or the licensee) submitted a request to the Nuclear Regulatory Commission (NRC) which proposed its relief plan for the Fourth 10-Year Inservice Inspection (ISI) Interval Plan Request for Relief (RR) 13-ON-001, Sections 2 through 8 for relief from the requirement to examine 100% of the volume specified by the American Society of Mechanical Engineers Boiler and Pressure Vessel Code (ASME Code), Section XI, Section IX, Rules for Inservice Inspection of Nuclear Power Plant Components, 1998 Edition with 2000 Addenda (as modified by Code Case N-460) requirements at Oconee Nuclear Station, Unit 3 (ONS 3).

Specifically, pursuant to Title 10 of the *Code of Federal Regulations* 10 CFR 50.55a(g)(6)(i), the licensee requested relief and to use alternative requirements, for in-service inspection items on the basis that the code requirement is impractical.

The NRC staff has reviewed the subject request and concludes, as set forth in the enclosed safety evaluation, 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)(5)(iii). Furthermore, 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. Therefore, the NRC staff grants relief for the subject examinations of the components contained in Request for Relief 13-ON-001 for the ONS, Unit 3, fourth 10-year ISI interval which began on January 2, 2005 and ended on July 15, 2014.

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.

If you have any questions, please contact the Project Manager, Randy Hall, at 301-415-4032, or via email at Randy.Hall@nrc.gov.

Sincerely,

/E Edwin Hackett FOR RJP

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

Docket No. 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. 13-ON-001

DUKE ENERGY CAROLINAS, LLC

OCONEE NUCLEAR STATION, UNIT 3

DOCKET NO. 50-287

1.0 INTRODUCTION

The NRC staff has reviewed and evaluated the information provided by Duke Energy Carolinas, LLC (the licensee), in its letter dated September 26, 2013, (Agencywide Documents Access and Management System (ADAMS) Accession No. ML13273A037), which proposed its Fourth 10-Year Inservice Inspection (ISI) Interval Plan, Request for Relief (RR) 13-ON-001, Sections 2 through 8 from the requirements of the American Society of Mechanical Engineers Boiler and Pressure Vessel Code (ASME Code), Section XI, for Oconee Nuclear Station, Units 3 (ONS, Unit 3). Additionally, in response to a Nuclear Regulatory Commission (NRC) request for additional information, the licensee submitted additional information in its letter dated April 10, 2014, (ADAMS Accession No. ML14107A035).

Specifically, pursuant to Title 10 of the Code of Federal Regulations 10 CFR 50.55a(g)(6)(i), the licensee requested relief from the requirement to examine 100% of the volume specified by the ASME Code, Section XI, Section IX, Rules for Inservice Inspection of Nuclear Power Plant Components, 1998 Edition with 2000 Addenda (as modified by Code Case N-460) requirements and to use alternative requirements, for in-service inspection items on the basis that the code requirement is impractical.

2.0 REGULATORY EVALUATION

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, 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. Determination of impracticality in 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 NRC no later than 12 months after the expiration of the initial 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, Unit 3, fourth 10-year ISI program is the 1998 Edition, through the 2000 Addenda, of Section XI of the ASME Code. The fourth 10-year ISI interval for ONS, Unit 3, is scheduled to end on July 15, 2014.

3.0 TECHNICAL EVALUATION

The information provided by the licensee in support of the requests for relief from ASME Code requirements has been evaluated, and the bases for disposition are documented below. For clarity, the licensee's requests have been evaluated in several parts according to ASME Code Examination Category, and listed in alphabetical order.

Request for Relief 13-ON-001, Part A, ASME Code, Section XI, Table IWB-2500-1, Examination Category B-D, Item B3.110, Full Penetration Welded Nozzles in Vessels, ONS, Unit 3.

ASME Code Requirement

ASME Code, Section XI, Table IWB-2500-1, Examination Category B-D, Item B3.110 requires 100 percent volumetric examination, as defined by Figures IWB-2500-7 (a) through (d), as applicable, of full penetration Class 1 Pressurizer (PZR) nozzle-to-vessel welds. ASME Code Case N-460, "Alternative Examination Coverage for Class 1 and Class 2 Welds", as an alternative approved for use by the NRC in Regulatory Guide (RG) 1.147, Revision 16, "Inservice Inspection Code Case Acceptability" (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 nozzle-to-vessel welds listed below in Table 3.1.1 for ONS, Unit 3.

Table 3.1.1- ASME Code, Section XI, Table IWB-2500-1, Examination Category B-D for ON, Unit 3			
ASME Code Item	Weld ID	Weld Type	Coverage Obtained (Percent)
B3.110	3-PZR-WP26-1	PZR Sampling Nozzle-to-Heater Belt Shell	30.2
B3.110	3-PZR-WP26-2	PZR Sampling Nozzle-to-Heater Belt Shell	30.2
B3.110	3-PZR-WP26-3	PZR Sampling Nozzle-to-Heater Belt Shell	34.7
B3.110	3-PZR-WP26-7	PZR Sampling Nozzle-to-Heater Belt Shell	34.7

Licensee's Basis for Relief Request (as stated)

PZR Sampling Nozzle-to-Heater Belt Shell, Weld 3-PZR-WP26-1

Component configuration

- Surface 1: Shell – Carbon steel
- Surface 2: Sampling Nozzel – Carbon steel
- Diameter: N/A
- Thickness: 6.188 in.

This component was scanned manually with conventional methods. Scanning requirements are described in ASME Section V, Article 4, T-441.1.2(a), T-441.1.3, T-441.1.4, T-441.1.5, and T-441.1.6. These requirements describe and are specific to scanning components in two axial and two circumferential directions. This component was scanned to the extent possible to meet these requirements. The aggregate coverage that was obtained is described and calculated from the following:

- Weld coverage using 45°, 60° & 70° shear waves for axial scans (S1, S2), and 45° & 60° shear waves for circ. scans (CW, CCW) obtained 12.3% coverage.

- Base material coverage using 45°, 60° & 70° shear wave for axial scans (S1) and 45" & 60° shear waves for circ. scans (CW, CCW) obtained 49.3% coverage.

- 0° scan coverage obtained 29.1 % coverage.

- The aggregate coverage was calculated to be (12.3% + 49.3% + 29.1%)/3 = 30.2%

The impracticality was caused by the weld taper configuration of the sampling nozzle to the shell that does not allow meaningful interrogation from the Surface 2 nozzle side. In order to scan all of the required volume for this weld, the shell to sampling nozzle weld would have to be redesigned and replaced, which is impractical.

Ultrasonic [(UT)] examination of the weld for the item number O3.B3.110.0009 was conducted using personnel, equipment, and procedures qualified in accordance with ASME Section XI, 1998 Edition with the 2000 Addenda.

The system leakage test performed each refueling outage in accordance with [ASME Code, Section XI,] Table IWB-2500-1, Examination Category B-P requires a VT-2 visual examination to detect evidence of leakage. This test and VT-2 examination provides additional assurance of pressure boundary integrity.

In addition to the above [ASME] Code required examinations (volumetric and pressure test). Reactor Building Normal Sump and Reactor Building area radiation monitoring contribute to ensuring pressure boundary integrity by providing means to detect reactor coolant leakage and take prompt corrective actions.

Duke Energy has examined the weld to the maximum extent possible utilizing approved examination techniques and equipment. Based on the acceptable results for the coverage completed by the volumetric examination, the pressure testing (VT-2) examinations required by [ASME Code,] Section XI, and the leakage monitoring, it is Duke's position that the combination of these examinations provides a reasonable assurance of the continued structural integrity of these welds.

PZR Sampling Nozzle-to-Heater Belt Shell Weld 3-PZR-WP26-2

Component configuration

- Surface 1: Shell - Carbon steel
- Surface 2: Sampling Nozzle - Carbon steel
- Diameter: N/A
- Thickness: 6.188 in.

This component was scanned manually with conventional methods. Scanning requirements are described in ASME Code, Section V, Article 4, T-441.1.2(a), T-441.1.3, T-441.1.4, T-441.1.5, and T-441.1.6. These requirements describe and are specific to scanning components in two axial and two circumferential directions. This component was scanned to the extent possible to meet these requirements. The aggregate coverage that was obtained is described and calculated from the following:

- Weld coverage using 45°, 60° & 70° shear waves for axial scans (S1, S2), and 45° & 60° shear waves for circ. scans (CW, CCW) obtained 12.3% coverage.

- Base material coverage using 45°, 60° & 70° shear wave for axial scans (S1) and 45° & 60° shear waves for circ. scans (CW, CCW) obtained 49.3% coverage.

- 0° scan coverage obtained 29.1% coverage.

- The aggregate coverage was calculated to be (12.3% + 49.3% + 29.1%)/3 = 30.2%

The impracticality was caused by the weld taper configuration of the sampling nozzle to the shell that does not allow meaningful interrogation from the Surface 2 nozzle side. In order to scan all of the required volume for this weld, the shell to sampling nozzle weld would have to be redesigned and replaced, which is impractical.

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

This relief request is specific to examination volume coverage limitations only. All other Code requirements were satisfied.

No indications were recorded during this examination. The reject box is marked for internal tracking purposes of the coverage limitation only.

Ultrasonic examination of the weld for the item number O3.B3.110.0010 was conducted using personnel, equipment, and procedures qualified in accordance with ASME [Code,] Section XI, 1998 Edition with the 2000 Addenda.

The system leakage test performed each refueling outage in accordance with [ASME Code,] Table IWB-2500-1, Examination Category B-P requires a VT-2 visual examination to detect evidence of leakage. This test and VT-2 examination provides additional assurance of pressure boundary integrity.

In addition to the above [ASME] Code required examinations (volumetric and pressure test), Reactor Building Normal Sump and Reactor Building area radiation monitoring contribute to ensuring pressure boundary integrity by providing means to detect reactor coolant leakage and take prompt corrective actions.

Duke Energy has examined the welds to the maximum extent possible utilizing approved examination techniques and equipment. Based on the acceptable results for the coverage completed by the volumetric examination, the pressure testing (VT-2) examinations required by Section XI, and the leakage monitoring, it is Duke's position that the combination of these examinations provides a reasonable assurance of the continued structural integrity of these welds.

PZR Sampling Nozzle-to-Heater Belt Shell 3-PZR-WP26-3

Component configuration

- Surface 1: Shell - Carbon steel
- Surface 2: Sampling Nozzle - Carbon steel
- Diameter: N/A
- Thickness: 6.188 in.

This component was scanned manually with conventional methods. Scanning requirements are described in ASME Code, Section V, Article 4, T-441.1.2(a), T-441.1.3, T-441.1.4, T-441.1.5, and T-441.1.6. These requirements describe and are specific to

scanning components in two axial and two circumferential directions. This component was scanned to the extent possible to meet these requirements. The aggregate coverage that was obtained is described and calculated from the following:

- Weld coverage using 45° & 60° shear waves for axial scans (S1, S2), and 45° & 60° shear waves for circ. scans (CW, CCW) obtained 15.4% coverage.

- Base material coverage using 45° & 60° shear wave for axial scans (S1) and 45° & 60° shear waves for circ. scans (CW, CCW) obtained 54.8% coverage.

- 0° scan coverage obtained 33.8% coverage.

- The aggregate coverage was calculated to be (15.4% + 54.8% + 33.8%)/3 = 34.7%

The impracticality was caused by the weld taper configuration of the sampling nozzle to the shell that does not allow meaningful interrogation from the Surface 2 nozzle side. In order to scan all of the required volume for this weld, the shell to sampling nozzle weld would have to be redesigned and replaced, which is impractical.

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

This relief request is specific to examination volume coverage limitations only. All other Code requirements were satisfied.

No indications were recorded during this examination. The reject box is marked for internal tracking purposes of the coverage limitation only.

PZR Sampling Nozzle-to-Heater Belt Shell 3-PZR-WP26-7

Component configuration

- Surface 1: Shell - Carbon steel
- Surface 2: Sampling Nozzle - Carbon steel
- Diameter: N/A
- Thickness: 6.188 in.

This component was scanned manually with conventional methods. Scanning requirements are described in ASME Code, Section V, Article 4, T-441.1.2(a), T-441.1.3, T-441.1.4, T-441.1.5, and T-441.1.6. These requirements describe and are specific to scanning components in two axial and two circumferential directions. This component was scanned to the extent possible to meet these requirements. The aggregate coverage that was obtained is described and calculated from the following:

- Weld coverage using 45° & 60° shear waves for axial scans (S1, S2), and 45° & 60° shear waves for circ. scans (CW, CCW) obtained 15.4% coverage.

- Base material coverage using 45° & 60° shear wave for axial scans (S1) and 45° & 60° shear waves for circ. scans (CW, CCW) obtained 54.8% coverage.

- 0° scan coverage obtained 33.8% coverage.

- The aggregate coverage was calculated to be (15.4% + 54.8% + 33.8%)/3 = 34.7%

The impracticality was caused by the weld taper configuration of the sampling nozzle to the shell that does not allow meaningful interrogation from the Surface 2 nozzle side. In order to scan all of the required volume for this weld, the shell to sampling nozzle weld would have to be redesigned and replaced, which is impractical.

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

This relief request is specific to examination volume coverage limitations only. All other Code requirements were satisfied.

No indications were recorded during this examination. The reject box is marked for internal tracking purposes of the coverage limitation only.

Licensee's Proposed Alternative Examination (as stated)

No substitution alternative for this weld is available which would provide better coverage. Radiography (RT) is not a desired option because RT is limited in the ability to detect service induced flaws. Use of other manual or automated UT techniques, whether conventional or phased array, were considered, but would not increase coverage due to the limitation created by the component configuration. The use of any other UT technique available would incur the same physical scanning limitations.

Staff Evaluation

The ASME Code requires 100 percent volumetric examination of ASME Code, Class 1 nozzle-to-vessel welds. However, the design configuration of the subject welds and weld taper configuration of the weld taper configuration limit access for UT scanning. In order to effectively increase the examination coverage, the nozzle-to-vessel welds would require design modifications. Therefore, the NRC staff determined that 100 percent ASME Code-required volumetric examinations are considered impractical.

The PZR nozzle-to-vessel welds listed in Tables 3.1.1 (ONS, Unit 3) are constructed of carbon steel material with stainless steel inside diameter surface cladding. 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 along the nozzle axes in the through-wall direction of the vessel. This nozzle design geometry restricts scanning for ASME Code-required UT examinations to be performed only from the shell side of the welds. In addition, UT scans cannot be performed from the curved outside diameter (OD) surface on the nozzle blend radii, further limiting the volumetric examinations.

As shown on the sketches and technical descriptions included in the licensee's submittals, examinations of the subject PZR nozzle-to-vessel welds have been completed to the extent practical with volumetric coverage of 30.2 percent (see Table 3.1.1 above) 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 the highest regions of stress, and where one would expect degradation sources to be manifested should they occur. The PZR nozzle-to-vessel weld examinations were performed with UT techniques in accordance with the applicable requirements of the ASME Code Section V, Article 4. The welds were examined using 0-degree longitudinal and 45-, 60- and 70-degree shear waves. No indications were detected on the subject nozzles.

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 (Reference 4). Therefore, it is expected that the UT techniques employed by the licensee would detect structurally significant flaws that might occur on either side of the subject welds due to the fine-grained carbon steel microstructures.

The licensee has shown that it is impractical to meet the ASME Code-required 100 percent volumetric examination coverage for the subject nozzle-to-vessel welds due to nozzle design and weld taper configuration of the nozzle. 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.

The licensee is also performing system leakage testing that is performed each refueling outage in accordance with ASME Code, Section XI, Table IWB-2500-1, Examination Category B-P which requires a VT-2 visual examination to detect evidence of leakage. This test and VT-2 examination provides additional assurance of pressure boundary integrity.

In addition to the above ASME Code required examinations (volumetric and pressure test), Reactor Building Normal Sump and Reactor Building area radiation monitoring contribute to ensuring pressure boundary integrity by providing means to detect reactor coolant leakage and take prompt corrective actions. Therefore, the NRC staff determined that based on the ASME Code examinations performed and radiation monitoring provide reasonable assurance of structural integrity of the subject components.

3.2 Request for Relief 13-ON-001, Part B, ASME Code, Section XI, Table IWB-2500-1, Examination Category B-J, Item B9.11, Pressure Retaining Welds in Piping, ONS, Unit 3

ASME Code Requirement

ASME Code, Section XI, Table IWB-2500-1, Examination Category B-J, Item B9.11, requires essentially 100 percent volumetric and surface examinations, as defined by Figure IWB-2500-8, for circumferential piping welds 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 Table 3.2.1 for ONS, Unit 3.

Table 3.2.1 – ASME Code, Section XI, Table IWB-2500-1, Examination Category B-J for ONS, Unit 3			
ASME Code Item	Weld ID	Weld Type	Coverage Obtained (Percent)
B9.11	3-53A-15-26	Pipe-to-Valve Weld (3CF-11) Low Pressure Injection System	36.8
B9.11	3CF-126-4	Pipe-to-Valve Weld (3CF-14) Low Pressure Injection System	37.5

Component Configurations:

- Pipe: Forged Stainless Steel
- Valve: Cast Austenitic Stainless Steel (CASS)
- Diameter: 14.0 in.
- Thickness: 1.250 in.

Licensee's Basis for Relief Request

Low Pressure Injection System Pipe-to-Valve Weld 3-53A-15-26 - The impracticality was caused by the taper configuration and cast stainless material of the valve, 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. There was also a branch connection limiting the axial scan from the pipe side. In order to scan all of the volume for this weld, the valve would have to be redesigned and replaced, which is impractical.

Low Pressure Injection System Pipe-to-Valve Weld 3CF-126-4 - The impracticality was caused by the taper configuration and cast stainless material of the valve, 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.

Licensee's Proposed Alternative Examination

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

Staff Evaluation

The ASME Code requires essentially 100 percent volumetric and surface examinations for selected ASME Code, Section XI, 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. This would place a burden on the licensee; thus, obtaining 100 percent of ASME Code-required volumetric examinations is considered impractical.

The Low Pressure Injection System, Pipe-to-Valve components in ONS, Unit 3 (Table 3.2.1) are constructed of a CASS valve and a forged stainless steel pipe. Both the pipe and valve design geometries and the presence of CASS material restrict ultrasonic scanning mainly to the pipe side of the welds. In addition, weld 3-53A-15-26 has a branch connection near it, which limits the axial scan from the pipe side of the weld.

Volumetric examinations of 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 through the industry's Performance Demonstration Initiative (PDI). They meet ASME Code Section XI, Appendix VIII examination requirements for flaws located on the near-side of the welds; far-side detection of flaws is considered to be a "best effort". No ASME Code, Section XI, Appendix VIII requirements currently exist for demonstrating ultrasonic scanning through CASS.

The components were scanned manually with conventional methods using the requirements described in 10 CFR 50.55a(b)(2)(xv)(A)(1). As shown on the sketches and technical descriptions included in the licensee's submittals, examinations of the subject LPI system pipe-to-valve welds have been completed to the extent practical with volumetric coverage ranging from approximately 36.8 to 37.5 percent (see Table 3.2.1) of the ASME Code-required volumes. The limitations encountered during the performance of the ultrasonic examinations were caused by CASS materials, curvature

in the taper of the transition region from the pipe-to-valve configurations and a nearby branch connection. The configurations and materials limit the volumetric examinations primarily to the forged stainless steel side of these welds.

The licensee's ultrasonic scanning techniques included a combination of 45 degree shear waves and "best effort" 60 degree refracted longitudinal waves (L-waves), for the ASME Code, Class 1 piping welds listed in Table 3.2.1, from the accessible forged piping side of the welds. No indications were detected on either weld, and there is no operational experience showing service induced cracking on these welds.

Additionally, L-waves have been shown to provide enhanced detection on the far-side of austenitic stainless steel welds (references 1-3). Therefore, while the licensee has only taken credit for obtaining limited volumetric coverage, it is expected that the techniques employed would have provided coverage beyond the near-side of the welds. For ONS, Unit 3 the licensee implemented ASME Code Case N-663, Alternative Requirements for Classes 1 and 2 Surface Examination, Section XI, Division 1; therefore, no surface examinations were required for the welds listed in Table 3.2.1. The NRC staff has determined that there is no known operational

experience showing cracking in similar stainless steel welds, and the only forms of cracking that are expected to occur are thermal fatigue due to the very low oxygen concentration in pressurized water reactor coolant. Given the location of these welds, it is expected that thermal fatigue cracking would progress relatively slowly though the weld.

System pressure and leakage tests are performed each inspection period in accordance with ASME Code, Section XI, Table IWB-2500-1, under examination category B-P. This requires a VT-2 visual examination to detect evidence of leakage. Additionally, ONS, Unit 3, reactor building normal sump monitoring and other leakage detection systems provide additional assurance that, in the event that leakage did occur through a weld, it would be detected and proper action taken.

The NRC concludes that 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. The NRC staff also concludes that, if significant service-induced degradation had occurred in the forged and welded portions of the ASME-required volumes of the subject welds, evidence of it would have been detected by the examinations performed. Therefore, the NRC staff has determined that the volumetric examinations obtained, continuous sump monitoring, periodic leakage test with VT-2 examinations and the industry operational experience record provide reasonable assurance of structural integrity of the subject welds.

3.3 Request for Relief 13-ON-001, Part C, ASME Code, Section XI, Table IWC-2500-1, Examination Category C-A, Item C1.30, Pressure Retaining Welds in Pressure Vessels, ONS, Unit 3

ASME Code Requirement

ASME Code, Section XI, Table IWC-2500-1, Examination Category C-A, Item C1.30, requires essentially 100 percent volumetric examination of the weld length, as defined by ASME Code, Section XI, Figure 2 IWC-2500-1, Volume E-F-G-H of the length of Class 2 circumferential welds. "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 examinations of Class 2 Steam Generator A, Feedwater System, Tubesheet to Shell Weld # 3-SGA-W69 weld shown in Table 3.3.1 for ONS, Unit 3.

Table 3.3.1 – ASME Code, Section XI, Table IWC-2500-1, Examination Category C-A for ONS, Unit 3

ASME Code Item	Weld ID	Weld Type	Coverage Obtained (Percent)
C1.30	3-SGA-W69	Steam Generator A, Feedwater System, Tube-to-Sheet Weld	75.6

Licensee's Basis for Relief Request (as stated)

- Component configuration:
- Surface 1: Shell - Carbon steel
- Surface 2: Tubesheet - Carbon steel
- Diameter: 148 in.
- Thickness: 5.125 in.

This component was scanned manually with conventional methods. Scanning requirements are described in ASME Section V, Article 4, T-441.1.2(a), T-441.1.3, T-441.1.4, T-441.1.5, and T-441.1.6. These requirements describe and are specific to scanning components in two axial and two circumferential directions. This component was scanned to the extent possible to meet these requirements. The aggregate coverage that was obtained is described and calculated from the following:

- Near Surface coverage using 60° shear waves for axial scans (S1, S2), and 60° shear waves for circ. scans (CW, CCW) obtained 73.1% coverage.

- Weld coverage using 35°, 45° & 60° shear waves for axial scans (S1, S2), and 45° & 60° shear waves for circ. scans (CW, CCW) obtained 75.7% coverage.

- Base material coverage using 35°, 45°& 60° shear wave for axial scans (S1) and 45° & 60° shear waves for circ. scans (CW, CCW) obtained 80.6% coverage.

- 0° scan coverage obtained 73.1 % coverage.

- The aggregate coverage was calculated to be (73.1% + 75.7% + 80.6% + 73.1)/4 = 75.6%.

The impracticality was caused by four lateral restraints that did not allow scanning from the Surface 1, CW and CCW direction, and allowed only partial scanning from the Surface 2 direction. In order to scan all of the required volume for this weld, the lateral supports would have to be redesigned and replaced, which is impractical.

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

This relief request is specific to examination volume coverage limitations only. All other Code requirements were satisfied.

No indications were recorded during this examination. The reject box is marked for internal tracking purposes of the coverage limitation only.

Ultrasonic examination of the weld for the item number 03.C1.30.0002 was conducted using personnel, equipment, and procedures qualified in accordance with ASME Section XI, 1998 Edition with the 2000 Addenda.

The system leakage test performed each period in accordance with Table IWC-2500-1, Examination Category C-H requires a VT-2 visual examination to detect evidence of leakage. This test and VT-2 examination provides additional assurance of pressure boundary integrity.

In addition to the above ASME Code required examinations (volumetric and pressure test), Reactor Building Normal Sump monitoring ensure pressure boundary integrity by providing means to detect leakage and take prompt corrective actions.

Duke Energy has examined the weld to the maximum extent possible utilizing approved examination techniques and equipment. Based on the acceptable results for the coverage completed by the volumetric examination, the pressure testing (VT-2) examinations required by Section XI, and the leakage monitoring, it is Duke's position that the combination of these examinations provides a reasonable assurance of the continued structural integrity of these welds.

In its RAI, the NRC staff requested that the licensee clarify what examination methodologies were used in examining Tubesheet-to-Shell Weld # 3-SGA-W69. The licensee responded and stated:

> This weld was inspected in accordance with ASME Code Section V, Article 4 requirements, as modified by ASME Code Section XI, Article 1, Table 1-2000-1. ASME Code required examinations were performed using Procedure NDE-820 and appropriately qualified personnel. A supplemental "zero degree" exam was performed using Procedure NDE-640 and appropriately qualified personnel, in addition to the ASME Code required examinations. No flaws were detected in either exam.

Licensee's Proposed Alternative Examination

The licensee considered Radiography (RT) and was determined not to be a desired option and there was no other substitution alternative for this weld is available which would provide better coverage. However, the licensee's examinations were performed to the maximum extent practical.

Staff Evaluation

The ASME Code requires essentially 100 percent volumetric examination of pressure retaining welds on selected Class 2 pressure vessels. The licensee was unable to scan the subject weld from Surface 1, CW and the CCW direction, and only a partial scanning was obtained by the licensee on surface 2 due to four lateral restraints. In order to scan all of the required volume for this weld, the lateral restraints would have to be redesigned and replaced which is impractical.

As shown on the sketches and technical descriptions included in the licensee's submittals, examinations of Steam Generator A, Feedwater System, Tubesheet to Shell Weld #3-SGA-W69 has been performed to the extent practical, with the licensee obtaining approximately 75.6 percent of the required ASME Code examination volumes.

This weld was inspected in accordance with ASME Code, Section V, Article 4 requirements, as modified by ASME Code Section XI, Article 1, Table 1-2000-1. ASME Code required examinations were performed using the licensee's Procedure NDE-820 and appropriately

qualified personnel. A supplemental "zero degree" exam was performed using licensee's Procedure NDE-640 and appropriately qualified personnel, in addition to the ASME Code required examinations. No flaws were detected in either exam.

The licensee has shown that it is impractical to meet the ASME Code-required volumetric examination coverage for the subject welds due to four lateral restraints. However, based on the volumetric coverage obtained, and the UT techniques employed, 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. The licensee is also performing system leakage testing that is performed each refueling outage in accordance with ASME Code, Section XI, Table IWB-2500-1, Examination Category B-P which requires a VT-2 visual examination to detect evidence of leakage. This test and VT-2 examination provides additional assurance of pressure boundary integrity.

In addition to the above ASME Code required examinations (volumetric and pressure test), Reactor Building Normal Sump and Reactor Building area radiation monitoring contribute to ensuring pressure boundary integrity by providing means to detect reactor coolant leakage and take prompt corrective actions. Therefore, the NRC staff determined that based on the ASME Code examinations performed and radiation monitoring provide reasonable assurance of structural integrity of the subject components. Furthermore, the NRC staff determined that the examinations performed provide reasonable assurance of structural integrity of the subject components.

The licensee requested approval of this alternative for the fourth ten-year interval of the ONS 1/2/3 inservice inspection program, which ends July 15, 2014.

4.0 CONCLUSION

As set forth above, the NRC staff concludes 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)(5)(iii). Furthermore, 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. Therefore, the NRC staff grants relief for the subject examinations of the components contained in Request for Relief 13-ON-001 for the ONS, Unit 3, fourth 10-year ISI interval which began on January 2, 2005 and ended on July 15, 2014.

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.

5.0 REFERENCES

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Date: August 14, 2014

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Sincerely,

/RA/ G. Edward Miller for

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

Docket No. 50-287

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