Mr. William R. McCollum, Jr.
Vice President, Oconee Site
Duke Energy Corporation
7800 Rochester Highway
Seneca, SC 29672

May 6, 2002

SUBJECT: OCONEE NUCLEAR STATION, UNIT 2 RE: THIRD 10-YEAR INTERVAL INSERVICE INSPECTION PROGRAM PLAN REQUEST FOR RELIEF NO. 01-011 (TAC NO. MB2677)

Dear Mr. McCollum:

By letter dated August 6, 2001, Duke Energy Corporation (the licensee), proposed Relief Request No. 01-011 for the third 10-year inservice inspection interval for Oconee Nuclear Station, Unit 2. The request pertains to relief from the volumetric examination of essentially 100 percent of the volume as required by the ASME Code, Section XI, for the steam generator nozzle-to-vessel weld, shell-to-shell weld, upper tubesheet-to-shell weld, nozzle inside radius, and valve-to-pipe weld identified in the relief request. The Code-required volumetric examination was deemed impractical due to component configuration that allowed only limited coverage of the welds and the nozzle inside radius.

The staff has reviewed the information provided for this relief request as documented in the enclosed Safety Evaluation. The staff grants the relief, pursuant to the provisions of 10 CFR 50.55a(g)(6)(i).

Sincerely,

/RA/

John A. Nakoski, Chief, Section 1
Project Directorate II
Division of Licensing Project Management
Office of Nuclear Reactor Regulation

Docket No. 50-270

Enclosure: As stated

cc w/encl: See next page

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

THIRD TEN-YEAR INTERVAL INSERVICE INSPECTION PROGRAM PLAN

REQUEST FOR RELIEF NO. 01-011

OCONEE NUCLEAR STATION, UNIT 2

DUKE ENERGY CORPORATION

DOCKET NO. 50-270

1.0 INTRODUCTION

The inservice inspection (ISI) of the American Society of Mechanical Engineers (ASME) Boiler and Pressure Vessel Code (Code) Class 1, Class 2, and Class 3 components is to be performed in accordance with Section XI of the ASME Code and applicable edition and addenda as required by Title 10 of the *Code of Federal Regulations* (10 CFR) Section 50.55a(g), except where specific written relief has been granted by the Commission pursuant to 10 CFR 50.55a(g)(6)(i). 10 CFR 50.55a(a)(3) states that alternatives to the requirements of paragraph (g) may be used, when authorized by the NRC, if the applicant demonstrates that: (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.

Pursuant to 10 CFR 50.55a(g)(4), ASME Code Class 1, 2, and 3 components (including supports) will 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 of Nuclear Power Plant Components," to the extent practical within the limitations of design, geometry, and materials of construction of the components. The regulations require that inservice examination of components and system pressure tests conducted during the first 10-year interval and subsequent intervals comply with the requirements in the latest edition and addenda of Section XI of the ASME Code incorporated by reference in 10 CFR 50.55a(b) twelve months prior to the start of the 120-month interval, subject to the limitations and modifications listed therein. The ISI Code of record for Oconee Nuclear Station, Unit 2, third 10-year interval is the 1989 Edition of the ASME Code. The components (including supports) may meet the requirements set forth in subsequent editions and addenda of the ASME Code incorporated by reference in 10 CFR 50.55a(b) subject to the limitations and modifications listed therein and subject to Commission Approval.

By letter dated August 6, 2001, Duke Energy Company (the licensee) submitted Relief Request No. 01-011 for the third 10-year ISI interval of Oconee Nuclear Station, Unit 2. The licensee requests relief from the Code-required volumetric examination coverage of the steam generator nozzle-to-vessel weld, shell-to-shell weld, upper tubesheet-to-shell weld, and nozzle inside radius and valve-to-pipe weld. The Code requires that volumetric examinations using ultrasonic testing (UT) use prescribed beam angles and scan directions. The sum of the volumes

examined with different beam angles and scan directions equals the examination coverage. The licensee performed ultrasonic examination of the items shown in Table 1 of this safety evaluation and determined that the Code-required coverages were impractical due to component configuration and actual physical barriers. The identification of the welds, percentage of examination coverages, and obstructions to examinations are listed in Table 1. Pursuant to 10 CFR 50.55a(g)(6)(i), the staff has evaluated the licensee's request for relief.

2.0 DISCUSSION

System/Components for which Relief is Requested

See Table 1 below.

Table 1 - List of welds, percentage of examination coverages, and obstructions hindering examinations.

Item Identification *	**Weld Description**	**IWB-2500-1, B-D, Item No.**	**% ** Coverage Achieved**	**Obstruction Preventing Code Coverage**
2-SGA-WG25	Nozzle-to-vessel	B03.130.005	58.98%	Nozzle configuration blending into head
2-SGA-WG25	Nozzle Inside Radius	B03.140.005	70.21%	Nozzle configuration blending into head
2-SGA-WG8-1	Shell-to-Shell	C01.010.001	50.89%	Taper on nozzle side of the weld
2-SGA-WG60	Tubesheet-to-Shell	C01.030.001	42.15%	Support hangers and support pads
2HP-341-V1	Valve-to-Pipe	C05.021.044	61.34%	Taper on valve side of the weld

* SGA = Steam Generator A
** In the submittal, the licensee itemized the percent coverage for each beam angle and scan direction.

Code Requirement

ASME Code, Section XI, 1989 Edition, in examination categories B-D (Full Penetration Welds of Nozzles in Vessels), C-A (Pressure Retaining Welds in Pressure Vessels) and C-F-1 (Pressure Retaining Welds in Austenitic Stainless Steel or High Alloy Piping), requires essentially 100 percent volumetric examination coverage of the welds and nozzle inside radii.

The ASME Section XI, Appendix Vlll, "Performance Demonstration for Ultrasonic Examination Systems," specimen set and qualification requirements in 10 CFR 50.55a(b)(2)(xv)(A) states:

> "When applying Supplements 2 and 3 to Appendix VIII, the following examination coverage criteria requirements must be used:
>
> 1) Piping must be examined in two axial directions and when examination in the circumferential direction is required, the circumferential examination must be performed in two directions, provided access is available.
>
> 2) Where examination from both sides is not possible, full coverage credit may be claimed from single side for ferritic welds. Where examination from both sides is not possible on austenitic welds, full coverage credit from a single side may be claimed only after completing a successful single sided Appendix VIII demonstration using flaws on the opposite side of the weld."

Code Case N-460, approved for use by NRC in Regulatory Guide 1.147, "Inservice Inspection Code Case Acceptability, ASME Section Xl, Division 1," allows credit for full volume coverage of welds if it can be shown that greater than 90 percent of the required volume has been examined.

Code Requirement from which Relief is Requested

Relief is requested from the requirement to examine greater than 90 percent of the required volume specified in the ASME Code, Section XI, 1989 Edition. Due to existing geometry, configuration and austenitic weld metal, obtaining greater than 90 percent coverage, which is the volume required by Code Case N-460, is impractical.

Basis for Relief

A. Steam Generator 2A Nozzle-to-Vessel Weld 2-SGA-WG25, Item B03.130.005, was examined to the maximum extent practical using ultrasonic techniques in accordance with the requirements of ASME Section XI, Appendix VIII, Supplements 4 and 6 of the 1995 Edition with the 1996 Addenda as administered by the Performance Demonstrative Initiative (PDI). The examination coverage was limited to 57.98 percent of the required volume because of the nozzle configuration. In order to achieve more coverage, the nozzle would have to be redesigned to allow scanning from both sides of the weld.

B. Steam Generator 2A Nozzle-to-Vessel Inside Radius Section for weld 2-SGA-WG25, Item B03.140.005, was examined to the maximum extent practical using ultrasonic techniques in accordance with the requirements of ASME Section XI, Appendix I of the 1989 Edition. The examination coverage was limited to 70.21 percent of the required volume. Limitations were caused due to the ratio of the nozzle outside diameter (OD) to the vessel thickness. When the nozzle OD is large in relation to the vessel thickness, less coverage will be obtained when scanning from the vessel side.

C. Steam Generator 2A Shell-to-Shell Weld 2-SGA-WG8-1, Item C01.010.001, was examined to the maximum extent practical using ultrasonic techniques in accordance with the requirements of ASME Section XI, Appendix VIII, Supplements 4 and 6 of the 1995 Edition with the 1996 Addenda as administered by the PDI. The examination coverage was limited to 50.89 percent of the required volume because of the taper configuration. In order to achieve more coverage, the weld would have to be redesigned to allow scanning from both sides of the weld.

D. Steam Generator 2A Upper Tubesheet-to-Shell Weld 2-SGA-WG60, Item C01.030.001, was examined to the maximum extent practical using ultrasonic techniques in accordance with the requirements of ASME Section XI, Appendix VIII, Supplements 4 and 6 of the 1995 Edition with the 1996 Addenda as administered by the PDI. The examination coverage was limited to 42.15 percent of the required volume because of the configuration, and interference from a support hanger and a support pad. In order to achieve more coverage, the weld would have to be redesigned to allow scanning from both sides of the weld.

E. Valve 2HP-120 to Pipe Weld 2HP-341-V1, Item C05.021.044, was limited to 61.34 percent coverage of the required volume because of the single-sided access due to the valve configuration. In order to achieve more coverage, the valve would have to be redesigned to allow scanning from both sides of the weld.

Alternate Examinations or Testing

No additional examinations are planned for the subject welds during the current interval. The use of radiography as an alternate volumetric examination of the welds/components referenced in this request is not a viable option. Restrictions to performing radiography are primarily due to inability to access the inside of the components to place film or position a radiographic source.

3.0 EVALUATION

The staff has evaluated the information provided by the licensee in support of the volumetric examinations of the subject welds performed during the third 10-year inservice inspection interval of Oconee Nuclear Station, Unit 2. For steam generator 2A, (the nozzle-to-vessel weld, nozzle inside radius section, shell-to-shell weld, and the valve 2HP-120 to pipe weld), ultrasonic scanning in the axial direction could be performed from only one side of the weld due to component configuration that prevented scanning from the tapered surface on the far side of the component. The tubesheet-to-shell weld was obstructed by support hangers and pads that restricted scanning for complete examination coverage. The steam generator welds were examined to the maximum extent practical using ultrasonic techniques in accordance with the requirements of Appendix VIII of ASME Section XI. Since the qualifications were conducted on samples with access to both sides of the weld, the licensee did not take credit for examination of the far side with single-sided examination. However, the licensee's best-effort examination with single-sided access and with the obstructions to scanning achieved volumetric examination coverages ranging from 42.15 to 70.21 percent as shown in Table 1. Code Case N-460, approved by NRC in Regulatory Guide 1.147, allows credit for full volume coverage if it can be shown that more than 90 percent of the required volume has been examined. The examinations did not identify any rejectable indication. The residual stresses are similar along the total length of the weld heat affected zones. Primary water stress corrosion cracking is

driven by these stresses along with the environment and susceptible material. A flaw missed by volumetric examination in one area will typically have a portion of the flaw in another area, making the pattern of cracking in the weld detectable. Therefore, the staff concludes that there is a high likelihood that if there were any service-induced flaws existing in the welds or in the base metal adjacent to the welds, the examination of the accessible weld volume would have at least detected a portion of the flaw. On this basis, the staff has determined that the licensee's limited examination of the welds and the nozzle inside radius provides reasonable assurance of structural integrity of the components.

The staff determined that the examination coverage was reduced due to component configuration and attachment interferences that restricted scanning from the far side of the weld or the inside radius. The examinations were limited and predominately from one side of the weld. The examinations resulted in the same volume and coverage that were obtained during examinations of the second interval. Any differences between the second and third intervals were the result of changes in Code requirements. These changes affected UT qualifications. For the second interval, the examinations were performed using a prescriptive UT technique; for the third interval, the examinations were performed using a performance-based UT technique according to Appendix VIII.

With the current configurations and restrictions, coverages beyond those achieved in Table 1 are impractical. In order to meet the Code requirements, new components would have to be designed, fabricated, and installed. This level of effort would impose a significant burden on the licensee.

4.0 CONCLUSION

The staff has reviewed the licensee's submittal and has concluded that compliance with the Code requirements for full volumetric examinations of the subject welds and the nozzle inside radius are impractical due to component configuration and other interferences to scanning. The staff has further determined that if the Code requirements were to be imposed on the licensee, the components would have to be redesigned that would impose a significant burden on the licensee. The staff finds that the examination coverage of the accessible volume of the welds and the nozzle inside radius provides reasonable assurance of structural integrity of the components. Therefore, relief is granted pursuant to 10 CFR 50.55a(g)(6)(i) for the third 10-year inservice inspection interval of Oconee Unit 2. The granting of 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 given due consideration to the burden upon the licensee that could result if the requirements were imposed on the facility.

Principal Contributor: D. Naujock

Date: May 6, 2002

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Vice President, Oconee Site
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John A. Nakoski, Chief, Section 1
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Docket No. 50-270

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