

July 3, 2001

Mr. M. S. Tuckman
Executive Vice President
Nuclear Generation
Duke Energy Corporation
526 South Church Street
P.O. Box 1006 (EC07H)
Charlotte, NC 28201-1006

SUBJECT: DUKE ENERGY CORPORATION RE: ISI PROGRAM RELIEF REQUEST FOR
OCONEE NUCLEAR STATION, UNITS 1, 2, AND 3; MCGUIRE NUCLEAR
STATION, UNITS 1 AND 2; AND CATAWBA NUCLEAR STATION, UNITS 1
AND 2 (TAC NOS. MB1176, MB1177, MB1178, MB1193, MB1194, MB1179,
AND MB1180)

Dear Mr. Tuckman:

By letter dated February 5, 2001, you submitted Request for Relief 01-GO-01 that proposed an alternative to certain ultrasonic testing requirements of the American Society of Mechanical Engineers Section XI Code pertaining to the length sizing criteria of the Performance Demonstration Initiative at the Oconee Nuclear Station, Units 1, 2, and 3; McGuire Nuclear Station, Units 1 and 2; and Catawba Nuclear Station, Units 1 and 2. The staff has approved the proposed alternative pursuant to 10 CFR 50.55a(a)(3)(i), on the basis that it provides an acceptable level of quality and safety.

Our safety evaluation is enclosed.

Sincerely,

/RA/

Richard L. Emch, Jr., Chief, Section 1
Project Directorate II
Division of Licensing Project Management
Office of Nuclear Reactor Regulation

Docket Nos. 50-269, 50-270, 50-287, 50-369, 50-370, 50-413, and 50-414

Enclosure: Safety Evaluation

cc w/encl: See next page

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SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

RELIEF REQUEST FOR INSERVICE INSPECTION

OCONEE NUCLEAR STATION, UNITS 1, 2, AND 3

MCGUIRE NUCLEAR STATION, UNITS 1 AND 2

CATAWBA NUCLEAR STATION, UNITS 1 AND 2

DUKE ENERGY CORPORATION

DOCKET NOS. 50-269, 50-270, 50-287, 50-369, 50-370, 50-413, AND 50-414

1.0 INTRODUCTION

The inservice inspection (ISI) of the American Society of Mechanical Engineers Boiler and Pressure Vessel Code (ASME Code) Class 1, 2, and 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 licensee 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 pre-service 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. Currently, McGuire and Catawba are in their second 10-year ISI interval, and Oconee is in its third 10-year ISI interval. For all units of these three nuclear stations, the applicable Edition of Section XI of the ASME Code is the 1989 Edition.

By letter dated February 5, 2001, Duke Energy Corporation (the licensee) submitted Request for Relief 01-GO-01 which proposed an alternative to certain ultrasonic testing requirements of the ASME Code pertaining to the length sizing criteria of the Performance Demonstration

Initiative (PDI) at the Oconee Nuclear Station, Units 1, 2, and 3; McGuire Nuclear Station, Units 1 and 2; and Catawba Nuclear Station, Units 1 and 2. The request for relief was submitted pursuant to 10 CFR 50.55a(a)(3)(i) for all units of these three nuclear stations. The staff's evaluation of the subject relief request is contained in the following section.

2.0 EVALUATION

The information provided by the licensee in support of the relief request has been evaluated pursuant to 10 CFR 50.55a(a)(3)(i), and the bases for disposition are documented below.

Relief Request 01-GO-01- All Category B-A, Item B1.10 Longitudinal and Circumferential Shell Welds and Item B1.20 Head Welds

2.1 Code Requirements for Which Relief is Requested

The licensee has requested relief from the requirements of the 1995 Edition with 1996 Addenda, Appendix VIII to Section XI of the ASME Code, Supplement 4, Subparagraphs 3.2(b) and 3.2(c) relating to flaw sizing acceptance criteria. Subparagraph 3.2(b) requires that flaw lengths estimated by ultrasonic examination be the true length $-1/4$ inch/ $+1$ inch. Subparagraph 3.2(c) requires that sizing results of 3.2(a) and 3.2(b) satisfy certain statistical parameters.

2.2 Licensee's Proposed Alternative to Code (as stated)

Duke Energy Corporation proposes to use the 0.75 RMSE [Root Mean Square Evaluation] length sizing qualification criteria in lieu of the requirements of ASME Section XI, 1995 Edition with the 1996 Addenda, Appendix VIII, Supplement 4, Subparagraph 3.2(b). The RMSE calculation will be used in lieu of Subparagraph 3.2(c).

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

Qualifications administered by the PDI have used a length sizing qualification criteria of 0.75 inch RMSE since the beginning of these demonstrations in 1994. The 0.75-inch length sizing criteria is included in ASME Code Case N-622, "Ultrasonic Examination of RPV and Piping, Bolts and Studs, Section XI, Division I."

The NRC performed an assessment of the PDI program in 1995. As part of this assessment, they reviewed exceptions to the ASME Code, which were parts of the PDI program. The assessment report states that the NRC "does not take exception to the 0.75 inch RMSE length sizing tolerance"

Conversations between the NRC staff and representatives of PDI were held on January 12, 2000. In these conversations it was acknowledged that the 0.75 inch RMSE length sizing criteria should have been addressed in the modifications to Supplement 4 of Appendix VIII in 10 CFR 50.55a(b)(2)(xv)(C) It was also stated that this would be corrected in a future revision.

In a public meeting in October 11, 2000, at NRC offices in White Flint, MD, the PDI identified the discrepancy between Subparagraph 3.2(c) and the PDI program. The NRC agreed that 10 CFR 50.55a(b)(2)(xv)(C)(1) should have excluded Subparagraph 3.2(c).

Operating in parallel with the actions of the PDI, the NRC staff incorporated most of Code Case N-622 in the rule published in the Federal Register, 64 FR 51370. Appendix VI to Code Case N-622 contains the proposed alternative sizing criteria, which has been authorized by the staff. The staff agrees that the omission of the length sizing tolerance of 0.75 inch RMS in the rule and the inclusion of the statistical parameters of Subparagraph 3.2(c) of Supplement 4 to Appendix VIII was an oversight.

2.4 Staff Evaluation

On March 26, 2001, the NRC published "Industry Codes and Standards; Amended Requirements" in the Federal Register (66 FR 16391) that corrected an error discovered in the final rule of paragraph (b)(2)(xv)(C) of 10 CFR 50.55a, "Codes and Standards," issued on September 22, 1999. The rule in paragraph (b)(2)(xv)(C) addressed the provisions regarding application of Supplement 4 to Appendix VIII of the ASME Code, Section XI, specifically on flaw depth and length sizing qualification criteria.

The published correction revised 10 CFR 50.55a(b)(2)(xv)(C)(1) to stipulate that a depth sizing requirement of 0.15 inch RMS be used in lieu of the requirement in Subparagraph 3.2(a) and a length sizing requirement of 0.75 inch RMS be used in lieu of the requirement in Subparagraph 3.2(b) of Supplement 4 to Appendix VIII, Section XI of the ASME Code. Therefore, the licensee's request for relief from the requirements of Subparagraph 3.2(b) is not necessary.

In the second part of the alternative, the licensee proposed eliminating the use of Supplement 4, Subparagraph 3.2(c) that imposes three statistical parameters for depth sizing. The first parameter, 3.2(c)(1), pertains to the slope of a linear regression line. The linear regression line is the difference between actual versus true value plotted along a through-wall thickness. For Supplement 4 performance demonstrations, a linear regression line of the data is not applicable because the performance demonstrations are performed on test specimens with flaws located in the inner 15 percent through-wall. The differences between actual versus true value produce a tight grouping of results that resemble a shotgun pattern. The slope of a regression line from such data is extremely sensitive to small variations, thus making the parameter of Subparagraph 3.2(c)(1) a poor and inappropriate acceptance criterion. The second parameter, 3.2(c)(2), pertains to the mean deviation of flaw depth. The value used in the code is too lax with respect to evaluating flaw depths within the inner 15 percent of wall thickness. Therefore, the licensee has proposed to use the more appropriate criterion of 0.15 inch RMS of 10 CFR 50.55a(b)(2)(xv)(C)(1), which modifies Subparagraph 3.2(a), as the acceptance criterion. The third parameter, 3.2(c)(3), pertains to a correlation coefficient. The value of the correlation coefficient in Subparagraph 3.2(c)(3) is inappropriate for this application since it is based on the linear regression from Subparagraph 3.2(c)(1).

The PDI program personnel were aware of the inappropriateness of Subparagraph 3.2(c) early in the development of the program. They brought the issue before the appropriate ASME committee, which formalized eliminating the use of Supplement 4, Subparagraph 3.2(c) in Code

Case N-622. The NRC staff representatives participated in the discussions and consensus process of the code case. Based on the above, the NRC staff believes that the use of Subparagraph 3.2(c) requirements in this context is inappropriate and that the proposed alternative to use the RMS value of 10 CFR 50.55a(b)(2)(xv)(C)(1), which modifies the criterion of Appendix VIII, Supplement 4, Subparagraph 3.2(a), in lieu of Subparagraph 3.2(c) will provide an acceptable level of quality and safety.

3.0 CONCLUSION

Based on the discussion above, the staff has concluded that the proposed alternative to use the RMS value of 10 CFR 50.55a(b)(2)(xv)(C)(1), which modifies the criterion of Appendix VIII, Supplement 4, Subparagraph 3.2(a), in lieu of Subparagraph 3.2(c) will provide an acceptable level of quality and safety. Therefore, pursuant to 10 CFR 50.55a(a)(3)(i), the staff authorizes the proposed alternative for the second 10-year interval for McGuire and Catawba, and the third 10-year interval for Oconee.

Principal Contributor: Shou-Nien Hou

Date: July 3, 2001

Catawba, McGuire, Oconee Nuclear
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