February 27, 2004

Mr. W. R. McCollum, Jr.
Senior Vice President, Nuclear Support
Duke Energy Corporation
526 South Church Street
P.O. Box 1006
Charlotte, North Carolina 28201-1006

SUBJECT: CATAWBA NUCLEAR STATION, UNITS 1 AND 2, MCGUIRE NUCLEAR STATION, UNIT 2, AND OCONEE NUCLEAR STATION, UNIT 3 RE: RELIEF REQUEST 03-GO-011 - ALTERNATIVE TO ASME SECTION XI (TAC NOS. MB9920, MB9921, MB9923, AND MB9926)

Dear Mr. McCollum:

By letter dated July 1, 2003, Duke Energy Corporation (the licensee) submitted requests for relief for Catawba Nuclear Station, Units 1, and 2, and McGuire Nuclear Station, Unit 2, second 10-year in-service inspection interval, and for Oconee Nuclear Station, Unit 3, third 10-year in-service inspection interval. The licensee proposed an alternative to the American Society for Mechanical Engineers Boiler and Pressure Vessel Code, Section XI, Appendix VIII, Supplements 2 and 3 for the qualification of personnel, procedures and equipment used for the ultrasonic examination of Category B-J Pressure Retaining piping welds from the inside surface of pressurized water reactors. The proposed alternative would permit a reduced number of flaws to be used for Supplement 2 and 3 qualifications if personnel, procedures, and equipment are already qualified under the requirements of Supplement 10.

The Nuclear Regulatory Commission (NRC) staff has reviewed the information provided for this relief request. The NRC staff's Safety Evaluation is provided in the Enclosure. Based on the information provided, pursuant to Title 10 of the *Code of Federal Regulations*,

Section 50.55a(a)(3)(i), the NRC grants Relief Request 03-GO-011 for the remainder of the third inspection period of Oconee Nuclear Station, Unit 3, and the remainder of the second inspection interval of McGuire Nuclear Station, Unit 2 and Catawba Nuclear Station, Units 1 and 2.

Sincerely,

/RA/

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

Docket Nos. 50-413, 50-414, 50-370, and 50-287

cc w/encl: See next page

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SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

REQUEST FOR RELIEF 03-GO-011

CATAWBA NUCLEAR STATION, UNITS 1 AND 2

MCGUIRE NUCLEAR STATION, UNIT 2

OCONEE NUCLEAR STATION, UNIT 3

DUKE ENERGY CORPORATION

DOCKET NOS. 50-413, 50-414, 50-370, AND 50-287

1.0 INTRODUCTION

By letter dated July 1, 2003 (Ref. 1), Duke Energy Corporation (Duke), the licensee, submitted requests for relief for Catawba Nuclear Station, Units 1, and 2, and McGuire Nuclear Station, Unit 2, second 10-year in-service inspection (ISI) interval, and for Oconee Nuclear Station, Unit 3, third 10-year ISI. The licensee proposed an alternative to the American Society for Mechanical Engineers (ASME) Boiler and Pressure Vessel Code (Code), Section XI, Appendix VIII, Supplements 2 and 3 for the qualification of personnel, procedures and equipment used for the ultrasonic examination of Category B-J Pressure Retaining piping welds from the inside surface of pressurized water reactors. The proposed alternative would permit a reduced number of flaws to be used for Supplement 2 and 3 qualifications if personnel, procedures, and equipment are already qualified under the requirements of Supplement 10.

2.0 REGULATORY EVALUATION

Title 10 of the *Code of Federal Regulations* (10 CFR) Section 50.55a(g) requires that the ISI of the ASME Code Class 1, 2, and 3 components shall be performed in accordance with Section XI of the ASME Code and applicable edition and addenda as required, 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, in part, 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) shall 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 In-service 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 in-service examination of components and system pressure tests conducted during the first ten-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 McGuire Nuclear Station Unit 2, Catawba Nuclear Station Units 1, and 2, and Oconee Nuclear Station Unit 3 is the 1989 Edition. 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.

2.1 Components for Which Relief Is Requested

Duke is requesting relief for the Category B-J pressure retaining piping welds subject to examinations using procedures, personnel and equipment qualified to the 1995 Edition, 1996 Addenda of the ASME Code Section XI, Appendix VIII, Supplement 2, “Qualification Requirements for Wrought Austenitic Piping Welds,” and Supplement 3, “Qualification Requirements for Ferritic Piping Welds.”

2.2 Code Requirements from Which Relief Is Requested

The licensee proposes an alternative to the requirements of ASME Code 1995 Edition, 1996 Addenda, Section XI, Appendix VIII, Table VIII-3110-1, “Component Qualification Supplements,” Supplement 2 and Supplement 3. The licensee is requesting relief to use the proposed alternative (Section V of the licensee’s submittal) for implementation of Appendix VIII, Supplements 2 and 3 as coordinated with the proposed alternative for Supplement 10 implementation program, submitted to the NRC under Relief Request 03-GO-009 (Ref. 2). The staff approved this request by letter dated December 10, 2003 (Ref. 3). The Performance Demonstration Initiative (PDI) will administer the alternative program.

2.3 Basis for Relief

Duke stated that depending on the particular design, the nozzle to the main coolant piping may be fabricated using ferritic, austenitic, or cast stainless components, and assembled using ferritic, austenitic, or dissimilar metal welds. Differing combinations of these assemblies are in close proximity, which typically means the same ultrasonic essential variables are used for each weld. The licensee stated that it would employ the most challenging ultrasonic examination process (i.e., the ultrasonic examination process associated with a dissimilar metal would be applied to a ferritic or austenitic weld).

Duke then stated that separate qualifications to Supplements 2, 3, and 10 are redundant when conducted in accordance with the PDI program. The licensee provided an example that during a personnel qualification to the PDI Program, the candidate would be exposed to a minimum of 10 flawed grading units for each individual supplement. The personnel qualifications to Supplements 2, 3, and 10 would therefore require a total of 30 flawed units. The licensee considered test sets this large to be unworkable. Additionally, the licensee noted, a full procedure qualification (i.e. 3 personnel qualifications) to the PDI Program requirements would require 90 flawed grading units. Duke considered this to be burdensome for a procedure that

would use the same essential variables or the same criteria for selecting essential variables for all 3 supplements.

The PDI program recognizes the Supplement 10 qualification as the most stringent and technically challenging ultrasonic application. The essential variables used for the qualification of Supplements 2, 3, and 10 are the same. The licensee stated a coordinated add-on implementation would be sufficiently stringent to qualify Supplements 2 and 3 if the requirements used to qualify Supplement 10 are satisfied as a prerequisite. The licensee's conclusion is based on the fact that the majority of the flaws in Supplement 10 are located wholly in austenitic weld material. This configuration is known to be challenging for ultrasonic techniques due to the variable dendritic structure of the weld material. Conversely, flaws in Supplement 2 and 3 initiate in the fine grained base materials.

The licensee also stated the proposed alternative is more stringent than the current Code requirements for a detection and length sizing qualification. The licensee provided the following example to support its statement: the current Code would allow a detection procedure, personnel, and equipment to be qualified to Supplement 10 with 5 flaws, Supplement 2 with 5 flaws, and Supplement 3 with 5 flaws, for a total of only 15 flaws. The licensee's proposed alternative of qualifying Supplement 10 using 10 flaws and adding on Supplement 2 with 5 flaws, and Supplement 3 with 3 flaws results in a total of 18 flaws, which will be multiplied by a factor of 3 for the procedure qualification.

Based on the above information, the licensee concludes the use of a limited number of Supplement 2 or 3 flaws is sufficient to assess the capabilities of procedures and personnel who have already satisfied Supplement 10 requirements.

The licensee provided the proposed alternate PDI program (Supplement 14). This supplement was submitted to the ASME Code Committee for consideration as new Supplement 14 to Appendix VIII and was approved by the Subcommittee on Nuclear ISI in February 2003.

2.4 Alternative Examination

Pursuant to 10 CFR 50.55a(a)(3)(i), the licensee proposes to use the PDI program as an alternative to the requirements of ASME Section XI, 1995 Edition, 1996 Addenda, Appendix VIII, Table VIII-3110-1 for Supplement 2 and Supplement 3 as coordinated with the alternative PDI Supplement 10, "Qualification Requirements for Dissimilar Metal Piping Welds," implementation program as referenced in Duke Energy Corporation Relief Request 03-GO-009. The submittal identified the PDI program alternative as Supplement 14.

2.5 NRC Staff Evaluation

The ASME Code currently requires separate qualifications for Supplement 2, Supplement 3, and Supplement 10. Qualifications for each supplement would entail a minimum of 10 flaws each for a total of 30 flaws minimum. The minimum number of flaws per supplement established a statistical based pass/fail objective. The process of a single qualification for each supplement would greatly expand the minimum number of ferritic and austenitic flaws required to be identified that would also raise the pass/fail ratio acceptance criteria.

The ASME Code recognizes, and the NRC staff agrees, that flaws in austenitic material are more difficult to detect and size than flaws in ferritic material. The PDI program recognizes the Supplement 10 qualification as the most stringent and technically challenging ultrasonic application. The basis for this conclusion is due to the variable dendritic structure of the weld material. The prevailing reasoning concluded that a Supplement 3 qualification following a Supplement 2 qualification had diminishing returns on measuring personnel skills and procedure effectiveness. Therefore, in lieu of separate Supplements 2 and 3 qualifications, the ASME Code developed Supplement 12 that provides for a Supplement 3 add-on to a Supplement 2 qualification. The add-on consists of a minimum of 3 flaws in the ferritic material. A statistical evaluation of Supplement 12 acceptance criteria satisfied the pass/fail objective established for Appendix VIII performance demonstration acceptance criteria.

The proposed alternative builds upon the experiences and philosophy of Supplement 12 by starting with the most challenging Supplement 10 qualifications, as implemented by the PDI program (PDI Supplement 10), and adding a sufficient number of flaws to demonstrate the personnel skills and procedure effectiveness of the less challenging Supplements 2 and 3 qualifications. A PDI Supplement 10 performance demonstration has at least 1 flaw with a maximum of 10 percent of the total number of flaws being in the ferritic material. The rest of the flaws are in the more challenging austenitic material. When expanding the PDI Supplement 10 qualification to include Supplement 2 and 3, the proposed alternative would add a minimum of 5 flaws in austenitic material and 3 flaws in ferritic material to the performance demonstration. Therefore, a combined Supplements 2, 3, and 10 qualification requires a minimum of 18 flaws in the performance demonstration test. The performance demonstration results added to the appropriate PDI Supplement 10 results must satisfy the acceptance criteria of the PDI Supplement 10. A statistical evaluation performed by the Pacific Northwest National Laboratories, an NRC contractor, showed that the proposed alternative acceptance criteria satisfied the pass/fail objective established for Appendix VIII for an acceptable performance demonstration.

The NRC staff has determined that use of a limited number of flaws to qualify Supplements 2 or 3 as coordinated with the PDI developed alternative to Supplement 10 will provide equivalent flaw detection performance to that of the Code-required qualification for piping welds. As such, the licensee's proposed alternative provides an acceptable level of quality and safety. Therefore, pursuant to 10 CFR 50.55a(a)(3)(i), the licensee's proposed alternative contained in RR-03-GO-011 is authorized for the remainder of the third inspection interval of Oconee Nuclear Station, Unit 3, and the remainder of the second inspection interval of McGuire Nuclear Station, Unit 2 and Catawba Nuclear Station, Units 1 and 2.

3.0 CONCLUSION

Based upon the above evaluation, the NRC staff concludes that the licensee's proposal to use the PDI program for implementation of Appendix VIII, Supplement 2 and 3 as coordinated with the alternative PDI Supplement 10 implementation program will provide an acceptable level of quality and safety. Therefore, pursuant to 10 CFR 50.55a(a)(3)(i), Relief Request No. 03-GO-011 is authorized for the remainder of the third inspection of Oconee Nuclear Station, Unit 3, and the remainder of the second inspection interval of McGuire Nuclear Station, Unit 2 and Catawba Nuclear Station, Units 1 and 2. All other requirements of the ASME Code, Section XI for which relief has not been specifically requested and approved remain applicable, including third party review by the Authorized Nuclear In-service Inspector.

4.0 REFERENCES

1. Letter from W. R. McCollum, Jr., Senior Vice President, Nuclear Support, Duke Energy Corporation to USNRC, “Relief Request for Alternative to ASME Section XI Relief Request 03-GO-011,” July 1, 2003.

2. Letter from W. R. McCollum, Jr., Senior Vice President, Nuclear Support, Duke Energy Corporation to USNRC, “Relief Request for Alternative to ASME Section XI Relief Request 03-GO-009,” July 1, 2003.

3. Letter from John A. Nakoski, USNRC to W. R. McCollum, Jr., Senior Vice President, Nuclear Support, Duke Energy Corporation, “Oconee Nuclear Station, Units 1, 2 and 3; McGuire Nuclear Station, Units 1 and 2; and Catawba Nuclear Station, Units 1 and 2, RE: Safety Evaluation of Relief Request No. 03-GO-009: Qualifications for Performance of Ultrasonic Examinations (TAC Nos. MB9997, MB9998, MB9915, MB9916, MB9917, MB9918, and MB9919),” December 10, 2003.

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Date: February 27, 2004

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