July 20, 2004

G. R. Peterson, Vice President
McGuire Nuclear Station
Duke Energy Corporation
12700 Hagers Ferry Road
Huntersville, NC 28078-8985

SUBJECT: MCGUIRE NUCLEAR STATION, UNIT 2 - RELIEF REQUEST 03-004, SECOND 10-YEAR INSERVICE INSPECTION (ISI) INTERVAL EXTENSION FOR REACTOR VESSEL EXAMINATION (TAC NO. MC0320)

Dear Mr. Peterson:

By letter dated August 14, 2003, and as supplemented on May 10, 2004, Duke Energy Corporation, the licensee for McGuire Nuclear Station (McGuire), Unit 2, submitted a request for relief, Relief Request 03-004, from the requirements of the American Society of Mechanical Engineers (ASME), *Boiler and Pressure Vessel Code* (Code) Section XI, 1998 Edition with no Addenda, Subsection IWA-2430(d). Specifically, the licensee requested to extend the inspection interval for performing the McGuire, Unit 2 reactor vessel examinations beyond the one-year Code allowable extension to encompass the entire duration of the Spring 2005 refueling outage.

The Nuclear Regulatory Commission (NRC) staff has completed its review of the subject request for relief. As documented in the enclosed Safety Evaluation, the NRC staff concludes that the proposed alternative is justified on the basis that compliance with the applicable ASME Code would result in hardship without a compensating increase in the level of quality and safety. Therefore, the staff authorizes the proposed alternative pursuant to Title 10 of the *Code of Federal Regulations* Section 50.55a(a)(3)(ii) for the second 10-year ISI interval at McGuire, Unit 2. This relief is authorized until the end of Cycle 16 for McGuire, Unit 2 (on or before June 1, 2005).

Sincerely,

/RA/

Stephanie M. Coffin, Acting Chief, Section 1
Project Directorate II
Division of Licensing Project Management
Office of Nuclear Reactor Regulation

Docket No. 50-370

Enclosure: As stated

cc w/encl: See next page

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ACCESSION NUMBER:ML042030006 * See Safety Evaluation NRR-028

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MCGUIRE NUCLEAR STATION, UNIT 2 - RELIEF REQUEST 03-004, SECOND 10-YEAR INSERVICE INSPECTION INTERVAL EXTENSION FOR REACTOR VESSEL EXAMINATION (TAC NO. MC0320)

Dated: July 20, 2004

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SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

REQUEST TO EXTEND THE ASME CODE SECTION XI 10-YEAR INSPECTION INTERVAL

BEYOND THE CODE ALLOWABLE ONE-YEAR FOR

MCGUIRE NUCLEAR STATION, UNIT 2 DUKE ENERGY CORPORATION

DOCKET NUMBER 50-370

1.0 INTRODUCTION

By letter dated August 14, 2003, and as supplemented on May 10, 2004, Duke Energy Corporation, the licensee for McGuire Nuclear Station (McGuire), Unit 2, submitted a request for relief, Relief Request 03-004, from the requirements of the American Society of Mechanical Engineers (ASME), *Boiler and Pressure Vessel Code* (Code) Section XI, 1998 Edition with no Addenda, Subsection IWA-2430(d). Specifically, the licensee requested to extend the inspection interval for performing the McGuire, Unit 2 reactor vessel examinations beyond the one-year Code allowable extension to encompass the entire duration of the Spring 2005 refueling outage.

The McGuire, Unit 2 second inservice inspection (ISI) interval began on March 1, 1994. The licensee proposed to extend the second ISI interval for McGuire, Unit 2 reactor vessel inspections up to 92 days beyond the 11 years permitted by the ASME Code not to exceed June 1, 2005. This request does not affect the inspection requirements of the McGuire, Unit 2 third 10-year ISI interval which began on March 1, 2004, in accordance with Title 10 of the *Code of Federal Regulations* (10 CFR) 50.55a(g)(4)(ii) and as stated in a December 19, 2003, letter from the licensee to the U.S. Nuclear Regulatory Commission (NRC).

2.0 REGULATORY EVALUATION

2.1 Applicable Requirements

The ISI requirements of the ASME Code Class 1, 2, and 3 components are to be performed in accordance with Section XI of the ASME Code and applicable edition and addenda as required by 10 CFR 50.55a(g), except where specific written relief has been granted by the Commission pursuant to 10 CFR 50.55a(g)(6)(i). Section 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.

ENCLOSURE

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 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 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. The Code of Record for McGuire, Unit 2 for the second 10-year ISI interval, which began on March 1, 1994, and with the one-year extension permitted by ASME Code scheduled to end February 28, 2005, is the 1989 Edition with no addenda of Section XI 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.

3.0 TECHNICAL EVALUATION

3.1 Systems/Components For Which Relief Is Requested

The components and number of welds affected by this request for relief are taken from the May 10, 2004, submittal.

Examination Category	Item Number	Number of Welds	Description
B-A	B1.11	4	Circumferential Shell Weld
B-A	B1.21	1	Circumferential Head Weld
B-A	B1.22	6	Meridional Head Weld
B-A	B1.30	1	Flange-to-Upper Shell Weld
B-D	B3.90	16	Nozzle-to-Vessel Weld
B-D	B3.100	8	Nozzle Inside Radius Weld
B-F	B5.10	16	Dissimilar Metal Nozzle-to-Safe End Butt Weld
B-F	B5.130	16	Dissimilar Metal Piping $\geq$ 4 inch Nominal Pipe Size (NPS) Butt Weld
B-N-1	B13.10	VT-3 Interior	Reactor Vessel Interior

B-N-2	B13.60	6 Radial Keyways & 56 Incore Instr. Nozzles (VT-3)	Interior Attachments Beyond Beltline
B-N-3	B13.70	Core Support, when structure is removed from RPV (VT-3)	Removable Core Support Structure

3.2 Code Requirements

Section XI of the ASME Code, 1989 Edition with no Addenda, Subsection IWA-2430(a) states, "The inservice examinations and system pressure tests required by IWB, IWC, IWD, and IWE shall be completed during each of the inspection intervals for the service lifetime of the power unit. The inspections shall be performed in accordance with the schedules of Inspection Program A of IWA-2431, or optionally Inspection Program B of IWA-2432." McGuire is using Inspection Program B.

IWA-2430(d) states, "For components inspected under Program B, each of the inspection intervals may be extended or decreased by as much as 1 year. Adjustments shall not cause successive intervals to be altered by more than 1 year from the original pattern of the intervals."

3.3 Proposed Alternative

The licensee proposed to extend the second 10-year ISI interval for McGuire, Unit 2 reactor vessel examinations up to 92 days beyond the 11 years permitted by ASME Code not to exceed June 1, 2005.

3.4 Basis for Relief

The end date of the second 10-year interval for McGuire, Unit 2 is February 29, 2004. As allowed by Code Subsection IWA-2430(d), the licensee plans to use the one-year interval extension to capture an additional refueling outage in which to conduct Unit 2's 10-year reactor vessel inspections. However, based on Unit 2's projected start date and duration of the end of cycle (EOC) 15 refueling outage and the fuel cycle design for Cycle 16, the EOC 16 refueling outage start date could potentially be beyond the one-year extended inspection interval end date of February 28, 2005. In addition, the schedule impact of an extension of Unit 2's EOC 15 refueling an outage duration and/or any forced outage(s) during Cycle 16 could push the outage date out further. Therefore, relief is requested to perform the second interval reactor vessel examination beyond the Code allowable one-year extension period, to encompass the entire duration of the Spring 2005 refueling outage.

Eight of the welds requiring volumetric examination during the 10-year reactor vessel inspection are Category B-F dissimilar metal (DM) welds. The licensee's decision to use the one-year interval extension was based on recent developments in the Electric Power Research Institute (EPRI) - Performance Demonstration Initiative (PDI) DM weld program. Currently, ultrasonic testing (UT) technology requires depth sizing detected flaws to an accuracy of 0.125 root mean

square (RMS) as specified in Supplement 10 of Appendix VIII. At this time, one reactor vessel inspection vender within the industry is qualified to meet the requirements of ASME Section XI, Appendix VIII, Supplement 10 for DM welds with the configuration and wall-thickness of those at McGuire, Unit 2.

Due to the configuration of the core barrel, inspection of four of the eight DM welds will require its removal. To perform inspections on the non-DM welds during the upcoming EOC 15 refueling outage and defer the DM welds to the EOC 16 refueling outage (i.e., partial scope inspections or partial deferral) would require pulling the core barrel twice (once in each outage). This would be an obvious hardship (without any compensating increase in quality or safety) that would result in extra work/dosage incurred and would significantly increase the potential for damage to plant components from performing the core barrel movement (a “high risk evolution”) in both refueling outages, EOC 15 and EOC 16.

3.5 Staff Evaluation

The purpose of the reactor pressure vessel (RPV) examinations is to ensure structural integrity. The ASME Code requires a minimum number of examinations to be performed during each period of the interval. To achieve the minimum number of examinations for the second interval, the licensee would need to complete the subject examinations. The licensee is requesting an extension of the interval of not more than 92 days beyond the Code permitted extension in order to complete the subject examinations.

The licensee established the necessary contracts for performing the subject examination in advance of the scheduled EOC 15 refueling outage. The contracts were entered into with the licensee believing the vendor would have qualified personnel and procedures available in time for the outage. To qualify personnel and procedures to the supplements of Appendix VIII, the vendor participated in the performance demonstration process administered by the EPRI PDI. The vendor successfully qualified personnel and procedures to Supplements 4 and 6 and had limited success in qualifying them to Supplements 5 and 7. The vendor was unsuccessful in qualifying personnel and procedures to Supplement 10. The vendor was not prepared with qualified personnel and procedures to perform all of the examinations scheduled for the EOC 15 refueling outage, and there was insufficient time available for the licensee to implement new contracts with other vendors before the start of the EOC 15 refueling outage.

The examinations that could be performed by the vendor during the EOC 15 refueling outage necessitated removal of the core barrel. However, the core barrel would have to be removed again during EOC 16 refueling outage to perform the remaining examinations. Removing the core barrel in two successive outages to complete all of the subject examinations would result in unnecessary radiation dose to plant personnel and increase the risk associated with core barrel removal.

The licensee decided to reduce the radiation exposure to personnel and reduce the risks associated with handling the core barrel by extending the second ISI interval for RPV inspections to include the EOC 16 refueling outage. The extension would allow vendors time to test and qualify different examination techniques, and allow for the contracting of services with vendors which have qualified personnel and procedures. The difficulties associated with canceling an existing contract, finding vendors with qualified personnel and procedures, writing relief requests for plant-specific situations affecting the subject examinations, and removing the

core barrel twice would result in a hardship or unusual difficulty without a compensating increase in the level of quality and safety.

4.0 CONCLUSION

Based on the above evaluation, the NRC staff concludes that the licensee's proposed alternative provides reasonable assurance of structural integrity of the components, thus compliance with the ASME Code requirements would result in hardship or unusual difficulty without a compensating increase in the level of quality and safety. Therefore, pursuant to 10 CFR 50.55a(a)(3)(ii), the NRC staff authorizes the extension of the second 10-year ISI interval up to 92 days beyond February 28, 2005, not to exceed June 1, 2005, to complete the McGuire, Unit 2 reactor vessel examinations.

All other requirements of the ASME Code requirements for which relief has not been specifically requested remain applicable, including third party review by the Authorized Nuclear Inservice Inspector.

Principal Contributor: Donald G. Naujock

Date: July 20, 2004