July 30, 2004

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

SUBJECT: MCGUIRE NUCLEAR STATION, UNIT 2 - RE: RELIEF REQUEST 03-003, REQUEST TO USE CODE CASE N-566-2 (TAC MC2385)

By letter to the U.S. Nuclear Regulatory Commission (NRC) dated March 8, 2004, Duke Energy Corporation, the licensee for McGuire Nuclear Station (McGuire), Unit 2, submitted a request for relief, Relief Request No. 03-003, from the requirements of the American Society of Mechanical Engineers Boiler and Pressure Vessel Code, Section XI, 1998 Edition with the 2000 Addenda, Subsection IWA-5250(a)(2). This paragraph requires removal of bolting and performance of a VT-3 visual examination for degradation if leakage occurs at a bolted connection, in a system borated for the purpose of controlling reactivity, during the conduct of a system pressure test. The alternative would allow stoppage of leakage at the bolted connection or, if leakage is not stopped, would require that the connection be evaluated for joint integrity in accordance with specified criteria.

The 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 provides an acceptable level of quality and safety. Therefore, the NRC staff authorizes the proposed alternative pursuant to Title 10 of the *Code of Federal Regulations*, Section 50.55a(a)(3)(i), for the third 10-year inservice inspection interval at McGuire, Unit 2.

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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SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

THIRD 10-YEAR INSERVICE INSPECTION INTERVAL

REQUEST FOR RELIEF 03-003

MCGUIRE NUCLEAR STATION, UNIT 2

DUKE ENERGY CORPORATION

DOCKET NO. 50-370

1.0 INTRODUCTION

By letter to the U.S. Nuclear Regulatory Commission (NRC) dated March 8, 2004, Duke Energy Corporation, the licensee for McGuire Nuclear Station (McGuire), Unit 2, submitted a request for relief, Relief Request No. 03-003, from the requirements of the American Society of Mechanical Engineers (ASME) Boiler and Pressure Vessel Code (Code), Section XI, 1998 Edition and 2000 Addenda, Subsection IWA-5250(a)(2). This paragraph requires the removal of bolting and performance of a VT-3 visual examination for degradation if leakage occurs at a bolted connection, in a system borated for the purpose of controlling reactivity, during the conduct of a system pressure test. The alternative would allow stoppage of leakage at the bolted connection or, if leakage is not stopped, would require that the connection be evaluated for joint integrity in accordance with specified criteria. The staff has reviewed and evaluated the licensee's request for relief pursuant to Title 10 of the *Code of Federal Regulations* (10 CFR) 50.55a(a)(3)(i).

2.0 REGULATORY EVALUATION

The inservice inspection (ISI) of ASME Code Class 1, 2, and 3 components shall be performed in accordance with Section XI, "Rules for Inservice Inspection of Nuclear Power Plant Components," of the ASME Code and applicable 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 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 ASME Code, Section XI, to the extent practical within the limitations of design, geometry, and materials of construction of the components. The regulation requires 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 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 applicable edition of Section XI of the ASME Code for the third 10-year ISI interval for McGuire, Unit 2, is the 1998 Edition with the 2000 Addenda.

3.0 TECHNICAL EVALUATION

3.1 System/Components for Which Relief is Requested

All Class 1, 2, and 3 systems/components subject to IWA-5000 pressure testing.

3.2 Code Requirements From Which Relief is Requested

Section XI of the ASME Code, 1998 Edition with 2000 Addenda, Subsection IWA 5250(a)(2) states, “If leakage occurs at a bolted connection in a system borated for the purpose of controlling reactivity, one of the bolts shall be removed, VT-3 examined, and evaluated in accordance with IWA-3100. The bolt selected shall be the one closest to the source of leakage. When the removed bolt has evidence of degradation, all remaining bolting in the connection shall be removed, VT-3 examined, and evaluated in accordance with IWA-3100.”

3.3 Licensee's Proposed Alternative

When leakage is identified at bolted connections by visual, VT-2 examination during system pressure testing, an evaluation will be performed to determine the susceptibility of the bolting to corrosion and to assess the potential for failure as stated in Code Case N-566-2.

The evaluation will consider the following factors:

1. the number and service age of the bolts;
2. bolt and component material;
3. corrosiveness of process fluid;
4. leakage location and system function;
5. leakage history at connection or other system components; and
6. visual evidence of corrosion at the assembled connection.

When the evaluation of the above variables is concluded and the evaluation determines that the leaking condition has not degraded the fasteners, then no further action is necessary. However, reasonable attempts to stop the leakage shall be taken.

If the evaluations of the variables above indicate the need for further evaluation, or no evaluation is performed, then a bolt closest to the source of leakage shall

be removed and VT-3[1] visually examined. When the removed bolting shows evidence of rejectable degradation, all remaining bolts in the connection shall be removed and VT-3 visually examined. If the leakage is identified when the bolted connection is in service or Technical Specifications require it to be operable, and the information in the evaluation is supportive, the removal of the bolt for VT-3 visual examination may be deferred to the next component/system outage of sufficient duration.

3.4 Basis for Use of Proposed Alternative

Removal of pressure retaining bolting at mechanical connections for visual, VT-3 examination and subsequent evaluation in locations where leakage has been identified is not always the most discerning course of action to determine the acceptability of the bolting. The Code requirement to remove, examine, and evaluate bolting in this situation does not allow the owner to consider other factors which may indicate the acceptability of mechanical joint bolting.

Other factors that should be considered when evaluating bolting acceptability when leakage has been identified at a mechanical joint include, but are not limited to: joint bolting material, service age of joint bolting materials, location of the leakage, history of leakage at the joint, evidence of corrosion with the joint assembled, and corrosiveness of process fluid.

Performance of the pressure test while the system is in service may identify leakage at a bolted connection that, upon evaluation, may conclude the integrity and pressure retaining ability of the joint is not challenged. It would not be prudent to impact the availability of a safety system by removing the system from service to address a leak that does not challenge the system's ability to perform its safety function.

A situation frequently encountered at Duke Energy Corporation is the complete replacement of bolting materials (studs, bolts, nuts, washers, etc.) at mechanical joints during plant outages. When the associated system piping is pressurized during plant start up, leakage may be identified at these joints. The root cause of this leakage is most often due to thermal expansion of the piping and bolting materials and subsequent fluid seepage at the joint gasket. Proper retorquing of the bolting, in most cases, stops the leakage. Removal of the bolting to evaluate for corrosion would be unwarranted in this situation due to the new condition of the bolting materials.

3.5 Staff Evaluation

The NRC staff has reviewed the licensee's request and concludes that the evaluation process proposed by the licensee provides a sound engineering approach for evaluating the acceptability for the continued service of bolting. This evaluation considers a number of factors

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[1] The acceptance criteria for Visual, VT-1 will be used to assess the acceptability of the bolting.

including bolting materials, service age of joint bolting materials, location of the leakage, history of leakage at the joint, evidence of corrosion with the joint assembled, and corrosiveness of process fluid. This proposed alternative engineering evaluation considers all the factors necessary to identify the potential for degradation of the bolts in any leaking bolted connection. Accordingly, the use of this type of engineering evaluation is expected to result in the identification of appropriate corrective actions and to avoid unnecessary joint disassembly when the bolts are fit for service. As a result, the licensee's alternative to the Code-required removal of bolting at a joint when leakage occurs will provide an acceptable level of quality and safety since the integrity of the joint will be maintained.

The licensee noted that if a bolt has to be removed, they will perform a VT-3 examination and use VT-1 acceptance criteria. The VT-1 acceptance criteria for bolting categories B-G-1 and B-G-2 is defined in ASME Code Section XI Table IWB-2500-1. For pressure retaining bolting greater than 2" in diameter category B-G-1 the acceptance criteria is ASME Code Section XI IWB-3515. For pressure retaining bolting 2" in diameter and less category B-G-2 the acceptance criteria is ASME Code Section XI IWB-3517. These acceptance criteria are appropriate to use in this application and are therefore acceptable.

This alternative to the requirements of ASME Code, Section XI, 1998 Edition with the 2000 Addenda, Subsection IWA-5250(a)(2) is consistent with ASME Code Case N-566-2.

4.0 CONCLUSION

Based on the NRC staff's review of the information provided in the request for relief, Relief Request No. 03-003, the staff concludes that the licensee's proposed alternative to the requirements of Subsection IWA-5250(a)(2) at McGuire, Unit 2, is a technically sound engineering approach and will provide an acceptable level of quality and safety by ensuring the integrity of bolted connections. Therefore, the proposed alternative is authorized for the third 10-year ISI interval of McGuire, Unit 2, pursuant to 10 CFR 50.55a(a)(3)(i).

All other requirements of the ASME Code, Section XI, for which relief has been specially requested remain applicable, including third party review by the Authorized Nuclear Inservice Inspector.

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Date: July 30, 2004

McGuire Nuclear Station

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