

March 10, 2005

Mr. 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 - REQUEST FOR RELIEF RE:  
CLASS 3 HYDROSTATIC PRESSURE TESTS RR-02-003 (TAC NO. MC2382)

Dear Mr. Peterson:

By letter to the Nuclear Regulatory Commission (NRC) dated March 8, 2004, as supplemented by letter January 17, 2005, Duke Energy Corporation, the licensee for McGuire Nuclear Station (McGuire), Unit 2, requested an alternative to the American Society of Mechanical Engineers (ASME) *Boiler and Pressure Vessel Code* (Code), 1998 Edition through the 2000 Addenda, for Class 3, Category D-B, pressure-retaining components subject to IWD-5222 hydrostatic testing.

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 compliance with the Code requirements would result in a hardship without a compensating increase in the level of quality and safety, and that your proposed alternative will provide reasonable assurance of pressure boundary integrity of the subject components. Accordingly, the NRC staff authorizes the use of the alternative pursuant to 10 CFR 50.55a(a)(3)(ii) for the third 10-year inservice inspection interval. All other ASME Code, Section XI requirements for which relief has not been specifically requested remain applicable, including third party review by the Authorized Nuclear Inservice Inspector.

Sincerely,

*/RA/*

John A. Nakoski, 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

CLASS 3 HYDROSTATIC PRESSURE TESTS RR-02-003

DUKE ENERGY CORPORATION

MCGUIRE NUCLEAR STATION, UNIT 2

DOCKET NO. 50-370

1.0 INTRODUCTION

By letter to the Nuclear Regulatory Commission (NRC) dated March 8, 2004, as supplemented by letter January 17, 2005, Duke Energy Corporation, the licensee for McGuire Nuclear Station (McGuire), Unit 2, requested to use an alternative to the requirements of the American Society of Mechanical Engineers (ASME) *Boiler and Pressure Vessel Code* (Code), Section XI, 1998 Edition through the 2000 Addenda, for Class 3, Category D-B, pressure-retaining components subject to IWD-5222 hydrostatic testing.

2.0 REGULATORY EVALUATION

2.1 Applicable Requirements

The Inservice Inspection (ISI) of ASME Code, Class 1, 2, and 3 components shall be performed in accordance with Section XI, "Rules for ISI of Nuclear Power Plant Components," of the ASME Code and applicable 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). 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 the ASME Code, Section XI, "Rules for 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) twelve months prior to the start of the 120-month interval, subject to the limitations and

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modifications listed therein. The applicable Code of record for the third 10-year ISI for McGuire, Unit 2 is the 1998 Edition through 2000 Addenda of the ASME Code, Section XI. The McGuire, Unit 2 third 10-year ISI interval began on March 1, 2004, and ends on February 28, 2014.

### 3.0 TECHNICAL EVALUATION

#### 3.1 Systems/Components For Which Relief Is Requested

All McGuire, Unit 2, Class 3, Category D-B, pressure-retaining components subject to IWD-5222 hydro

#### 3.2 Code Requirements

Section XI, Table IWD-2500-1, of the ASME Code, 1998 Edition through the 2000 Addenda, requires a system leakage test each inspection period for Class 3 pressure-retaining components. Additionally, Table IWD-2500-1 requires a system hydrostatic test each inspection interval for these same Class 3 pressure-retaining components.

#### 3.3 Licensee's Proposed Alternative

Duke Energy Corporation requests that a Class 3 system leakage test (IWD-5221) be conducted in lieu of the Class 3 system hydrostatic test (IWD-5222).

#### 3.4 Basis for Use of Proposed Alternative

Consistent with the philosophy of ASME Code Case N-498-1, this request is based on performing the VT-2 visual examinations at nominal operating pressure in lieu of the interval hydrostatic pressure tests. A review of all Class 3 interval hydrostatic pressure tests performed at McGuire Nuclear Station to date has shown that a leak has never occurred in the base metal or in an existing weld. All leaks that have occurred have been in mechanical joints such as packing glands and body-to-bonnet connections. Additionally, the ASME Boiler & Pressure Vessel Code, Section XI Committee has determined that a hydrostatic test only increases the leakage rate from that of a leakage test run at nominal operating pressure. That is, raising the test pressure from operating pressure to hydrostatic pressure has not identified any new leakage. Therefore, performing a VT-2 visual examination at nominal operating pressure provides reasonable assurance of system integrity.

The ASME Code Committee and the Nuclear Regulatory Commission have endorsed the use of a leakage test in lieu of a hydrostatic test for Class 1 and Class 2 pressure-retaining components in the 1998 Edition through the 2000 Addenda of the Boiler & Pressure Vessel Code, Section XI. McGuire Nuclear Station 1 requested and was granted relief from this requirement for their unit 1, third interval plan via Request for Relief serial number 01-002, revision 1 (Tac No. MB2069 [ML013380096]). Therefore, the unit 2 system leakage test similarly is sufficient to determine the leakage integrity of Class 3 pressure-retaining components at an acceptable level of quality and safety.

### 3.5 Staff Evaluation

The 1998 Edition through the 2000 Addenda ASME Code, Section XI, Table IWD-2500-1, Category D-B, Pressure Retaining Components, Item D2.10 requires a system leakage test each inspection period for Class 3 pressure-retaining components. Additionally, Table IWD-2500-1, Category D-B, Item D2.20, requires a system hydrostatic test each inspection interval for these same Class 3, pressure retaining components. The licensee requested that system leakage tests be conducted in lieu of the 10-year interval hydrostatic test for Class 3, Category D-B, Item D2.20 pressure retaining components.

In its letter dated January 17, 2005, the licensee stated that when performing the system leakage tests it would meet 10 CFR 50.55a(b)(2)(xx) requirements for hold times prior to performing VT-2 visual examinations. 10 CFR 50.55a(b)(2)(xx) requires a 10 minute hold time after attaining test pressure for Class 2 and 3 components that do not normally operate during plant operations. No hold time is required for the remaining Class 2 and Class 3 components provided that the system has been in operation for at least 4 hours for insulated components or 10 minutes for uninsulated components.

Hydrostatic pressure testing frequently requires a significant effort to set up and perform due to the need to use special equipment, such as temporary attachment of test pumps and gauges, and the need for unique valve lineups. Hydrostatic testing only subjects the piping components to a small increase in pressure over the design pressure<sup>1</sup> and, therefore, does not present a significant challenge to pressure boundary integrity when compared to structural margins required by the design Code. Accordingly, hydrostatic pressure testing is primarily regarded as a means to increase the probability of leak detection during the examination of components under pressure, rather than as a measure of the structural integrity of the components.

Therefore, considering that the hydrostatic pressure tests rarely result in pressure boundary leaks that would not occur during system leakage tests, the NRC staff determined that the increased assurance of the integrity of Class 3 systems that could be achieved by the performance of a hydrostatic test is not commensurate with the significant burden of performing such a test. Furthermore, the NRC staff determined that the proposed system leakage tests

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<sup>1</sup>ASME Code requires that for operating temperatures less than 200 EF the hydrostatic test pressure is 1.1 times the design pressure and for operating temperature greater than 200 EF the hydrostatic test pressure is 1.25 times the design pressure.

with the hold times prior to the VT-2 visual examinations stated by the licensee provide reasonable assurance of leak tightness of the subject piping systems and components.

#### 4.0 CONCLUSION

Based on the above evaluation, the NRC staff concludes that compliance with Code hydrostatic testing requirements for Class 3 systems would result in a significant hardship without a compensating increase in the level of quality and safety. The licensee's proposed alternative provides reasonable assurance of structural integrity of the subject piping systems and components. Therefore, the proposed alternative is authorized, pursuant to 10 CFR 50.55a(a)(3)(ii) for the third 10-year ISI interval. All other requirements of the ASME Code, Section XI for which relief has not been specifically requested remain applicable, including third party review by the Authorized Nuclear Inservice Inspector.

Principal Contributor: T. McLellan

Date: March 10, 2005