

August 11, 2004

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 - RELIEF REQUEST NO. 04-MN-001,
RELIEF FROM THE REQUIREMENTS OF AMERICAN SOCIETY OF
MECHANICAL ENGINEERS BOILER AND PRESSURE VESSEL CODE,
SECTION XI, TO REPAIR FLAWS IN CONTAINMENT SPRAY PIPING WELDS
(TAC NO. MC2526)

Dear Mr. Peterson:

By letter to the U.S. Nuclear Regulatory Commission (NRC) dated April 2, 2004, Duke Energy Corporation, the licensee for McGuire Nuclear Station (McGuire), Unit 2, submitted a request for relief, Relief Request No. 04-MN-001, from the requirements of the American Society of Mechanical Engineers (ASME) *Boiler and Pressure Vessel Code* (Code), Section XI, 1998 Edition with the 2000 Addenda, Subparagraph IWC-3122.2. Specifically, the licensee requested to defer ASME Code, Class 2, piping repairs on two containment spray pipe welds until the end of cycle (EOC) 16 refueling outage or a forced outage of sufficient duration prior to the EOC 16 refueling outage for McGuire, Unit 2.

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 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 NRC staff authorizes the proposed alternative pursuant to Title 10 of the *Code of Federal Regulations*, Section 50.55a(a)(3)(ii), for the ASME Code, Class 2, repair of containment spray piping at McGuire, Unit 2. This relief is authorized until the EOC 16 refueling outage or a forced outage of sufficient duration prior to the EOC 16 refueling outage for McGuire, Unit 2.

Sincerely,

/RA MRoss-Lee for/

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

REQUEST TO DEFER WELD REPAIR ON CONTAINMENT SPRAY PIPING (RR-04-MN-001)

DUKE ENERGY CORPORATION

MCGUIRE NUCLEAR STATION, UNIT 2

DOCKET NUMBER 50-370

1.0 INTRODUCTION

By letter to the U.S. Nuclear Regulatory Commission (NRC) dated April 2, 2004, Duke Energy Corporation, the licensee for McGuire Nuclear Station (McGuire), Unit 2, submitted a request for relief, Relief Request No. 04-MN-001, from the requirements of the American Society of Mechanical Engineers (ASME) *Boiler and Pressure Vessel Code* (Code), Section XI, 1998 Edition with the 2000 Addenda, Subparagraph IWC-3122.2. Specifically, the licensee requested to defer ASME Code, Class 2, piping repairs on two containment spray (NS system) pipe welds until the next refueling or forced extended outage for McGuire, Unit 2.

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 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.

3.0 TECHNICAL EVALUATION

3.1 Systems/Components For Which Relief Is Requested

ASME Code, Class 2, NS system piping weld identification numbers NS2F521 and NS2F490. These welds are located on vertical runs of 8-inch diameter schedule 10 (i.e. 0.148 inch thick) stainless steel piping between the NS system heat exchangers and the NS system nozzles, after the last system isolation valve (there is a check valve and a manual isolation valve between each weld and the spray headers). The first weld is part of NS system train 2A1 piping and the second is part of NS system train 2B2 piping.

ENCLOSURE

3.2 Code Requirements

ASME Code, Section XI, 1998 Edition with the 2000 Addenda, Subsection IWC, "Requirements for Class 2 Components of Light-Water Cooled Power Plants," Subparagraph IWC-3122.2, "Acceptance by Repair/Replacement Activity."

3.3 Licensee's Proposed Alternative

Referencing ASME Code, Section XI, Subparagraph IWC-3122.3, "Acceptance by Analytical Evaluation," the licensee proposes to accept the as-found relevant conditions (i.e., through-wall flaws) for continued operation by the following two compensatory actions.

- Maintain the validity of the off-site dose analysis by monitoring boron accumulation to empirically determine changes in crack size and leakage rate. This action will be performed monthly.
- Maintain a water column in the pipe above each flawed weld to ensure containment integrity. A check to ensure water level is adequate will be performed monthly.

The proposed alternative will be used until the code repair of both NS system piping welds is performed during the end of cycle (EOC) 16 refueling outage, which is scheduled to begin in the first quarter of 2005. If a condition leads to a forced outage of sufficient duration, the repairs will be performed during the unscheduled outage.

3.4 Basis for Use of Proposed Alternative

The two NS system pipe welds that the licensee identified in its request for relief have through-wall flaws as evidenced by the visual discovery of boron deposits at the weld seams and the results of subsequent surface and volumetric examinations. Each weld had two deposits of boron located on opposite sides of the weld seam circumference. The boron was removed and a visual inspection of the welds was performed. On weld NS2F521, a crack less than 5/16" long was observed on one side of the weld seam circumference while several pin-hole leaks were observed on the other side. On weld NS2F490, no surface cracks were observed. A boron deposit approximately 3/16" long was found on one side of the weld seam circumference while a smaller deposit was noticed on the other side.

Because the piping is thin-walled, the welds could not be examined using ultrasonic methods to characterize the flaws, so they were examined by radiography. The new radiographs were compared to the original construction radiographs; but there was no significant difference between the two radiographs to indicate the presence of a flaw. The weld exam results still passed the original construction code acceptance criteria.

Performing a code repair of the weld flaws now would create a hardship for the utility based on the following concerns: 1) on-line running of welding equipment within the containment annulus in close proximity to cable routings creates an unknown risk of electromagnetic interference with operating plant electrical components/systems, 2) the repair effort will require removal of each NS system train from service but the repair work is not expected to be completed within the Technical Specification (TS) allowed 72-hour limiting condition for operation (LCO), and 3) adverse component/system cycling affects related to a plant shutdown. Neither on-line or

outage options are judged to be commensurate with the low severity nature of the identified flaws.

No compensating increase in the level of quality and safety would be gained by immediate repair of the welds. Engineering calculations and judgment provide the basis to state that the NS system piping from penetration number 2M370 (i.e., NS train 2A1) to the NS system headers, the limiting case, is very robust and capable of performing its design function.

3.5 Staff Evaluation

By letter to the NRC dated April 2, 2004, Duke Energy Corporation, the licensee for McGuire, Unit 2, submitted a request for relief, Relief Request No. 04-MN-001, from the requirements of the ASME Code, Section XI, 1998 Edition with the 2000 Addenda, Subparagraph IWC-3122.2. Specifically, the licensee requested to defer ASME Code, Class 2, piping repairs on two NS system pipe welds until the next refueling or forced extended outage for McGuire, Unit 2.

ASME Code, Section XI, Subparagraph IWC-3122.2, states that components whose examination detects flaws exceeding the acceptance standard of Table IWC-3410-1 are unacceptable for continued service until the components are corrected by repair. The proposed alternative will be used until the code repair of both NS system piping welds is performed during the EOC 16 refueling outage, which is scheduled to begin in the first quarter of 2005. If a condition leads to a forced outage of sufficient duration, the repairs will be performed during the unscheduled outage.

The two NS system pipe welds that the licensee identified in its request for relief have through-wall flaws at the weld seams. The piping material is austenitic stainless steel, 8-inch diameter schedule 10 piping and the welds were completed using the gas tungsten arc welding process. Each weld had two deposits of boron, located on opposite sides of the weld seam circumference. The boron was removed and a visual inspection of the welds was performed. On weld NS2F521, a crack less than 5/16" long was observed on one side of the weld seam circumference while several pin-hole leaks were observed on the other side. On weld NS2F490, no surface cracks were observed. A boron deposit approximately 3/16" long was found on one side of the weld seam circumference while a smaller deposit was noticed on the other side.

Because the piping is thin-walled stainless steel material, the welds were examined using radiography. The new radiographs were compared to the original construction radiographs. The comparison showed that there was no significant difference between the two radiographic sets. The flaws present in the welds that the licensee has visually observed were not detectable by radiography. The new radiographic results showed that the weld still passed the original construction code acceptance criteria.

The licensee stated that performing a code repair of the flawed weld would create a hardship for the utility based on the following concerns: 1) on-line running of welding equipment within the containment annulus in close proximity to cable routings creates an unknown risk of electromagnetic interference with operating plant electrical components/systems, 2) the repair effort will require removal of each NS system train from service but the repair work is not expected to be completed within the TS allowed 72-hour LCO, and 3) adverse component/system cycling affects related to a plant shutdown. Neither on-line or outage

options were judged to be commensurate with the low severity nature of the identified flaws. Therefore, the licensee concluded that no compensating increase in the level of quality and safety would be gained by performing an immediate ASME Code repair of the flawed welds.

In support of the April 2, 2004, request for relief, the licensee performed an operability evaluation of the NS system piping and included it as Attachments 1, 2, and 3 (Agencywide Documents Access and Management System Accession No. ML041040800). Based upon the licensee's operability evaluation, the system was determined to be operable with the following results.

- For dose consideration; the total leak rate from the cracks (0.010 gpm) is below the acceptance criteria (0.058 gpm),
- For containment integrity; a water column above the flawed welds provides a backup to the containment isolation check valves, and
- For containment structure; a civil engineering analysis determined that the flawed welds do not challenge the containment penetration or piping.

The licensee also committed to maintain the validity of the off-site dose analysis by monitoring boron accumulation on a monthly basis to determine changes in crack size and leakage rate. In addition, the licensee would maintain a water column in the pipe above each flawed weld to ensure containment integrity. A check to ensure water level is adequate would be performed monthly.

The NRC staff finds the licensee's reasoning in support of its request for relief acceptable. This finding is based on the fact that the identified flaws are very small and undetectable by radiography. The licensee has performed a comprehensive operability evaluation which showed that the calculated leak rate from the postulated cracks is below the acceptance rate for the piping. Further, the licensee would monitor the conditions of the flawed welds by monitoring the water level in the pipe above the welds and monitoring the boron accumulation on a monthly basis. The licensee's action constitutes an acceptable temporary alternative to the ASME Code requirements. In addition, the licensee has demonstrated that imposing the ASME Code requirements would create a hardship for the utility because the welding equipment within the containment annulus would have to be placed in close proximity to plant cables which could create electromagnetic interference with operating electrical components.

In addition, the repair effort is not expected to be completed within the TS allowed 72-hour LCO which would require isolation of the NS system. Such isolation is not in the best interest of plant safety, given the magnitude of the flaw and the licensee alternative program.

4.0 CONCLUSION

Based on the information provided in the licensee's submittal, 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 NRC staff authorizes the proposed alternative pursuant to 10 CFR 50.55a(a)(3)(ii), for the ASME Code, Class 2, repair of NS system piping at McGuire, Unit 2.

This relief is authorized until the EOC 16 refueling outage or a forced outage of sufficient duration prior to the EOC 16 refueling outage for McGuire, Unit 2.

All other ASME Code, Section XI, requirements for which relief was not specifically requested and authorized herein by the NRC staff remain applicable, including third party review by the Authorized Nuclear Inservice Inspector.

Principal Contributor: G. Georgiev

Date: August 11, 2004