



UNITED STATES  
NUCLEAR REGULATORY COMMISSION  
WASHINGTON, D.C. 20555-0001

September 17, 2010

Mr. Regis T. Repko  
Vice President  
McGuire Nuclear Station  
Duke Energy Carolinas, LLC  
12700 Hagers Ferry Road  
Huntersville, NC 28078

SUBJECT: MCGUIRE NUCLEAR STATION, UNIT 2 (MCGUIRE 2) – RELIEF 09-MN-001,  
FOR LIMITED WELD EXAMINATION COVERAGE (TAC NO. ME3718)

Dear Mr. Repko:

By letter dated March 23, 2009, as superseded by letters dated February 26, 2010, and August 16, 2010, Duke Energy Carolinas, LLC (the licensee) submitted relief request (RR) 09-MN-001, for McGuire 2 related to the volumetric coverage requirement for weld examinations specified in the American Society of Mechanical Engineers, *Boiler and Pressure Vessel Code* (ASME Code), Section XI. RR 09-MN-001 pertains to the volumetric examinations of the reciprocating charging pump inlet to flange weld in the chemical and volume control system. The relief is requested for McGuire 2 for the duration of the third 10-year inservice inspection (ISI) interval which is scheduled to end on March 1, 2014.

The U.S. Nuclear Regulatory Commission (NRC) staff has reviewed the licensee's submittal and, based on the information provided in the licensee's RR, the NRC staff has determined that compliance with the ASME Code requirements for volumetric coverage of the subject weld is impractical due to the component configuration. If the ASME Code requirements were to be imposed on the licensee, the components would need to be redesigned, which would impose a burden on the licensee. The NRC staff finds the examination coverage of the accessible weld volume, as complemented by the additional examinations performed by the licensee, provide reasonable assurance of structural integrity of the subject weld. Therefore, relief is granted pursuant to Title 10 of the *Code of Federal Regulations* (10 CFR), Part 50, Section 50.55a(g)(6)(i) for the duration of the third 10-year ISI interval of McGuire 2 which is scheduled to end on March 1, 2014.

This relief is authorized by law and will not endanger life or property or the common defense and security, and is otherwise in the public interest giving due consideration to the burden upon the licensee if the requirements were imposed on the facility.

R. Repko

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

Sincerely,



Gloria Kulesa, Chief  
Plant Licensing Branch II-1  
Division of Operating Reactor Licensing  
Office of Nuclear Reactor Regulation

Docket No. 50-370

Enclosure:  
As stated

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UNITED STATES  
NUCLEAR REGULATORY COMMISSION  
WASHINGTON, D.C. 20555-0001

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

OF THIRD 10-YEAR INTERVAL INSERVICE INSPECTION

RELIEF NO. 09-MN-001

DUKE ENERGY CAROLINAS, LLC

MCGUIRE NUCLEAR STATION, UNIT 2

DOCKET NO. 50-370

1.0 INTRODUCTION

By letter dated March 23, 2009 (Agencywide Documents Access and Management System (ADAMS), Accession No. ML090900514), as supplemented by letters dated February 26, 2010 (ADAMS Accession No. ML100680433), and August 16, 2010 (ADAMS Accession No. ML102360177), Duke Energy Carolinas, LLC (the licensee) submitted relief request (RR) 09-MN-001, to the U.S. Nuclear Regulatory Commission (NRC) for review and approval. Pursuant to Title 10 of the *Code of Federal Regulations* (10 CFR), Part 50, Section 50.55a(g)(5)(iii), the licensee requested relief from the volumetric coverage requirement for weld examinations specified in the American Society of Mechanical Engineers, *Boiler and Pressure Vessel Code* (ASME Code), Section XI, "Rules for Inservice Inspection of Nuclear Power Plant Components." RR 09-MN-001 pertains to the volumetric examinations of the reciprocating charging pump inlet to flange weld in the chemical and volume control system. The relief is requested for McGuire Nuclear Station, Unit 2 (McGuire 2), for the duration of the third 10-year inservice inspection (ISI) interval which began on March 1, 2004, and is scheduled to end on March 1, 2014.

2.0 REGULATORY EVALUATION

Section 50.55a(g) specifies that ISI of nuclear power plant components shall be performed in accordance with the requirements of the ASME Code, Section XI, except where specific written relief has been granted by the Commission pursuant to 10 CFR 50.55a(g)(6)(i). The regulation at 10 CFR 50.55a(g)(6)(i) states that the Commission may grant such relief and may impose such alternative requirements as it determines is authorized by law and will not endanger life or property or the common defense and security and is otherwise in the public interest, given the consideration of the burden upon the licensee. The regulation at 10 CFR 50.55a(a)(3) states that alternatives to the requirements of paragraph (g) may be used, when authorized by the NRC, if (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. Section 50.55a(g)(5)(iii) states that if the licensee has determined that conformance with certain code requirements is impractical for its facility, the licensee shall notify the Commission and submit, as specified in Section 50.4, information to support the determinations.

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, to the extent practical within the limitations of design, geometry, and materials of construction of 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 of 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.

### 3.0 TECHNICAL EVALUATION

#### 3.1 Applicable Code Edition and Addenda

The 1998 Edition through 2000 Addenda to the ASME Code, Section XI, is the code of record for the third 10-year ISI Program at McGuire 2. The relief is requested for the third 10-year ISI interval which began on March 1, 2004, and ends on March 1, 2014.

#### 3.2 ASME Code Components Affected

Code Class: Class 2  
System: Chemical and Volume Control System  
Examination Category: R-A  
Code Component: Risk-Informed Piping Examination  
Code Item No.: R1.11

The weld for which relief is requested is listed below.

<b>System / Component</b>	<b>Weld ID No.</b>	<b>Component Material</b>
Chemical and Volume Control System, Reciprocating Charging Pump Inlet to Flange Weld	2RCHP-IN	Stainless Steel

Weld 2RCHP-IN has a wall thickness of 0.237 inches and a nominal diameter of 4.0 inches.

#### 3.3 Applicable Code Requirement

The examination requirements for ASME Code Class 1 and 2 piping welds at McGuire 2 are governed by the risk-informed (RI)-ISI Program which is based on the NRC-approved Westinghouse Owners Group Topical Report WCAP-14572, Rev. 1-NP-A, "Westinghouse Owners Group Application of Risk-Informed Methods to Piping Inservice Inspection Topical Report," (Ref. 1). By letter dated June 12, 2002 (Ref. 2), the NRC staff authorized the inclusion of the RI-ISI Program as an acceptable alternative to the ASME Code, Section XI, requirements for ASME Code Class 1 piping welds, Examination Categories B-F and B-J, and ASME Code Class 2 piping welds, Examination Categories C-F-1 and C-F-2, for the third 10-year ISI interval of McGuire 2.

By letter dated May 1, 2006 (Ref. 3), the NRC staff authorized the licensees who have already implemented RI-ISI Programs based on the original WCAP-14572, Rev. 1-NP-A, to incorporate,

without requesting relief, the modifications in WCAP-14572, Rev. 1-NP-A, Supplement 2, "Westinghouse Owners Group Application of Risk-Informed Methods to Piping Inservice Inspection Topical Report Clarifications," (Ref. 4) and to make changes to their ISI Programs in accordance with the provisions of 10 CFR 50.59, if the evaluation criteria are met.

In a response to the NRC staff's request for additional information (RAI) dated February 26, 2010, the licensee stated that the modifications in WCAP-14572, Rev. 1-NP-A, Supplement 2, have been incorporated to the RI-ISI Program of McGuire 2. WCAP-14572, Rev. 1-NP-A, Supplement 2 (Ref. 4), Table 4.1-1, Examination Category R-A, Risk-Informed Piping Examinations, Item No. R1.11 requires 100% examination coverage for the areas and/or volumes as identified in Figure IWB-2500 8(C).

McGuire 2 has also adopted ASME Code Case N-460, "Alternative Examination Coverage for Class 1 and Class 2 Welds," for its ISI Program which is applicable when the entire examination volume or area cannot be examined due to interference by another component or part geometry. Under such circumstances, ASME Code Case N-460 allows a reduction in examination coverage on any Class 1 or Class 2 weld, provided the reduction in coverage for that weld is less than 10%. ASME Code Case N-460 has been approved for use by the NRC staff in Regulatory Guide 1.147, Rev. 15.

#### 3.4 Impracticality and/or Burden Caused by Code Compliance

The licensee requested relief from the requirement to examine 100% of the required volume specified in ASME Code, Section XI. As stated by the licensee, the volumetric examinations of Weld 2RCHP-IN using radiographic testing (RT) do not meet the 100% examination coverage requirements. The required examination area for Weld 2RCHP-IN includes the 0.625-inch weld width and 0.250 inches on both sides of the weld. However, limitations from the pipe flange to pump inlet configuration do not allow for RT film placement to capture the radiographic image of the 0.250 inch of base metal on the pump side of the examination area. The licensee stated that the weld would have to be redesigned to obtain additional coverage to meet the ASME Code, Section XI, IWB-2500 examination coverage requirements which would be an undue burden.

The licensee stated that during RT examinations of Weld 2RCHP-IN, only 78.0% coverage of the required examination volume was obtained due to the geometry of the pipe flange-to-pump inlet weld. Examinations included 100% of the volume of Weld 2RCHP-IN and the required base metal on the flange side. The interferences from pump housing restricted access to the base metal on the pump housing side of Weld 2RCHP-IN. Weld 2RCHP-IN would have to be redesigned to provide the Code-required coverage. In the volume covered by RT examinations, rejectable fabrication flaws were detected in the weld metal. Weld 2RCHP-IN was repaired by welding in March 2008, reexamined by RT in April 2008, and found to be acceptable. The aforementioned examination limitations were encountered in the April 2008 examinations of the subject weld and only 78.0% coverage of the required examination volume was obtained.

### 3.5 Proposed Alternative Examination

According to the licensee, there are no viable alternative examination techniques available and the ultrasonic testing (UT) would not provide additional examination coverage due to the aforementioned component configuration limitations.

### 3.6 Justification for Granting Relief

The licensee stated that the RT examination was performed using personnel and procedures qualified in accordance with the 1998 Edition through 2000 Addenda to ASME Code, Section V, Article 2.

The licensee stated that the visual examinations (VT-2), in conjunction with the system leakage testing each refueling outage, provide adequate assurance of pressure boundary integrity. The licensee stated that, in addition to the Code-required examinations (volumetric and pressure testing), there are other activities which provide confidence that, in the event that leakage did occur through Weld 2RCHP-IN, it would be detected and proper action would be taken. Specifically, the visual observations performed during operator rounds provide additional assurance that any leakage would be detected prior to gross failure of the component. Further, the licensee stated that the leakage at Weld 2RCHP-IN would likely be detected during the leak rate test, as required by Technical Specification (TS) 5.5.3, "Primary Coolant Sources Outside Containment," for the chemical and volume control system on a refueling frequency.

The licensee stated that the component Weld 2RCHP-IN was not volumetrically examined during construction.

In addition to Weld 2RCHP-IN in this segment, the licensee examined by UT one additional weld from the same segment during this outage due the Code-required sample expansion. The UT examinations of the additional weld did not identify any recordable indications and greater than 90.0% volumetric coverage was obtained on this additional weld.

The licensee stated that, based on the coverage and results of the volumetric examinations, VT-2, and the pressure testing performed, and the state of the additional weld in this segment that was found to be free from unacceptable fabrication defects, reasonable assurance of component integrity exists.

### 3.7 Duration of Relief

RR 09-MN-001 was submitted for approval for the duration of the third 10-year ISI interval for McGuire 2 which began on March 1, 2004, and is scheduled to end on March 1, 2014.

### 3.8 NRC Staff Evaluation

The NRC staff has evaluated the information provided in RR 09-MN-001 and the supplemental letters dated February 26, 2010, and August 16, 2010, submitted in response to the NRC staff's RAI. The licensee requested relief from the requirements to examine 100% of the volume specified by ASME Code, Section XI.

The examination requirements for Class 2 piping welds at McGuire 2 are governed by the RI-ISI Program which are based on WCAP-14572, Rev. 1-NP-A (Ref. 1) and its Supplement 2 (Ref. 4). The RI-ISI Program at McGuire 2 has been accepted by the NRC staff as an alternative to the ASME Code, Section XI, requirements for Class 2 piping welds, Examination Categories C-F-1 and C-F-2, for the third 10-year ISI interval of McGuire 2 (Ref. 2).

ASME Code Case N-460, which has been approved for use by the NRC staff in Regulatory Guide 1.147, Rev. 15, allows for a reduction in coverage for volumetric or surface examinations of welds, provided that greater than 90% of the required volume or surface has been examined.

The NRC staff has determined that in March 2008, the licensee's best effort volumetric examinations of Weld 2RCHP-IN by RT with component configuration limitations achieved volumetric coverage of 78.0%. The licensee stated that rejectable fabrication flaws were detected in the subject weld during this examination. In response to the NRC staff's RAI, the licensee confirmed that the fabrication flaws were completely removed before Weld 2RCHP-IN was repaired. In addition, the licensee performed the penetrant testing (PT) examinations of excavated areas prior to welding to ensure that the fabrication flaws were not extended into the pipe housing weld or the base materials. Further, the licensee stated that the surface examinations were not performed on the limited portion of the areas of Weld 2RCHP-IN that could not be volumetrically examined because the RI-ISI Program did not require this weld to have surface examination. The NRC staff has determined that the licensee's best effort volumetric examinations of Weld 2RCHP-IN following the repair in April 2008 achieved the same volumetric coverage (i.e. 78.0%) and found the weld to be acceptable.

The licensee stated that Weld 2RCHP-IN is the pipe flange-to-pump housing inlet weld for which the required examination area includes the 0.625-inch weld width and 0.250 inches on both sides of the weld. However, limitations from the pipe flange-to-pump housing inlet configuration do not allow for RT film placement to capture the radiographic image of the 0.250 inch of base metal on the pump side of the examination area. The NRC staff has determined that the examination coverage of Weld 2RCHP-IN was reduced due to limitations from component configuration and geometry which restricted the volumetric examinations to the percentage identified above.

The NRC staff has determined that the licensee has performed the Code required VT-2 and system leakage tests every refueling outage. No through-wall leakage has been reported for the subject weld by the licensee. In addition to the Code-required examinations (volumetric and pressure testing), the licensee stated that the visual observations have been performed during operator rounds which provide additional assurance that any leakage would be detected prior to gross failure of the component. Further, in the event leakage did occur through this weld, it would likely be detected during the leak rate test, as required by TS 5.5.3 for the chemical and volume control system on a refueling frequency.

The licensee stated that an alternative volumetric examination method such as UT would not provide additional examination coverage due to the component configuration limitations. However, the licensee stated that there was one additional weld in the same segment of Weld 2RCHP-IN that was examined by UT during this outage. The UT examinations did not identify any recordable indications and greater than 90.0% volume coverage was obtained on this additional weld.

Therefore, the NRC staff has determined that the licensee's limited RT examination coverage of the subject weld, as complemented by additional examinations, provide reasonable assurance of structural integrity. In order to meet the ASME Code requirements, the components would have to be redesigned, fabricated, and installed in the systems, which would impose a burden on the licensee. Based on the component configuration and examination limitations, it is impractical for the licensee to meet the ASME Code coverage requirements.

#### 4.0 CONCLUSION

The NRC staff concludes that compliance with the ASME Code requirements for volumetric coverage of the subject weld is impractical due to the component configuration. If the ASME Code requirements were to be imposed on the licensee, the components must be redesigned, which would impose significant burden on the licensee. The NRC staff finds the examination coverage of the accessible weld volume, as complemented by the additional examinations performed by the licensee, provide reasonable assurance of structural integrity of the subject weld. Therefore, relief is granted pursuant to 10 CFR 50.55a(g)(6)(i) for the duration of the third 10-year ISI interval of McGuire 2 which began on March 1, 2004, and is scheduled to end on March 1, 2014. This relief is authorized by law and will not endanger life or property or the common defense and security, and is otherwise in the public interest giving due consideration to the burden upon the licensee if the requirements were imposed on the facility.

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

#### 5.0 REFERENCES

1. "Westinghouse Owners Group Application of Risk-Informed Methods to Piping Inservice Inspection Topical Report," Westinghouse Owners Group Topical Report WCAP-14572, Revision 1-NP-A, February 1999, ADAMS Accession No. ML012630349.
2. Letter dated June 12, 2002, J. A. Nakoski, U.S. NRC, to H. B. Barron, Duke Energy Corporation, "McGuire Nuclear Station, Units 1 and 2: Request to Use Risk-Informed Inservice Inspection Program, Relief Requests 01-005 and 01-008, (TAC Nos. MB2375, MB2376, MB2377 AND MB2378)," ADAMS Accession No. ML021480421.
3. Letter dated May 1, 2006, H. K. Nieh, U.S. NRC, to G. Bischoff, PWR Owners Group Program Management Office, "Final Safety Evaluation for Pressurized Water Reactor (PWR) Owners Group Topical Report WCAP-14572, Revision 1-NP-A, Supplement 2, "Westinghouse Owners Application of Risk-Informed Methods to Piping Inservice Inspection Topical Report Clarifications, (TAC No. MC3979)," ADAMS Accession No. ML061160035.

4. "Westinghouse Owners Group Application of Risk-Informed Methods to Piping Inservice Inspection Topical Report Clarifications," Westinghouse Owners Group Topical Report WCAP-14572, Revision 1-NP-A, Supplement 2, August 10, 2004 (ADAMS Accession No. ML042390336).

Principal Contributor: A. Rezai, NRR

Date: September 17, 2010

R. Repko

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

Sincerely,

*/RA/*

Gloria Kulesa, Chief  
Plant Licensing Branch II-1  
Division of Operating Reactor Licensing  
Office of Nuclear Reactor Regulation

Docket No. 50-370

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