



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

August 19, 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 1 (MCGUIRE 1) – RELIEF 09-MN-006,
REV. 1, FOR LIMITED WELD EXAMINATION COVERAGE
(TAC NO. ME2282)

Dear Mr. Repko:

By letter dated August 31, 2009, as superseded by letter dated December 17, 2009, and as supplemented by letter dated August 11, 2010, Duke Energy Carolinas, LLC (the licensee), submitted relief request (RR) 09-MN-006, Rev. 1, for McGuire 1 related to volumetric coverage requirements for weld examinations specified in the American Society of Mechanical Engineers *Boiler and Pressure Vessel Code* (ASME Code), Section XI. RR 09-MN-006, Rev. 1, pertains to the volumetric examinations of a full coupling to pipe weld (a pipe butt weld to reducer) in the safety injection system. The relief is requested for McGuire 1 for the duration of the third 10-year inservice inspection (ISI) interval which is scheduled to end on December 1, 2011.

The NRC staff has reviewed the licensee's submittal and, based on the information provided in the licensee's request for relief, the NRC staff has determined that compliance with the Code requirements for volumetric coverage of the subject weld is impractical due to the component configuration. If the Code requirements were to be imposed on the licensee, the components must 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 10 CFR 50.55a(g)(6)(i) for the duration of the third 10-year ISI interval of McGuire 1 which is scheduled to end on December 1, 2011. 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. 50-369

Enclosure:
Relief

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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-006, REV. 1

DUKE ENERGY CAROLINAS, LLC

MCGUIRE NUCLEAR STATION, UNIT 1

DOCKET NOS. 50-369

1.0 INTRODUCTION

By letter dated August 31, 2009 (Agencywide Documents Access and Management System (ADAMS), Accession No. ML092520239), as superseded by letter dated December 17, 2009 (ADAMS Accession No. ML093631561), and as supplemented by letter dated August 11, 2010 (ADAMS Accession No. ML102300097), Duke Energy Carolinas, LLC (the licensee), submitted relief request (RR) 09-MN-006, Rev. 1, 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. RR 09-MN-006, Rev. 1, pertains to the volumetric examinations of a full coupling to pipe weld (a pipe butt weld to reducer) in the safety injection system. The relief is requested for McGuire Nuclear Station, Unit 1 (McGuire 1) for the duration of the third 10-year inservice inspection (ISI) interval which is scheduled to end on December 1, 2011.

2.0 REGULATORY EVALUATION

The regulation at 10 CFR 50.55a(g) specifies that ISIs of nuclear power plant components shall be performed in accordance with the requirements of 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. The regulation at 10 CFR 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.

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, "Rules for In-service Inspection of Nuclear Power Plant Components," to the extent practical within the limitations of design, geometry, and materials of construction of components. The regulations require that in-service 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 ASME Code Edition and Addenda

The 1998 Edition through 2000 Addenda to ASME Code, Section XI, is the code of record for the third 10-year ISI program at McGuire 1. In addition, the volumetric examinations are to be conducted in accordance with Appendix VIII, Supplement 2 of the 1998 Edition through 2000 Addenda to ASME Code, Section XI.

3.2 ASME Code Components Affected

Code Class: Class 2
System: Safety Injection 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.

System / Component	Weld ID No.	Component Material
Safety Injection System; Pipe Butt Weld to Reducer	1NI231-1	Stainless Steel

Weld 1NI231-1 has a wall thickness of 0.281 inch and a nominal diameter of 1.50 inches.

3.3 Applicable ASME Code Requirement

The examination requirements for ASME Code Class 1 and 2 piping welds at McGuire 1 are governed by the risk-informed (RI)-ISI program which is based on the NRC-approved Westinghouse Owners Group Topical Report (TR) WCAP-14572, Rev. 1-NP-A, "Westinghouse Owners Group Application of Risk-Informed Methods to Piping Inservice Inspection Topical Report," (ADAMS Accession No. ML012630349). By letter dated June 12, 2002 (ADAMS Accession No. ML021480421), the NRC 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 1. TR

WCAP-14572, Rev. 1-NP-A, 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 IWC-2500-7(a).

McGuire 1 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 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 in Regulatory Guide (RG) 1.147, Rev. 15 (ADAMS Accession No. ML072070419).

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. Due to limitations from the geometry of the taper on the reducer, the volumetric examinations of Weld 1NI231-1 using ultrasonic testing (UT) do not meet the 100% coverage requirements. UT examination of Weld 1NI231-1 resulted in only 77.5% coverage of the required volume using 45° and 60° shear waves in the axial direction and 38° shear waves in the circumferential direction. In addition, a supplemental examination from the reducer side was performed using 70° shear waves; this is not included in the percent of coverage because qualification for examination of the far side of the weld does not exist. There were no recordable indications found during the examination of Weld 1NI231-1.

The licensee stated that the weld and components would have to be redesigned to obtain additional coverage to meet the ASME Code, Section XI, IWC-2500 examination coverage requirements which would be an undue burden.

3.5 Proposed Alternative Examinations

The licensee stated that radiographic testing (RT) is not a desired option because RT is limited in the ability to detect service-induced degradation mechanisms such as thermal fatigue cracking and stress corrosion cracking initiating at the pipe inside surface. Additionally, RT has not been subjected to the performance demonstration requirements in a manner similar to UT.

The licensee also stated that an alternate butt weld from within Risk Segment NI-063B cannot be selected for examination in lieu of Weld 1NI231-1 because there is only one other butt weld (Weld 1NI270B-13) in Risk Segment NI-063B and this weld was examined during the McGuire 1 refueling outage 1EOC19. The examination of Weld 1NI270B-13 was acceptable with examination coverage greater than 90%.

3.6 Justification for Granting Relief

The licensee stated that the UT of Weld 1NI231-1 was conducted using personnel, equipment, and procedures qualified in accordance with the requirements in Appendix VIII, Supplement 2, of the 1998 Edition through 2000 Addenda of ASME Code, Section XI, as administered by the Performance Demonstration Initiative (PDI). There were no recordable indications found during the examination of Weld 1NI231-1.

The licensee stated that the ASME Code, Section XI, IWC-5220, "System Leakage Test," performed each inspection period provides adequate assurance of pressure boundary integrity. Visual examination (VT-2) was performed in conjunction with the system leakage test on October 23, 2008, for the piping segment containing Weld 1NI231-1. No leakage was detected.

The licensee stated that, in the event that leakage did occur through the weldment, it would be detected by the reactor coolant system (RCS) leakage detection instrumentations and routine RCS leakage calculations, and proper action would be taken. Technical Specification (TS) 3.4.15 requires the RCS leakage detection instrumentation to be operable during Modes 1 through 4. The RCS leakage detection instrumentation is comprised primarily of the containment atmosphere particulate radioactivity monitors, containment sump level instrumentation, and the containment ventilation unit condensate drain tank level monitor. Similarly, TS Surveillance Requirement 3.4.13.1 requires that an RCS mass balance be performed every 72 hours. The periodic RCS leakage calculations and the RCS leakage detection instrumentations provide early detection capability in the event of weldment leakage, whereby mitigative actions could be taken prior to catastrophic component failure.

The licensee stated that the component weld was volumetrically examined during construction and verified to be free from unacceptable fabrication defects.

The licensee stated that, based on the above information a reasonable assurance of component integrity exists.

3.7 Duration of Relief

RR 09-MN-006, Rev. 1, is submitted for approval for the duration of the third 10-year ISI interval at McGuire 1 which is scheduled to end on December 1, 2011.

3.8 NRC Staff's Evaluation Summary

The NRC staff has evaluated the information provided in RR 09-MN-006, Rev. 1, in support of the volumetric examinations of Weld 1NI231-1. The licensee requested relief from the requirements to examine 100% of the volume specified by the ASME Code, Section XI.

The examination requirements for Class 2 piping welds at McGuire 1 are governed by the RI-ISI program which is based on TR WCAP-14572, Rev. 1-NP-A. The RI-ISI program has been authorized by the NRC as an acceptable 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 1.

ASME Code Case N-460, which has been approved for use by the NRC in Regulatory Guide (RG) 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 the licensee's best effort volumetric examinations achieved volumetric coverage of 77.5% for Weld 1NI231-1. The percentage of volumetric coverage represented the aggregate coverage using 45° and 60° shear waves in the axial direction and 38° shear waves in the circumferential direction. The 45° shear wave axially scanned the weld

from the pipe side and the 60° shear wave axially scanned the weld from the reducer side. The 38° shear wave circumferentially scanned the weld from the pipe side in the clockwise direction and from the reducer side in the counterclockwise direction. There were no recordable indications found in the volume covered by the UT examinations. The NRC staff has determined that the volumetric examination coverage was reduced due to limitation from the geometry of the taper on the reducer. In order for the licensee to achieve the Code-required coverage, the weld and component would have to be redesigned which would be an undue burden.

In addition, the licensee performed a supplemental examination from the reducer side using 70° shear waves. However, the licensee did not include the 70° shear wave examinations in the percent of coverage because qualification for examination of the far side of the weld does not exist. There were no recordable indications found in the volume covered by this examination.

The NRC staff has determined that the licensee has performed the Code-required VT-2 examination in conjunction with system leakage tests each inspection period. The licensee reported that the VT-2 examination was performed on October 23, 2008, for the piping segment containing Weld 1NI231-1 and no leakage was detected. The licensee stated that in the event that leakage did occur through the weldment, the leakage would be detected by the RCS leakage detection instrumentations and the routine RCS leakage calculations prior to catastrophic component failure.

Therefore, the NRC staff has determined that the licensee's limited volumetric examinations of the subject weld, as supplemented by additional examinations, provide reasonable assurance of structural integrity. In order to meet the 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 access limitations, it is impractical for the licensee to meet the Code coverage requirements.

4.0 CONCLUSION

The NRC staff concludes that compliance with the Code requirements for volumetric coverage of the subject weld is impractical due to the component configuration. If the Code requirements were to be imposed on the licensee, the components must 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 10 CFR 50.55a(g)(6)(i) for the duration of the third 10-year ISI interval of McGuire 1 which is scheduled to end on December 1, 2011. 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 In service Inspector.

Principal Contributors: A. Rezai, NRR
C. Nove, NRR

Date: August 19, 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. 50-369

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