May 25, 2007

Mr. G. R. Peterson
Vice President
McGuire Nuclear Station
Duke Power Company LLC
12700 Hagers Ferry Road
Huntersville, NC 28078

SUBJECT: MCGUIRE NUCLEAR STATION, UNIT 2, REQUEST FOR RELIEF 05-MN-003, FOR SECOND 10-YEAR INTERVAL INSERVICE INSPECTION PROGRAM PLAN (TAC NOS. MD2144, MD2146, MD2147, MD2148, MD2149, MD2150, MD2151, AND MD2152)

Dear Mr. Peterson:

By letter dated May 12, 2006, as supplemented letter dated March 26, 2007, Duke Power Company LLC (the licensee), submitted Relief Request No. 05-MN-003, for its Second 10-Year Interval Inservice Inspection (ISI) Program Plan for McGuire Nuclear Station, Unit 2. The licensee requested approval of proposed alternatives to the American Society of Mechanical Engineers (ASME), *Boiler and Pressure Vessel Code* (Code), 1989 edition with no addenda, for welds 2RPV-W03, 2RPV-W01, 2RPV-W15-SE, 2RPV-W17-SE, 2RPV-W18-SE, 2NC2F-1-1, 2NC2F-3-1, and 2NC2F-4-1. The licensee submitted the relief request as a result of limited weld coverage following ISI examinations during refueling outage 16.

The Nuclear Regulatory Commission (NRC) staff has reviewed the licensee's submittal and, based on the information provided, concludes that compliance with the specified ASME Code requirements for welds 2RPV-W03, 2RPV-W15-SE, 2RPV-W17-SE, 2RPV-W18-SE, 2NC2F-1-1, 2NC2F-3-1, and 2NC2F-4-1 is impractical and that the volumetric examinations performed during refueling outage 16 provide reasonable assurance of structural integrity of the subject welds. Therefore, relief is granted pursuant to Title 10 of the *Code of Federal Regulations*, Part 50, Section 50.55a(g)(6)(i) for the second 10-year ISI interval at McGuire Nuclear Station, Unit 1. The staff has determined that granting relief pursuant to 10 CFR 50.55a(g)(6)(i) 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 that could result if the requirements were imposed on the facility.

The NRC staff has reviewed the licensee's submittal and, based on the information provided, concludes that for weld 2RPV-W01, the licensee is in compliance with the specified ASME Code requirements and relief is not needed.

The enclosed Safety Evaluation contains the NRC staff's evaluation and conclusions.

Sincerely,

/RA/

Evangelos C. Marinos, Chief
Plant Licensing Branch II-1
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

Docket No. 50-370

Enclosure:
Safety Evaluation

cc w/encl: See next page

May 25, 2007

The enclosed Safety Evaluation contains the NRC staff's evaluation and conclusions.

Sincerely,

/RA/

Evangelos C. Marinos, Chief
Plant Licensing Branch II-1
Division of Operating Reactor Licensing
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Safety Evaluation

cc w/encl: See next page

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SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

OF SECOND 10-YEAR INTERVAL INSERVICE INSPECTION

REQUEST FOR RELIEF NO. 05-MN-003

DUKE POWER COMPANY, LLC

MCGUIRE NUCLEAR STATION, UNIT 2

DOCKET NO. 50-370

1.0 INTRODUCTION

By letter dated May 12, 2006 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML061500093), as supplemented March 26, 2007 (ADAMS Accession No. ML070940298) Duke Power Company LLC, the licensee, submitted Request for Relief 05-MN-003 from requirements of the American Society of Mechanical Engineers (ASME), *Boiler and Pressure Vessel Code* (Code), Section XI, *Rules for Inservice Inspection of Nuclear Power Plant Components* for McGuire Nuclear Station, Unit 2 (McGuire 2). The licensee submitted the relief request as a result of limited weld coverage following inservice inspection (ISI) examinations during refueling outage 16. Table 1 below provides a list of the welds and their associated systems. The Nuclear Regulatory Commission (NRC) has reviewed and evaluated the information provided by the licensee.

2.0 REGULATORY REQUIREMENTS

Inservice inspection (ISI) of the ASME Code Class 1, 2, and 3 components is performed in accordance with Section XI of the Code and applicable addenda as required by Title 10 of the *Code of Federal Regulations* (10 CFR), Part 50, Section 50.55a(g), except where specific relief has been granted by the NRC 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 (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, "Rules for Inservice Inspection 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 modifications listed therein. The ASME Code of record for the McGuire 2 second 10-year interval inservice inspection program, which began on March 1, 1994, and ended on June 1, 2005, is the 1989 edition with no addenda of Section XI of the ASME Code. The NRC in its safety evaluation dated July 20, 2004, approved an extension of the second 10-year ISI program interval end date to June 1, 2005.

3.0 EVALUATION

The Table below is a listing of the welds and their associated systems, the licensee is requesting relief from and proposing alternatives to the Code due to limited weld examination coverage.

TABLE 1

List Number	Limited Area/Weld I.D. Number	System/Component for Which Relief is Requested: Area or Weld to be Examined	Code Requirement from Which Relief is Requested: 100% Exam Volume Coverage Exam Category Item No. Fig. No. Limitation Percentage
1.	2RPV-W03	NC System Reactor Vessel Lower Shell-to-Lower Head Circumferential Weld	ASME Code, Section XI, Table IWB-2500-1, Exam Category B-A Item No. B01.011.003 Fig. IWB-2500-1 72.6% Volume Coverage (COVERAGE LIMITATION)
2.	2RPV-W01	NC System Reactor Vessel Lower Head-to-Bottom Head Circumferential Weld	ASME Code, Section XI, Table IWB-2500-1, Exam Category B-A Item No. B01.021.002 Fig. IWB-2500-3 87.19% Volume Coverage (COVERAGE LIMITATION)
3.	2RPV-W15-SE	NC System Reactor Vessel Outlet Nozzle-to-Safe End Weld (22 Degrees)	ASME Code, Section XI, Table IWB-2500-1, Exam Category B-F Item No. B05.010.005 and B05.010.005A Fig. IWB-2500-8 84.38% Volume Coverage (COVERAGE LIMITATION)

List Number	Limited Area/Weld I.D. Number	System/Component for Which Relief is Requested: Area or Weld to be Examined	Code Requirement from Which Relief is Requested: 100% Exam Volume Coverage Exam Category Item No. Fig. No. Limitation Percentage
4.	2RPV-W17-SE	NV System Reactor Vessel Outlet Nozzle-to-Safe End Weld (202 degrees)	ASME Code, Section XI, Table IWB-2500-1, Exam Category B-F Item No. B05.010.007 and B05.010.007A Fig. IWB-2500-8 80.24% Volume Coverage (COVERAGE LIMITATION)
5.	2RPV-W18-SE	NV System Reactor Vessel Outlet Nozzle-to-Safe End Weld (338 degrees)	ASME Code, Section XI, Table IWB-2500-1, Exam Category B-F Item No. B05.010.008 and B05.010.008A Fig. IWB-2500-8 83.34% Volume Coverage (COVERAGE LIMITATION)
6.	2NC2F-1-1	NC System Reactor Vessel Outlet Nozzle-to-safe End Weld (22 degrees)(pipe side scan)	ASME Code, Section XI, Table IWB-2500-1, Exam Category B-F Item No. B05.130.001 and B05.130.001A Fig. IWB-2500-8 84.38% Volume Coverage (COVERAGE LIMITATION)
7.	2NC2F-3-1	NV System Reactor Vessel Outlet Nozzle-to-Safe End Weld (202 degrees) (pipe side scan)	ASME Code, Section XI, Table IWB-2500-1, Exam Category B-F Item No. B05.130.009 and B05.130.009a Fig. IWB-2500-8 80.24% Volume Coverage (COVERAGE LIMITATION)

List Number	Limited Area/Weld I.D. Number	System/Component for Which Relief is Requested: Area or Weld to be Examined	Code Requirement from Which Relief is Requested: 100% Exam Volume Coverage Exam Category Item No. Fig. No. Limitation Percentage
8.	2NC2F-4-1	NV System Reactor Vessel Outlet Nozzle-to-safe End Weld (338 degrees)(pipe side scan)	ASME Code, Section XI, Table IWB-2500-1, Exam Category B-F Item No. B05.130.013 and B05.130.013 A Fig. IWB-2500-8 83.34% Volume Coverage (COVERAGE LIMITATION)

3.1 Weld 2RPV-W03 NC System Reactor Vessel Lower Shell to Lower Head Circumferential Weld

3.1.1 Code Requirements from Which Relief is Requested

The ASME Code, Section XI, Table IWB-2500-1, Category B-A, Item No. B1.11 reactor pressure vessel (RPV) lower shell-to-lower head circumferential weld, requires volumetric examination of essentially 100% of the inspection volume defined in figure IWB-2500-1 for Weld 2RPV-W03.

3.1.2 Licensee's Basis for Relief Request (As Stated)

RPV Lower Shell-to-Lower Head Circumferential Weld 2RPV-W03

(The [RPV] Lower Shell-to-Lower Head Circumferential Weld [2RPV-W03] is carbon steel. The thickness of this weld is 5.300 inches.) During the ultrasonic examination of this weld, 100% coverage of the required examination volume could not be obtained. Coverage was limited due to the proximity of six Core Support Lugs. Scanning was conducted between and below the obstructing lugs with the scan boundaries maximized by visually assisted positioning of the exam head so that scan starts and stops were as close to the support lugs as tool configuration allowed. Beam angles dual element 45 degree refracted L-wave, single element 45 degree L-waves and single element 45 shear wave were used for this examination. This percentage represents the aggregate coverage of all scans performed on the weld and base material. In order to achieve more coverage, the six Core Support Lugs would have to be moved to allow greater access for scanning, this would be impractical. There were no recordable indications found during the inspection of this weld.

3.1.3 Proposed Alternative Examinations or Testing

The scheduled 10-year code examination was performed on the referenced area/welds and it resulted in the noted limited coverage of the required ultrasonic volume. No additional examinations are planned for the area/weld during the current inspection interval.

3.1.4 Justification for Granting Relief

Ultrasonic examination of Reactor Pressure Vessel (RPV) lower shell-to-lower head circumferential weld 2RPV-W03 was conducted using personnel, equipment and procedures qualified in accordance with ASME Section XI, Appendix VIII, 1995 edition with the 1996 addenda as modified by 10 CFR 50.55a(b)(2)(xiv, xv and xvi). Although 100% coverage of the examination volume could not be achieved, the amount of coverage obtained for this examination provides an acceptable level of quality and integrity. Due to the design of the reactor vessel and location of the core guide lugs, it is not feasible to obtain the required examination coverage. This weld is not exposed to significant neutron fluence and is not prone to negative material property changes (i.e., embrittlement) associated with neutron bombardment. If a leak were to occur at the weld in question, there are methods by which the leak could be identified for prompt engineering evaluation. The plant is designed to detect the following:

a.) Increased containment humidity. This parameter is indicated in the control room and is monitored periodically by operations and also monitored by the containment ventilation system engineer. Lower containment humidity and ventilation unit condensate drain tank (VUCDT) level are recorded at the start of each shift.

b.) Increased temperatures in lower containment, steam generator compartment, pressurizer compartment, or in the core sump room. These temperatures are monitored continuously by the operator aid computer (OAC) alarms, and are periodically monitored by the system engineer. The OAC alarm is set for immediate operations notification when an alarm set point is exceeded.

c.) Increased input into the VUCDT level. This parameter is monitored continuously by operations via an OAC alarm and also periodically by the liquid radwaste system engineer and reactor coolant system engineer. The OAC alarm is set for immediate operations notification when an alarm setpoint is exceeded.

d.) Increase in unidentified reactor coolant leakage. This parameter would be exhibited during performance of [the] reactor coolant leakage calculation, which is required by McGuire 2 Technical Specifications to be performed every 72 hours. The unidentified leakage limit in Technical Specification 3.4.13.1 is 1 gallon per minute (gpm).

e.) Increased containment floor and equipment sump levels. These levels are monitored continuously by the OAC alarms for immediate operations notification, and are periodically monitored by the system engineer.

f.) Change in the volume control tank (VCT) level rate (a more negative rate is set to alarm to operations at 1.0 gpm). This is closely monitored by the chemical and volume control system engineer.

Note: Although diverse means are available to identify a leak in containment, containment entry would be required to identify the exact source of the leakage. In addition, a Mode 3 containment walkdown is performed each refueling outage at shutdown and startup to identify any leaks.

3.1.5 NRC Staff's Evaluation

The ASME Code, Section XI, Table IWB-2500-1, Category B-A, Item No. B01.011.003 reactor pressure vessel (RPV) lower shell-to-lower head circumferential weld, requires volumetric examination of essentially 100% of the inspection volume defined in figure IWB-2500-1 for Weld 2RPV-W03.

The licensee was unable to meet the ASME Code requirements during its volumetric examination of Weld 2RPV-W03. Examination coverage was limited due to the proximity of six core support lugs inside the RPV. The licensee noted that scanning was conducted between and below the obstructing lugs with the scan boundaries maximized by visually assisted positioning of the exam head so that scan starts and stops were as close to the support lugs as tool configuration allowed. For the licensee to achieve 100% volumetric coverage, the six core support lugs would have to be moved to allow the licensee to perform the ASME Code-required examination of Weld 2RPV-W03. For the licensee to achieve 100% volumetric coverage, the subject weld and six core support lugs would have to be redesigned and modified. This would place a burden on the licensee to the extent that the ASME Code-required 100% volumetric examinations are impractical.

As shown on the sketches and technical descriptions provided by the licensee, the six core support lugs limit the examination of weld 2RPV-W03; however, the licensee was able to achieve an aggregate coverage of 72.6% of the required volume from all scans performed on the subject weld and base material. Further, the ultrasonic examination of the subject weld was conducted using personnel, equipment and procedures qualified in accordance with ASME Code, Section XI, Appendix VIII, 1995 edition with the 1996 addenda. The licensee found no recordable indications during the inspection of the subject weld.

The licensee has shown that it is impractical to meet the ASME Code-required 100% volumetric examination coverage for the subject weld due to the six core support lugs. Based on the high level of examination coverage obtained for weld 2RPV-W03, if significant service-induced degradation were occurring, the NRC staff finds there is reasonable assurance that evidence of it would have been detected by the examinations that were performed.

3.1.6. Conclusion

The NRC staff concludes that compliance with the ASME Code coverage requirement is impractical. Furthermore, the examinations performed by the licensee provide reasonable assurance of the continued inservice structural integrity of the subject components. Therefore, RR 05-MN-003, Request No. 1 is granted pursuant to 10 CFR 50.55a(g)(6)(i). This relief is authorized by law and will not endanger life or property or common defense and security, and is otherwise in the public interest, giving due consideration to the burden upon the licensee and facility that could result if the Code requirements were imposed on the facility.

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

3.2 Weld 2RPV-W01 NC System Reactor Vessel to Bottom Head Head Circumferential Weld

3.2.1 Code Requirements from Which Relief is Requested

The ASME Code, Section XI, Table IWB-2500-1, Category B-A, Item No B01.021.002 lower head-to-bottom head circumferential weld, requires volumetric examination of essentially 100% of the accessible weld length and volume as defined in figure IWB-2500-3 for weld 2RPV-W01.

3.2.2 Licensee's Basis for Relief Request (As Stated)

> (The [RPV] Lower Head-to-Bottom Head Circumferential Weld [2RPV-W01] is carbon steel. The thickness of this weld is 5.300 inches.) During the ultrasonic examination of this weld, 100% coverage of the required examination volume could not be obtained. Coverage was limited due to the Lower Head to Bottom Head Weld being at approximately the same position as the peripheral bottom mounted instrumentation tubes (BMI). Scanning was conducted above and between the obstructing penetrations with scan boundaries maximized by visually-assisted positioning of the exam head so that scan starts and stops were as close to the tubes as tool configuration allowed. The amount of coverage reported represents the aggregate coverage from all scans performed on the weld and base material. Beam angles, dual element 45-degree L-wave, single element 45 degree L-wave and single element 45 shear wave were used for this examination. This percentage represents the aggregate coverage of all scans for the weld. In order to achieve more coverage, the [BMI] tubes would have to be moved to allow greater access for scanning, this would be impractical. There were no recordable indications found during the inspection of this weld.

3.2.3 Proposed Alternative Examinations or Testing

The scheduled 10-year code examination was performed on the referenced area/welds and it resulted in the noted limited coverage of the required ultrasonic volume. No additional examinations are planned for the area/weld during the current inspection interval.

3.2.4 Justification for Granting Relief

Ultrasonic examination of RPV lower head-to-bottom head circumferential weld 2RPV-W01 was conducted using personnel, equipment and procedures qualified in accordance with ASME Code, Section XI, Appendix VIII, 1995 edition with the 1996 addenda as modified by 10 CFR 50.55a(b)(2)(xiv, xv and xvi). Although 100% coverage of the examination volume could not be achieved, the amount of coverage obtained for this examination provides an acceptable level of quality and integrity. Due to the design of the reactor vessel and location of the bottom-mounted instrumentation tubes, it is not feasible to obtain the required examination coverage. This weld is not exposed to significant neutron fluence and is not prone to negative material property changes (i.e., embrittlement) associated with neutron bombardment. If a leak were to occur at the weld in question, there are methods by which the leak could be identified for prompt engineering evaluation. The plant is designed to detect the following:

a.) Increased containment humidity. This parameter is indicated in the control room and is monitored periodically by operations and also monitored by the containment ventilation system engineer. Lower containment humidity and VUCDT level are recorded at the start of each shift.

b.) Increased temperatures in lower containment, steam generator compartment, pressurizer compartment, or in core sump room. These temperatures are monitored continuously by the OAC alarms, and are periodically monitored by the system engineer. The OAC alarm is set for immediate operations notification when an alarm set point is exceeded.

c.) Increased input into the VUCDT level. This parameter is monitored continuously by operations via an OAC alarm and also periodically by the liquid radwaste system engineer and reactor coolant system engineer. The OAC alarm is set for immediate operations notification when an alarm setpoint is exceeded.

d.) Increase in unidentified reactor coolant leakage. This parameter would be exhibited during performance of the reactor coolant leakage calculation, which is required by Technical Specifications to be performed every 72 hours. The unidentified leakage limit in the McGuire 2 Technical Specification 3.4.13.1 is 1 gpm.

e.) Increased containment floor and equipment sump levels. These levels are monitored continuously by the OAC alarms for immediate operations notification, and are periodically monitored by the system engineer.

f.) Change in the VCT level rate (a more negative rate is set to alarm to operations at 1.0 gpm). This is closely monitored by the chemical and volume control system engineer.

Note: Although diverse means are available to identify a leak in containment, containment entry would be required to identify the exact source of the leakage. In addition, a Mode 3 containment walkdown is performed each refueling outage at shutdown and startup to identify any leaks.

3.2.5 <u>NRC Staff's Evaluation</u>

The ASME Code, Section XI, Table IWB-2500-1, Category B-A, Item No B01.021.002 lower head-to-bottom head circumferential weld, requires volumetric examination of essentially 100% of the accessible weld length and volume as defined in figure IWB-2500-3 for weld 2RPV-W01.

For weld 2RPV-W01 the licensee does not require relief because the ASME Code Committees when writing this particular examination requirement for Examination Category B-A, item No B1.21 considered the various obstructions and inferences on the bottom of the reactor, i.e., peripheral BMI tubes, insulation, reactor support, and etc. For this specific examination item, the ASME Code says the examination coverage is to be essentially 100% of the <u>accessible</u> weld length.

The licensee noted that the examination coverage was limited due to weld 2RPV-W01 being at approximately the same position as the peripheral BMI tubes. Scanning was conducted above and between the obstructing penetrations with scan boundaries maximized by visually-assisted positioning of the exam head so that scan starts and stops were as close to the tubes as tool configuration allowed. The licensee obtained an aggregate coverage of 87.19% of the total weld inspection volume from all scans performed on the weld and base material. Therefore, the NRC staff finds the licensee has met the ASME Code requirements by obtaining essentially 100% of the accessible weld length for weld 2RPV-W01, and the requested relief therefore is not required.

3.2.6 Conclusion

The NRC staff concludes that compliance with the ASME Code coverage requirement has been met and relief is not required for Relief 05-MN-003, Request No. 2.

3.3 Weld 2RPV-W15-SE NC System Reactor Vessel Outlet Nozzle to Safe End Weld (22 Degrees), Weld 2RPV-W17-SE NC System Reactor Vessel Outlet Nozzle to Safe End Weld (202 Degrees) and Weld 2RPV-W18-SE NC System Reactor Vessel Outlet Nozzle to Safe End Weld (338 Degrees)

3.3.1 Code Requirements from Which Relief is Requested

The ASME Code, Section XI, Table IWB-2500-1, Category B-F, Item No. B5.10 RPV nozzle-to-safe end butt welds, requires volumetric and surface examination of 100% of the inspection volume or area defined in figure IWB-2500-8 for welds 2RPV-W15-SE, 2RPV-W17-SE, and 2RPV-W18-SE.

3.3.2 Licensee's Basis for Relief Request (As Stated)

> (The [RPV] Outlet Nozzle to Safe End Weld[s] [2RPV-W15-SE, 2RPV-W17-SE, and 2RPV-W18-SE are] stainless steel to carbon steel [welds]. The diameter of the weld is 29.00 inches with a wall thickness of 2.312 inches.) During the ultrasonic examination of this weld, 100% coverage of the required examination volume could not be obtained. Coverage was limited due to the ID [inside diameter] configuration which consists of counter-bore and weld root protrusion. Ultrasonic scans were performed from the ID surface using 70 degree L wave transducers applied in four directions. This exam interrogated the inner 1/3 thickness volume. Eddy Current examination was also employed to examine inner surfaces of the dissimilar metal welds and the adjacent examination volumes where ID geometry presented a limitation to the detection of axial flaws as defined in the PDQS [Performance Demonstration Qualification Summary] for the qualified [ASME Code, Section XI,] Appendix VIII techniques.

3.3.3 Proposed Alternative Examinations or Testing

The scheduled 10-year code examination was performed on the referenced area/welds and it resulted in the noted limited coverage of the required ultrasonic volume. No additional examinations are planned for the area/weld during the current inspection interval.

3.3.4 Justification for Granting Relief

Ultrasonic examination of RPV outlet nozzle-to-safe end welds 2RPV-W15-SE, 2RPV-W17-SE, and 2RPV-W18-SE was conducted using personnel, equipment and procedures qualified in accordance with ASME Code Section XI, Appendix VIII, 1995 edition with the 1996 addenda as modified by 10 CFR 50.55a(b)(2)(xiv, xv and xvi). Although 100% coverage of the examination volume could not be achieved, the amount of coverage obtained for this examination provides an acceptable level of quality and integrity. Due to the ID configuration, counter-bore and weld root protrusion, it is not feasible to obtain the required examination coverage. The welds are not exposed to significant neutron fluence and are not prone to negative material property changes (i.e., embrittlement) associated with neutron bombardment. If a leak were to occur at the welds in question, there are methods by which the leak could be identified for prompt engineering evaluation. The plant is designed to detect the following:

a.) Increased containment humidity. This parameter is indicated in the control room and is monitored periodically by operations and also monitored by the containment ventilation system engineer. Lower containment humidity and VUCDT level are recorded at the start of each shift.

b.) Increased temperatures in lower containment, steam generator compartment, pressurizer compartment or in the core sump room. These temperatures are monitored continuously by the OAC alarms, and are periodically monitored by the system engineer. The OAC alarm is set for immediate operations notification when an alarm set point is exceeded.

c.) Increased input into the VUCDT level. This parameter is monitored continuously by operations via an OAC alarm and also periodically by the liquid radwaste system engineer and reactor coolant system engineer. The OAC alarm is set for immediate operations notification when an alarm setpoint is exceeded.

d.) Increase in unidentified reactor coolant leakage. This parameter would be exhibited during performance of the reactor coolant leakage calculation, which is required by Technical Specifications to be performed every 72 hours. The unidentified leakage limit in the McGuire Unit 2 Technical Specification 3.4.13.1 is 1 gpm.

e.) Increased containment floor and equipment sump levels. These levels are monitored continuously by the OAC alarms for immediate operations notification, and are periodically monitored by the system engineer.

f.) Change in the VCT level rate (a more negative rate is set to alarm to operations at 1.0 gpm). This is closely monitored by the chemical and volume control system engineer.

Note: Although diverse means are available to identify a leak in containment, containment entry would be required to identify the exact source of the leakage. In addition, a Mode 3 containment walkdown is performed each refueling outage at shutdown and startup to identify any leaks.

3.3.5 NRC Staff's Evaluation

The ASME Code, Section XI, Table IWB-2500-1, Category B-F, Item No. B5.10 RPV nozzle-to-safe end butt welds, requires volumetric and surface examination of 100% of the inspection volume or area defined in figure IWB-2500-8 for welds 2RPV-W15-SE, 2RPV-W17-SE, and 2RPV-W18-SE.

RPV outlet nozzle-to-safe end welds 2RPV-W15-SE, 2RPV-W17-SE, and 2RPV-W18-SE are stainless steel-to-carbon steel welds with a 29.00-inch diameter and a wall thickness of 2.312 inches. The licensee found that during the examination of these welds it was unable to obtain 100% coverage of the required examination volumes. As addressed in the licensee's submittial specific obstructions related to the design and fabrication of the weld limit access for examination of these welds so that 100% of the required coverage cannot be obtained. For the licensee to achieve 100% volumetric coverage, the subject nozzles would have to be redesigned and modified. This would place a burden on the licensee to the extent that the ASME Code-required volumetric examinations are impractical.

As shown on the sketches and technical descriptions provided by the licensee, the examinations of the subject nozzles are limited by the nozzle configuration; however, the licensee was able to examine approximately 84.36%, 80.24%, and 83.34% of the ASME Code-required volume for welds 2RPV-W15-SE, 2RPV-W17-SE, and 2RPV-W18-SE, respectively. Ultrasonic scans were performed from the inside diameter (ID) surface using 70-degree L wave transducers applied in four directions. This exam interrogated the inner 1/3 thickness volume. Eddy current examination was also employed to examine inner surfaces of the dissimilar metal weld and the adjacent examination volume where ID geometry presented a limitation to the detection of axial flaws as defined in the performance demonstration qualification summary for the qualified ASME Code, Section XI, Appendix VIII techniques. The licensee also examined 100% of the subject welds when performing a surface examination. The examinations performed by the licensee did not detect any unacceptable indications.

The NRC staff has determined that the licensee has shown that it is impractical to meet the ASME Code-required 100% volumetric examination coverage for the subject welds. Based on the high level of examination coverage obtained for welds 2RPV-W15-SE, 2RPV-W17-SE, and 2RPV-W18-SE, if significant service-induced degradation were occurring, there is reasonable assurance that evidence of it would have been detected by the examinations that were performed.

3.3.6. Conclusion

The NRC staff concludes that compliance with the ASME Code coverage requirement is impractical. Furthermore, the examinations performed by the licensee provide reasonable assurance of the continued inservice structural integrity of the subject components. Therefore, RR 05-MN-003, Request Nos. 3, 4 and 5 are granted pursuant to 10 CFR 50.55a(g)(6)(i). This relief is authorized by law and will not endanger life or property or common defense and security, and is otherwise in the public interest, giving due consideration to the burden upon the licensee and facility that could result if the Code requirements were imposed on the facility.

All other ASME Code, Section XI, requirements which were not specifically requested and authorized herein by the NRC staff remain applicable, including third-party review by the

Authorized Nuclear Inservice Inspector.

3.4 Welds 2NC2F-1-1 NC System Reactor Vessel Outlet Nozzle to Safe End (22 Degrees) Pipe Side Scan, Weld 2NC2F-3-1 NC System Reactor Vessel Outlet Nozzle to Safe End (202 Degrees) Pipe Side Scan and 2NC2F-4-1 NC System Reactor Vessel Outlet Nozzle to Safe End (338 Degrees) Pipe Side Scan

3.4.1 Code Requirements from Which Relief is Requested

The ASME Code, Section XI, Table IWB-2500-1, Category B-F, Item No. B5.130 for 4-inch or larger nominal pipe size (NPS) pressure retaining dissimilar metal welds, requires volumetric and surface examination of 100% of the inspection volume or area as defined in figure IWB-2500-8.

The ASME Code, Section XI, Table IWB-2500-1, Category B-J, Item No. B9.10 for 4-inch or larger NPS pressure retaining welds, requires volumetric and surface examination of essentially 100% of the inspection volume or area as defined in figure IWB-2500-8 for welds 2NC2F-1-1, 2NC2F-3-1, and 2NC2F-4-1.

3.4.2 Licensee's Basis for Relief Request (As Stated)

> The [RPV] Pipe-to-Safe End Weld[s] [2NC2F-1-1, 2NC2F-3-1, 2NC2F-4-1 are] stainless steel. The diameter of the weld[s are] 29.000 inches with a wall thickness of 2.300 inches.) During the ultrasonic examination of [these welds,] 100% coverage of the required examination volume could not be obtained. Coverage was limited due to the ID configuration which consists of counter-bore and weld root protrusion. Ultrasonic scans were performed from the ID surface using 70 degree L wave transducers applied in four directions. This exam interrogated the inner 1/3 thickness volume. Eddy Current examination was also employed to examine inner surfaces of the similar metal welds and the adjacent examination volumes where ID geometry presented a limitation to the detection of axial flaws as defined in the PDQS for the qualified [ASME Code, Section XI,] Appendix VIII techniques.

3.4.3 Proposed Alternative Examinations or Testing

The scheduled 10-year code examination was performed on the referenced area/welds and it resulted in the noted limited coverage of the required ultrasonic volume. No additional examinations are planned for the area/weld during the current inspection interval.

3.4.4 Justification for Granting Relief

An ultrasonic examination of RPV pipe-to-safe end welds 2NC2F-1-1, 2NC2F-3-1, and 2NC2F-4-1 was conducted using personnel, equipment and procedures qualified in accordance with ASME Code, Section XI, Appendix VIII, 1995 edition with the 1996 addenda as modified by 10 CFR 50.55a(b)(2)(xiv, xv and xvi). Although 100% coverage of the examination volume could not be achieved, the amount of coverage obtained for this examination provides an acceptable level of quality and integrity. Due to the ID configuration, counter-bore and weld root protrusion, it is not feasible to obtain the required examination coverage. The welds are not exposed to significant neutron fluence and are not prone to negative material property changes (i.e., embrittlement) associated with neutron bombardment. If a leak were to occur at the welds in question, there are methods by which the leak could be identified for prompt engineering evaluation. The plant is designed to detect the following:

a.) Increased containment humidity. This parameter is indicated in the control room and is monitored periodically by operations and also monitored by the containment ventilation system engineer. Lower containment humidity and VUCDT level are recorded at the start of each shift.

b.) Increased temperatures in lower containment, steam generator compartment, pressurizer compartment or in core sump room. These temperatures are monitored continuously by the OAC alarms, and are periodically monitored by the system engineer. The OAC alarm is set for immediate operations notification when an alarm set point is exceeded.

c.) Increased input into the VUCDT level. This parameter is monitored continuously by operations via an OAC alarm and also periodically by the liquid radwaste system engineer and reactor coolant system engineer. The OAC alarm is set for immediate operations notification when an alarm set point is exceeded.

d.) Increase in unidentified reactor coolant leakage. This parameter would be exhibited during performance of [the] reactor coolant leakage calculation, which is required by Technical Specifications to be performed every 72 hours. The unidentified leakage limit in the McGuire 2 Technical Specification 3.4.13.1 is 1 gpm.

e.) Increased containment floor and equipment sump levels. These levels are monitored continuously by the OAC alarms for immediate operations notification, and are periodically monitored by the system engineer.

f.) Change in the VCT level rate (a more negative rate is set to alarm to operations at 1.0 gpm). This is closely monitored by the chemical and volume control system engineer.

Note: Although diverse means are available to identify a leak in containment, containment entry would be required to identify the exact source of the leakage. In addition, a Mode 3 containment walkdown is performed each refueling outage at shutdown and startup to identify any leaks.

3.4.5 <u>NRC Staff's Evaluation</u>

The ASME Code, Section XI, Table IWB-2500-1, Category B-F, Item No. B5.130 for 4-inch or larger nominal pipe size (NPS) dissimilar metal butt welds, requires volumetric and surface examination of 100% of the inspection volume or area as defined in figure IWB-2500-8 for welds 2NC2F-1-1, 2NC2F-3-1, and 2NC2F-4-1.

3.4.5.1 <u>Incorrect ASME Code Category Classification</u>

The licensee classified Welds 2NC2F-1-1, 2NC2F-3-1, and 2NC2F-4-1 as dissimilar metal (DM) welds under ASME Code Category B-F, Item B5.130. In its response to the staff's RAI, the licensee confirmed that Welds 2NC2F-1-1, 2NC2F-3-1, and 2NC2F-4-1 are actually stainless steel safe-end to cast stainless steel piping welds. The correct ASME Code designation for those welds is Examination Category B-J, Item B9.10.

The licensee stated the following in its letter dated March 26, 2007, as justification for classifying the welds as Category B-F DM welds: "The subject stainless welds listed above were conservatively categorized as B-F welds because of their close proximity to the dissimilar metal weld and the carbon steel base material of the nozzle. By categorizing these welds as B-F they will receive 100% inspection rather than a 25% sample under category B-J."

The licensee believes that, by classifying the welds as Category B-F, the welds are ensured to be examined every interval, since this ASME Code Category requires 100% of DM welds to be examined each 10-year interval. However, ASME Code, Section XI categories are established by consensus to provide a basis for developing initial rules such as component population sampling, inspection methods and frequencies, inspection volumes or surface areas and subsequent requirements, e.g., flaw acceptability limits, repair criteria, etc., to ensure consistent implementation of ISI programs. To mis-categorize components for any reason, even with conservative intentions, is misleading and could potentially result in misapplication of hierarchal requirements.

The licensee may elect on a voluntary basis to examine all safe end-to-pipe welds associated with RPV nozzles during each interval, as an augmentation to the minimum criteria listed in ASME Code, Section XI for Examination Category B-J, Item B9.10 welds. The NRC staff determined that the licensee should correct the designation of these welds to ASME Code Category B-J. The licensee should also apply the correct ASME Code item numbering for welds 2NC2F-1-1, 2NC2F-3-1, and 2NC2F-4-1 (e.g., B9.11).

3.4.5.2 Limited Volumetric Coverage

ASME Code Category B-J, Items B9.11 and B9.12 require essentially 100% of the volume or area defined in figure IWB-2500-8 for Welds 2NC2F-1-1, 2NC2F-3-1, and 2NC2F-4-1. For welds 2NC2F-1-1, 2NC2F-3-1, and 2NC2F-4-1 the licensee is unable to obtain essentially 100% of the required inspection volumes due to the inside diameter configuration of the welds which have counterbore and root protrusion. The NRC staff determined that in order for the licensee to examine the subject welds as required by the ASME Code, the subject components would have to be redesigned which would be a hardship on the licensee. Therefore, the ASME Code requirements are impractical. Based on drawings and descriptions included in the licensee's submittial it was demonstrated that examinations performed are to the extent practical. The licensee obtained composite coverage of approximately 84.38%, 80.24%, and 83.34% of the ASME Code-required volume for Welds 2NC2F-1-1, 2NC2F-3-1, and 2NC2F-4-1, respectively. Based on the high level of examination coverage obtained for Welds 2NC2F-1-1, 2NC2F-3-1, and 2NC2F-4-1, if significant service-induced degradation were occurring, there is reasonable assurance that evidence of it would have been detected by the examinations that were performed.

3.4.6 Conclusion

The NRC staff concludes that compliance with the ASME Code coverage requirement is impractical. Furthermore, the examinations performed by the licensee provide reasonable assurance of the continued inservice structural integrity of the subject components. Therefore, RR 05-MN-003, Request Nos. 6, 7 and 8 are granted pursuant to 10 CFR 50.55a(g)(6)(i). This relief is authorized by law and will not endanger life or property or common defense and security, and is otherwise in the public interest, giving due consideration to the burden upon the licensee and facility that could result if the Code requirements were imposed on the facility.

All other ASME Code, Section XI, requirements, including reclassification of welds 2NC2F-1-1, 2NC2F-3-1, and 2NC2F-4-1, which were not specifically requested and authorized herein by the NRC staff remain applicable, including third-party review by the Authorized Nuclear Inservice Inspector.

4.0 CONCLUSIONS

The NRC staff has reviewed the licensee's submittal and, based on the information provided, the NRC staff concludes that for welds 2RPV-W03, 2RV-W15-SE, 2RPV-W17-SE, 2RPV-W18-SE, 2NC2F-1-1, 2NC2F-3-1, and 2NC2F-4-1 compliance with the specified ASME Code requirements is impractical and that the volumetric examinations performed provide reasonable assurance of structural integrity of these welds. Therefore, relief is granted pursuant to 10 CFR 50.55a(g)(6)(i) for the second 10- year ISI interval at McGuire 2 for these welds. The NRC staff has determined that granting relief pursuant to 10 CFR 50.55a(g)(6)(i) 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 that could result if the requirements were imposed on the facility.

All other requirements of ASME Code, Section XI for which relief has not been specifically requested remain applicable, including third-party review by the Authorized Nuclear Inservice Inspector.

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