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

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

OF THE FIRST 10-YEAR INTERVAL INSERVICE INSPECTION PROGRAM PLAN

REQUESTS FOR RELIEF FOR

DUKE POWER COMPANY

MCGUIRE NUCLEAR STATION, UNIT 2

DOCKET NO. 50-370

1.0 INTRODUCTION

The Technical Specifications (TS) for McGuire Nuclear Station, Unit 2, states that the inservice inspection of the American Society of Mechanical Engineers (ASME) Code Class 1, 2, and 3 components shall be performed in accordance with Section XI of the ASME Boiler and Pressure Vessel Code (ASME Code) and applicable addenda as required by Title 10 of the Code of Federal Regulations (10 CFR) Section 50.55a(g), except where specific written relief has been granted by the Commission pursuant to 10 CFR 50.55a(g)(6)(i). Section 50.55a(a)(3) states that alternatives to the requirements of paragraph (g) may be used, when authorized by the NRC, if (i) the proposed alternatives would provide an acceptable level of quality and safety or (ii) compliance with the specified requirements would result in hardship or unusual difficulty without a compensating increase in the level of quality and safety.

Pursuant to 10 CFR 50.55a(g)(4), ASME Code Class 1, 2, and 3 components (including supports) shall meet the requirements, except the design and access provisions and the pre-service examination requirements, set forth in the ASME Code, Section XI, "Rules for 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) 12 months prior to the start of the 120-month interval, subject to the limitations and modifications listed therein. The applicable edition of Section XI of the ASME Code for the McGuire Nuclear Station, Unit 2, first 10-year inservice inspection (ISI) interval is the 1980 Edition through Winter 1980 Addenda.

Pursuant to 10 CFR 50.55a(g)(5), if the licensee determines that conformance with an examination requirement of Section XI of the ASME Code is not practical for its facility, information shall be submitted to the Commission in support of that determination and a request made for relief from the ASME

Enclosure 1

Code requirement. After evaluation of the determination, pursuant to 10 CFR 50.55a(g)(6)(i), the Commission may grant relief and may impose alternative requirements that are determined to be authorized by law, will not endanger life, property, or the common defense and security, and are otherwise in the public interest, giving due consideration to the burden upon the licensee that could result if the requirements were imposed.

Pursuant to 10 CFR 50.55a(g)(6)(ii)(A), the Commission revoked all previous reliefs granted to licensees for the extent of volumetric examinations of reactor vessel shell welds, as specified in Section XI, Division 1 of the ASME Code. The Commission further required that all licensees augment their reactor vessel examination by implementing once, as part of the inservice inspection interval in effect on September 8, 1992, the Item B1.10 requirements (examine essentially 100% of the volume of each shell weld) of the 1989 Edition of the ASME Code.

Under 10 CFR 50.55a(g)(6)(ii)(A)(4), licensees may satisfy the augmented requirements by performing the ASME Section XI reactor vessel shell weld examinations scheduled for implementation during inservice inspection intervals in effect on September 8, 1992. As a result, the licensee is required to submit both an alternative to 10 CFR 50.55a(g)(6)(ii)(A) and a request for relief in accordance with 10 CFR 50.55a(g)(5)(iii), or a proposed alternative in accordance with 10 CFR 50.55a(3), for the same welds when the licensee obtains less than the required coverage (essentially 100%) during the examinations.

In a letter dated June 6, 1996, Duke Power Company (licensee), submitted to the NRC its first 10-year inservice inspection interval program plan requests for relief for McGuire Nuclear Station, Unit 2. The licensee also provided additional information in its letter dated April 29, 1997.

2.0 EVALUATION

The staff, with technical assistance from its contractor, the Idaho National Engineering and Environmental Laboratory (INEEL), has evaluated the information provided by the licensee in support of its First 10-Year Inservice Inspection Interval Program Plan Requests for Relief Nos. 97-001 and 96-003 (Parts A and B) for McGuire Nuclear Station, Unit 2. The licensee also provided additional information in its letter dated April 29, 1997. Based on the information submitted, the staff adopts the contractor's conclusions and recommendations presented in the Technical Letter Report (TLR), as modified below.

For Request for Relief No. 97-001, pursuant to 10 CFR 50.55a(g)(6)(ii)(A)(5), the licensee proposed an alternative to the coverage requirements of the augmented reactor pressure vessel (RPV) examination required by regulations. The essentially 100% coverage requirement could not be met for welds 2RPV-W03 and 2RPV-W06.

To comply with the augmented reactor vessel examination requirements of 10 CFR 50.55a(g)(6)(ii)(A), licensees must volumetrically examine essentially 100% of each of the Item B1.10 shell welds. In accordance with the regulations,

essentially 100% is defined as greater than 90% of the examination volume of each weld. As an alternative to the greater than 90% coverage requirement of the regulations, the licensee proposes that the examination coverage obtained be considered to provide an acceptable level of quality and safety for the RPV welds.

At McGuire, Unit 2, the augmented coverage requirements could not be met for two shell welds due to physical restrictions that limit scan coverage. For Welds 2RPV-W03 and 2RPV-W06, the geometric configuration or physical obstructions limited coverage to 43.6% and 48.2%, respectively, of the required volume. To achieve complete coverage for the subject welds, design modifications would be required to increase access from the inside surface (ID).

As a result of the augmented volumetric examination rule, licensees must make a reasonable effort to maximize examination coverage of their reactor vessels. In cases where examination coverage from the ID is inadequate, examination from the outside surface (OD) using manual inspection techniques is a potential option. However, at McGuire, Unit 2, the design of the reactor building prevents access for equipment and personnel from the OD. The licensee has attempted to maximize coverage from the inside surface by optimizing transducer arrangements for scanning close to obstructions; therefore, it is concluded that the licensee has made a reasonable effort to maximize examination coverage.

The licensee has examined approximately half of each of the subject shell welds, in addition to the examination of greater that 90% of all other RPV shell welds. Furthermore, the licensee has performed visual examinations of the vessel interior as required by the Code. This level of examination coverage is significant and should have detected inservice degradation, if present. The licensee's proposed alternative provides adequate assurance of structural integrity and is authorized pursuant to 10 CFR 50.55a(g)(6)(ii)(A) and 50.55a(a)(3)(ii) in that compliance with the Code would result in hardship or unusual difficulty without a compensating increase in the level of quality and safety.

Request for Relief No. 96-003 (Part A) includes welds B01.011.003 and B01.011.004 that were evaluated above under the 10 CFR 50.55a(g)(6)(ii)(A)(5) augmented reactor vessel examination rule. As permitted by the regulation, the licensee substituted the augmented RPV examination for the Section XI, RPV examination. Since the licensee completed and credited the augmented examination for the Section XI examinations, these same welds are evaluated below as an ASME, Section XI requests for relief.

For Request for Relief No. 96-003 (Part A) the licensee requested relief from the requirements of examination Category B-A, Item B1.11, 100% volumetric examination of RPV circumferential shell welds as defined by Figure IWB-2500-1. Items B1.21 and B1.22 require 100% volumetric examination of RPV circumferential and meridional head welds as defined by Figure IWB-2500-3. The licensee requested relief pursuant to 10 CFR 50.55a(g)(5)(iii), from the Code coverage requirements of essentially 100% for the RPV welds.

The Code requires 100% volumetric examination of the subject RPV welds. Complete examination is restricted by geometric configuration which makes the 100% volumetric examination impractical to perform for these welds. To gain access for examination, the RPV would require design modifications. Imposition of this requirement would create an undue burden on the licensee. The licensee has examined these welds to the extent practical, which is 48-86% of each weld. In addition, other RPV welds are being examined to the extent required by the Code. Therefore, any existing patterns of degradation would have been detected by the examinations that were completed and reasonable assurance of structural integrity has been provided.

Based on the impracticality of meeting the Code coverage requirements for the subject welds, and the reasonable assurance provided by the examinations that were completed on these and other welds, relief is granted pursuant to 10 CFR 50.55a(g)(6)(i).

For Request for Relief No. 96-003 (Part B) the Code requires that Examination Category B-D, Items B3.90 and B3.100 require 100% volumetric examination of RPV nozzle-to-vessel welds and nozzle inside radius (IR) sections as defined by Figure IWB-2500-7. Pursuant to 10 CFR 50.55a(g)(5)(iii), the licensee has requested relief from the coverage requirements of the Code for the RPV nozzle-to-vessel welds and the IR sections list in the Technical Letter Report (Enclosure 2).

The Code requires 100% volumetric examination of the subject RPV nozzle-to-vessel welds and inside radius sections. The staff determined that complete examination is restricted by geometric configuration which makes the 100% volumetric examination impractical to perform for these areas. To gain access for examination, the RPV nozzles would require design modifications. Imposition of this requirement would create an undue burden on the licensee.

The licensee has examined these welds to the extent practical, obtaining 44-72% coverage of each nozzle-to-vessel weld and 64-87% coverage for each nozzle inside a radius section. In addition, other Class 1 nozzles are being examined as required by the Code. Therefore, any existing patterns of degradation would have been detected by the examinations that were completed and reasonable assurance of the structural integrity has been provided.

The staff concluded that meeting the required Code coverage for the subject nozzle-to-vessel welds and inside radius sections is impractical. The licensee's proposed alternative provides reasonable assurance of structural integrity of the subject welds, based on the examinations that were completed on these and other Class 1 nozzles. Therefore, relief is granted pursuant to 10 CFR 50.55a(g)(6)(i). The Commission may grant such relief and may impose alternate requirements as it determines is authorized by law, giving due consideration to the burden upon the licensee if the requirements were imposed on the facility.

3.0 CONCLUSION

The staff has reviewed the licensee's submittal and concludes that the licensee has maximized examination coverage for the reactor vessel welds and that service-induced degradation, if present, would have been detected. Thus, the licensee's proposed alternative contained in Request for Relief No. 97-001, provides an acceptable level of quality and safety. Therefore, the licensee's proposed alternative is authorized pursuant to 10 CFR 50.55a(g)(6)(ii)(A) and 50.55a(a)(3)(ii).

For Request for Relief No. 96-003, Parts A and B, the staff concludes that the licensee has demonstrated that the Code coverage requirements are impractical for the subject welds at McGuire, Unit 2. Furthermore, by the examinations that were performed, the license's proposed alternative provides reasonable assurance of the structural integrity of the subject components. Therefore, relief is granted pursuant to 10 CFR 50.55a(g)(6)(i) for Request for Relief No. 96-003, Parts A and B.

Principal Contributor: T. McLellan

Date: August 22, 1997

TECHNICAL LETTER REPORT
ON THE FIRST 10-YEAR INSERVICE INSPECTION INTERVAL
REQUESTS FOR RELIEF
FOR
DUKE POWER COMPANY
MCGUIRE NUCLEAR STATION, UNIT 2
DOCKET NUMBER: 50-370

1.0 INTRODUCTION

By letter dated June 6, 1996, the licensee, Duke Power Company, submitted Request for Relief 96-003 for McGuire Nuclear Station, Unit 2. As a result of a Nuclear Regulatory Commission (NRC) request for additional information (RAI) and a February 25, 1997, conference call, the licensee provided further information by letter dated April 29, 1997. With this letter, the licensee submitted Request for Alternative 97-001 regarding the augmented reactor pressure vessel examination required by 10 CFR 50.55a(g)(6)(ii)(A) and provided further clarification regarding Request for Relief 96-003. The Idaho National Engineering and Environmental Laboratory (INEEL) staff has evaluated these requests in the following section.

2.0 EVALUATION

The first 10-year inservice inspection interval ended March 1, 1994. The Code of record for the McGuire Nuclear Station, Unit 2, first 10-year inservice inspection interval is the 1980 Edition through Winter 1980 Addenda of the American Society of Mechanical Engineers Boiler and Pressure Vessel Code, Section XI. The information provided by the licensee in support of the proposed alternative to the regulatory requirements and the request for relief from Code requirements have been evaluated and the bases for the disposition is documented below.

A. Request for Alternative 97-001 to the Augmented Reactor Pressure Vessel (RPV) Examination per 10 CFR 50.55a(g)(6)(ii)

Regulatory Requirement: In accordance with 10 CFR 50.55a(g)(6)(ii)(A), all licensees must implement once, as part of the inservice inspection interval in effect on September 8, 1992, an augmented volumetric examination of the RPV welds specified in Item B1.10 of Examination Category B-A of the 1989 Edition of the ASME Code, Section XI. Examination Category B-A, Items B1.11 and B1.12 require volumetric examination of essentially 100% of the RPV circumferential and longitudinal shell welds, as defined by Figures IWB-2500-1 and -2, respectively. Essentially 100%, as defined by 10 CFR 50.55a(g)(6)(ii)(A)(2), is greater than 90% of the examination volume of each weld.

Licensee's Proposed Alternative: Pursuant to 10 CFR 50.55a(g)(6)(ii)(A)(5), the licensee has proposed an alternative to the coverage requirements of the augmented RPV examination required by the regulations. The essentially 100% coverage requirement could not be met for two welds listed in the table below. Essentially 100% of all other Examination Category B-A, Item B1.10 welds have been examined. The licensee stated:

"In addition to the volumetric examination that has been performed on the McGuire reactor vessel, Duke Power has performed a visual examination of the internals and the inside of the reactor vessel as required by ASME Section XI, Table IWB-2500-1. This visual examination did not identify any rejectionable conditions per ASME Section XI acceptance standards.

"The use of radiography as an alternate volumetric examination method is not feasible due to component thickness and restrictions from physical barriers which prohibit access from the placement of source, image quality indicators, film, etc. In addition, the background radiation levels would not allow for a radiographic examination to render meaningful results.

"Performing the ultrasonic examination from the outside of the reactor vessel is not a viable option. The design of McGuire's reactor building prohibits access for the equipment and personnel from outside the vessel.

"Duke Power Company will continue to perform ultrasonic examinations of all vessel welds to the maximum extent practical in accordance with the requirements of ASME Section V, Article 4, 1989 Edition and Regulatory Guide 1.150, Revision 1, Appendix A. The application of Code Case N-460 will be utilized in all cases where less than 100% but greater than 90% weld coverage is obtained, a request for relief from ASME Section XI Code requirements will be submitted.

"Duke Power Co. proposes as an alternative to the greater than 90% coverage requirement of 10 CFR 50.55a(g)(6)(ii)(A), that the examination coverage obtained on the welds listed in Attachment 1 [summarized below] be considered to provide an acceptable level of quality and safety. No additional examination will be required."

Item No.	Weld ID	Description	Limitation	Coverage
B01.011.003	2RPV-W03	Lower shell-to-lower head weld	Geometric configuration	43.6%
B01.011.004	2RPV-W06	Upper shell-to-nozzle belt weld	Geometric configuration	48.2%

Licensee's Basis for the Proposed Alternative: (as stated):

"10 CFR 50.55a(g)(6)(ii)(A)(5) states the 'Licensees that make a determination that they are unable to completely satisfy the requirements for the augmented reactor vessel shell weld examination specified in 50.55a(g)(6)(ii)(A) shall submit information to the Commission to support the determination and shall propose an alternative to the examination requirements that would provide an acceptable level of quality and safety.' 10 CFR 50.55a(a)(3) states that alternatives to the requirements of paragraph (g) may be used when authorized by the Director of the Office of Nuclear Reactor Regulation. The proposed alternative(s) must demonstrate that an acceptable level of quality and safety, or compliance with the specified requirements would result in hardship or unusual difficulty without a compensating increase in the level of quality and safety.

"Examination of 100% of reactor pressure vessel shell [welds] is impractical. Examination of the accessible weld volume provides sufficient and reasonable assurance of vessel integrity. The reduction in the expected examination coverage will not endanger life or property or the common defense and security because the reactor coolant system is designed and constructed to have low probability of gross rupture or significant leakage throughout its design life. Technical Specifications 3/4.4.6 for McGuire Nuclear Station places conservative limits on the amount of reactor coolant leakage allowed during system operation. Any weld failure would allow additional coolant to leak from the system. The reactor coolant system leakage detection system is in place to detect any variation in the system water within its boundaries. If leakage exceeds Technical Specifications 3.4.6.2, procedures are in place to assure safe shutdown of the unit within specified time limits.

"Due to the design of the McGuire reactor vessels and location of the physical obstructions, it is impractical to obtain the examination coverage required by 10 CFR 50.55a(g)(6)(ii)(A)(2) without placing undue hardship on Duke Power. Based on the portions of the required volumetric and visual examination that have been completed, any existing pattern of degradation would have been detected.

"Duke Power Company will continue to ultrasonically examine the reactor vessel B1.10 category welds to the extent practical within the limits of original design and construction. This will provide reasonable assurance of weld/component integrity.

"Attachment 2" provides the calculations documenting the actual amount of Code required examination coverage obtained. A combination of multiple angles and ultrasonic techniques was used to obtain the maximum coverage possible. The use of an alternate transducer head provided increased coverage through optimum transducer arrangement for scanning close to obstructions. However, during the ultrasonic examination of the welds referenced below and listed in Attachment 1 of this alternative, the greater than 90% coverage required per 10 CFR 50.55a(g)(6)(ii)(A)(2) could not be obtained due to geometry and actual physical barriers.

"Reactor Vessel Lower Shell to Lower Head Weld (2RPV-W03): This examination was limited to 43.6% aggregate coverage of the required weld volume. The principle limitation for this weld is six core guide lugs welded to the vessel ID just above the weld on the lower shell section, whose presence restricts the scanning surface in that area and limits the examination coverage."

"Reactor Vessel Upper Shell to Nozzle Belt Weld (2RPV-W06): This examination was limited to 48.2% aggregate coverage of the required weld volume. The principle limitation for this weld is the presence of a taper at the ID surface starting at the upper edge of the weld and extending up from the nozzle belt section. The taper causes the scanning fixture to lift-off the vessel surface, thus disrupting the sound beams which in turn reduces the examination coverage. The reactor vessel shell welds were examined from the vessel inside the surface using automated ultrasonic examination equipment. The examinations were done with various contact head arrangements to optimize the maximum examination coverage. This allowed each transducer to scan as close as possible to any obstruction around the area examined. Although the coverage requirements of 10 CFR 50.55a(g)(6)(ii)(A) could not be met, the examinations were performed with modified equipment and tooling designed to accomplish the maximum coverage possible.

"As a result of inspections performed, the 100% requirement would be impractical for McGuire Nuclear Station. The reactor vessel welds were examined to the maximum extent practical to the requirements of Section V, Article 4 of the 1980 Edition through the Winter 1980 Addenda of the ASME Boiler and Pressure Vessel Code and the additional requirements of Regulatory Guide 1.150. To meet the 10 CFR 50.55a(g)(6)(ii)(A)(2) examination coverage requirements, design modifications would be necessary to gain access to the weld in order to obtain complete coverage. The design modifications are impractical due to the vast scope of work that would be required. Imposition of this requirement would cause a considerable burden on Duke Power with no commensurate safety benefit realized."

Evaluation: To comply with the augmented reactor vessel examination requirements of 10 CFR 50.55a(g)(6)(ii)(A), licensees must volumetrically examine

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*Attachments contained in licensee's submittal, but not in this report.

essentially 100% of each of the Item B1.10 shell welds. In accordance with the regulations, essentially 100% is defined as greater than 90% of the examination volume of each weld. As an alternative to the greater than 90% coverage requirement of the regulations, the licensee proposes that the examination coverage obtained be considered to provide an acceptable level of quality and safety for the RPV welds.

At McGuire Unit 2, the augmented coverage requirements cannot be met for two shell welds due to physical restrictions that limit scan coverage. For Welds 2RPV-W03 and 2RPV-W06, the geometric configuration or physical obstructions limited coverage to 43.6% and 48.2 %, respectively, of the required volume. To achieve complete coverage for the subject welds, design modifications would be required to increase access from the inside surface (ID).

As a result of the augmented volumetric examination rule, licensees must make a reasonable effort to maximize examination coverage of their reactor vessels. In cases where examination coverage from the ID is inadequate, examination from the outside surface (OD) using manual inspection techniques is a potential option. However, at McGuire Unit 2, the design of the reactor building prevents access for equipment and personnel from the OD. The licensee has attempted to maximize coverage from the inside surface by optimizing transducer arrangements for scanning close to obstructions; therefore, it is concluded that the licensee has made a reasonable effort to maximize examination coverage.

The licensee has examined approximately half of each of the subject shell welds, in addition to the examination of greater that 90% of all other RPV shell welds. Furthermore, the licensee has performed visual examinations of the vessel interior as required by the Code. This level of examination coverage is significant and should have detected inservice degradation, if present. Therefore, the licensee's proposed alternative provides an acceptable level of quality and safety, and it is recommended that the licensee's proposed alternative be authorized pursuant to 10 CFR 50.55a(g)(6)(ii)(A).

B. Request for Relief 96-003 (Part A), Examination Category B-A, Items B1.11, B1.21, and B1.22, Reactor Pressure Vessel (RPV) Shell and Head Welds

Code Requirement: Examination Category B-A, Item B1.11 requires 100% & 2 volumetric examination of RPV circumferential shell welds as defined by Figure IWB-2500-1. Items B1.21 and B1.22 require 100% volumetric examination of RPV circumferential and meridional head welds as defined by Figure IWB-2500-3.

Licensee's Code Relief Request: Pursuant to 10 CFR 50.55a(g)(5)(iii), the licensee has requested relief from the Code coverage requirements for the RPV welds listed in the table below.

TABLE 96-003 (Part A)		
Weld ID	Area	Limitation/Coverage
B01.011.003	Lower shell-to-lower head	Geometric configuration/43.6%
B01.011.004	Upper shell-to-nozzle belt weld	Geometric configuration/48.2%
B01.021.002	Lower head-to-bottom head	Geometric configuration/53.4%
B01.022.001	Lower head meridional @ 210°	Geometric configuration/86.6%
B01.022.002	Lower head meridional @ 150°	Geometric configuration/83%
B01.022.003	Lower head meridional @ 90°	Geometric configuration/86.6%
B01.022.004	Lower head meridional @ 30°	Geometric configuration/76.4%
B01.022.005	Lower head meridional @ 330°	Geometric configuration/86.6%
B01.022.006	Lower head meridional @ 270°	Geometric configuration/86.6%

Licensee's Basis for Requesting Relief (as stated):

"During the ultrasonic examination of the welds shown in Attachment 1 for Refueling Outage 8, the minimum 90% coverage requirement of ASME Section XI, 1980 Edition through Winter 1980 Addenda, clarified by Code Case N-460, could not be obtained due in part to geometry and to actual physical barriers. A combination of multiple angles and UT techniques was used to obtain the maximum coverage possible. The attached examination reports document the actual amount of examination coverage obtained. Drawings showing details of the affected welds including calculation methods are included as Attachment 2*.

Licensee's Proposed Alternative (as stated):

"The use of radiography as an alternate volumetric examination is not practical due to component thickness and geometric configurations. Other restrictions making radiography impractical are the use of double wall techniques and physical barriers prohibiting access for placement of source, film, number bands, etc. As a result of the impractical use of radiography Duke Power Company will continue to use the most current techniques available for future examinations of the Item Numbers shown in Attachment 1.

Duke Power Company will continue to ultrasonically examine the welds, including inside radius sections, to the extent practical within the limits of original design and construction. This will provide reasonable assurance of weld/component integrity. Thus, an acceptable level of quality and safety will have been achieved and public health and safety will not be endangered by allowing relief from the aforementioned Code requirements."

Evaluation: The Code requires 100% volumetric examination of the subject RPV welds. However, complete examination is restricted by geometric configuration which makes the 100% volumetric examination impractical to perform for these welds. To gain access for examination, the RPV would require design modifications. Imposition of this requirement would create an undue burden on the licensee.

The licensee has examined these welds to the extent practical, which is 48-86% of each weld. In addition, other RPV welds are being examined to the extent required by the Code. Therefore, any existing patterns of degradation would have been detected by the examinations that were completed and reasonable assurance of structural integrity has been provided.

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* Included in licensee's submittal but not in this report.

Based on the impracticality of meeting the Code coverage requirements for the subject welds, and the reasonable assurance provided by the examinations that were completed on these and other welds, it is recommended that relief be granted pursuant to 10 CFR 50.55a(g)(6)(i).

C. Request for Relief 96-003 (Part B), Examination Category B-D, Items B3.90 and B3.100, Reactor Pressure Vessel (RPV) Nozzle-to-Vessel Welds and Inside Radius (IR) Sections

Code Requirement: Examination Category B-D, Items B3.90 and B3.100 require 100% volumetric examination of RPV nozzle-to-vessel welds and nozzle inside radius (IR) sections as defined by Figure IWB-2500-7.

Licensee's Code Relief Request: Pursuant to 10 CFR 50.55a(g)(5)(iii), the licensee has requested relief from the coverage requirements of the Code for the RPV nozzle-to-vessel welds and IR sections listed in the table below.

TABLE 96-003 (Part B)

Weld ID	Area	Coverage	Limitation
B03.090.001 B03.090.001A	Inlet @ 67° from vessel ID Inlet @ 67° from nozzle ID	72.1%	Geometric configuration
B03.090.002 B03.090.002A	Inlet @ 113° from vessel ID Inlet @ 113° from nozzle ID		
B03.090.003 B03.090.003A	Inlet @ 247° from vessel ID Inlet @ 247° from nozzle ID		
B03.090.004 B03.090.004A	Inlet @ 293° from vessel ID Inlet @ 293° from nozzle ID		
B03.090.005 B03.090.005A	Outlet @ 22° from vessel ID Outlet @ 22° from nozzle ID	43.7%	Geometric configuration
B03.090.006 B03.090.006A	Outlet @ 158° from vessel ID Outlet @ 158° from nozzle ID		
B03.090.007 B03.090.007A	Outlet @ 202° from vessel ID Outlet @ 202° from nozzle ID		
B03.090.008 B03.090.008A	Outlet @ 338° from vessel ID Outlet @ 338° from nozzle ID		

TABLE 96-003 (Part B)			
Weld ID	Area	Coverage	Limitation
B03.100.001	Inlet IR Section @ 67°	64.6%	Geometric Configuration
B03.090.002	Inlet IR Section @ 113°		
B03.090.003	Inlet IR Section @ 247°		
B03.090.004	Inlet IR Section @ 293°		
B03.090.005	Outlet IR Section @ 22°	87.7%	Geometric Configuration
B03.090.006	Outlet IR Section @ 158°		
B03.090.007	Outlet IR Section @ 202°		
B03.090.008	Outlet IR Section @ 338°		

Licensee's Basis for Requesting Relief (as stated):

"During the ultrasonic examination of the welds shown in Attachment 1 for Refueling Outage 8, the minimum 90% coverage requirement of ASME Section XI, 1980 Edition through Winter 1980 Addenda, clarified by Code Case N-460, could not be obtained due in part to geometry and to actual physical barriers. A combination of multiple angles and UT techniques was used to obtain the maximum coverage possible. The attached examination reports document the actual amount of examination coverage obtained. Drawings showing details of the affected welds including calculation methods are included as Attachment 2*.

Licensee's Proposed Alternative (as stated):

"The use of radiography as an alternate volumetric examination is not practical due to component thickness and geometric configurations. Other restrictions making radiography impractical are the use of double wall techniques and physical barriers prohibiting access for placement of source, film, number bands, etc. As a result of the impractical use of radiography Duke Power Company will continue to use the most current techniques available for future examinations of the Item Numbers shown in Attachment 1.

Duke Power Company will continue to ultrasonically examine the welds, including inside radius sections, to the extent practical within the limits of original design and construction. This will provide reasonable assurance of weld/component integrity. Thus, an acceptable level of quality and safety will have been achieved and public health and safety will not be endangered by allowing relief from the aforementioned Code requirements."

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* Included in licensee's submittal but not in this report.

Evaluation: The Code requires 100% volumetric examination of the subject RPV nozzle-to-vessel welds and inside radius sections. However, complete examination is restricted by geometric configuration which makes the 100% volumetric examination impractical to perform for these areas. To gain access for examination, the RPV nozzles would require design modifications. Imposition of this requirement would create an undue burden on the licensee.

The licensee has examined these welds to the extent practical, obtaining 44-72% coverage of each nozzle-to-vessel weld and 64-87% coverage for each nozzle inside a radius section. In addition, other Class 1 nozzles are being examined as required by the Code. Therefore, any existing patterns of degradation would have been detected by the examinations that were completed and reasonable assurance of the structural integrity has been provided.

Based on the impracticality of meeting the Code coverage requirements for the subject nozzle-to-vessel welds and inside radius sections, and the reasonable assurance provided by the examinations that were completed on these and other Class 1 nozzles, it is recommended that relief be granted pursuant to 10 CFR 50.55a(g)(6)(i).

3.0 CONCLUSION

The INEEL staff has reviewed the licensee's submittal and concludes that the licensee has maximized examination coverage for the reactor vessel welds and that service-induced degradation, if present, would have been detected. Thus, for Request for Alternative 97-001, the licensee's proposed alternative provides an acceptable level of quality and safety. Therefore, it is recommended that the licensee's proposed alternative be authorized pursuant to 10 CFR 50.55a(g)(6)(ii)(A).

For Request for Relief 96-003, Parts A and B, the INEEL staff concludes that the licensee has demonstrated that the Code coverage requirements are impractical for the subject welds at McGuire, Unit 2. Furthermore, reasonable assurance of the structural integrity of the subject components has been provided by the examinations that were performed.

Therefore, it is recommended that relief be granted pursuant to 10 CFR 50.55a(g)(6)(i) for Request for Relief 96-003, Parts A and B.

Principal Contributor: T. McLellan

Date: August 22, 1997