



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

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION
OF THE FIRST TEN-YEAR INTERVAL INSERVICE INSPECTION PROGRAM PLAN

REQUEST FOR RELIEF NO. 96-02

DUKE POWER COMPANY

CATAWBA NUCLEAR STATION, UNIT 2

DOCKET NO. 50-414

1.0 INTRODUCTION

The Technical Specifications (TS) for Catawba Nuclear Station (CNS), Unit 2, state 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 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 difficulties 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 CNS, Unit 2, first 10-year inservice inspection (ISI) interval is the 1980 Edition through the Winter 1981 Addenda. The CNS, Unit 2, first 10-year interval ended August 19, 1996.

Enclosure 1

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 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.

In a letter dated February 29, 1996, Duke Power Company (licensee), submitted to the NRC its First Ten-Year Inservice Inspection Interval Request for Relief No. 96-02 for CNS, Unit 2.

2.0 EVALUATION AND CONCLUSIONS

The staff, with technical assistance from its contractor, the Idaho National Engineering Laboratory, has evaluated the information provided by the licensee in support of its First Ten-Year Inservice Inspection Interval Request for Relief No. 96-02 for CNS, Unit 2. Based on the information submitted, the staff adopts the contractor's conclusions and recommendations presented in the Technical Letter Report.

The staff has reviewed the licensee's Request for Relief No. 96-02 Parts 1 through 4 from the first 10-year interval Code examination requirements for CNS, Unit 2, and concludes that the Code examination requirements are impractical for the subject welds. To perform the Code-required examinations, design modifications or component replacement that provide for complete volumetric examination would be required and would result in a burden on the licensee without a compensating increase in the level of quality and safety. The examination coverage of the subject welds provides reasonable assurance of structural integrity of the welds. Therefore, relief is granted pursuant to 10 CFR 50.55a(g)(6)(i) for Request for Relief No. 96-02, Parts 1 through 4 as requested.

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Dated: October 1, 1996

TECHNICAL LETTER REPORT
ON THE FIRST 10-YEAR INSERVICE INSPECTION INTERVAL
REQUEST FOR RELIEF 96-02
FOR
CATAWBA NUCLEAR STATION, UNIT 2
DUKE POWER COMPANY
DOCKET NUMBER: 50-414

1.0 INTRODUCTION

By letter dated February 29, 1996, Duke Power Company submitted Request for Relief 96-02. The Idaho National Engineering Laboratory (INEL) staff has evaluated this relief request in the following section.

2.0 EVALUATION

The Code of record for the Catawba Nuclear Station, Unit 2, first 10-year inservice inspection interval, which ended August 19, 1996, is the *American Society of Mechanical Engineers (ASME) Boiler and Pressure Vessel Code*, Section XI, 1980 Edition through the Winter 1981 Addenda. The information provided by the licensee in support of the request has been evaluated and the bases for granting relief are documented below.

2.1 Request for Relief 96-02 (Part 1 of 4), Examination Category B-A, Items B1.11 and B1.12, Reactor Pressure Vessel Circumferential and Longitudinal Welds, Items B1.21 and B1.22, Reactor Pressure Vessel Head Circumferential and Meridional Welds

Code Requirement: Table IWB-2500-1, Examination Category B-A, Items B1.11 and B1.12 require 100% volumetric examination of circumferential and longitudinal shell welds as defined by Figures IWB-2500-1 and -2. Items B1.21 and B1.22 require 100% volumetric examination of circumferential and meridional head welds as defined by Figure IWB-2500-3.

ENCLOSURE 2

Licensee's Code Relief Request: The licensee requested relief from the Code-required volumetric examination of the following reactor pressure vessel (RPV) welds:

Item Number	Examination Area	Limitation/Coverage
Lower Head-to-Shell Weld		
B01.011.001, W-13	2RPV-101-141	Core Guide Lugs/57%
Lower Shell Longitudinal Welds		
B01.012.007, W-09	2RPV-101-142A	Core Guide Lugs/81%
B01.012.008, W-10	2RPV-101-142B	Core Guide Lugs/81%
B01.012.009, W-11	2RPV-101-142C	Core Guide Lugs/81%
Lower Head Weld		
B01.021.001, W-18	2RPV-101-151	Incore Nozzles/44%
Lower Head Meridional Welds at 0° and 180°		
B01.022.005, W-14	2RPV-101-154A	Core Guide Lugs and Incore Nozzles/64% and 63%
B01.022.007, W-16	2RPV-101-154C	

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

"The following welds received limited coverage because of Core Guide Lug obstructions:

B01.011.001, W-13 Lower Head-to-Shell Weld = 57%
 B01.012.007, W-09 Lower Shell Long. Seam = 81%
 B01.012.008, W-10 Lower Shell Long. Seam = 81%
 B01.012.009, W-11 Lower Shell Long. Seam = 81%

"These welds were examined to the extent practical in accordance with ASME Section V, Article 4 1980 Edition with Winter 1981 Addenda and the additional requirements of Regulatory Guide 1.50.

"B01.021.001, W-18 Lower Head Weld received limited coverage of 44% because of Incore Penetrations. This weld was examined to the maximum extent practical in accordance with ASME Section V, Article 4 1980 Edition with 1981 Addenda and the additional requirements of Regulatory Guide 1.150.

"The following welds received limited coverage because of Core Guide Lugs and Incore Penetrations:

B01.022.005, W-14 Lower Head Meridional Weld 0° = 64%
B01.022.007, W-16 Lower Head Meridional Weld 180° = 63%

"These welds were examined to the maximum extent practical in accordance with ASME Section V, Article 4 1980 Edition with Winter 1981 Addenda and the additional requirements of Regulatory Guide 1.150."

Licensee's Proposed Alternative Examination (as stated):

"Duke Power Company will continue to perform an ultrasonic examination of all Reactor 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."

Evaluation: The Code requires that the subject reactor pressure vessel shell and head welds receive 100% volumetric examination. Based on a review of the sketches provided by the licensee, it has been determined that internal attachments and incore nozzles limit scanning, thus precluding complete volumetric coverage. As a result, the Code-required examination coverage is impractical. To obtain complete volumetric coverage, design modifications or component replacement with ones of a design allowing for complete volumetric coverage would be required, causing a considerable burden on the licensee.

The licensee obtained 57% volumetric coverage of the lower head-to-shell weld, 81% volumetric coverage of the lower shell longitudinal seams, 44% volumetric coverage of the lower head circumferential weld, and 64% and 63% volumetric coverage of the lower head meridional welds. Based on the percentages of the Code-required volumetric coverage obtained, in combination with complete Code coverage of other reactor pressure vessel welds, it is reasonable to conclude that degradation, if present, would have been detected, providing reasonable assurance of structural integrity. Therefore, it is recommended that relief be granted pursuant to 10 CFR 50.55a(g)(6)(i).

2.2 Request for Relief 96-02 (Part 2 of 4), Examination Category B-D,
Items B3.90 and B3.100, Reactor Pressure Vessel Nozzle-to-Shell and Inner
Radius Sections

Code Requirement: Table IWB-2500-1, Examination Category B-D,
 Items B3.90 and B3.100 require 100% volumetric examination of all reactor
 pressure vessel nozzle-to-shell welds and inner radius sections as
 defined by Figure IWB-2500-7 each inspection interval.

Licensee's Code Relief Request: The licensee requested relief from the
 Code-required 100% volumetric examination of the following nozzle-to-
 shell welds and inner radius sections:

Item Number	Examination Area	Limitation/Coverage
Outlet Nozzle to Shell Welds		
B03.090.005, W-19	2RPV-107-121A @ 22°	Outlet Nozzle Boss/52%
B03.090.006, W-25	2RPV-107-121B @ 158°	
B03.090.007, W-27	2RPV-107-121C @ 202°	
B03.090.008, W-33	2RPV-107-121D @ 338°	
Inlet Nozzle Inner Radius Sections		
B03.100.001, W-21	2RPV-105-121A @ 67°	Geometric Configuration/81%
B03.100.002, W-23	2RPV-105-121B @ 113°	
B03.100.003, W-29	2RPV-105-121C @ 247°	
B03.100.004, W-31	2RPV-105-121D @ 293°	

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

"The following Outlet Nozzle-to-Shell welds each received limited
 coverage of 52% because of single sided access from the vessel inside
 surface:

B03.090.005, W-19 Outlet Nozzle at 22°
 B03.090.006, W-25 Outlet Nozzle at 158°
 B03.090.007, W-27 Outlet Nozzle at 202°
 B03.090.008, W-33 Outlet Nozzle at 338°

"The examinations from the nozzle bore achieved 100% coverage of the
 required examination volume. These welds were examined to the maximum
 extent practical in accordance with ASME Section V, Article 4 1989
 Edition and the additional requirements of Regulatory Guide 1.150.

"The following Nozzle Inner Radii each received limited coverage of 81% because of the geometric configuration of the nozzle:

B03.100.001, W21 Inlet Nozzle at 67°
B03.100.002, W23 Inlet Nozzle at 113°
B03.100.003, W29 Inlet Nozzle at 247°
B03.100.004, W31 Inlet Nozzle at 293°

"These nozzle inner radius sections were examined to the maximum extent practical in accordance with ASME Section V, Article 4 1989 Edition.

licensee's Proposed Alternative Examination (as stated):

"Duke Power Company will continue to perform an ultrasonic examination of all Reactor 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,

"Duke Power Company will continue to perform an ultrasonic examination of Class 1 and 2 Nozzle Inside Radius Sections to the maximum extent practical in accordance with the requirements of ASME Section V, Article 4, 1989 Edition.

Evaluation: The Code requires that the subject nozzle-to-shell welds and inner radius sections receive 100% volumetric examination. Based on a review of the sketches provided, it has been determined that the component geometry limits the scanning area. As a result, complete examination of the Code-required volume is impractical. To obtain complete volumetric examination, design modifications or component replacement with ones of a design that provides for complete volumetric examination would be necessary. Imposition of this requirement would cause a considerable burden on the licensee.

The licensee completed 52% of the Code-required volumetric examination of the subject nozzle-to-shell welds and 81% of the examination of the inner radius sections. Based on the significant percentage of coverage obtained, it is reasonable to conclude that degradation, if present, would have been detected. As a result, reasonable assurance of structural integrity is provided. Therefore, it is recommended that relief be granted pursuant to 10 CFR 50.55a(g)(6)(i).

2.3 Request for Relief 96-02 (Part 3 of 4), Examination Category B-J, Item B9.11, Class 1 Pipe Circumferential Butt Welds, and Examination Category B-M-1, Item B12.40, Valve Body Welds

Code Requirement: Table IWB-2500-1, Examination Category B-J, Item B9.11 requires 100% surface and volumetric examination of pressure-retaining circumferential butt welds equal to or greater than 4-inch nominal pipe size as defined in Figure IWR-2500-8.

Table IWB-2500-1, Examination Category B-M-1, Item B12.40, requires 100% volumetric examination of valve body welds in valves equal to or greater than 4 nominal pipe size as defined by Figure IWB-2500-17.

Licensee's Code Relief Request: The licensee requested relief from the Code-required 100% volumetric examination of pipe Weld 2NC13-06 (Item B09.011.019) and valve body Weld 2ND-37A (Item B12.040.002D).

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

"Single sided access prevents scanning B09.011.019 from the pump side of the weld. Three insulation supports spaced 120° apart further restrict the coverage of this weld. The reported coverage for this weld is 73.3%.

"Cast stainless steel metal weld characteristics mandate the use of refracted longitudinal waves. This type of ultrasonic wave produces mode conversion at the pipe inside surface, thus preventing the use of sound path distances beyond the first "leg". Therefore, coverage of the required examination volume in two beam path directions is not practical. This weld was examined to the maximum extent practical in accordance with ASME Section XI, Appendix III, 1980 Edition 1981 Addenda.

"B12.040.002D, 2ND-37A, Valve Body-to-Bonnet Weld was examined to the maximum extent practical using 45° and 60° beam angles in accordance with the requirements of ASME Section XI, Appendix III, 1980 Edition Winter 1981 Addenda.

"Because of geometric conditions, i.e., valve body and bonnet taper, 68.08% of the required volume was covered. In order to achieve more coverage of the required volume the valve body would have to be redesigned."

Licensee's Proposed Alternative Examination (as stated):

"Duke Power Company will perform future ultrasonic examinations of Class 1 cast stainless steel Piping and Valve Body Welds to the maximum extent practical in accordance with the requirements of ASME Section XI, Appendix III, 1989 Edition."

Evaluation: The Code requires that the subject welds receive 100% volumetric examination. Based on a review of the sketches provided, it has been determined that the geometric configuration of the pipe circumferential weld and valve body weld examination areas limit ultrasonic scanning, precluding complete Code-required volumetric examination. As a result, the Code-required examination is impractical. To perform the complete Code-required examination, design modifications or component replacement with ones of a design that provides for complete volumetric examination would be required. Imposition of this requirement would cause a considerable burden on the licensee.

The licensee completed 73% of the Code-required volumetric examination of the pipe weld and 68% of the examination of the valve body weld. The licensee was able to perform the Code-required surface examination on the pipe weld. Based on the significant percentage of coverage obtained, it is reasonable to conclude that degradation, if present, would have been detected. As a result, reasonable assurance of structural integrity is provided. Therefore, it is recommended that relief be granted pursuant to 10 CFR 50.55a(g)(6)(i).

2.4 Request for Relief 96-02 (Part 4 of 4), Examination Category C-B,
Item C2.22, Class 2 Pressure Vessel Inner Radius Section

Code Requirement: Examination Category C-B, Item C2.22 requires 100% volumetric examination of the nozzle inner radius sections of nozzles without reinforcing plates in vessels equal to or greater than 1/2 inch nominal thickness as defined by Figure IWC-2500-4(a) or (b).

Licensee's Code Relief Request: The licensee requested relief from the

Code-required 100% volumetric examination coverage for Steam Generator 2D, Main Steam nozzle inside radius section 2SGD-UH-15 (Item C02.022.007).

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

Due to limitations caused by the ratio of the nozzle O.D. to the vessel thickness, 51% of the required weld volume was covered. When the nozzle O.D. is small in relation to the vessel thickness, more coverage can be obtained when scanning from the vessel side.

"Examination from nozzle boss and O.D. blend radius using compound angles, determining which angles to use, metal paths to calibrate and area of coverage is not accurate with manual calculations. Duke Power Company is investigating the use of computer modeling to solve future limitation problems.

"Nozzle inner radius sections are examined with ultrasonics to the maximum extent practical from the vessel wall. Calibration blocks and procedures are in accordance with ASME Section V, Article 4."

Licensee's Proposed Alternative Examination (as stated):

"Duke Power Company will continue to perform an ultrasonic examination of Class 1 and 2 Nozzle Inside Radius Sections to the maximum extent practical in accordance with the requirements of ASME Section V, Article 4, 1989 Edition.

Evaluation: The Code requires that the steam generator main steam nozzle inside radius section receive 100% volumetric examination. Based on a review of the sketches provided, it has been determined that the nozzle configuration limits coverage of the inner radius section. As a result, complete, Code-required, volumetric examination is impractical. To provide complete volumetric examination, design modifications or component replacement with ones of a design that provides for complete coverage would be required. Imposition of this requirement would cause a considerable burden on the licensee.

The licensee completed 51% of the Code-required volumetric examination of the main steam nozzle inside radius section. Based on the percentage of coverage obtained, it is reasonable to conclude that degradation, if

present, would have been detected. As a result, reasonable assurance of structural integrity is provided. Therefore, it is recommended that relief be granted pursuant to 10 CFR 50.55a(g)(6)(i).

3.0 CONCLUSION

The INEL staff has reviewed Request for Relief 96-02 and concludes that the specific requirements of the Code are impractical for the subject components at Catawba Nuclear Station, Unit 2. Therefore, it is recommended that relief be granted, pursuant to 10 CFR 50.55a(g)(6)(i), as requested.