

October 4, 2002

Mr. Otto L. Maynard
President and Chief Executive Officer
Wolf Creek Nuclear Operating Corporation
Post Office Box 411
Burlington, KS 66839

SUBJECT: WOLF CREEK GENERATING STATION - RELIEF REQUEST I2R-25 RELATED
TO THREE CARBON STEEL PIPING WELDS (TAC NO. MB4078)

Dear Mr. Maynard:

By letter dated February 12, 2002 (ET 02-0002), you requested relief for the use of an alternative to the requirements in Section XI, on inservice inspection (ISI), of the American Society of Mechanical Engineers Boiler and Pressure Vessel Code (ASME Code) at Wolf Creek Generating Station (WCGS). The relief is applicable to the closure head-to-flange weld on the reactor pressure vessel, Weld No. CH-101-101, and pertains to the limited volumetric examination conducted on the weld due to the physical geometry of the weld joint and flange design. The examination is part of the ISIs conducted during the second 10-year inspection interval of WCGS.

The staff has evaluated the relief request against the requirements of Section XI of the 1989 Edition of the ASME Code, which is the applicable ASME Code for WCGS. Based on the evaluation, the use of the proposed alternative is authorized pursuant to 10 CFR 50.55a(g)(6)(i) in that the Code requirements are impractical, and the proposed alternative provides reasonable assurance of structural integrity, is authorized by law, will not endanger life or property or the common defense and security, and is otherwise in the public interest given consideration to the burden upon the licensee that could result if the requirements were imposed.

Sincerely,

/RA/

Stephen Dembek, Chief, Section 2
Project Directorate IV
Division of Licensing Project Management
Office of Nuclear Reactor Regulation

Docket No. 50-482

Enclosure: Safety Evaluation

cc w/encl: See next page

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SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

RELATED TO RELIEF REQUEST I2R-25

WOLF CREEK NUCLEAR OPERATING CORPORATION

WOLF CREEK GENERATING STATION

DOCKET NO. 50-482

1.0 INTRODUCTION

By letter dated February 12, 2002, Wolf Creek Nuclear Operating Corporation (WCNOC, the licensee) requested relief for the use of an alternative to certain volumetric inservice inspection (ISI) requirements in Section XI of the American Society of Mechanical Engineers Boiler and Pressure Vessel Code (ASME Code). The relief requested applies to the closure head-to-flange weld on the reactor pressure vessel (RPV), Weld No. CH-101-101, and pertains to the limited volumetric examination conducted on the weld due to the physical geometry of the weld joint and flange design. The examination is part of the ISIs conducted during the second 10-year inspection interval of Wolf Creek Generating Station (WCGS).

2.0 REGULATORY REQUIREMENTS

The ISI of Class 1, 2, and 3 components is to be performed in accordance with Section XI, "Rules for Inservice Inspection of Nuclear Power Plant Components," of the ASME Code, and applicable addenda as required by Section 50.55a(g) of Title 10 of the Code of Federal Regulations (10 CFR), except where specific 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 U. S. Nuclear Regulatory Commission (NRC), if the applicant demonstrates that (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 preservice 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) twelve months prior to the start of the 120-month interval, subject to the limitations and modifications listed therein. The Code of record for the second 10-year ISI interval for WCGS is the 1989 Edition of the ASME Code.

The staff has reviewed the request for relief pertaining to limited volumetric examination of the piping welds against the requirements of the 1989 Edition of the ASME Code, Section XI, pursuant to 10 CFR 50.55a(g)(6)(i).

3.0 RELIEF REQUEST NO. I2R-25

Code Requirement:

The licensee's second Interval ISI Program Plan is prepared to the 1989 Edition of the ASME Code, Section XI. In addition, the RPV is examined in accordance with the recommendations of Regulatory Guide (RG) 1.150, "Ultrasonic Testing of Reactor Vessel Welds During Preservice and Inservice Examinations," Revision 1 (Alternate Method¹). From the ASME Code, Section XI, Table IWB-2500-1, the non-destructive examinations required for this weld are surface and volumetric. ASME Code, Section XI, Figure IWB-2500-5 illustrates the required examination surface area and volume, respectively.

Section V of the ASME Code, 1989 Edition, Article 4, Paragraph T-441.3.2, specifies that the volume illustrated in Figure IWB-2500-5 be scanned by straight and angle beam techniques. The angle technique scans shall generally have nominal angles of 45 degrees and 60 degrees. The examination volume must be scanned with the angle beam search units directed both at right angles to the weld axis (perpendicular to the weld) and along the weld axis (parallel-to the weld).

Licensee's Code Relief Request:

Pursuant to 10 CFR 50.55a(a)(3)(i), the licensee requested relief to conduct alternative examinations on the basis that a reasonable percentage of the weld has been examined using available technology and techniques.

Pursuant to 10 CFR 50.55a(g)(6)(i), the licensee requested relief on the basis that conformance with the Code requirements is impractical. In order to achieve the ASME Code-required examinations, the licensee stated that the closure head would have to be redesigned and refabricated.

Identification of Component:

Code Class:	1
Examination Category:	B-A
Item Number:	B1.40
Description:	Closure Head-to-Flange Weld on RPV
Weld Identification Number:	CH-101-101 (Closure Head)

1. Alternate Method to RG 1.150 was recommended by an Ad Hoc Committee of the Electric Utility Industry after reviewing the original version of RG 1.150. The NRC evaluated the recommended alternative method and it was incorporated in RG 1.150, Revision 1, February 1, 1983.

Licensee's Basis for Requesting Relief:

In Reference 1², the licensee requested a similar relief request for the first interval incomplete volumetric exam for the subject weld. At that time, the NRC authorized the relief and concluded in the safety evaluation attached to its letter dated November 12, 1987, that the limited examination (100 percent surface and 94 percent volumetric) of the subject weld provided an acceptable level of safety and that compliance with the ASME Code requirements would "result in hardship or unusual difficulties without a compensating increase in the level of quality and safety."

The licensee provided the following information in its letter:

Licensee's ISI Program Plan for Inspection Interval 2

100 per cent of the Code required surface exam was completed during Refuel IX with no indications recorded.

The design and configuration of the closure head-to-flange weld and the location of the lifting lugs prevent 100 percent ultrasonic (UT) examination of the Code required volume for the subject weld.

Inspection Volume Coverage Summary

The required scan path is obstructed for the entire weld length (545.5 inches) by the flange and for 24 inches by the three lifting lugs. Figure 1³ provides a representation of the joint.

Due to the contour of the flange, the edge of the required adjacent base metal on the flange side of the weld is unable to be examined with 45 degree and 60 degree parallel and 0 degree scans. The amount of the Weld Required Volume (WRV) examined by these three scans is 83.8 percent for each scan.

The 45 degree perpendicular scan was affected by both the flange location and by the location of the lifting lugs. The coverage reduction due to the flange is 6.8 percent; due to the lifting lugs is 0.2 percent for a total reduction of 7.0 percent. This gives the amount of the WRV examined by the 45 degree perpendicular scan at 93.0 percent.

The 60 degree perpendicular scan was affected by both the flange location and by the location of the lifting lugs. The coverage reduction due to the flange is 12.5 percent; due to the lifting lugs is 0.2 percent for a total reduction of 12.7 percent. This gives the amount of the WRV examined by the 60 degree perpendicular scan at 87.3 percent.

-
2. Reference 1 is the licensee's letter dated March 20, 1987, (WM 87-0097) from B.D. Withers, Wolf Creek Nuclear Operating Corporation, to NRC.
 3. Figure 1 showing the closure head-to-flange weld configuration is attached to the licensee's letter dated February 12, 2002.

The average of the above five scans yields 86.3 percent composite coverage.

There were no unacceptable indications noted during the performance of these examinations.

Additional Technical Considerations

The RPV was designed and fabricated in accordance with the stringent quality controls of ASME Code Section III. During fabrication, the ASME Code Section III required volumetric and surface examinations to be performed on these specific welds with acceptable results.

Based on this information, reasonable assurance of the continued inservice structural integrity of the subject welds is achieved without performing a complete ASME Code examination. Compliance with the applicable ASME Code requirements can only be accomplished by redesigning and refabricating the reactor vessel. The licensee has stated that this course of action is impractical.

Licensee's Proposed Alternative Examination:

- (1) The closure head-to-flange weld has been examined to the fullest extent practical. The licensee proposes that the completed examinations be considered an acceptable alternative to the Code requirements.
- (2) Periodic System Leakage Tests per Category B-P, Table IWB-2500-1, ASME Code, Section XI, provide additional verification of component integrity.

Staff Evaluation:

The Code requires 100 percent volumetric and surface examination of the subject closure head-to-flange weld on RPV Weld No. CH-101-101. The design and configuration of the closure head-to-flange weld and the location of the lifting lugs prevent 100 percent UT examination of the ASME Code required volume for the subject weld. The licensee performed five scans in various directions and angles and obtained 86.3 percent composite volumetric examination coverage. The licensee found no unacceptable indications during the performance of the subject examinations. In addition, the licensee obtained 100 percent of the ASME Code required surface exam during Refuel Outage IX with no indications recorded.

The staff has determined that the ASME Code requirement to volumetrically examine the closure head-to-flange weld on RPV Weld No. CH-101-101 100 percent is impractical, because the subject component would have to be redesigned and refabricated. The imposition of the ASME Code requirement would result in an undue burden on the licensee. The volumetric and surface examinations performed provide reasonable assurance of structural integrity of the weld, and the periodic system leakage tests per Category B-P, Table IWB-2500-1, ASME Code, Section XI, provide additional verification of component integrity.

4.0 CONCLUSION

For Relief Request I2R-25, the staff concludes that the ASME Code requirements are impractical and the volumetric and surface examinations performed provide reasonable assurance of structural integrity of the closure head-to-flange weld on RPV Weld No. CH-101-101. The staff has evaluated the relief request against the requirements of Section XI of the 1989 Edition of the ASME Code, which is the applicable ASME Code for WCGS. Based on the evaluation, the use of the proposed alternative is authorized pursuant to Section 50.55a(g)(6)(i) in that the proposed alternative is authorized by law and will not endanger life or property or the common defense and security and is otherwise in the public interest given consideration to the burden upon the licensee that could result if the requirements were imposed.

Principal Contributor: T. McLellan

Date: October 4, 2002

Wolf Creek Generating Station

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