April 23, 2003

Mr. Rick A. Muench
President and Chief Executive Officer
Wolf Creek Nuclear Operating Corporation
P.O. Box 411
Burlington, KS 66839

SUBJECT: WOLF CREEK GENERATING STATION - RELIEF REQUEST NO. I2R-23 RELATED TO LIMITED EXAMINATION ON FEEDWATER NOZZLE TO STEAM GENERATOR WELD (TAC NO. MB4077)

Dear Mr. Muench:

By letter dated February 12, 2002 (ET 02-0001), as supplemented by letter dated November 4, 2002 (ET 02-0048), 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 (i.e., the ASME Code) at Wolf Creek Generating Station (WCGS). The relief is applicable to the "A" steam generator feedwater nozzle to shell weld EBB01A-11-W. You stated that a complete examination of the weld could not be performed because of the physical geometry of the weld joint and nozzle design.

The staff has evaluated Relief Request I2R-23 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 in the second 10-year interval for WCGS is authorized pursuant to 10 CFR 50.55a(g)(6)(i) in that the ASME 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 due consideration to the burden upon the licensee that could result if the requirements were imposed.

Sincerely,

/RA by Robert Gramm for/

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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** Changes made 4/23/03 JND
* See EMCB Memorandum dated 02/21/2003

ADAMS Accession No.: ML031130636 NRR-028

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Wolf Creek Generating Station

cc:

Jay Silberg, Esq.
Shaw, Pittman, Potts & Trowbridge
2300 N Street, NW
Washington, D.C. 20037

Regional Administrator, Region IV
U.S. Nuclear Regulatory Commission
611 Ryan Plaza Drive, Suite 400
Arlington, TX 76011-7005

Senior Resident Inspector
U.S. Nuclear Regulatory Commission
P.O. Box 311
Burlington, KS 66839

Chief Engineer, Utilities Division
Kansas Corporation Commission
1500 SW Arrowhead Road
Topeka, KS 66604-4027

Office of the Governor
State of Kansas
Topeka, KS 66612

Attorney General
Judicial Center
301 S.W. 10th, 2nd Floor
Topeka, KS 66612

County Clerk
Coffey County Courthouse
110 South 6th Street
Burlington, KS 66839

Vick L. Cooper, Chief
Radiation Control Program, RCP
Kansas Department of Health
and Environment
Bureau of Air and Radiation
1000 SW Jackson, Suite 310
Topeka, KS 66612-1366

Site Vice President
Wolf Creek Nuclear Operating Corporation
P.O. Box 411
Burlington, KS 66839

Superintendent Licensing
Wolf Creek Nuclear Operating Corporation
P.O. Box 411
Burlington, KS 66839

U.S. Nuclear Regulatory Commission
Resident Inspectors Office
8201 NRC Road
Steedman, MO 65077-1032

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

RELATED TO RELIEF REQUEST NO. I2R-23

FOR SECOND 10-YEAR INTERVAL INSERVICE INSPECTION PROGRAM

WOLF CREEK NUCLEAR OPERATING CORPORATION

WOLF CREEK GENERATING STATION

DOCKET NO. 50-482

1.0 INTRODUCTION

By letter dated February 12, 2002, as supplemented by letter dated November 4, 2002, Wolf Creek Nuclear Operating Corporation (WCNOC/the licensee) 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 (i.e., the ASME Code) at Wolf Creek Generating Station (WCGS). The relief is applicable to the "A" steam generator feedwater nozzle to shell weld EBB01A-11-W.

2.0 REGULATORY REQUIREMENTS

Inservice inspection of the ASME Code 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 10 CFR 50.55a(g), except where specific relief has been granted by the Commission pursuant to 10 CFR 50.55a(g)(6)(i). Section 50.55a(g)(6)(i) states the Commission will evaluate determinations under paragraph (g)(5) of this section that code requirements are impractical. The Commission may grant such relief and may impose such alternative requirements as it determines is authorized by law and will not endanger life or property or the common defense and security and is otherwise in the public interest giving due consideration to the burden upon the licensee that could result if the requirements were imposed on the facility.

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 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 ten-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 WCGS, second 10-year ISI interval is the 1989 Edition of the ASME Code.

3.0 TECHNICAL EVALUATION

This evaluation addresses the licensee's request for relief I2R-23 that was submitted in the application dated February 12, 2002.

Code Requirement

The WCGS second interval ISI program plan is prepared to Section XI of the 1989 Edition ASME Code. From Table IWC-2500-1, Examination Category C-B, Item C2.21, the non-destructive examinations (NDE) required for the steam generator feedwater nozzle to shell welds (listed below) are surface and volumetric. In ASME Section XI, Figure IWC-2500-4(a) illustrates the required examination surface area and volume, respectively. In accordance with Note (4) of Table IWC-2500-1 for multiple vessels of similar design, the required examinations may be limited to one vessel.

Appendix I directs the examination of vessels greater than 2 inches in thickness to be conducted in accordance with Article 4 of Section V, as supplemented by Table 1-2000-1.

ASME Section V, 1989 Edition, Article 4, Paragraph T-441.3.2, specifies that the volume illustrated in Figure IWC-2500-4(a) 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), from both sides of the weld if possible.

Licensee's Code Relief Request:

Pursuant to 10 CFR 50.55a(g)(6)(i), the licensee is requesting relief on the basis that conformance with the Code requirements is impractical, and in order to achieve the Code required examinations, the steam generator nozzle would have to be redesigned and refabricated.

Identification of Components:

Code Class:	2
Examination Category:	C-B
Item Number:	C2.21
Description:	Steam generator feedwater nozzle to shell welds. There is one feedwater nozzle to shell weld per steam generator; WCGS has four steam generators.
Weld Identification Number:	EBB01 A-11-W (in the "A" steam generator)

Licensee's Basis for Requesting Relief:

The following basis for the requested relief is taken verbatim from the licensee's application:

> In Reference [2 listed in the licensee's application], the NRC evaluated WCNOC's first interval incomplete volumetric exam for the subject weld. [Note that the licensee incorrectly listed Reference 1 in its application in referring

to NRC's evaluation of the licensee's first interval incomplete volumetric examination for the subject weld.] At that time, the NRC concluded that the limited exam of the subject weld provided an acceptable level of safety and that compliance with the Code requirements would result in hardship or unusual difficulty without a compensating increase in the level of quality and safety.

WCNOC [Licensee's] IS Program Interval 2

100 percent of the Code required surface exam was completed during Refuel X.

The steam generator feedwater nozzle to shell weld design and configuration prevents 100 per cent ultrasonic (UT) examination of the Code required volume for the subject weld. Physical limitations are due to nozzle forging and weld joint geometry. Due to these limitations, the examination of the weld required volume can only be performed from the shell side of the joint. Figure 1[1] provides a representation of the joint. Once the transducer shoe passes point A shown on Figure 1, liftoff [the transducer coming off the weld] is experienced, and the 0 degree and parallel scans become invalid.

Inspection Volume Coverage Summary:

A one sided exam from the shell side using a 45 degree search unit on the perpendicular scans was completed. A full vee exam was performed, providing complete coverage from two directions.

A one sided exam from the shell side using a 60 degree search unit on the perpendicular scans was completed from one direction. A full vee exam could not be performed due to the WCNOC calibration block not being physically long enough to support a full vee calibration.

Parallel scans and 0 degree scans of the subject weld are impractical due to joint configuration, and effective coverage is 0 percent.

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

The composite amount of Code Required Volume (CRV), which has been examined, is 30 percent. This is determined as shown below:

45 degree perpendicular scan	100% [100 percent]
60 degree perpendicular scan	50% (coverage in one direction only)
45 degree parallel scan	0% (joint geometry does not allow scan)
60 degree parallel scan	0% (joint geometry does not allow scan)
0 degree scan	0% (joint geometry does not allow scan)

150/500 x100% = 30%

---

1. Figure 1 is contained in the licensee's letter dated February 12, 2002 and is not included in this report.

> The only increase in coverage provided by a longer calibration block would be the 60 degree perpendicular scan in another direction. This would increase the composite coverage of the CRV to only 40 percent. The difficulty in obtaining the material and manufacturing a new calibration block when combined with the effort and dose of reperforming the exam does not result in a compensating increase in safety.
>
> *Additional Technical Considerations*
>
> The WCNOC steam generators were designed and fabricated in accordance with the stringent quality controls of ASME Section Ill. During fabrication, the ASME Section Ill required volumetric and surface examinations were performed on these specific welds with acceptable results.
>
> Based on this information, [WCNOC concluded that] reasonable assurance of the continued in service structural integrity of the subject welds is achieved without performing a complete Code examination. Compliance with the applicable Code requirements can only be accomplished by re-designing and re-fabricating the steam generator nozzle. WCNOC deems this course of action impractical.

Licensee's Proposed Alternative Examination:

The following proposed alternative examination for the requested relief is taken verbatim from the licensee's application:

> The steam generator feedwater nozzle to shell weld has been examined to the fullest extent practical. WCNOC proposes that the completed examinations be considered an acceptable alternative to the Code requirements.
>
> Periodic System Leakage Tests per Category C-H, Table IWC-2500-1, provide additional verification of component integrity.

Staff Evaluation:

The ASME Code requires 100 percent volumetric and surface examination of the subject welds; however, examination of these welds is restricted due to the component geometric configuration. The licensee proposed that the completed examinations be considered an acceptable alternative to the Code requirements.

On February 11, 2003, a teleconference with the licensee was held to address the staff's questions to clarify statements in the licensee's application regarding the ultrasonic volumetric coverage obtained as noted below for the Steam Generator A Nozzle-to-Shell Weld EBB01 A-11-W. The staff inquired if the licensee obtained 100 percent examination volume from one side with its 60 degree perpendicular scan, but only took credit for 50 percent of the examination. The licensee informed the staff that it only credited 50 percent of the examination, because the examination was performed from only one side of the weld and that the configuration of the subject nozzle-to-shell component prevented the examiner from performing the examination from both sides of the weld.

The staff also requested in the teleconference that the licensee clarify the reasons for the 0 percent volumetric examination coverage for the 45, 60 degree parallel scans and 0 degree scan. The licensee informed the staff, that due to the configuration of the subject nozzle-to-shell component, they experienced lift off of the transducer and could not obtain the required Code coverage.

The summary of the February 11, 2003, teleconference has been docketed in ADAMS under Accession No. ML030640016.

The licensee performed a one-sided exam from the shell side using a 45 degree search unit for a perpendicular scan and was able to obtain 100 percent volumetric coverage. In addition, using a 45 degree search unit, the licensee performed a full vee examination from two directions and was able to obtain complete coverage of the subject weld. The licensee also performed a one-sided exam from the shell side using a 60 degree search unit on the perpendicular scan and was able to obtain 50 percent volumetric coverage of the weld. The licensee could not perform a full vee exam using a 60 degree search unit because the licensee's calibration block was physically not long enough to support a full vee calibration.

The licensee in its supplemental letter dated November 4, 2002, addressed the staff's inquiry regarding why fabrication of a new calibration block would be impractical. The licensee responded that it would be difficult to obtain the material and manufacture a new calibration block, and that a new calibration block would only increase the composite coverage (by using a 60 degree perpendicular scan in another direction) from 30 to 40 percent of the Code-required volume. Furthermore, the licensee stated that the Authorized Nuclear Inservice Inspector (ANII) has approved the subject calibration block.

A licensee can change the calibration block design and material for the existing UT technique by following the requirements of Section XI, Appendix III, paragraph III-1100(d) of the ASME Code. Paragraph III-1100(d) states that an alternative calibration block design and material may be used for an existing UT technique, as provided by paragraph IWA-2240 of the ASME Code. Paragraph IWA-2240 permits the use of alternative blocks provided an ANII is satisfied that the results are demonstrated to be equivalent or superior to those of the specified UT method. Therefore, based on the information provided by the licensee in this request for relief, the ASME Code provides a means of considering the use of alternative calibration blocks under the provisions of IWA-2240. The implementation of IWA-2240 regarding the application of an alternative calibration block obviates the need for a relief request regarding an alternate calibration block.

Round robin tests, as reported in NUREG/CR-5068, have demonstrated that UT examinations of ferritic material from a single side provide high probabilities of detection (usually 90 percent or greater) for both near- and far-side cracks in blind inspection trials. While the licensee may not have achieved complete examination coverage (from both sides) as required by the ASME Code, the UT examinations performed by the licensee from the vessel side of the carbon steel weld meet the inspection procedure guidelines documented in NUREG/CR-5068. Therefore, based on the drawings provided by the licensee, the staff determined that the steam generator feedwater nozzle-to-shell weld design and configuration prevents 100 percent UT examination of the Code-required volume for the subject weld and that the Code-required volumetric examinations are impractical. Imposition of the Code would result in a significant burden on the licensee because the subject components would have to be re-designed and

re-fabricated in order for the licensee to perform the Code-required examinations. The licensee completed 30 percent composite coverage and 100 percent coverage with a 45 degree perpendicular scan. In addition, the Code-required 100 percent surface examination was completed and Code VT-2 visual examinations for evidence of leakage were performed during the system leakage test prior to startup after Refueling Outage 10 with acceptable results. Therefore, the staff concludes that the best effort UT and 100 percent surface examinations performed, and the VT-2 visual examinations performed during the system leakage tests provide reasonable assurance of the structural integrity of the subject components.

4.0 CONCLUSION

For Relief Request I2R-23, the staff concludes that the ASME Code requirements are impractical and that imposition of the Code would result in a significant burden on the licensee because the subject components would have to be redesigned and refabricated. The acceptable surface, volumetric, and visual examinations performed provide reasonable assurance of structural integrity of the subject components. Therefore, the licensee's request for relief is granted pursuant to 10 CFR 50.55a(g)(6)(i) for the second 10-year interval.

Principal Contributor: T. K. McLellan, EMCB/DE

Date: April 23, 2003