

November 20, 2006

Mr. Rick A. Muench  
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-36 FOR THE  
SECOND 10-YEAR INTERVAL INSERVICE INSPECTION (TAC NO. MD0290)

Dear Mr. Muench:

By letter dated March 2, 2006 (ET 06-0011), supplemented by letter dated July 12, 2006 (ET 06-0027), Wolf Creek Nuclear Operating Corporation (the licensee) submitted Relief Request (RR) I2R-36 for its second 10-year inservice inspection (ISI) program interval at Wolf Creek Generating Station (WCGS). Included with the submittal were the following five RRs: I2R-34, I2R-35, I2R-36, I2R-37, and I2R-38. This letter only addresses RR I2R-36.

In the enclosed safety evaluation (SE), the Nuclear Regulatory Commission (NRC) staff has evaluated the information provided by the licensee for the proposed second 10-year ISI interval RR I2R-36 for WCGS. Based on the SE, the staff concludes that it is impractical for the licensee to meet the applicable American Society of Mechanical Engineers (ASME) Boiler and Pressure Vessel Code requirements. Therefore, 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 grants relief and imposes alternative requirements in accordance with paragraph 50.55a(g)(6)(i) of Title 10 of the *Code of Federal Regulations* for the second 10-year ISI interval for WCGS. All other requirements of the ASME Code, Sections III and XI, for which relief has not been specifically requested, remain applicable, including third-party review by the Authorized Nuclear Inservice Inspector.

Sincerely,

*/RA/*

David Terao, Chief  
Plant Licensing Branch IV  
Division of Operating Reactor Licensing  
Office of Nuclear Reactor Regulation

Docket No. 50-482

Enclosure: Safety Evaluation

cc w/encl: See next page

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OFFICIAL AGENCY RECORD

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SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

RELATED TO RELIEF REQUEST I2R-36

FOR THE SECOND 10-YEAR INTERVAL INSERVICE INSPECTION

WOLF CREEK NUCLEAR OPERATING CORPORATION

WOLF CREEK GENERATING STATION

DOCKET NO. 50-482

1.0 INTRODUCTION

By letter dated March 2, 2006 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML060720056), as supplemented by letter dated July 12, 2006 (ADAMS Accession No. ML062000312), Wolf Creek Nuclear Operating Corporation (the licensee) submitted Relief Request (RR) I2R-36 for its second 10-year inservice inspection (ISI) program interval at Wolf Creek Generating Station (WCGS). Included with the submittal were the following five RRs: I2R-34, I2R-35, I2R-36, I2R-37, and I2R-38. This safety evaluation (SE) only addresses RR I2R-36.

2.0 REGULATORY EVALUATION

ISI of the American Society of Mechanical Engineers (ASME) Boiler and Pressure Vessel Code Class 1, 2, and 3 components are performed in accordance with applicable editions and addenda of Section XI of the ASME Code, "Rules for Inservice Inspection of Nuclear Power Plant Components," as required by Title 10 of the *Code of Federal Regulations* (10 CFR) 50.55a(g), except where specific relief has been granted by the Nuclear Regulatory Commission (NRC) pursuant to 10 CFR 50.55a(g)(6)(i) where code requirements are impractical. Paragraph 10 CFR 50.55a(g)(6)(i) indicates that NRC 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) must 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 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 ASME Code of record for the WCGS second 10-year ISI interval is the 1989 Edition, with no addenda.

### 3.0 TECHNICAL EVALUATION

#### 3.1 ASME Code Requirement

ASME Code, Section XI, 1989 Edition, with no addenda, Figure IWC-2500-1, Examination Category C-A Full Penetration Bonnet Flange to Channel Welds of the Residual Heat Exchanger, Code Item Number C1.10, requires that ultrasonic testing (UT) must be conducted on each side of the weld equal to a distance of one-half of the flange thickness adjacent to the weld for the flange side, and one-half of the channel thickness adjacent to the weld for the channel side.

#### 3.2 System/Component(s) for which Relief is Requested

The licensee requested relief for the following ASME Code, Section XI, Category C-A full penetration bonnet flange to channel welds of the residual heat exchanger:

Code Item Number C1.10 - Bonnet Flange to Channel Welds of the Residual Heat Exchanger.

#### 3.3 Licensee's Proposed Alternative and Basis for Requesting Relief (as stated in the licensee's letter dated March 2, 2006):

##### **3. Applicable Code Requirement**

ASME Section XI, Figure IWC-2500-1 1989 Edition with no addenda requires volumetric examination of a minimum volume of base material on each side of the weld equal to a distance of ½ inch for the shell circumferential weld [one-half of the flange thickness adjacent to the weld for the flange side, one-half of the channel thickness adjacent to the weld for the channel side] (Code Item C1.10).

The Wolf Creek Nuclear Operating Corporation (WCNOC) second ten-year interval inservice inspection program plan also implements Code Case N-460, which is endorsed by the NRC in Regulatory Guide 1.147, "Inservice Inspection Code Case Acceptability ASME Section XI, Division 1." Code Case N-460 states in part, "when the entire examination volume or area cannot be examined due to interference by another component or part geometry, a reduction in examination coverage on any Class 1 or Class 2 weld may be accepted provided the reduction in coverage for that weld is less than 10 percent."

NRC Information Notice (IN) 98-42, "Implementation of 10 CFR 50.55a(g) Inservice Inspection Requirements," termed a reduction in coverage of less than 10 percent to be essentially 100 percent." IN 98-42 states in part, 'The NRC has adopted and further refined the definition of "essentially 100 percent" to mean "greater than 90 percent"... has been applied to all examinations of welds or other areas required by ASME Section XI.'

**4. Impracticality of Compliance**

The examination of the subject components is limited by the configuration of the flange design and the location of flange bolting. As shown on the attached figures [in the licensee's March 2, 2006, submittal], the proximity of the bolting to the bonnet flange to channel weld limits the scans from the flange side of the weld. Complete perpendicular coverage was achieved; however, the parallel coverage was limited on the flange side of the weld. Although a small amount of scanning was able to be performed on the flange side, parallel coverage was conservatively credited only to the channel side of the weld. This yields a composite coverage of the required examination volume of 75%.

Removal of the bolting to allow for complete coverage would be needed to meet the Code requirements. This would result in a considerable increase of radiological exposure to WCNOG personnel as, during refueling outages, this component is located in an area classified as a "high radiation area." The dose rates around this component generally range from 15 to 50 millirem per hour. It is estimated that it would take approximately 40 additional man-hours to remove the bolting, perform the additional examination and replace the bolting. The amount of dose received by personnel during this time would be a considerable burden to WCGS.

**5. Burden Caused by Compliance**

The design configuration restrictions of the bonnet flange of the RHR [residual heat remover] heat exchanger at Wolf Creek Generating Station (WCGS) make the Code required examination coverage requirements impractical. The bolting is located so that circumferential scanning for axial flaws is limited on the flange side of the weld. To examine essentially 100% of the Code required volume would require removal and replacement of the bolting, causing Wolf Creek personnel to receive an additional amount of radiological dose, likely well in excess of one man-Rem.

**6. Proposed Alternative and Basis for Use**

Proposed Alternative

The following alternatives are proposed in lieu of the required examination coverage of essentially 100 percent:

1. Ultrasonic Testing (UT) of the subject weld was performed to the maximum extent practical during the second ten-year interval.
2. Pressure test VT-2 visual examinations were performed as required by Code Category C-H during the second ten-year interval. No evidence of leakage was identified for this component.

### Basis for Use

The basis for use of this alternative is that it provides the best examination coverage practical within the limitations of the current configuration. Based on the percentage of the examination volume completed, and the lack of any indications detected, there is a high level of confidence in the continued structural integrity of the weld. WCNOG does not believe that there is an increased level of safety or quality commensurate with the amount of increased dose required to complete this examination.

It should be noted that the Channel-to-Head weld of this RHR heat exchanger was examined with 100% coverage achieved, and no indications were detected.

## **7. Duration of Proposed Alternative**

The second ten-year ISI interval which began September 3, 1995, and ended September 2, 2005.

### Precedents

Comanche Peak Steam Electric Station Letter, dated March 10, 2005, Docket No. 50-446, "Relief Requests B-12, B-13, B-14, and C-8 to the Unit 2 Inservice Inspection (ISI) from 1986 Edition of ASME Code, Section XI, No Addenda," and the associated NRC Safety Evaluation Report dated July 8, 2005 (TAC No. MC6405)

## **4.0 STAFF EVALUATION**

ASME Code, Section XI, 1989 Edition, and no Addenda, Figure IWC-2500-1, Examination Category C-A Full Penetration Bonnet Flange to Channel Welds of the Residual Heat Exchanger, Code Item Number C1.10, requires that UT must be conducted on each side of the weld equal to a distance of one-half of the flange thickness adjacent to the weld for the flange side, and one-half of the channel thickness adjacent to the weld for the channel side.

As stated in its application for relief and discussed above in the section on the licensee's basis for requesting relief from the ASME Code, the licensee explained that (1) examination of the subject components is limited by the configuration of the flange design and the location of flange bolting, and (2) removal of the bolting to allow for complete coverage would be needed to meet the Code requirements resulting in a considerable increase in personnel radiation exposure. Therefore, the licensee concluded that it was impractical to meet the applicable ASME Code requirement. Based on its review of the relief requested, the NRC staff agrees with the licensee that it is impractical for the licensee to meet the applicable ASME Code requirements.

In its letter dated March 2, 2006, the licensee stated that no indications were identified in the subject welds during the previous preservice and ISI UT examinations, and complete coverage of the subject welds was not achieved during these UT examinations.

To effectively evaluate the licensee's proposed alternative, the staff, in an electronic mail dated May 9, 2006, requested that the licensee provide additional information regarding the following issues associated with the relief request.

- (1) Type of weld metal that was used for the subject welds.
- (2) State of stress that is present in the uninspected portion of the welds.

The licensee, in its letter dated July 12, 2006, provided responses to the staff's request for additional information (RAI). The following section provides information regarding the responses from the licensee and the corresponding staff evaluation.

#### 4.1 Type of Weld Metal that was Used for the Subject Welds

In its response to the staff's RAI, the licensee, in a letter dated July 12, 2006, stated that carbon/low-alloy steel weld metal was used for all the subject welds.

#### 4.2 State of Stress that is Present in the Uninspected Portion of the Welds

In its response to the staff's RAI, the licensee, in a letter dated July 12, 2006, stated that the uninspected portion of the weld is a low-stress region. The licensee stated that the subject welds have a very large flaw tolerance and they experience mild-duty cycle. The volume of the subject welds where degradation would be first expected to occur was examined to the ASME Code, Section XI, requirements. These welds are subject to pressure visual testing (VT-2) during every outage and this test would detect any through-wall leakage in the subject welds. Since no flaws were detected in the subject welds, the licensee concluded that the proposed alternative examination provides reasonable assurance of structural integrity.

The staff reviewed the licensee's responses to the RAIs and finds that the licensee's technical basis for the reduction in the examination volume is acceptable for the following reasons:

- (1) The base metal and weld metal were extensively examined during construction, preservice inspection, and prior inservice inspections. These examinations indicated no flaws which required evaluation per the ASME Code.
- (2) The low-alloy steel bonnet flange to channel welds of the residual heat exchanger are classified as ferritic welds. Unlike stainless-steel welds or nickel-alloy welds, these ferritic welds are less likely to experience aging degradation due to intergranular stress-corrosion cracking near the heat-affected zone region of the weld area.
- (3) The uninspected portion of the weld is a low-stress region and, therefore, service-induced flaws are less likely to occur in the volume near the weld that was excluded from the UT examinations. The licensee conducted UT examinations on the volume of the subject welds where service-induced cracking is more likely to occur. Since UT examinations thus far did not identify any cracking in the inspected region, the staff concludes that there is no reason to expect service-induced degradation in the uninspected regions of the subject

welds. Furthermore, the licensee's pressure test VT-2 examinations during every refueling outage did not identify any through-wall leakage in these welds. Therefore, the staff concludes that there is no active service-induced degradation in the subject welds.

Based on the above evaluation, the NRC staff concludes that the prior UT examinations and VT-2 and pressure tests of the subject welds did not identify any unacceptable flaws (per the ASME Code, Section XI criteria), the location of the uninspected region of the welds is a low-stress region, and this region is less prone to any service-induced cracking. Based on these conclusions, the NRC staff finds that the licensee's proposed alternative will identify degradation in these welds in a timely manner so that corrective actions can be taken by the licensee to maintain the structural integrity of the subject welds. Based on this and the impracticality of meeting the applicable ASME Code requirements, the NRC staff concludes that the requested relief may be granted to the licensee for the second 10-year interval in accordance with 10 CFR 50.55a(g)(6)(i).

#### 5.0 CONCLUSION

Based on the above discussion, the staff concludes that it is impractical for the licensee to meet the applicable code requirements. Therefore, 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 proposed RR I2R-36 is granted for the second 10-year ISI interval for WCGS. All other requirements of the ASME Code, Sections III and XI, for which relief has not been specifically requested, remain applicable, including third-party review by the Authorized Nuclear Inservice Inspector.

Principal Contributor: Ganesh S. Cheruvenki

Date: November 20, 2006