

August 6, 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 (RR) I2R-27
RELATED TO THREE CARBON STEEL PIPING WELDS (TAC NO. MB4079)

Dear Mr. Maynard:

By letter dated February 12, 2002 (ET 02-0004), Wolf Creek Nuclear Operating Corporation (WCNOC) requested relief for the use of an alternative to the requirements in Section XI, on inservice inspection, of the American Society of Mechanical Engineers Boiler and Pressure Vessel Code (the ASME Code) at the Wolf Creek Generating Station (WCGS). The relief, applicable to three carbon steel piping welds located in the no-break zone associated with high energy piping, pertains to the limited volumetric examination conducted for each of the welds due to the configuration of the weld. The examinations are a part of the high-energy line break augmented inservice inspections 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 enclosed safety evaluation, RR-I2R-27 is granted pursuant to 10 CFR 50.55a(g)(6)(i) for WCGS for the second 10-year inservice inspection interval. This relief is authorized by law and will not endanger life, 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 on the facility.

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 NO. I2R-27

WOLF CREEK NUCLEAR OPERATING CORPORATION

WOLF CREEK GENERATING STATION

DOCKET NO. 50-482

1.0 INTRODUCTION

The inservice inspection (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 American Society of Mechanical Engineers Boiler and Pressure Vessel Code (the ASME Code), and applicable addenda as required by 10 CFR 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 the licensee 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, 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 10-year interval, subject to the limitations and modifications listed therein. The applicable ASME Code of Record for the second 10-year ISI interval of Wolf Creek Generating Station (WCGS), is the 1989 Edition.

By letter dated February 12, 2002, Wolf Creek Nuclear Operating Corporation (WCNOC, the licensee) requested relief for the use of an alternative to ISI requirements in Section XI of the ASME Code. The licensee also provided information to clarify its application of February 12, 2002 (ADAMS Accession No. ML021610398).

The licensee requested relief from certain volumetric examination requirements in order to comply with the NRC Branch Technical Position MEB 3-1, "Postulated Rupture Locations in Fluid System Piping Inside and Outside Containment," to Standard Review Plan 3.6.2, "Determination of Rupture Locations and Dynamic Effects Associated with the Rupture of

Piping." The relief, applicable to three carbon steel piping welds located in the no-break zone associated with high energy piping, pertains to the limited volumetric examination conducted for each of the welds due to the configuration of the weld. The examinations are a part of the high-energy line break augmented inspection program conducted during the second 10-year inspection interval of WCGS. 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).

2.0 RELIEF REQUEST NO. I2R-27

Identification of Component (Welds) and Systems

<u>Item</u>	<u>System</u>	<u>Penetration Weld No. and Configuration</u>
1.	Feedwater	AE-04-F043 (3" weld-o-let to valve)
2.	Feedwater	AE-04-F033 (4" elbow to valve)
3.	Main Steam	AB-01-F035 (4" extrusion to pipe)

Code Class and Examination

Class 2 high-energy fluid system piping requiring 100% volumetric examination of welds during each inspection interval as defined in the ASME Code, Section XI, Subsection IWA-2400, Inspection Program.

Examination Requirements

The ASME Code, Section XI, 1989 Edition, Figure IWC-2500-7 requires the lower 1/3 thickness extending 0.25 inch beyond the weld crown on each side, 360 degrees around the weld to be ultrasonically examined. Appendix III, "Ultrasonic Examination of Piping Systems," of the ASME Code, Section XI requires scanning for reflectors parallel to the weld seam (perpendicular scan) and for reflectors transverse to the weld seam (parallel scan).

Licensee's Requested Relief

Relief is requested for limited parallel scan of 66%, 75%, and 74% in lieu of 100% as required under Appendix III of the ASME Code, Section XI, which amounts to 83%, 87.5%, and 87% average volumetric coverage for each of the welds identified above against items 1, 2, and 3, respectively.

Licensee's Proposed Alternative Examinations (as stated in the application)

- 1) The subject welds have been examined to the fullest extent practical. WCNOG proposes that the completed examination be considered as an acceptable alternative to the augmented inspection requirement.
- 2) Periodic system leakage tests per Category C-H, Table IWC-2500-1, provide additional verification of component integrity.

Licensee's Basis for Relief (as stated in the application)

Due to configuration geometry, the Code-required volume cannot be obtained. The perpendicular scans were completed with 100% coverage on the listed welds. However, the required coverage on parallel scans cannot be obtained.

Weld AE-04-F033 connects a 4-inch elbow to a 4-inch valve. Due to the configuration of the joint, parallel coverage on 25 percent of the Weld Required Volume (WRV) on the valve side of the weld cannot be obtained. The shaded area in Figure 1 illustrates the volume that cannot be examined.

Weld AE-04-F043 connects a 3-inch weld-o-let to a 3-inch valve. Due to the configuration of the joint, parallel coverage on 34 percent of the WRV on the valve side of the weld cannot be obtained. The shaded area in Figure 2 illustrates the volume that cannot be examined.

Weld AB-01-F035 connects a 4-inch extruded outlet from the 28-inch main steam header to a 4-inch pipe. Due to the configuration of the extrusion, parallel coverage on 26 percent of the WRV on the extrusion side of the weld cannot be obtained. The shaded area in Figure 3 illustrates the volume that cannot be examined.

To obtain the code required coverage on the subject welds would require re-designing and re-fabricating the piping in which these welds are installed. WCNOG considers this to be impractical.

WCNOG considers that the use of the proposed alternative examination described below will provide an acceptable level of quality and safety as required by 10 CFR 50.55a(a)(3)(i).

3.0 EVALUATION

The augmented inspection of Class 2 high energy fluid system piping requires a 100% volumetric examination during each inspection interval in accordance with the applicable ASME Code, Section XI. The staff notes that each of the welds identified in Relief Request No. I2R-27 were examined in accordance with the performance demonstration requirements of Appendix VIII to Section XI, and did receive 100% volumetric examination coverage during the perpendicular scan which would only detect reflectors parallel to the weld seam. The parallel scans were restricted due to weld configurations resulting from an elbow to a valve, a weld-o-let to a valve, and an extrusion to a pipe. However, 66% to 75% of volumetric examination coverages were obtained transverse to the welds. The staff has estimated that the composite volumetric coverages for the welds varied from 83% to 87.5%. Nevertheless, Code Case N-460, "Alternative Examination Coverage for Class 1 and Class 2 Welds," which has been endorsed by the NRC, allows a reduction in examination coverage of less than 10% for a weld due to interference by another component or part geometry. The staff has determined that it is impractical to perform the Code-required examination of the welds due to component configuration. In order to comply with the Code requirement, a design modification of the piping

system will have to be performed which would impose a significant burden on the licensee. The staff has further evaluated the impact of limited volumetric examination coverage on the structural integrity of the welds.

In assessing the structural integrity of the welds in the piping affected by this relief request, the staff focused on the issues of active degradation mechanisms, the likelihood of a flaw existing in the subject welds, and the growth of an existing flaw necessary to cause a failure during the current inspection interval. The factors considered were:

- The primary stresses under normal, upset, and faulted conditions are well below the allowable stresses of ASME Code, Section III. The secondary stresses are also well within the Code allowable stresses.
- The circumferential welds for which relief from inservice examination is requested are composed of carbon steel which is not susceptible to stress corrosion cracking in the exposed environment. The components are also categorized as low susceptibility in the flow accelerated corrosion susceptibility analysis. There is no information which would suggest that there is a degradation mechanism active in the subject welds which would cause a failure in the second inspection interval. The examination conducted for each weld provides reasonable assurance of structural integrity of the weld since any significant pattern of degradation in the weld would have been detected during examination of the accessible weld volume. Furthermore, should the conditions in the systems change, examination of the remaining welds in the systems will likely detect the onset of service-related degradation.
- The preservice and the limited inservice inspection of the welds conducted in the first 10-year interval for the welds detected no relevant indication.
- In an unlikely event of a flaw being present that escaped detection during the first 10-year ISI interval, assuming reasonable crack growth between consecutive inspection intervals, it is highly unlikely that the flaw would grow to a critical size to cause a failure of the weld. Further, the system pressure test, which is routinely conducted at the end of the refueling outage prior to operation, will likely result in a detection of a leak before any significant failure occurs.

The staff has, therefore, concluded that there is reasonable assurance of structural integrity of these welds, and that the criteria for piping segments designated as a "break-exclusion zone" will continue to be maintained.

Based on the licensee's basis for relief given above, the staff also concludes that to obtain the ASME Code-required coverage on the three subject welds would be impractical because, as

was stated in the application by the licensee, the piping in which these welds are installed would have to be redesigned and refabricated.

4.0 CONCLUSION

Based on the above, the staff concludes that reasonable assurance of structural integrity of the

welds addressed by this relief request has been provided, and that compliance with the ASME Code-required examinations is impractical. Therefore, request for relief No. I2R-27 is granted pursuant to 10 CFR 50.55a(g)(6)(i) for WCGS for the second 10-year inservice inspection interval. This grant of relief is authorized by law and will not endanger life, 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 on the facility.

Principal Contributor: Prakash Patnaik

Date: August 6, 2002

Wolf Creek Generating Station

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