WOLF CREEK
NUCLEAR OPERATING CORPORATION

Richard A. Muench
Vice President Engineering

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ET 99-0002

U. S. Nuclear Regulatory Commission
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Washington, D. C. 20555

References: 1) Letter ET 97-0031, dated May 23, 1997, from R. A. Muench, WCNOC, to USNRC
2) Letter 98-00499, dated April 15, 1998, from USNRC to O. L. Maynard, WCNOC

Subject: Docket 50-482: Inservice Inspection Program Alternative for Limited Reactor Vessel Shell Weld Examinations and Relief Request I1R-50

Gentlemen:

Wolf Creek Nuclear Operating Corporation (WCNOC), in Reference 1, submitted Inservice Inspection Program Relief Request I1R-48 for various reactor vessel welds which were impractical to inspect in their entirety. Reference 2 documented the NRC approval of the relief request for the welds identified within the submittal with the exception of reactor vessel welds identified as 1-RV-101-122A, 1-RV-101-122B, and 1-RV-101-122C. This letter provides Relief Request I1R-50 which specifically addresses these three welds.

Welds 1-RV-101-122A, 1-RV-101-122B, and 1-RV-101-122C are reactor vessel shell longitudinal welds and are subject to the augmented requirements of 10 CFR 50.55a(g)(6)(ii)(A). These welds are also subject to the provisions of the ASME Boiler and Pressure Vessel Code, Section XI. Both 10 CFR 50.55a(g)(6)(ii)(A) and ASME Section XI 1980 Edition with Winter 1981 Addenda, first interval requirements, require 100 percent examination of these welds at Wolf Creek Generating Station.

WCNOC requests use of an alternative to the requirements of 10 CFR 50.55a(g)(6)(ii)(A) for these welds in accordance with the provisions of 10 CFR 50.55a(g)(6)(ii)(A)(5). WCNOC also requests relief from the ASME Code requirements pursuant to 10 CFR 50.55a(g)(5)(iii). WCNOC has implemented the augmented examination provisions of 10 CFR 50.55a(g)(6)(ii)(A)(4), and the inspection provisions of the WCNOC Inservice Inspection Program, which was developed in accordance with the 1980 Edition with Winter 1981 Addenda of ASME Section XI, by attempting to perform 100 percent examination of these welds. These examinations were performed in the spring of 1996 in Refuel VIII, as part of the final First 10-Year Interval Inservice Inspections. WCNOC was unable to examine greater than 90 percent of the required volume for welds 1-RV-101-122A, 1-RV-101-122B, and 1-RV-101-122C because of the design and geometry of the reactor vessel in areas adjacent to these welds. Attachment I provides Relief Request I1R-50 and the technical basis for this position. Attachment II identifies WCNOC commitments made in this letter.

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As an alternative to examining essentially 100 percent of these welds, WCNOC proposes that the examination completed in Refuel VIII, which was performed to the fullest extent practical, be considered an acceptable alternative. The Wolf Creek Generating Station reactor vessel was designed and fabricated in accordance with the stringent quality controls of ASME Section III. During fabrication, the ASME Section III required volumetric and surface examinations were performed on these specific welds with acceptable results. In addition to the ASME Code Section III required nondestructive examination, all full penetration ferritic pressure boundary welds in the reactor vessel were ultrasonically examined during fabrication. These examinations were performed upon completion of the welding and intermediate heat treatment but prior to the final post-weld heat treatment. After vessel hydrotesting, all full penetration ferritic pressure boundary welds in the reactor vessel were ultrasonically examined again. These post hydrotesting examinations were performed in addition to the ASME Section III nondestructive examination requirements.

In Refuel VIII, a significant percentage of the required volume of the subject welds was successfully examined, which would provide detection of significant patterns of degradation. Considering the significant percentage of weld coverage in Refuel VIII, and the extensive fabrication and preservice nondestructive examinations performed, WCNOC proposes that performing the examinations to the fullest extent practical provides an acceptable level of quality and safety.

If you have any questions concerning this submittal, please contact me at (316) 364-4034, or Mr. Michael J. Angus, at (316) 364-4077.

Very truly yours,

Richard A. Muench

RAM/rlr

Attachments

cc: W. D. Johnson (NRC) w/a
E. W. Merschoff (NRC) w/a
K. M. Thomas (NRC) w/a
Senior Resident Inspector (NRC) w/a

RELIEF REQUEST I1R-50

Component Identification:

Examination Category B-A, Item B1.12
Class 1-Reactor Pressure Vessel Longitudinal Shell Welds

Weld Identification Numbers:

1-RV-101-122A, 1-RV-101-122B, and 1-RV-101-122C

Examination Requirements:

Augmented Requirements

10 CFR 50.55a(g)(6)(ii)(A) requires that licensee reactor vessel examinations be augmented to implement the requirements of the 1989 Edition of the ASME Boiler and Pressure Vessel Code, Section XI, for reactor vessel shell welds identified as Item B1.10 of Examination Category B-A in Table IWB-2500-1. This augmented examination requirement mandates that essentially 100 percent (greater than 90 percent) of each of the shell welds shall be examined. The weld examination consists of 100 percent volumetric examination of each weld plus one half the wall thickness of adjacent base metal on each side of the weld crown.

ASME Section V, 1989 Edition, Article 4, T-441.3, specifies that this volume is to be examined with three angle beams scans (i.e., 45 degrees 60 degrees and 70 degrees nominal) for reflectors transverse to the weld seam, with three angle beam scans for reflectors parallel to the weld seam, and with a straight (0 degrees) beam scan for planar and laminar reflectors. The 70 degree angle beam examination is performed for near surface (ID) coverage.

Wolf Creek Nuclear Operating Corporation (WCNOC) Inservice Inspection Program Requirements

ASME Section XI, 1980 Edition through Winter 1981 Addenda, Table IWB-2500-1, Examination Category B-A, Item No. B1.12 (longitudinal shell welds), requires 100 percent volumetric examination of each weld plus one half the wall thickness of adjacent base metal on each side of the weld crown.

ASME Section V, 1980 Edition through Winter 1981 Addenda, Article 4, T-441.4, specifies that this volume is to be examined with two angle beams scans (i.e., 45° and 60° nominal) for reflectors transverse to the weld seam, with two angle beam scans for reflectors parallel to the weld seam, and with a straight (0°) beam scan for planar and laminar reflectors.

Alternative and Relief Requested:

Pursuant to 10 CFR 50.55a(g)(6)(ii)(A)(5), an alternative to the requirements of 10 CFR 50.55a(g)(6)(ii)(A)(2) is requested on the basis that the proposed alternative provides an acceptable level of quality and safety.

Pursuant to 10 CFR 50.55a(g)(5)(iii), relief is requested from ASME Section XI, 1980 Edition through Winter 1981 Addenda, Table IWB-2500-1, Examination Category B-A, Item No. B1.12, on the basis that conformance with the Code requirements is impractical.

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These requests are based on limitations associated with the WCNOC reactor vessel design and configuration. The following table summarizes the composite Code Required Volume (CRV) inspection volumes achieved for these welds:

Item Number	Weld ID	Reference Sketch	Composite CRV Achieved
B1.12	1-RV-101-122A (Weld 6)	Figure 1	66.7 percent
B1.12	1-RV-101-122B (Weld 7)	Figure 1	69.9 percent
B1.12	1-RV-101-122C (Weld 8)	Figure 1	74.4 percent

Basis for Alternative and Relief:

Reactor vessel design and configuration prevents 100 percent ultrasonic (UT) examination of the Code required volume for the subject welds. Physical limitations for all three welds are due to nozzle geometry and location in the upper shell course relative to the longitudinal weld location as well as flange to shell weld ID taper as shown in Figure 1. Composite coverage of the UT scans was calculated to be 66.7 percent, 69.9 percent, and 74.4 percent for Welds A, B, and C, respectively. A composite of the CRV achieved by all scans is provided for each weld in subsequent pages of this relief request. Calculation of the CRV achieved percentages is based on a conservative approach which employs the UT central ray data only; beam spread was not taken into account.

The WCNOC reactor vessel was designed and fabricated in accordance with the stringent quality controls of ASME Section III. During fabrication, the ASME Section III required volumetric and surface examinations were performed on these specific welds with acceptable results. In addition to the ASME Code Section III required nondestructive examination, all full penetration ferritic pressure boundary welds in the reactor vessel were ultrasonically examined during fabrication. These examinations were performed upon completion of the welding and intermediate heat treatment but prior to the final post-weld heat treatment. After hydrotesting, all full penetration ferritic pressure boundary welds in the reactor vessel were ultrasonically examined again. These examinations were performed in addition to the ASME Section III nondestructive examination requirements. In Refuel VIII, a significant portion of the code required volume of the subject welds was examined which provides for detection of significant patterns of degradation. Therefore, it is unlikely that a flaw occurring on these welds was not detected.

Based on this information, reasonable assurance of the continued inservice 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 redesigning and re-fabricating the reactor vessel. WCNOC deems this course of action impractical.

Proposed Alternative Examinations:

1) The reactor vessel shell longitudinal welds have been examined to the fullest extent practical. WCNOC proposes that the completed examinations be considered an acceptable alternative to the requirements.

2) Periodic System Leakage Tests per Category B-P Table IWB-2500-1, as well as the Reactor Coolant System leakage detection system, provide additional verification of component integrity.

RELIEF REQUEST I1R-50

WELD # 1-RV-101-122A
REACTOR VESSEL SHELL LONGITUDINAL WELD

Examination Limitation:

Inlet nozzle radii and flange ID taper

Composite Coverage:

66.7 percent

Inspection Volume Coverage Summary:

Parallel (2 angles): 82.9 percent
Parallel (2 angles + 2 directions): 69.7 percent
Perpendicular (2 angles): 50.5 percent
Perpendicular (2 angles + 2 directions): 50.5 percent
Zero Degree: 60.5 percent

Coverage Breakdown for Parallel Scans:

0 degree:	Perpendicular + 10 percent for Tan Scan = 60.5 percent
45 degree:	67.5 percent WM (down), 67.9 percent WM (up), 67.5 percent EV (down), 67.9 percent EV (up)
60 degree:	71.4 percent WM (down), 71.9 percent WM (up), 71.4 percent EV (down), 71.9 percent WM (up)
70 degree:	59.7 percent WM (down), 63.8 percent WM (up), 59.7 percent EV (down), 63.8 percent EV (up)

Coverage Breakdown for Perpendicular Scans:

0 degree:	50.5 percent WM, 50.5 percent EV
45 degree:	50.5 percent WM, 50.5 percent EV
60 degree:	50.5 percent WM, 50.5 percent EV
70 degree:	50.5 percent WM, 50.5 percent EV

RELIEF REQUEST I1R-50

WELD #1-RV-101-122B
REACTOR VESSEL SHELL LONGITUDINAL WELD

Examination Limitation:

Outlet nozzle protrusion and flange ID taper

Composite Coverage:

69.9 percent

Inspection Volume Coverage Summary:

Parallel (2 angles): 62.6 percent
Parallel (2 angles + 2 directions): 33.1 percent
Perpendicular (2 angles): 77.1 percent
Perpendicular (2 angles + 2 directions): 77.1 percent
Zero Degree: 77.1 percent

Coverage Breakdown for Parallel Scans:

45 degree:	50.8 percent WM (down), 50.4 percent WM (up), 50.8 percent EV (down), 50.4 percent EV (up)
60 degree:	54.9 percent WM (down), 50.5 percent WM (up), 54.9 percent EV (down), 50.5 percent EV (up)
70 degree:	23.1 percent WM (down), 27.6 percent WM (up), 23.1 percent EV (down), 27.6 percent EV (up)

Coverage Breakdown for Perpendicular Scans:

0 degree:	77.1 percent WM, 77.1 percent EV
45 degree:	77.1 percent WM, 77.1 percent EV
60 degree:	77.1 percent WM, 77.1 percent EV
70 degree:	77.1 percent WM, 77.1 percent EV

RELIEF REQUEST I1R-50

WELD #1-RV-101-122C
REACTOR VESSEL SHELL LONGITUDINAL WELD

Examination Limitation:

Outlet nozzle protrusion and flange ID taper

Composite Coverage:

74.4 percent

Inspection Volume Coverage Summary:

Parallel (2 angles): 61.2 percent
Parallel (2 angles + 2 directions): 41.3 percent
Perpendicular (2 angles): 87.6 percent
Perpendicular (2 angles + 2 directions): 87.6 percent
Zero Degree: 87.6 percent

Coverage Breakdown for Parallel Scans:

45 degree:	56.5 percent WM (down), 47.8 percent WM (up), 56.5 percent EV (down), 47.8 percent EV (up)
60 degree:	60.7 percent WM (down), 43.7 percent WM (up), 60.7 percent EV (down), 43.7 percent EV (up)
70 degree:	56.5 percent WM (down), 47.8 percent WM (up), 56.5 EV (down), 47.8 percent EV up

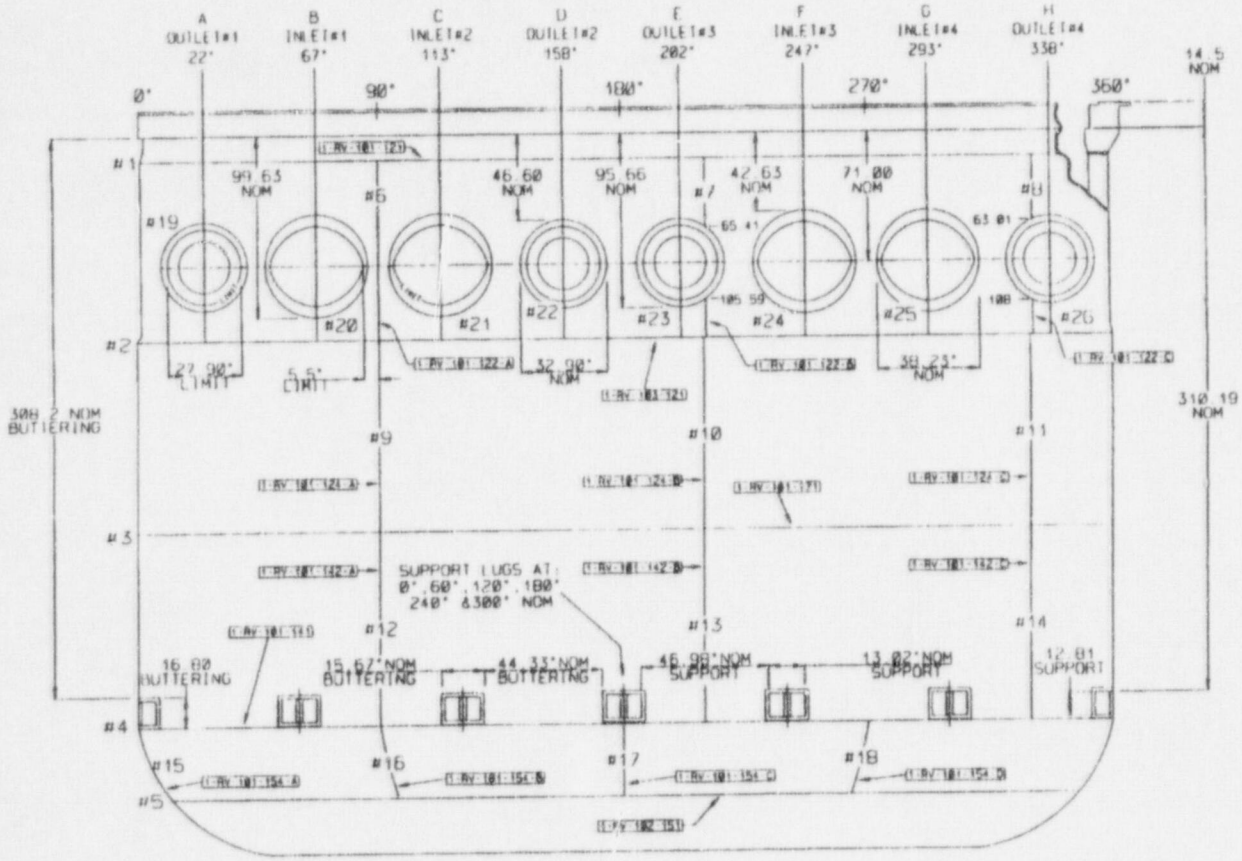
Coverage Breakdown for Perpendicular Scans:

0 degree:	87.6 percent WM, 87.6 percent EV
45 degree:	87.6 percent WM, 87.6 percent EV
60 degree:	87.6 percent WM, 87.6 percent EV
70 degree:	87.6 percent WM, 87.6 percent EV

RELIEF REQUEST I1R-50

FIGURE 1

Reactor Pressure Vessel Rollout View
(Not to scale)



LIST OF COMMITMENTS

The following table identifies those actions committed to by Wolf Creek Nuclear Operating Corporation (WCNOC) in this document. Any other statements in this submittal are provided for information purposes and are not considered to be commitments. Please direct questions regarding these commitments to Mr. Michael J. Angus, Manager Licensing and Corrective Action at Wolf Creek Generating Station, (316) 364-4077.

COMMITMENT	Due Date/Event
None	N/A