

# **WOLF CREEK**

NUCLEAR OPERATING CORPORATION

September 1, 2006

Terry J. Garrett  
Vice President Engineering

ET 06-0029

U. S. Nuclear Regulatory Commission  
ATTN: Document Control Desk  
Washington, DC 20555

Subject: Docket No. 50-482: 10 CFR 50.55a Request, Use of Alternative Ultrasonic Examination Method in Lieu of the Radiography Required by ASME Section III, Subarticle NC-5222

Gentlemen:

Pursuant to 10 CFR 50.55a(a)(3)(i), Wolf Creek Nuclear Operating Corporation (WCNOC) hereby requests Nuclear Regulatory Commission (NRC) approval of the attached 10 CFR 50.55a Request for the Third Ten-Year Interval of WCNOC's Inservice Inspection (ISI) Program.

The attached 10 CFR 50.55a Request requests alternatives to the requirements of ASME Section III, NC-5222, which requires circumferential piping, pump, and valve butt welded joints to be radiographed. The proposed alternative provides an acceptable level of quality and safety as required by 10 CFR 50.55a(a)(3)(i).

A similar Relief (10 CFR 50.55a) Request was approved by the NRC in a letter from Robert A. Gramm, NRC, to Charles D. Naslund, Union Electric Company, "Callaway Plant, Unit 1 – Request for Relief from Certain ASME Code Examinations for the Second and Third Inservice Inspection Intervals (TAC No. MC5379)," dated May 19, 2005.

WCNOC requests approval of the attached 10 CFR 50.55a Request by June 8, 2007, to support task planning and getting contracts and resources in place.

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There are no commitments contained within this letter. If you have any questions, please contact me at (620) 364-4084 or Mr. Kevin Moles at (620) 364-4126.

Sincerely,

A handwritten signature in black ink, appearing to read 'Terry J. Garrett', written in a cursive style.

Terry J. Garrett

TJG/rlt

Attachment: 10 CFR 50.55a Request

cc: J. N. Donohew (NRC), w/a  
W. B. Jones (NRC), w/a  
B. S. Mallett (NRC), w/a  
Senior Resident Inspector (NRC), w/a

**Wolf Creek Nuclear Operating Corporation  
10 CFR 50.55a Request,  
Use of Alternative Ultrasonic Examination  
Method in Lieu of the Radiography Required by  
ASME Section III, Subarticle NC-5222**

**10 CFR 50.55a Request****Proposed Alternative  
In Accordance with 10 CFR 50.55a(a)(3)(i)****Alternative Provides Acceptable Level of Quality and Safety****1.0 ASME CODE COMPONENTS AFFECTED**

Description: Alternative ultrasonic examination is requested for Class 2 Feedwater pipe welds listed in Table 1 and Class 2 Main Steam pipe welds listed in Table 2. The tables list the pipe description, weld identification (ID) number, nominal pipe size (NPS), pipe nominal thickness (T), and pipe base material for each weld.

**Table 1: Feedwater Pipe Welds**

Loop	Weld ID No. Note (1)	Description	NPS	"T" (inches)	Piping/Valve Material Note (2)
A	MW7069	Pipe-FV39 Upstream	14	1.094	SA106, Gr. B to SA216, Gr. WCB
A	MW7070	FV39-Pipe Downstream	14	1.094	SA216, Gr. WCB to SA333, Gr. 6
B	MW7071	Pipe-FV40 Upstream	14	1.094	SA106, Gr. B to SA216, Gr. WCB
B	MW7072	FV40-Pipe Downstream	14	1.094	SA216, Gr. WCB to SA333, Gr. 6
C	MW7073	Pipe-FV41 Upstream	14	1.094	SA106, Gr. B to SA216, Gr. WCB
C	MW7074	FV41-Pipe Downstream	14	1.094	SA216, Gr. WCB to SA333, Gr. 6
D	MW7075	Pipe-FV42 Upstream	14	1.094	SA106, Gr. B to SA216, Gr. WCB
D	MW7076	FV42-Pipe Downstream	14	1.094	SA216, Gr. WCB to SA333, Gr. 6

- Notes: (1) Weld ID Numbers replace those currently identified in the Wolf Creek Nuclear Operating Corporation (WCNOC) Inservice Inspection (ISI) Program Plan.  
(2) Chemical composition specification of SA333, Gr. 6 and SA106, Gr. B are identical.

**Table 2: Main Steam Pipe Welds**

Loop	Weld ID No. Note (1)	Description	NPS	"T" (inches)	Piping/Valve Material
1	MW7079	Pipe-to-Valve HV14 Upstream	28.38" OD	1.5	SA-106, Gr. C to SA216, Gr. WCB
1	MW7080	Valve HV14-to-Pipe Downstream	28.38" OD	1.5	SA216, Gr. WCB to SA-671 CC70 Cl 32
1	F009-A	Pipe-to-Torsional Restraint	28.38" OD	1.5	SA-671 CC70 Cl 32 to SA-508, Cl 1
2	MW7081	Pipe-to-Valve HV17 Upstream	28.38" OD	1.5	SA-106, Gr. C to SA216, Gr. WCB
2	MW7082	Valve HV17-to-Pipe Downstream	28.38" OD	1.5	SA216, Gr. WCB to SA-671 CC70 Cl 32
2	F028-A	Pipe-to-Torsional Restraint	28.38" OD	1.5	SA-671 CC70 Cl 32 to SA-508, Cl 1

**10 CFR 50.55a Request****Table 2 (continued): Main Steam Pipe Welds**

3	MW7083	Pipe-to-Valve HV20 Upstream	28.38" OD	1.5	SA-106, Gr. C to SA216, Gr. WCB
3	MW7084	Valve HV20-to-Pipe Downstream	28.38" OD	1.5	SA216, Gr. WCB to SA-671 CC70 CI 32
3	F052-A	Pipe-to-Torsional Restraint	28.38" OD	1.5	SA-671 CC70 CI 32 to-SA 508, CI 1
4	MW7077	Pipe-to-Valve HV11 Upstream	28.38" OD	1.5	SA-106, Gr. C to SA216, Gr. WCB
4	MW7078	Valve HV11-to-Pipe Downstream	28.38" OD	1.5	SA216, Gr. WCB to SA-671 CC70 CI 32
4	F076-A	Pipe-to-Torsional Restraint	28.38" OD	1.5	SA-671 CC70 CI 32 to SA-508, CI 1

Notes: (1) Weld ID Numbers replace those currently identified in the WCNOG ISI Program Plan.

**2.0 APPLICABLE CODE EDITION AND ADDENDA**

The following editions and addenda of the American Society of Mechanical Engineers (ASME) Boiler and Pressure Vessel Code, Sections III and XI, are used at Wolf Creek Generating Station (WCGS):

- ASME Section XI, 1998 Edition through the 2000 Addenda for the 3<sup>rd</sup> Interval Inservice Inspection (ISI) Program
- ASME Section III, 1974 Edition through Summer 1975 Addenda [Original Code of Construction]

**3.0 APPLICABLE CODE REQUIREMENTS**

- IWA-4520(a) of ASME Section XI requires welded joints made for installation of items to be examined in accordance with the Construction Code, which is Section III for the identified welds.
- NC-5222 of ASME Section III requires circumferential piping, pump, and valve butt welded joints to be radiographed.

**4.0 REASON FOR REQUEST****Background:**

WCNOG is currently in its third 10-year inservice inspection (ISI) interval, which began on September 3, 2005. The 1998 Edition through the 2000 Addenda of ASME Section XI governs repair/replacement activities for WCNOG's third 10-year ISI interval. IWA-4520(a) of ASME Section XI requires welded joints made for installation of items to be examined in accordance with the Construction Code, which is Section III for the identified welds. ASME Class 2 welds installed under the WCNOG Repair/Replacement Program are installed in accordance with the 1974 Edition with Summer 1975 Addenda of ASME Section III. Pursuant to the provisions of

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10CFR 50.55a(a)(3)(i), WCNOC requests permission to use an alternative ultrasonic examination method in accordance with the justification, requirements, and provisions detailed below in lieu of the radiography required by ASME Section III, NC-5222.

#### Justification for Alternative Ultrasonic Examination in Lieu of Radiography:

The proposed alternative ultrasonic examination will ensure an adequate level of safety and quality and will provide adequate verification that the Class 2 welds are free of significant flaws that could affect structural integrity. The examination will cover 100% of the weld volume and include base material for a distance of one-half the nominal through-wall pipe thickness (0.5T) on each side of the widest part of the weld. A demonstration of the ultrasonic examination system capability to detect both subsurface and surface workmanship type flaws (i.e., slag, porosity, lack of fusion, and incomplete penetration) will be performed on a qualification block. All flaws and indications will be evaluated in accordance with the standard acceptance criteria of NC-5330. In addition, an automated scan and data acquisition system will be used to improve examination repeatability and provide permanent storage of the raw data. Finally, the proposed alternative ultrasonic examination will be limited to base material and weld material that is conducive to ultrasonic examination.

Depending on flaw type (i.e., volumetric or planar) and orientation, ultrasonic examination may be superior to radiography or vice versa. Radiography is most effective in detection of volumetric type flaws (i.e., slag and porosity) and detection of planar type flaws (i.e., lack of fusion and cracks) that are oriented in a plane parallel to the x-ray beam. However, radiography is limited in detection of planar flaws not oriented parallel to the beam. In contrast, ultrasonic examination is very effective in detection of planar type flaws that are not oriented in a plane parallel to the sound beam and less effective in detecting flaws in a plane parallel to the sound beam. Finally, ultrasonic examination is capable of detecting volumetric type flaws such as slag or porosity.

The proposed alternative ultrasonic examination requirements and provisions address the known limitations of the ultrasonic method to ensure both planar and volumetric flaws in all orientations are detected and properly evaluated. First, examination using two angle beams (i.e., 45 and 60 degree nominally) or a procedure qualified on 100% of the weld volume in accordance with the performance demonstration methodology of Section XI, Appendix VIII is required. Second, scans in two directions perpendicular to the weld axis and two directions parallel to the weld axis are required. Third, to ensure laminar type flaws are detected, a supplemental examination using straight beam is also required. Finally, if an indication, such as slag or porosity, is not characterized as volumetric, the indication will be characterized as a planar type flaw and evaluated in accordance with the acceptance criteria of NC-5330. The acceptance criteria of NC-5330 specifies acceptable length of an indication only and does not differentiate between planar and volumetric type flaws. Most importantly, planar type flaws such as cracks, incomplete penetration, and lack of fusion, which are rejectable by NC-5330 for any size, are more readily and properly characterized by ultrasonic examination.

In addition to the effectiveness of the proposed alternative, with the use of ultrasonic examination in lieu of radiography, the personnel safety risk of inadvertent or accidental exposure and also the normal anticipated exposure associated with transportation, positioning and exposing a source for radiography is eliminated. Also, outage duration and costs will be reduced by allowing parallel path work to progress uninterrupted during examination of welds.

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**5.0 PROPOSED ALTERNATIVE AND BASIS FOR USE**

For ASME Class 2 welds installed under the WCNOG Repair/Replacement Program where ultrasonic examination will be performed in lieu of radiography the following requirements shall apply:

- (1) The nominal weld thickness shall be 1/2 inch or greater.
- (2) The ultrasonic examination shall not be applied to welds that include austenitic cast product forms or austenitic corrosion-resistant-clad piping butt welds.
- (3) The ultrasonic examination area shall include 100% of the volume of the entire weld plus 0.5T on each side of the widest part of the weld. The ultrasonic examination area shall be accessible for angle beam examination in four directions, two directions perpendicular to the weld axis and two directions parallel to the weld axis. Where perpendicular scanning is limited on one side of the weld, a technique using the second leg of the V-path may be credited as access for the second perpendicular examination direction provided that the detection capability of that technique is included in the procedure demonstration described in (5) and (6) below.
- (4) The ultrasonic examination shall be in accordance with (a) or (b) below:
  - (a) Examination shall be performed in accordance with Section V, Article 5 up to and including the 2000 Addenda. Two angle beams having nominal angles of 45 and 60 degrees should generally be used; however, other pairs of angle beams may be used provided the measured difference between the angles is at least 10 degrees. A supplemental straight beam shall also be used.
  - (b) Examination shall be performed by a procedure qualified in accordance with the performance demonstration methodology of Section XI, Appendix VIII provided the entire volume of the weld examination is included in the demonstration. A supplemental straight beam shall also be used.
- (5) A written procedure shall be followed. The procedure shall be demonstrated to perform acceptably on a qualification block or specimen that includes a weld with both surface and subsurface flaws as described in (7) below.
- (6) The qualification block material shall conform to the requirements applicable to the calibration block and in addition meet the following requirements:
  - (a) The material from which blocks are fabricated shall be one of the following: a nozzle dropout from the component; a component prolongation; or material of the same material specification, product form, and heat treatment condition as one of the materials joined. For piping, if material of the same product form and specification is

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not available, material of similar chemical analysis<sup>1</sup>, tensile properties, and metallurgical structure may be used.

- (b) Where two or more base material thicknesses are involved, the calibration block thickness shall be of a size sufficient to contain the entire examination path.
  - (c) Qualification block configuration shall contain a weld representative of the joint to be ultrasonically examined.
- (7) Each qualification block shall contain a minimum of six (6) flaws in accordance with (a) and (c) or (b) and (c) below:
- (a) At least three (3) flaws shall be planar in nature (i.e., cracks and side-wall lack of fusion). There shall be at least two (2) side-wall lack of fusion flaws, oriented parallel to the fusion line, one (1) on the upstream weld bevel and one (1) on the downstream weld bevel. At least one (1) planar flaw shall be surface and at least one (1) planar flaw shall be subsurface. At least three (3) flaws shall be volumetric in nature (i.e., slag and porosity) shall be included in the qualification block weld, The flaws shall be no larger in the through-wall direction than the diameter of the applicable side-drilled hole in the calibration block shown in Figure T-542.2.1 of Section V, Article 5, and no longer than the shortest unacceptable elongated discontinuity length listed in NC-5330 for the thickness of the weld that will be examined.
  - (b) Where a Section XI, Appendix VIII, performance demonstration methodology is used, supplemental qualification to a previously approved procedure may be demonstrated through the use of a blind test with appropriate specimens that contain a minimum of four (4) different construction-type and fabrication-type flaws (i.e., those described in (a) above) distributed throughout the thickness of the specimen(s).
  - (c) The remainder of the demonstration sample flaws shall be randomly selected by the sample fabricator.
- (8) A documented examination plan shall be provided showing the transducer placement, movement and component coverage that provides a standardized and repeatable methodology for weld acceptance. The examination plan shall also include the ultrasonic beam angle used, beam directions with respect to weld centerline, and volume examined for each weld.
- (9) The ultrasonic examination shall be performed using a device with an automated computer data acquisition system.
- (10) Data shall be recorded in unprocessed form. A complete data set with no gating, filtering, or thresholding for response from the examination volume in paragraph (3) above shall be included in the data record.

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<sup>1</sup> *Chemical composition is within the same ranges as required in the original material specification.*



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- (11) Personnel who acquire and analyze ultrasonic data shall be qualified and trained using the same type of equipment as in (9) above, and demonstrate their capability to detect and characterize the flaws using the procedure as described in (5) above.
- (12) The evaluation and acceptance criteria shall be in accordance with Section III NC- 5330.
- (13) Flaws exceeding the applicable acceptance criteria referenced in (12) above shall be repaired, and the weld subsequently reexamined using the same ultrasonic examination procedure that detected the flaw.
- (14) Review and acceptance of the ultrasonic examination procedure by the Authorized Nuclear Inservice Inspector is required.
- (15) All other related requirements of the Wolf Creek Repair/Replacement Program shall be met.
- (16) Use of ultrasonic examination in lieu of radiography shall be documented in accordance with the Wolf Creek Repair/Replacement Program on a Form NIS-2A and/or Section XI Repair/Replacement Plan, as applicable.

#### **6.0 DURATION OF THE PROPOSED ALTERNATIVE**

The alternatives in this 10 CFR 50.55a Request are requested for the Third Ten-Year Interval of WCNO's Inservice Inspection (ISI) Program.

#### **7.0 PRECEDENTS**

A similar Relief (10 CFR 50.55a) Request was approved by the NRC in a letter from Robert A. Gramm, NRC, to Charles D. Naslund, Union Electric Company, "Callaway Plant, Unit 1 – Request for Relief from Certain ASME Code Examinations for the Second and Third Inservice Inspection Intervals (TAC No. MC5379)," dated May 19, 2005.