

May 7, 2004

U.S. Nuclear Regulatory Commission
Attn: Document Control Desk
Mail Stop P1-137
Washington, DC 20555-0001

ULNRC-04997

Ladies and Gentlemen:

10 CFR 50.55a



**DOCKET NUMBER 50-483
UNION ELECTRIC COMPANY
CALLAWAY PLANT
REVISION TO REQUEST FOR RELIEF FROM
ASME SECTION III REQUIREMENTS REGARDING
NON-DESTRUCTIVE EXAMINATION OF WELDS PERFORMED
UNDER SITE REPAIR/REPLACEMENT PROGRAM**

By letter dated October 17, 2002 (ULNRC-04760), as supplemented by letters dated October 30, 2002 (ULNRC-04768) and February 13, 2003 (ULNRC-04807), Union Electric (AmerenUE) submitted, pursuant to 10 CFR 50.55a(a)(3)(i), a request for relief from requirements of the American Society of Mechanical Engineers (ASME) Code for the second 10-year inservice inspection interval at the Callaway plant. Specifically per the relief request, AmerenUE requested use of a proposed alternative to the non-destructive examination (NDE) requirements of Subarticle NC 5200 of Section III of the ASME Code (1974 Edition with Summer 1975 Addenda) for certain welds in Class 2 piping at the Callaway plant. The alternative approach would permit use of ultrasonic examination techniques in lieu of radiography for NDE of applicable welds.

The scope of the subject relief request evolved during the time between AmerenUE's initial submittal and the final submittal (of February 13, 2003). Initially, AmerenUE's request was based on the potential outcome of activities associated with the Flow-Accelerated Corrosion (FAC) program at Callaway. It was noted in the October 17, 2002 submittal that much of the feedwater system was being monitored for pipe-wall thinning due to FAC and that inspections were expected to be performed in forthcoming refueling outages, i.e., RF-12 (completed at the end of 2002), RF-13 (which is currently underway), and RF-14 (which is the last refueling outage in the current 10-year ISI interval). It was anticipated that if the inspection results indicated the need to replace certain pipe sections, the requested relief would be used to facilitate NDE of the required welds. Because of the uncertainty in which particular pipe sections would need replacement, it was AmerenUE's intent to request

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relief for all applicable Class 2 piping welds throughout the feedwater system, and not just to a specific list of welds or pipe sections. Discussions with the NRC indicated, however, that the scope of the relief request must be specific, and therefore a list of specific Class 2 feedwater pipe welds was included in the relief request provided in the October 17, 2002 submittal.

Subsequent to the October 17, 2002 submittal, the relief request was modified in response to questions / requests for information from the NRC. The revised relief request was provided to the NRC via AmerenUE's October 30, 2002 letter. Shortly after that, the anticipated FAC inspections were completed during RF-12. The results of those inspections confirmed no need for piping replacement, so the relief request was not immediately needed and thus not approved at that time.

Following RF-12, however, additional needs for the relief request were identified. These were identified from further planning and development of two significant modification activities, i.e., steam generator replacement (planned for RF-14) and replacement of the actuators on the feedwater control valves in RF-13. For the former, specifically affected pipe sections (and the necessary welds for that replacement) were identified for the feedwater and main steam systems. For the latter, replacement of the feedwater control valve actuators themselves would not require valve replacement, but it was recognized that one of the valves (AEFV0040) had been previously seal welded and would thus have to be removed and replaced. The welds required for this valve replacement were thus identified. As a result of these activities, the scope of the subject relief request was expanded to include the additional welds in the feedwater and main steam systems, and the revised relief request was submitted to the NRC via AmerenUE's February 13, 2003 letter.

AmerenUE's request was subsequently approved by the NRC. Accordingly, Code relief to permit ultrasonic examination of pipe butt-welded joints and circumferential pipe welds, in lieu of Code-required radiography for the specific scope of feedwater and main steam pipe welds, was granted by NRC letter dated July 1, 2003.

With regard to the intended application of the relief request, the noted feedwater system modifications for replacement of the control valve actuators, including replacement of the AEFV0040 valve, are presently underway for the current refueling outage. During this work, however, it was determined that one of the new valve actuators could not be properly matched to its designated control valve (AEFV0042). It has been determined that this valve must be replaced with a new valve to which the actuator can be matched. Since it was not anticipated that this valve would need to be replaced, the welds required for installing the new valve are not included in the approved relief request. The welds required for this valve replacement are of the same type identified in the relief request and are for the same or similar application in the same system. The relief request should thus be

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applicable to these welds, as the desire to do ultrasonic examination for the NDE of these welds in lieu of radiography still applies.

Based on the above, AmerenUE recognizes the need to revise the relief request to include the additional feedwater welds in its scope and to seek NRC approval of the revised relief request. Accordingly, the revised relief request is attached and submitted via this letter. Revision bars have been applied to indicate the changes made to the relief request (relative to what was previously approved).

As noted above, replacement of the AEFV0042 feedwater valve is currently underway in the current outage. Therefore, AmerenUE respectfully requests NRC approval of the revised relief request as soon as possible. It should be noted that, with regard to plant restart from the current outage, entry into plant heat-up conditions is currently projected to occur during the weekend of May 22. NRC approval is therefore requested on or by Friday, May 21, in anticipation of plant heat-up.

Please contact me at 573-676-8659 or Dave Shafer at 314-554-3104 for any questions you may regarding the revised relief request.

Sincerely,



Keith D. Young
Manager - Regulatory Affairs

TBE/jdg

Attachment

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Request to Use Alternative Ultrasonic Examination Method in Lieu of the Radiography Required by ASME Section III, Subarticle NC-5200

Background:

The 1989 Edition with no Addenda of ASME Section XI currently governs repair/replacement activities at the Callaway Nuclear Plant. Callaway Plant is currently in the second 10-year inservice inspection interval which began on August 1, 1995. ASME Class 2 welds installed under the Callaway Repair/Replacement Program are nondestructively examined in accordance with the 1974 Edition with Summer 1975 Addenda of ASME Section III. Alternatively, when pressure testing is performed in accordance with Code Case N-416-1, the welds are nondestructively examined in accordance with the 1992 Edition with no Addenda of ASME Section III. Pursuant to the provisions of 10CFR 50.55a(a)(3)(i), Callaway Plant 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-5200.

Components for Which Alternative Ultrasonic Examination is Requested:

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. These tables list a piping description, weld identification number, nominal pipe size, pipe schedule, and base material for each weld.

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 1/2 the nominal through-wall weld thickness on each side 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.

Ultrasonic and radiographic examination methods are complimentary and are not directly comparable or equivalent. 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 but is limited, compared to radiography, in ability to characterize volumetric flaws.

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, examination scans in two directions perpendicular to the weld axis and two directions parallel to the weld axis or examination scans as qualified on 100% of the weld volume in accordance with

the performance demonstration methodology of Section XI, Appendix VIII 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 specify acceptable lengths of indications only and do 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, use of ultrasonic examination in lieu of radiography will provide a significant reduction in personnel radiation exposure during refueling outage maintenance work. Also, outage duration and costs will be reduced by allowing parallel path work to progress uninterrupted during examination of welds. Finally, the personnel safety risk of inadvertent or accidental exposure and also the normal anticipated exposure associated with transporting, positioning and exposing a source for radiography is eliminated.

Proposed Alternative Ultrasonic Examination Requirements and Provisions:

For ASME Class 2 welds installed under the Callaway 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 weld, where T is the nominal thickness 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 2001 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. Examination scans shall be in four directions; two beam path directions perpendicular to the weld axis and two beam path directions parallel to the weld axis. Where the examination scan perpendicular to the weld is limited on one side, the second leg of the V-path may be used to achieve the two beam path directions. 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. Examination scans shall be in four directions; two beam path directions perpendicular to the weld axis and two beam path directions parallel to the weld axis. 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 not available, material of similar chemical analysis¹, tensile properties, and metallurgical structure² 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, including, for austenitic materials, the same welding process.
- (7) The qualification block shall include flaws in accordance with (a) or (b) below:
 - (a) At least two planar flaws shall be included in the qualification block weld, one surface and one subsurface oriented parallel to the fusion line. 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 three different construction-type and fabrication-type flaws distributed throughout the thickness of the specimen(s).
- (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.
- (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 Callaway Repair/Replacement Program shall be met.

¹ Chemical composition is within the same ranges as required in the original material specification.

² Same phase and grain shape as produced by the thermal process for the original specification.

- (16) Use of ultrasonic examination in lieu of radiography shall be documented in accordance with the Callaway Repair/Replacement Program on a Form NIS-2A and/or Section XI Repair/Replacement Plan, as applicable.

Table 1: Feedwater Pipe Welds

Description	Weld ID No. ⁽¹⁾	NPS	Sch.	Mat.
5-Dia. bend & expander upstream of A S/G inlet	2-AE-04-F014 ⁽²⁾	14	80	CS
	2-AE-04-S010-A	14	80	CS
	2-AE-04-S010-C	16	80	CS
	2-AE-04-F015	16	80	CS
5-Dia. bend & expander upstream of B S/G inlet	2-AE-04-F030 ⁽²⁾	14	80	CS
	2-AE-04-FW8	14	80	CS
	2-AE-04-FW7	14	80	CS
	2-AE-04-S021-C	16	80	CS
5-Dia. bend & expander upstream of C S/G inlet	2-AE-04-F035	16	80	CS
	2-AE-05-F030 ⁽²⁾	14	80	CS
	2-AE-05-S021-A	14	80	CS
	2-AE-05-S021-C	16	80	CS
5-Dia. bend & expander upstream of D S/G inlet	2-AE-05-F036	16	80	CS
	2-AE-05-F015 ⁽²⁾	14	80	CS
	2-AE-05-S022-A	14	80	CS
	2-AE-05-S022-C	16	80	CS
Feedwater isolation valve AEFV0040	2-AE-05-F035	16	80	CS
	2-AE-04-F020	14	120	CS
	2-AE-04-F019	14	120	CS
Elbow & pipe upstream of valve AEV0120 (B loop)	2-AE-04-S017-A	14	80	CS
	2-AE-04-F027	14	80	CS
	2-AE-04-F067	14	80	CS
Elbow & pipe downstream of valve AEV0120 (B loop)	2-AE-04-F070	14	80	CS
	2-AE-04-S019-A	14	80	CS
	2-AE-04-FW10	14	80	CS
Elbow downstream of valve AEV0123 (C loop)	2-AE-05-F029	14	80	CS
	2-AE-05-S020-A	14	80	CS
Elbow & pipe upstream of valve AEV0122 (D loop)	2-AE-05-F012	14	80	CS
	2-AE-05-S008-A	14	80	CS
	2-AE-05-F073	14	80	CS
Feedwater isolation valve AEFV0042 (D loop)	2-AE-05-F004	14	120	CS
	2-AE-05-F005	14	120	CS
	2-AE-05-F006 ⁽²⁾	14	120	CS

Notes:

- (1) Listed Weld ID Numbers are those currently identified in the Callaway ISI Program Plan.
- (2) New weld will be at this weld location or several inches upstream.

Table 2: Main Steam Pipe Welds

Description	Weld ID No. ⁽¹⁾	NPS	Sch. ⁽²⁾	Mat.
Pipe, reducer & elbow downstream of A S/G outlet	2-AB-01-F001	32	1.068"	CS
	2-AB-01-S001-A	32	1.068"	CS
	2-AB-01-S001-D	28	0.934"	CS
	new pipe weld ⁽³⁾	28	0.934"	CS
Pipe, reducer & elbow downstream of B S/G outlet	2-AB-01-F020	32	1.068"	CS
	2-AB-01-S013-A	32	1.068"	CS
	2-AB-01-S013-D	28	0.934"	CS
	new pipe weld ⁽³⁾	28	0.934"	CS
Pipe, reducer & elbow downstream of C S/G outlet	2-AB-01-F044	32	1.068"	CS
	2-AB-01-S027-A	32	1.068"	CS
	2-AB-01-S027-D	28	0.934"	CS
	new pipe weld ⁽³⁾	28	0.934"	CS
Pipe, reducer & elbow downstream of D S/G outlet	2-AB-01-F068	32	1.068"	CS
	2-AB-01-S041-A	32	1.068"	CS
	2-AB-01-S041-D	28	0.934"	CS
	new pipe weld ⁽³⁾	28	0.934"	CS

Notes:

- (1) Listed Weld ID Numbers are those currently identified in the Callaway ISI Program Plan.
- (2) Minimum wall thickness is listed in pipe schedule column.
- (3) New weld to be in pipe section downstream of 1st elbow from S/G outlet.

CALLAWAY OUTGOING CORRESPONDENCE REVIEW

Submittal Due Date <u>5/7/04</u>	Responsible Manager: <u>Keith Young</u> Ext. <u>68659</u>	
<input type="checkbox"/> Required <input checked="" type="checkbox"/> Requested <input type="checkbox"/> N/A	RA Contact: <u>Tom Elwood</u> Ext. <u>44593</u>	

Correspondence No.: ULNRC-04997 Subject: Revision of Request for Relief from ASME Section XI Requirements to Permit Ultrasonic Examination in Lieu of Radiography for Specified Welds in Feedwater and Main Steam Piping

Screening:	Initial / Date	Initial
Posting required per 10 CFR 19.11 (Other)?	<input type="checkbox"/> Yes Processed in accordance with APA-ZZ-00521, Attachment 9	<input checked="" type="checkbox"/> No <u>TBE</u>
Correspondence is an official report that requires additional reporting / distribution?	<input type="checkbox"/> Yes Processed in accordance with APA-ZZ-00520	<input checked="" type="checkbox"/> No <u>TBE</u>
Correspondence contains Commitments? See Commitment Summary in Correspondence	<input type="checkbox"/> Yes Processed in accordance with APA-ZZ-00540	<input checked="" type="checkbox"/> No <u>TBE</u>
Correspondence adds a new or modified design basis, safety analysis or facility operation as described by the FSAR or similarly impacts other Licensing documents?	<input type="checkbox"/> Yes Screened in accordance with APA-ZZ-00140	<input checked="" type="checkbox"/> No <u>TBE</u>
Associated CAR, RFR, MP, Calculation or Licensing Document Change Notice?	<input type="checkbox"/> Yes ID No.:	<input checked="" type="checkbox"/> No <u>TBE</u>

Technical Review		
Review Due Date to Support Submittal:	Signature	Date Completed
<u>Regulatory Affairs: Tom Elwood</u>	<u>Tom Elwood</u>	<u>5/7/04</u>
<u>Responsible Department:</u>		
<u>Engineering ISI Group: S. L. McCracken</u>	<u>Steve McCracken</u>	<u>5/7/04</u>

Regulatory Affairs review in the above block indicates format and content is consistent with regulatory requirements or requests. Departmental review indicates that the correspondence has been coordinated with the appropriate organizations and is technically correct; as well as indicating concurrence with commitments and due dates.

Senior Management Review		
<input type="checkbox"/> Approval Required under Oath/ Affirmation/ Declaration	Signature	Date Completed
<input type="checkbox"/> Senior Vice President and Chief Nuclear Officer		
<input type="checkbox"/> Vice President Nuclear		
<input type="checkbox"/> Plant Manager		
<input checked="" type="checkbox"/> Manager - Regulatory Affairs	<u>Keith Young</u>	<u>5/7/04</u>
<input type="checkbox"/> Manager - Nuclear Engineering		
<input type="checkbox"/> Manager - Quality Assurance		
<input type="checkbox"/> Manager - Operations Support		

Signatures in the above block indicate that content is consistent with company expectations on approach and responsiveness.

Remarks / Comments: This submittal transmits a revision of an ASME Section XI Relief Request that was previously approved for Callaway. NRC approval of the revised Relief Request is thus being requested. The Relief Request (as approved) permits ultrasonic examination methods to be used in lieu of ASME Code-required radiography for the nondestructive examination (NDE) of welds specifically identified in the relief request (i.e., for specific welds in the feedwater and main steam systems). While completing the modification for replacing the actuators on the feedwater control valves during the current outage (RF-13), an unexpected problem was encountered that requires removal and replacement of the AEFV0042 valve. Since replacement of this valve was not anticipated, the welds required for installation of the replacement valve are not included in the subject Relief Request. The desire to perform ultrasonic examination in lieu of radiography for these welds still applies, so the Relief Request must be revised to include these welds in its scope if the alternative NDE approach is to be permitted. This letter (ULNRC-04997) transmits the revised Relief Request to the NRC and requests their approval of the revision prior to heat-up from the current outage.