AmerenUE
Callaway Plant

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November 18, 2004

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

Ladies and Gentlemen: ULNRC-05092

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

AmerenUE (Union Electric) is submitting this letter to request NRC approval of a proposed revision to an American Society of Mechanical Engineers (ASME) Code relief request approved for the Repair/Replacement Program at the Callaway plant. The proposed revision involves a change in scope, as well as a change in the applicable 10-year inspection interval(s) for the relief request. Consistent with the original relief request, the proposed revision is submitted pursuant to 10 CFR 50.55a(a)(3)(i) for approval to utilize a proposed alternative to the non-destructive examination (NDE) requirements of Subarticle NC 5200 of Section III of the ASME Code, as applicable to identified pipe welds in sections of the Main Steam and Main Feedwater systems at the Callaway plant. Specifically, the requested relief would allow the subject Class 2 pipe welds to be examined using a qualified ultrasonic testing (UT) examination method in lieu of Code-required radiography.

The revised relief request is provided as Attachment 2 to this letter. The subject relief request has been revised before and was the subject of several letters submitted by AmerenUE, which are identified in the list of references provided as Attachment 1 to this letter. Applicable letters received from the NRC, including the approval letter for the original relief request and the approval letter for the last revision of the relief request, are also identified in Attachment 1.

The original relief request was submitted by AmerenUE letter dated October 17, 2002 (Reference 1 of Attachment 1). The intent was to provide for ultrasonic examination of welds for pipe sections that might require replacement based on the results of inspections planned for Class 2 pipe sections identified as susceptible to pipe wall thinning under Callaway's Flow Accelerated Corrosion (FAC) program. A follow-up letter dated October 30, 2002 (Reference 2 of

A047

Attachment 1) was submitted to revise the original request, which was prompted in response to a request for additional information received from the NRC staff on October 23, 2002.

Another letter, dated February 13, 2003 (Reference 3 of Attachment 1) was subsequently submitted to augment the scope of the proposed relief request for welds identified in other sections of Class 2 feedwater and main steam piping. The additional, potentially affected pipe sections were identified as part of the planned replacement of all four steam generators at Callaway during Refuel 14 (RF-14), and modification of the feedwater control system planned for RF-13. The latter, it was noted, would require replacement of a feedwater control valve, AEFV0040.

NRC approval of the relief request was subsequently granted via letter dated July 1, 2003 (Reference 6 of Attachment 1). However, during RF-13 (Spring 2004), a fourth letter was submitted by AmerenUE on May 7, 2004 (Reference 4 of Attachment 1) due to the identification of additional welds needed for the unanticipated replacement of another feedwater control valve, AEFV0042. A revision of the relief request was included in AmerenUE's letter to reflect the change in scope. NRC approval of the revised relief request was granted via letter dated May 19, 2004 (Reference 7 of Attachment 1).

With regard to FAC inspections and any required piping replacements, pipe-wall thinning inspections were performed during RF-12 but revealed no immediate need for corrective action or piping replacement. Inspections were performed again during RF-13, resulting in the need for immediate mitigation of one severely eroded area by application of a weld overlay for the affected Class 2 pipe section. (Use of the weld overlay was addressed and permitted via a separately submitted and approved relief request for Callaway.) Because the issue was resolved via the weld overlay, no piping replacement was required for that. During RF-13, however, the aforementioned feedwater control valves (AEFV0040 and AEFV0042) were replaced, and the relief request for use of UT in lieu of radiography was successfully applied to NDE of the required welds. In addition, results from the FAC examinations performed during RF-13 did reveal that feedwater piping located inside containment will need replacement during RF-14 which is scheduled for Fall of 2005. The affected feedwater piping includes portions not included in the currently approved relief request.

Revision of the subject relief request is thus needed to accommodate the additional scope of applicable or potentially required welds associated with the Class 2 Main Feedwater and Main Steam system piping, consistent with future plans for piping replacement. This includes contingency plans for replacement of main steam isolation valve (MSIV) bodies given that replacement of the MSIV actuators is a modification activity currently planned for RF-14 (or possibly RF-15). The revised scope of applicable welds is reflected in the attached, revised relief request.

It should be noted that Callaway is approaching the end of its current 10-year inservice inspection interval with regard to the plant's Inservice Inspection Program (as noted per Reference 5 of Attachment 1). As AmerenUE anticipates transitioning to the third 10-year inspection interval, the aforementioned plans and contingencies, including replacement of affected pipe sections, will remain in place for the third inspection interval due at least to continued inspection of main feedwater and steam piping under Callaway's FAC program. For these reasons, AmerenUE is requesting that the subject relief request be authorized for use for both the remainder of the current (i.e., second) interval and the forthcoming (third) 10-year inspection interval, given the imminent transition to the third interval. The base Code Edition and applicable Addenda for Callaway's third inspection interval and Repair/Replacement Program will be the 1998 Edition with 2000 Addenda, Section XI.

The revised relief request, as proposed, thus reflects a revised change in scope as well as a change in the applicable Code Edition and addenda, consistent with its applicability to both the second and third inservice inspection intervals. The enclosed version of the relief request, if approved, would supersede the previously approved versions (as approved per References 6 and 7).

It should be emphasized that this relief request affects the planning of work activities for Refuel 14. Therefore, AmerenUE respectfully requests approval of the revised relief request by July 2005. Please contact us for any questions you may have regarding this request.

Very truly yours,

Keith D. Young

Keith D. Young
Manager - Regulatory Affairs

TBE/jdg

Attachments: 1. References
2. Relief Request

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References

AmerenUE Letters

1. AmerenUE Letter ULNRC-04760 from John D. Blosser to USNRC Document Control Desk, dated October 17, 2002, "Request for Relief from ASME Section III Requirements Regarding Non-Destructive Examination of Welds Performed Under Site Repair/Replacement Program"

2. AmerenUE Letter ULNRC-04768 from John D. Blosser to USNRC Document Control Desk, dated October 30, 2002, "Revision to Request for Relief from ASME Section III Requirements Regarding Non-Destructive Examination of Welds Performed Under Site Repair/Replacement Program (TAC# MB6534)"

3. AmerenUE Letter ULNRC-04807 from John D. Blosser to USNRC Document Control Desk, dated February 13, 2003, "Revision to Request for Relief from ASME Section III Requirements Regarding Non-Destructive Examination of Welds Performed Under Site Repair/Replacement Program (TAC# MB6534)"

4. AmerenUE Letter ULNRC-04997 from Keith D. Young to USNRC Document Control Desk, dated May 7, 2004, "Revision to Request for Relief from ASME Section III Requirements Regarding Non-Destructive Examination of Welds Performed Under Site Repair/Replacement Program"

5. AmerenUE Letter ULNRC-05064 from Keith D. Young to USNRC Document Control Desk, dated October 18, 2004, "Request for Relief for the Callaway Plant Inservice Inspection Program"

NRC Letters

6. USNRC Letter from Stephen Dembeck to Garry L. Randolph (AmerenUE), dated July 1, 2003, "Callaway Plant, Unit 1 – Second Ten-Year Interval Inservice Inspection Program Relief Request to Use an Alternative Examination Method (TAC No. MB6534)"

7. USNRC Letter from Stephen Dembeck to Garry L. Randolph (AmerenUE), dated May 19, 2004, "Callaway Plant, Unit 1 – Second Ten-Year Interval Inservice Inspection Program Relief Request to Use an Alternative Examination Method (TAC No. MC3087)"

Relief Request

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

See Attached (8 pages)

Note

Revisions have been made to the text of this Relief Request (subsequent to NRC approval of the previous version submitted May 7, 2004) under "Background" as indicated by revision bars in the left column. Changes have been made in Tables 1 and 2 to include new piping scope, as indicated by revision bars in the right margin.

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.

The 1998 Edition with 2000 Addenda of ASME Section XI will be the base Code governing repair/replacement activities at the Callaway Nuclear Plant for the third 10-year inspection interval. ASME Class 2 welds installed under the Callaway Repair/Replacement Program during the third 10-year inspection interval will be nondestructively examined in accordance with the 1974 Edition with Summer 1975 Addenda of ASME Section III, except when applying the provisions of IWA-4540 of the 2000 Addenda of ASME Section XI, when the welds will be nondestructively examined in accordance with the 1992 or later edition of ASME Section III.

Pursuant to the provisions of 10CFR50.55a(a)(3)(i), Callaway Plant requests permission to use an alternative ultrasonic examination method during the second and third inspection intervals 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 the 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 analysis[1], tensile properties, and metallurgical structure[2] 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.

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[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.*

(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.

(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
Feedwater Loop A	**Inside Containment**			
5-Dia. bend & expander upstream of A S/G	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
Upstream of 5-Dia. Bend to containment penetration	2-AE-04-W674141-FW06	14	80	CS
	2-AE-04-W674141-FW05R2	14	80	CS
	2-AE-04-W674141-FW04	14	80	CS
	2-AE-04-W674141-FW03	14	80	CS
	2-AE-04-F072	14	120	CS
	2-AE-04-F073	14	120	CS
	2-AE-04-F074	14	80	CS
	2-AE-04-F036	14	80	CS
	2-AE-04-S024-A	14	80	CS
	2-AE-04-F011	14	80	CS
	2-AE-04-S006-B	14	80	CS
	2-AE-04-W674141-FW02R2	14	80	CS
	2-AE-04-W674141-FW01	14	80	CS
	2-AE-04-F009	14	80	CS
	2-AE-04-F037	14	80	CS
	new pipe weld(s)[3]	14	80	CS
Feedwater Loop B	**Inside Containment**			
5-Dia. bend & expander upstream of B S/G	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
	2-AE-04-F035	16	80	CS
Upstream of 5-Dia. bend	2-AE-04-S020-A	14	80	CS
	2-AE-04-F029	14	80	CS
Elbow & pipe downstream of AEV0120	2-AE-04-F070	14	80	CS
	2-AE-04-S019-A	14	80	CS
	2-AE-04-FW10	14	80	CS
Welds at valve AEV0120	2-AE-04-F069	14	120	CS
	2-AE-04-F068	14	120	CS

Description	Weld ID No. [1]	NPS	Sch	Mat
Elbow & pipe upstream of valve AEV0120	2-AE-04-S017-A	14	80	CS
	2-AE-04-F027	14	80	CS
	2-AE-04-F067	14	80	CS
Upstream of elbow to containment penetration	2-AE-04-W674142-FW04	14	80	CS
	2-AE-04-W674142-FW03	14	80	CS
	2-AE-04-W674142-FW02R1	14	80	CS
	2-AE-04-W674142-FW01	14	80	CS
	2-AE-04-F024	14	80	CS
	2-AE-04-F038	14	80	CS
	new pipe weld(s)[3]	14	80	CS

Feedwater Loop B	Outside Containment			
Feedwater isolation valve AEFV0040	2-AE-04-F020 (Complete)	14	120	CS
	2-AE-04-F019 (Complete)	14	120	CS

Feedwater Loop C	Inside Containment			
5-Dia. bend & expander upstream of C S/G	2-AE-05-F030[2]	14	80	CS
	2-AE-05- S021-A	14	80	CS
	2-AE-05-S021-C	16	80	CS
	2-AE-05-F036	16	80	CS
Elbow downstream of valve AEV0123	2-AE-05-F029	14	80	CS
	2-AE-05-S020-A	14	80	CS
Upstream of elbow to containment penetration	2-AE-05-F072	14	80	CS
	2-AE-05-F071	14	120	CS
	2-AE-05-F070	14	120	CS
	2-AE-05-W674143-FW06	14	80	CS
	2-AE-05-S018-A	14	80	CS
	2-AE-05-W674143-FW05	14	80	CS
	2-AE-05-S017-A	14	80	CS
	2-AE-05-W674143-FW04	14	80	CS
	2-AE-05-W674143-FW03R1	14	80	CS
	2-AE-05-W674143-FW02	14	80	CS
	2-AE-05-W674143-FW01	14	80	CS
	2-AE-05-F024	14	80	CS
	2-AE-05-F040	14	80	CS
	new pipe weld(s)[3]	14	80	CS

Description	Weld ID No. [1]	NPS	Sch	Mat
Feedwater Loop D	**Inside Containment**			
5-Dia. bend & expander upstream of D S/G	2-AE-05-F015 [2]	14	80	CS
	2-AE-05-S022-A	14	80	CS
	2-AE-05-S022-C	16	80	CS
	2-AE-05-F035	16	80	CS
Upstream of 5-Dia. Bend through AEFV0122	2-AE-05-S010-A	14	80	CS
	2-AE-05-F014	14	80	CS
	2-AE-05-F076	14	80	CS
	2-AE-05-F052	14	120	CS
	2-AE-05-F075	14	120	CS
	2-AE-05-F074	14	120	CS
Elbow & pipe upstream of valve AEV0122	2-AE-05-F012	14	80	CS
	2-AE-05-S008-A	14	80	CS
	2-AE-05-F073	14	80	CS
Upstream of elbow to containment penetration	2-AE-05-S007-A	14	80	CS
	2-AE-05-F011	14	80	CS
	2-AE-05-S006-B	14	80	CS
	2-AE-05-S006-A	14	80	CS
	2-AE-05-F010	14	80	CS
	2-AE-05-F009	14	80	CS
	2-AE-05-F039	14	80	CS
	new pipe weld(s)[3]	14	80	CS

Feedwater Loop D	Outside Containment			
Feedwater isolation valve AEFV0042	2-AE-05-F004 (Complete)	14	120	CS
	2-AE-05-F005 (Complete)	14	120	CS
	2-AE-05-F006	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.
(3) New pipe welds if required to achieve alignment or fit-up.

Table 2: Main Steam Pipe Welds

Description	Weld ID No. (1)	NPS	Sch (2)	Mat
Main Steam Loop A	**Inside Containment**			
	2-AB-01-F001	32	1.068"	CS
Pipe, reducer & elbow at A S/G outlet	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
Main Steam Loop A	**Outside Containment**			
MSIV ABHV0014	2-AB-01-F008	28	1.500"	CS
	2-AB-01-F009	28	1.500"	CS
Main Steam Loop B	**Inside Containment**			
	2-AB-01-F020	32	1.068"	CS
Pipe, reducer & elbow at B S/G outlet	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
Main Steam Loop B	**Outside Containment**			
MSIV ABHV0017	2-AB-01-F027	28	1.500"	CS
	2-AB-01-F028	28	1.500"	CS
Main Steam Loop C	**Inside Containment**			
	2-AB-01-F044	32	1.068"	CS
Pipe, reducer & elbow at C S/G outlet	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
Main Steam Loop C	**Outside Containment**			
MSIV ABHV0020	2-AB-01-F051	28	1.500"	CS
	2-AB-01-F052	28	1.500"	CS
Main Steam Loop D	**Inside Containment**			
	2-AB-01-F068	32	1.068"	CS
Pipe, reducer & elbow at D S/G outlet	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
Main Steam Loop D	**Outside Containment**			
MSIV ABHV0011	2-AB-01-F075	28	1.500"	CS
	2-AB-01-F076	28	1.500"	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.