October 30, 2007

Mr. Charles D. Naslund
Senior Vice President and
Chief Nuclear Officer
Union Electric Company
Post Office Box 620
Fulton, MO 65251

SUBJECT: CALLAWAY PLANT, UNIT 1 - ISSUANCE OF RELIEF REQUEST ISI-38 FOR THE SECOND 10-YEAR INSERVICE INSPECTION INTERVAL (TAC NO. MD3435)

Dear Mr. Naslund:

By letter dated October 25, 2006 (ULNRC-05183), as supplemented by letters dated June 29 and October 25, 2007 (ULNRC-05423 and -05452), Union Electric Company (the licensee) requested relief from certain requirements of the American Society of Mechanical Engineers Boiler and Pressure Vessel Code (i.e., the ASME Code) for the second 10-year inservice inspection (ISI) interval at the Callaway Plant (Callaway). Relief Requests (RRs) ISI-34 through ISI-41 were submitted. This letter only addresses RR ISI-38.

Based on the enclosed safety evaluation, the U.S. Nuclear Regulatory Commission (NRC) staff has determined that the ASME Code examination coverage requirements for the subject welds in RR ISI-38, are impractical, and granting relief pursuant to paragraph 50.55a(g)(6)(i) of Title 10 of the *Code of Federal Regulations* is authorized by law and will not endanger life or property or the common defense and security, and is otherwise in the public interest giving due consideration to the burden upon the licensee that could result if the requirements were imposed on the facility. Therefore, the NRC staff grants the relief requested in RR ISI-38 for the second 10-year ISI interval at Callaway. All other ASME Code, Section XI, requirements for which relief was not specifically requested and approved in this relief request remain applicable, including third-party review by the Authorized Nuclear Inservice Inspector.

Sincerely,

/RA/

Thomas G. Hiltz, Chief
Plant Licensing Branch IV
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

Docket No. 50-483

Enclosure: Safety Evaluation

cc w/encl: See next page

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Callaway Plant, Unit 1

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SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

RELATED TO RELIEF REQUEST ISI-38

FOR THE SECOND 10-YEAR INSERVICE INSPECTION INTERVAL

UNION ELECTRIC COMPANY

CALLAWAY PLANT, UNIT 1

DOCKET NO. 50-483

1.0 INTRODUCTION

By application dated October 25, 2006, as supplemented by letters dated June 29 and October 26, 2007 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML063050203, ML072390353, and ML07xxxxxxx[1], respectively), Union Electric Company (the licensee) requested relief from certain examination requirements of Section XI, "Rules for Inservice Inspection [(ISI)] of Nuclear Power Plant Components," of the American Society of Mechanical Engineers Boiler and Pressure Vessel Code (i.e., the ASME Code) for the second 10-year ISI interval at the Callaway Plant (Callaway).

Relief Requests (RRs) ISI-34 through ISI-41 were submitted in the application; however, this safety evaluation (SE) only addresses RR ISI-38. RRs ISI-35 and ISI-41 were approved in two letters to the licensee dated January 18, 2007 (ADAMS Accession Nos. ML063520318 and ML070030336). RRs ISI-36, ISI-37, and ISI-39 were addressed in the letter to the licensee dated September 17, 2007 (ADAMS Accession No. ML072400092). The remaining RRs ISI-34 and ISI-40 will be addressed in future letters to the licensee.

The ASME Code requirements pertaining to RR ISI-38 are part of the licensee's risk-informed (RI-ISI) program which was approved as an alternative to the ASME Code in a letter dated January 30, 2002 (ADAMS Accession No. ML013460265). Specifically, the licensee proposed a supplement to the examination volume of selected welds in the licensee's RI-ISI program. The second 10-year ISI interval ended December 18, 2005.

2.0 REGULATORY REQUIREMENTS

In accordance paragraph 50.55a(g)(4) in Part 50 of Title 10 of the *Code of Federal Regulations* (i.e., 10 CFR 50.55a(g)(4)), ASME Code Class 1, 2, and 3 components must meet the requirements set forth in ASME Code, Section XI, "Rules for Inservice Inspection of Nuclear Power Plants Components," to the extent practical within the limitations of design, geometry, and materials of construction of the components. The regulations require that all inservice

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1. The letter is not in ADAMS at this time.

examinations 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 ASME Code, Section XI, incorporated by reference in 10 CFR 50.55a(b) on the date 12 months prior to the start of the 10-year interval. For Callaway, the code of record for the second 10-year ISI interval is the 1989 Edition of Section XI of the ASME Code.

Alternatives to requirements may be authorized or relief granted by the Nuclear Regulatory Commission (NRC) pursuant to 10 CFR 50.55a(a)(3)(i), 10 CFR 50.55a(a)(3)(ii), or 10 CFR 50.55a(g)(6)(i). In proposing alternatives or requesting relief, the licensee must demonstrate that the proposed alternatives provide an acceptable level of safety; compliance would result in hardship or unusual difficulty without a compensating increase in the level of quality and safety; or conformance is impractical for the facility. Pursuant to 10 CFR 50.55a(g)(4)(iv), ISI items may meet the requirements set forth in subsequent editions and addenda of the ASME Code that are incorporated by reference in 10 CFR 50.55a(b), subject to the limitations and modifications listed therein, and subject to Commission approval. Portions of editions and addenda may be used provided that related requirements of the respective editions and addenda are met.

The licensee stated that the ASME Code of record for Callaway for the second 10-year interval ISI program, is the 1989 Edition with no Addenda of Section XI of the ASME Code.

3.0 TECHNICAL EVALUATION FOR REQUEST ISI-38

3.1 Affected Components

The affected pipe welds are identified in the following table:

Affected Pipe Welds

Weld Number	Description (1)	Code Category	Administrative Record Item	Coverage (percent)	Degradation Mechanism (2)
2-BB-01-F102	27.5-inch ID Inlet Safe-end to Elbow Welds	R-A	B-J, B9.11	50	None
2-BB-01-F202	27.5-inch ID Inlet Safe-end to Elbow Welds	R-A	B-J, B9.11	50	None
2-BB-01-F302	27.5-inch ID Inlet Safe-end to Elbow Welds	R-A	B-J, B9.11	50	None
2-BB-01-F402	27.5-inch ID Inlet Safe-end to Elbow Welds	R-A	B-J, B9.11	50	None

1. Piping size is to the National Pipe Standard (NPS).
2. Degradation Mechanism identified as “None” were examined as thermal fatigue.

ID = inside diameter

3.2 Applicable Code

The required examinations is according to the 1989 Edition with no addenda of Section XI of the ASME Code. For Class 1 piping, volumetric and surface examinations are shown in Figure IWB-2500-8(c) for 4 NPS (nominal 4-inch outside diameter pipe) and larger pipe.

The examination volume for the licensee's RI-ISI program is in the Electric Power Research Institute (EPRI) Topical Report TR-112657 Revision B-A, "Revised Risk-Informed Inservice Inspection Evaluation Procedure," Figure 4-2 for piping welds 4 NPS and larger. The Callaway RI-ISI program does not require a surface examination of the subject welds.

3.3 Proposed Alternative

The licensee proposed the 50 percent coverage, with personnel and procedures qualified to ASME Code, Appendix VIII, as administered by the EPRI Performance Demonstration Initiative (PDI), obtained on the subject welds with a best-effort examination approach for the remaining 50 percent coverage described below:

(1) For inlet nozzle safe-end to elbow welds, the licensee performed supplemental eddy current testing (ET) and enhanced visual testing (VT) examinations.

(2) The normal visual examination VT-2 examinations performed in conjunction with system pressure testing each refueling outage, along with reactor coolant system leak rate limitations, and atmospheric particulate radioactivity monitoring assures that any leakage would be detected prior to gross piping failure.

3.4 Licensee Basis for the Alternative

The licensee stated that the inlet nozzle safe-end to elbow welds are limited in examination coverage for the detection of axial flaws (circumferential scans), as per the PDI issued qualification document, due to the ID configuration (field weld root geometry). Areas of limitations were fully examined by supplement visual (enhanced VT) and ET techniques and the final ultrasonic testing (UT) examination coverage was estimated at 50 percent.

Of the four welds, only 2-BB-01-F102 was selected for the RI-ISI program and required to be examined. When combined with the additional coverage of the other three welds, the effects of limited coverage on weld 2-BB-01-F102 is negligible.

The licensee further stated also that the design configuration/restriction makes compliance with the ASME Code-required examination coverage requirements impractical. Plant modifications or the replacement of components designed to allow for complete coverage would be needed to meet the ASME Code requirements, which would impose a considerable burden on Callaway.

There is no change in the EPRI Risk-Informed Consequence Assessment, as failure is assumed as a conservative assumption.

3.5 Technical Evaluation

The ASME Code requires 100 percent volumetric and surface examination of selected Class 1 and Class 2 circumferential pipe welds. In addition, the ASME Code requires that the volumetric examination be conducted from both sides of these pressure retaining welds. However, the

geometric configurations of the subject welds limit UT from scanning both sides of the welds. For the licensee to achieve 100 percent volumetric coverage, the subject welds would have to be redesigned and modified. Because this would place a significant burden on the licensee, the ASME Code-required 100 percent volumetric examinations are impractical.

10 CFR 50.55a(g)(6)(ii)(C) requires the licensee to use the 1995 Edition with 1996 Addenda of the ASME Code, Section XI, Appendix VIII, "Performance Demonstration for Ultrasonic Examination Systems," for UT examination of pipe. UT examinations of the subject welds are performed with personnel and procedures qualified to the requirements of Appendix VIII, Supplement 2, "Qualification Requirements for Wrought Austenitic Piping Welds." The examination scanning requirements are in 10 CFR 50.55a(b)(2)(xv)(A), which states that (1) piping must be examined in two axial directions and, when examination in the circumferential direction is required, the circumferential examination must be performed in two directions, provided access is available, and (2) where examination from both sides is not possible on austenitic welds or dissimilar metal welds, full coverage credit from a single side[1] examination may be claimed only after completing a successful single-sided Appendix VIII demonstration using flaws on the opposite side of the weld. The nuclear power industry developed the PDI program to implement the requirements of ASME Code, Appendix VIII.

The test specimens used for Appendix VIII qualifications as administered by the PDI program are representative to the conditions existing in the nuclear power plants. To perform an examination for axial flaws, the transducer must scan circumferentially on the weld surface. The circumferential scanning effectiveness is reduced because of rough inside pipe surface conditions. Therefore, PDI restricts the inside pipe surface qualifications to the smooth surfaces. For the welds in question, axial scanning for circumferential flaws was achieved, but circumferential scanning for axial flaws was not achievable.

As an alternative to UT, the licensee stated it scanned for axial flaws used ET. Circumferential scan performed with ET transducers are more effective than UT on the rough weld surface because ET uses smaller transducers. ET is effective in detecting surface breaking flaws, if they exist. The combination of UT and ET provides reasonable assurance that structural integrity is being maintained.

The conditions on the inside pipe surface are not conducive to UT examination without surface conditioning such as grinding. Smoothing the inside weld surface for UT examinations is difficult because of the cramped operating space and exposure to residual radiation common in operating nuclear power plants. For the licensee to condition the inside pipe surface would impose a hardship without a compensating increase in quality and safety.

3.6 Conclusion

Based on the above evaluation, the NRC staff concludes that compliance with the ASME Code-required examination coverage for the subject welds in RR ISI-38 is impractical. Based on the UT and alternative examination methods, if significant service-induced degradation were

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1 When the transducer is located on the same side of the base metal and weld centerline, the examination is considered on the near-side, and when the transducer is located on the opposite side of the weld center line and opposite base metal, the examination is considered far-side. An examination performed with the transducer scanning in only one direction axially and one direction circumferentially is considered a single side examination.

occurring in the subject welds, there is reasonable assurance that the degradation would be detected by the performed examinations. In addition, leakage and radiation monitoring systems as described in the licensee's October 25, 2006 submittal and visual examinations performed after each refueling outage assures that any significant leakage would be detected. Therefore, pursuant to 10 CFR 50.55a(g)(6)(i), relief is granted for the RR ISI-38 for the second 10-year ISI interval at Callaway. This granting of relief is authorized by law and will not endanger life or property or the common defense and security, and is otherwise in the public interest giving due consideration to the burden upon the licensee that could result if the requirements were imposed on the facility.

All other requirements of the ASME Code, Section XI for which relief has not been specifically requested remain applicable, including third-party review by the Authorized Nuclear Inservice Inspector.

Principal Contributor: Don Naujock

Date: October 30, 2007