

September 17, 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 REQUESTS ISI-36,  
ISI-37, AND ISI-39 FOR THE SECOND 10-YEAR INSERVICE  
INSPECTION INTERVAL (TAC NO. MD3435)

Dear Mr. Naslund:

By letter dated October 25, 2006 (ULNRC-05183), Union Electric Company (the licensee) requested relief from certain examination requirements of Section XI, "Rules for Inservice Inspection 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 inservice inspection (ISI) interval at the Callaway Plant (Callaway). Relief Requests (RRs) ISI-34 through ISI-41 were submitted. This letter addresses RRs ISI-36, ISI-37, and ISI-39. RRs ISI-35 and ISI-41 were approved in our two letters dated January 18, 2007. The remaining RRs will be addressed in future letters.

In the supplemental letter dated June 29, 2007 (ULNRC-05423), the licensee has withdrawn RR ISI-37. Based on the attached safety evaluation, the Nuclear Regulatory Commission (NRC) staff has determined that the ASME Code examination coverage requirements are (1) met for the subject weld listed in RR ISI-36 and no relief from the ASME Code requirements is required, and (2) impractical for the subject welds listed in RR ISI-39. Based on this, for RR ISI-39, 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 in RR ISI-39 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

September 17, 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 REQUESTS ISI-36,  
ISI-37, AND ISI-39 FOR THE SECOND 10-YEAR INSERVICE  
INSPECTION INTERVAL (TAC NO. MD3435)

Dear Mr. Naslund:

By letter dated October 25, 2006 (ULNRC-05183), Union Electric Company (the licensee) requested relief from certain examination requirements of Section XI, "Rules for Inservice Inspection 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 inservice inspection (ISI) interval at the Callaway Plant (Callaway). Relief Requests (RRs) ISI-34 through ISI-41 were submitted. This letter addresses RRs ISI-36, ISI-37, and ISI-39. RRs ISI-35 and ISI-41 were approved in our two letters dated January 18, 2007. The remaining RRs will be addressed in future letters.

In the supplemental letter dated June 29, 2007 (ULNRC-05423), the licensee has withdrawn RR ISI-37. Based on the attached safety evaluation, the Nuclear Regulatory Commission (NRC) staff has determined that the ASME Code examination coverage requirements are (1) met for the subject weld listed in RR ISI-36 and no relief from the ASME Code requirements is required, and (2) impractical for the subject welds listed in RR ISI-39. Based on this, for RR ISI-39, 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 in RR ISI-39 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

DISTRIBUTION:

PUBLIC	RidsNrrDorlPl4	RidsRgn4MailCenter
LPLIV Reading	RidsNrrPMJDonohew	RidsNrrDciCvib
RidsAcrsAcnwMailCenter	RidsNrrLAJBurkhardt	TMcLellan/CVIB
RidsNrrDorlDpr	RidsOgcRp	

ADAMS Accession No.: ML07240092

\*previously concurred

OFFICE	NRR/LPL4/PM	NRR/LPL4/LA	NRR/CVIB/BC	OGC - NLO w/comments	NRR/LPL4/BC
NAME	JDonohew*	JBurkhardt	MMitchell*	JRund*	THiltz
DATE	9/5/07	9/14/07	8/24/07	9/12/07	9/17/07

OFFICIAL RECORD COPY

Callaway Plant, Unit 1

cc:

John O'Neill, Esq.  
Pillsbury Winthrop Shaw Pittman LLP  
2300 N. Street, N.W.  
Washington, D.C. 20037

Technical Services Branch Chief  
FEMA Region VII  
2323 Grand Boulevard, Suite 900  
Kansas City, MO 64108-2670

Mr. Keith A. Mills, Supervising Engineer  
Regional Regulatory Affairs/Safety Analysis  
AmerenUE  
P.O. Box 620  
Fulton, MO 65251

Mr. Dan I. Bolef, President  
Kay Drey, Representative  
Board of Directors Coalition for the  
Environment  
6267 Delmar Boulevard  
University City, MO 63130

U.S. Nuclear Regulatory Commission  
Resident Inspector Office  
8201 NRC Road  
Steedman, MO 65077-1302

Mr. Lee Fritz, Presiding Commissioner  
Callaway County Courthouse  
10 East Fifth Street  
Fulton, MO 65251

Mr. Les H. Kanuckel  
Manager, Quality Assurance  
AmerenUE  
P.O. Box 620  
Fulton, MO 65251

Mr. David E. Shafer  
Superintendent, Licensing  
Regulatory Affairs  
AmerenUE  
P.O. Box 620  
Fulton, MO 65251

Missouri Public Service Commission  
Governor Office Building  
200 Madison Street  
P.O. Box 360  
Jefferson City, MO 65102-0360

Manager, Regulatory Affairs  
AmerenUE  
P.O. Box 620  
Fulton, MO 65251

Regional Administrator, Region IV  
U.S. Nuclear Regulatory Commission  
611 Ryan Plaza Drive, Suite 400  
Arlington, TX 76011-4005

Mr. Keith G. Henke, Planner  
Division of Community and Public Health  
Office of Emergency Coordination  
930 Wildwood P.O. Box 570  
Jefferson City, MO 65102

Mr. H. Floyd Gilzow  
Deputy Director for Policy  
Department of Natural Resources  
P.O. Box 176  
Jefferson City, MO 65102-0176

Director, Missouri State Emergency  
Management Agency  
P.O. Box 116  
Jefferson City, MO 65102-0116

Mr. Rick A. Muench  
President and Chief Executive Officer  
Wolf Creek Nuclear Operating Corporation  
P.O. Box 411  
Burlington, KA 66839

Mr. Scott Clardy, Director  
Section for Environmental Public Health  
P.O. Box 570  
Jefferson City, MO 65102-0570

Certrec Corporation  
4200 South Hulen, Suite 422  
Fort Worth, TX 76109

June 2007

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

RELATED TO RELIEF REQUESTS ISI-36, ISI-37, AND ISI-39

FOR 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 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML063050203), 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 inspection 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 RRs ISI-36, ISI-37, and ISI-39.

The Nuclear Regulatory Commission (NRC) staff has reviewed and evaluated the information provided by the licensee in its letter dated October 25, 2006, which proposed ISI program plan RRs ISI-36, ISI-37, and ISI-39 for the second 10-year inspection interval at Callaway. The licensee provided additional information on RR ISI-37 in its letter dated June 29, 2007 (ADAMS Accession No. ML072390353).

In its letter dated June 29, 2007, the licensee withdrew RR ISI-37. Therefore, RRs ISI-36 and ISI-39 are evaluated below in this SE; however, RR ISI-37 is not evaluated because it has been withdrawn.

2.0 REGULATORY REQUIREMENTS

The ISI of the ASME Code for Class 1, 2, and 3 components is performed in accordance with Section XI of the ASME Code and applicable addenda as required by Paragraph 50.55a(g) in Title 10 of the *Code of Federal Regulations* (i.e., 10 CFR 50.55a(g)). Pursuant to 10 CFR 50.55a(g)(6)(i), the NRC may grant such relief and impose alternative requirements as it determines 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.

Pursuant to 10 CFR 50.55a(g)(4), ASME Code Class 1, 2, and 3 components (including supports) shall meet the requirements, except the design and access provisions and the preservice examination requirements, set forth in the ASME Code, Section XI, to the extent practical within the limitations of design, geometry, and materials of construction of the components. The regulations require that ISI of components 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 Section XI of the ASME Code incorporated by reference in 10 CFR 50.55a(b) 12 months prior to the start of the 120-month interval, subject to the limitations and modifications listed therein.

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

The table listing the two RRs that are addressed in this SE is given below with the ASME Code component, the applicable weld numbers, and the applicable ASME Code requirements:

Table - RRs ISI-36 and ISI-39

Request for Relief Number	ASME Code Component (Area or Weld to be Examined)	Weld ID No.	Applicable ASME Code Requirement (100% Weld Coverage)
ISI-36	Reactor Pressure Vessel (RPV) Lower Torus to Dollar Plate Weld	2-RV-102-151	ASME Code, Exam Category B-A, Item No. B1.21, Figure IWB-2500-3, 74.2% Volume Coverage
ISI-39	RPV A, B, C, and D Outlet Nozzle to Shell Welds	2-RV-107-121-A, 2-RV-107-121-B, 2-RV-107-121-C, and 2-RV-107-121-D	ASME Code, Exam Category B-D, Item No. B3.90, Figure IWB-2500-7(a) 79.3% Volume Coverage

3.0 NRC STAFF EVALUATION OF RRs NOS. ISI-36 AND ISI-39

3.1 RR No. ISI-36

Applicable ASME Code Components

The ASME Code component is the RPV Lower Torus to Dollar Plate Weld numbered 2-RV-102-151.

### Applicable ASME Code Requirements

The applicable ASME Code requirements are the following:

1. ASME Code, Section XI, IWC-2500-1, Category B-A, Item B1.21, which requires volumetric examination of essentially 100 percent of the accessible weld length of the RPV Lower Torus to Dollar Plate Weld numbered 2-RV-102-151.
2. ASME Code Case N-460, "Alternative Examination Coverage for Class 1 and Class 2 Welds," as an alternative approved for use by the NRC in Regulatory Guide 1.147, Revision 14, "Inservice Inspection Code Case Acceptability, ASME Section XI, Division 1," states that a reduction in examination coverage due to part geometry or interference for any ASME Code Class 1 or 2 weld is acceptable provided that the reduction is less than 10 percent, (i.e., greater than 90 percent examination coverage is obtained).

Licensee's Basis for Relief Request (As stated in the licensee's application in the attachment for 10 CFR 50.55a Request Numbers ISI-36 (A.) through ISI-39 (D.))

- A. The [RPV] Lower Torus to Dollar Plate weld is positioned at about the same elevation as the peripheral bottom-mounted instrumentation (BMI) tubes. Scanning was conducted between obstructing penetrations with the scan boundaries maximized by visually assisted position[ing] of the exam head so that scan starts and stops were as close to the tubes as tool configuration allowed. Final examination coverage was estimated at 74.2%.
- B. [Not for RR ISI-36]
- C. [Not for RR ISI-36]
- D. [Not for RR ISI-36]

The design configuration/restriction makes 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. This would impose a considerable burden to [the licensee of the] Callaway Plant.

Licensee's Proposed Alternative Examination (As stated in the licensee's application)

[The licensee for] Callaway proposes to accept the percent coverage obtained on the subject examinations. The best-effort examination approach, in addition to the other considerations or actions described below, provides reasonable assurance of safety and/or structural integrity.

- [Does not apply to RR ISI-36.]
- The reactor vessel shell welds are constructed of low alloy steel ... These materials have been shown to be resistant to stress corrosion cracking in

pressurized water environments. There is no [potential] degradation mechanism, other than fatigue, active in the subject welds that would cause weld failure.

- VT-2 examinations performed in conjunction with system pressure testing each refueling, along with reactor coolant system leak rate limitations imposed by the plant's Technical Specifications, as well as containment atmospheric particulate radioactivity monitoring, provide additional assurance that a leak would be detected prior to any gross failure occurring.

### NRC Staff's Evaluation

When writing the inspection requirements for welds on the bottom of the RPV, the ASME Code Committees considered the difficulty in examining these welds because of the various components under the RPV (i.e., reactor supports, control rod drives, and instrumentation tube penetrations). The ASME Code, Section XI, Category B-A, Item B1.21 specifically states that it requires a volumetric examination of essentially 100 percent of the accessible weld length of the RPV Lower Torus to Dollar Plate Weld 2-RV-102-151. Because of the following:

1. the licensee's statement in its basis for RR ISI-36 that the scanning of the weld was conducted between obstructing penetrations with the scan boundaries maximized by visually assisted positioning of the exam head so that scan starts and stops were as close to the tubes as the tool configuration allowed, and
2. the figure of the bottom-head dollar BMI tube scans that supports the above licensee's statement on the scanning of the weld (the figure is sheet 20 of 21 in the Westdyne Reactor Vessel Weld Results Summary Report for the lower torus to dollar plate weld, weld No. 2-RV-102-151 (the subject weld of RR ISI-36) in the attachment to the licensee's application for RRs ISI-36 through ISI-39),

the NRC staff concludes that the licensee did meet the ASME Code requirement to examine essentially 100 percent of the accessible weld length for weld 2-RV-102-151 (i.e., 100 percent of the accessible weld length). Based on this conclusion, the NRC staff further concludes that relief is not required for the subject weld because the licensee has met the ASME Code requirement.

### 3.2 RR No. ISI-39

#### Applicable ASME Code Components

The applicable ASME Code components are the RPV A, B, C, and D Outlet Nozzle-to-Shell weld numbers 2-RV-107-121-A, 2-RV-107-121-B, 2-RV-107-121-C, and 2-RV-107-121-D.

#### Applicable ASME Code Requirements

The applicable ASME Code requirement is the ASME Code, Section XI, IWB-2500-1, Category B-D, Item B3.90, which requires volumetric examination of 100 percent of the weld inspection volume as required in Figure IWB-2500-7(a).

Licensee's Basis for Relief Request (As stated in the licensee's application in the attachment for 10 CFR 50.55a Request Numbers ISI-36 (A.) through ISI-39 (D.))

- A. [Not for RR ISI-39]
- B. [Not for RR ISI-39]
- C. [Not for RR ISI-39]
  
- D. [The licensee for the] Callaway Plant obtained 100% coverage for reflectors parallel to the weld seam by a combination of radial scan paths (Star scans) and scans from within the nozzle bore (Bore scans). However, the proximity of the nozzle protrusion or boss to the [RPV] Outlet Nozzle-to-Shell welds limits the parallel scans from the vessel ID [inside diameter] (Tangential scans). Because of this, limited coverage of 58.6% was achieved [when] examining for transverse reflectors. Combined final ultrasonic examination coverage was estimated at 79.3%.

The design configuration/restriction makes 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. This would impose a considerable burden to [the licensee of the] Callaway Plant.

Licensee's Proposed Alternative Examination (As stated in the licensee's application)

[The licensee for] Callaway proposes to accept the percent coverage obtained on the subject examinations. The best-effort examination approach, in addition to the other considerations or actions described below, provides reasonable assurance of safety and/or structural integrity.

- For the Inlet Nozzle Safe-end to Elbow welds, [the licensee for] Callaway performed supplemental eddy current and enhanced visual examinations.
- The reactor vessel shell welds are constructed of low alloy steel, and the Inlet Nozzle Safe-end to Elbow welds are constructed of stainless steel materials. These materials have been shown to be resistant to stress corrosion cracking in pressurized water environments. There is no [potential] degradation mechanism, other than fatigue, active in the subject welds that would cause weld failure.
- VT-2 examinations performed in conjunction with system pressure testing each refueling, along with reactor coolant system leak rate limitations imposed by the plant's Technical Specifications, as well as containment atmospheric particulate radioactivity monitoring, provide additional assurance that a leak would be detected prior to any gross failure occurring.

NRC Staff's Evaluation

ASME Code, Section XI requires volumetric examination of 100 percent as required in Figure IWB-2500-7(a) for the RPV Outlet Nozzle-to-Shell Welds numbered 2-RV-107-A,



2-RV-107-B, 2-RV-107-C, and 2-RV-107-D. The licensee was unable to meet the ASME Code requirements due to the proximity of the nozzle protrusion or boss that limits the parallel scans from the RPV ID for tangential scans. For the licensee to meet the ASME Code requirements, modifications to, or the replacement of, the subject components would be required and would be major changes to the plant, which would place a burden on the licensee. Based on this, the NRC staff concludes that the ASME Code requirements are impractical.

The licensee obtained 100 percent coverage for reflectors parallel to the weld seam by a combination of radial scan paths and scans from within the nozzle bore. Because of the configuration of the subject nozzles, the coverage was limited to 58.6 percent in examining for transverse reflectors. The licensee obtained an aggregate examination coverage of 79.3 percent for each of the subject nozzles. The licensee also performed supplemental eddy current and enhanced visual examinations. Therefore, the NRC staff determined that the examinations performed would have detected any significant patterns of degradation, if any had occurred. The NRC staff also determined that the volumetric and ASME Code VT-2 visual examinations during system walkdowns performed provided reasonable assurance of the structural integrity of RPV outlet nozzle-to-shell welds numbered 2-RV-107-A, 2-RV-107-B, 2-RV-107-C, and 2-RV-107-D.

#### 4.0 CONCLUSION

The NRC staff has reviewed the licensee's application dated October 25, 2006, which submitted the licensee's RRs ISI-36, ISI-37, and ISI-39. RR ISI-37 was withdrawn in the licensee's letter dated June 26, 2007.

Based on its evaluation in Section 3.1 of this SE, the NRC staff concludes for RR ISI-36 that relief is not required for Callaway because the licensee has met the ASME Code volumetric examination requirements for the RPV Lower Torus to Dollar Plate Weld 2-RV-102-151.

Furthermore, based on its evaluation in Section 3.2 of this SE, the NRC staff concludes that the ASME Code examination coverage requirements are impractical for the subject welds listed in RR ISI-39. Based on the coverages obtained, if significant service-induced degradation were occurring, there is reasonable assurance that evidence of it would be detected by the volumetric examinations that were performed. The volumetric examinations, supplemental eddy current and enhanced visual examinations, and VT-2 visual examinations during plant walkdowns performed provide reasonable assurance of structural integrity of the RPV Outlet Nozzle-to-Shell Welds numbered 2-RV-107-A, 2-RV-107-B, 2-RV-107-C, and 2-RV-107-D. The NRC staff has determined that granting relief pursuant to 10 CFR 50.55a(g)(6)(i) for RR ISI-39 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, pursuant to 10 CFR 50.55a(g)(6)(i), the NRC staff concludes that RR ISI-39 is granted for Callaway for the second 10-year ISI interval.

All other ASME Code, Section XI requirements for which relief was not specifically requested and approved in the subject requests for relief remain applicable, including third-party review by the authorized Nuclear Inservice Inspector.

Principal Contributor: Thomas K. McLellan

Date: September 17, 2007