



UNITED STATES  
NUCLEAR REGULATORY COMMISSION  
WASHINGTON, D.C. 20555-0001

September 4, 2014

Mr. Fadi Diya  
Senior Vice President and  
Chief Nuclear Officer  
Union Electric Company  
P.O. Box 620  
Fulton, MO 65251

SUBJECT: CALLAWAY PLANT, UNIT 1 – RELIEF REQUEST I3R-16 FOR TEMPORARY  
NON-CODE REPAIR OF THE TRAIN “A” COMPONENT COOLING WATER  
HEAT EXCHANGER (TAC NO. MF3650)

Dear Mr. Diya:

By letter dated March 19, 2014, Union Electric Company (dba Ameren Missouri, the licensee) submitted request for relief I3R-16, proposing an alternative to certain American Society of Mechanical Engineers (ASME) Boiler and Pressure Vessel Code (Code) requirements for the Callaway Plant, Unit 1. The scope of the request was limited to the temporary repair of leakage in the train “A” Component Cooling Water Heat Exchanger (EEG01A). In lieu of the IWA-4000 repair requirements, the licensee proposed an alternative applying provisions of IWA-4133, “Mechanical Clamping Devices used as Piping Pressure Boundary,” and Mandatory Appendix IX, “Mechanical Clamping Devices for Class 2 and 3 Piping Pressure Boundaries,” for installation of a temporary non-Code repair to control leakage from EEG01A.

The licensee requested authorization to use the proposed alternative pursuant to Title 10 of the *Code of Federal Regulations* (10 CFR), Part 50, paragraph 55a(a)(3)(ii), on the basis that complying with the specified requirement would result in hardship or unusual difficulty without a compensating increase in the level of quality and safety.

The U.S. Nuclear Regulatory Commission (NRC) staff has reviewed the subject request and concludes, as set forth in the enclosed safety evaluation, that the licensee has adequately addressed all of the regulatory requirements set forth in 10 CFR 50.55a(a)(3)(ii). Therefore, the staff authorizes use of the proposed alternative at Callaway Plant, Unit 1, until the end of the next refueling outage (i.e., Fuel Cycle 20), which is scheduled for October 2014.

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.

The NRC staff provided verbal authorization for relief request I3R-16 during a teleconference with your staff on March 25, 2014.

F. Diya

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If you have any questions, please contact Fred Lyon at 301-415-2296 or via e-mail at [fred.lyon@nrc.gov](mailto:fred.lyon@nrc.gov).

Sincerely,

A handwritten signature in black ink, appearing to read "E. R. Oesterle". The signature is fluid and cursive, with a large initial "E" and "R".

Eric R. Oesterle, Acting Chief  
Plant Licensing Branch IV-1  
Division of Operating Reactor Licensing  
Office of Nuclear Reactor Regulation

Docket No. 50-483

Enclosure:  
Safety Evaluation

cc w/encl: Distribution via Listserv



UNITED STATES  
NUCLEAR REGULATORY COMMISSION  
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SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

RELIEF REQUEST I3R-16 FOR TEMPORARY NON-CODE REPAIR OF THE

TRAIN "A" COMPONENT COOLING WATER HEAT EXCHANGER

UNION ELECTRIC COMPANY

CALLAWAY PLANT, UNIT 1

DOCKET NO. 50-483

1.0 INTRODUCTION

By letter dated March 19, 2014 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML14079A529), Union Electric Company (dba Ameren Missouri, the licensee) requested relief from certain American Society of Mechanical Engineers (ASME) *Boiler and Pressure Vessel Code* (Code) requirements for the Callaway Plant, Unit 1 (Callaway). The scope of the request is limited to the temporary repair of leakage in the train "A" component cooling water (CCW) heat exchanger (EEG01A). In lieu of the IWA-4000 requirements, the alternative will apply provisions of IWA-4133, "Mechanical Clamping Devices used as Piping Pressure Boundary," and Mandatory Appendix IX, "Mechanical Clamping Devices for Class 2 and 3 Piping Pressure Boundaries," for installation of a temporary non-Code repair to control leakage from EEG01A.

Although the licensee has already implemented the temporary non-Code repair to control leakage from the subject component prior to the issuance of this safety evaluation (SE), this SE is being issued to document the decision made by the U.S. Nuclear Regulatory Commission (NRC) staff to grant the licensee's request by verbal authorization on March 25, 2014 (ADAMS Accession No. ML14087A210).

2.0 REGULATORY EVALUATION

Pursuant to Title 10 of the *Code of Federal Regulations* (10 CFR) 50.55a(a)(3), alternatives to requirements may be authorized by the NRC if the licensee demonstrates that: (i) the proposed alternatives provide an acceptable level of quality and safety, or (ii) compliance with the specified requirements would result in hardship or unusual difficulty without a compensating increase in the level of quality and safety. The licensee submitted the subject relief request, pursuant to 10 CFR 50.55a(a)(3)(ii).

Enclosure

### 3.0 LICENSEE EVALUATION

#### 3.1 Component Affected

Train "A" Component Cooling Water Heat Exchanger (EEG01A) tube side manway access, an ASME Class 3 Component.

#### 3.2 ASME Code Requirements for which Relief is Requested

The inservice inspection (ISI) Code of record for Callaway Plant for the third ten-year ISI interval is the ASME Code, Section XI 1998 Edition, including 2000 Addenda.

Section C.12 of Chapter 0326 of the NRC Inspection Manual states, in part, that there is no generically approved alternative (non-Code repair) for temporary repair of flaws in a Class 3 vessel (such as EEG01A). The component must be repaired in accordance with the Code, or Code relief must be requested and approved from the NRC in order to apply a non-Code repair.

ASME Code, Section XI requires that repair/replacement activities on ASME Code Class components be performed in accordance with the rules found in Article IWA-4000, "Repair/Replacement Activities." IWA-4133, "Mechanical Clamping Devices used as Piping Pressure Boundary," allows mechanical clamping devices to be used as piping pressure boundary provided the requirements of Mandatory Appendix IX, "Mechanical Clamping Devices for Class 2 and 3 Piping Pressure Boundary," are met. Relief is requested to use IWA-4133 and to apply the provisions of ASME Code, Section XI, Mandatory Appendix IX for a temporary repair to the subject component, heat exchanger EEG01A.

#### 3.3 Duration of Relief Request

This relief request for Callaway is applicable to the end of the current fuel cycle, which is scheduled for October 2014.

#### 3.4 Reason for Request

On October 14, 2013, the licensee discovered a leak of essential service water (ESW) from the train "A" CCW heat exchanger EEG01A. The leak is due to a flaw from localized pitting and has been analyzed with ultrasonic examination. The bounding size of the flaw has been conservatively estimated to be a pit of a ½-inch diameter.

Given the conservative flaw size, the maximum calculated leak rate is 59.4 gallons per minute (gpm). An evaluation (Attachment A to the submittal) of the structural integrity of the subject component with a ½ inch diameter flaw was done according to ASME Code Case N-705, "Evaluation Criteria for Temporary Acceptance of Degradation in Moderate Energy Class 2 or 3 Vessels and Tanks" (accepted by the NRC and incorporated into Revision 16 of Regulatory Guide 1.147, "Inservice Inspection Code Case Acceptability, ASME Section XI, Division 1"). The evaluation has determined that the flaw responsible for the leakage is acceptable and that structural integrity of EEG01A will be maintained through the current fuel cycle without repair.

If the flaw were to grow larger than ½-inch diameter, the maximum calculated leak rate would be > 59.4 gallons per minute (gpm), which would reduce the inventory of the ultimate heat sink (UHS) over the 30-day ESW mission time. Compensatory actions have been taken by the licensee to assure the minimum UHS level is maintained above 75.5 percent full in order to provide sufficient inventory to compensate for existing ESW leakage plus the postulated 59.4 gpm loss and keep the UHS and ESW system operable. In an effort to provide additional margin to assure the minimum UHS level, a temporary mechanical clamping device is proposed, which would reduce leakage and would be able to be credited as a pressure boundary in the area of the flaw.

### 3.5 Licensee's Proposed Alternative to ASME Code IWA-4000

In its letter dated March 19, 2014, the licensee stated, in part, that:

A mechanical clamp will be installed over the leakage location and will act as a credited pressure boundary in the vicinity of the pinhole leak.... A detailed description of the mechanical clamping device and the supporting calculations are supplied in Attachment B [to the submittal].

Until a permanent repair is performed in accordance with IWA-4000 to restore [heat exchanger] EEG01A to its design condition, the following actions are also being performed to satisfy the ASME Code Case N-705 requirements for monitoring and examination of the flaw.

- Daily leakage monitoring is performed to assure the leakage remains within acceptable limits established in the Code Case N-705 evaluation. At present, there is no active leakage of ESW through the flaw. Following installation of the mechanical clamping device, this daily monitoring will also provide assurance that integrity of the credited pressure boundary is maintained.
- Ultrasonic examinations are performed quarterly to verify whether the degradation, including growth, continues to meet the acceptable limits established in the Code Case N-705 evaluation. The mechanical clamp pressure block has been designed to allow removal during these periodic examinations to facilitate measurement of the flaw.

### 3.6 Licensee's Basis for the Proposed Alternative

An ASME Code Repair/Replacement of the heat exchanger would require draining of ESW from the CCW heat exchanger, making one ESW train inoperable, and would also make one emergency diesel generator inoperable. This activity would therefore place the plant in Action statements for Technical Specifications 3.7.7, "Component Cooling Water System," 3.7.8, "Essential Service Water System," and 3.8.1, "AC Sources – Operating," each of which requires restoration of the inoperable train within 72 hours. The Code Repair/Replacement activity on the CCW heat exchanger could last longer than 72 hours and would therefore necessitate a unit shutdown. Cycling the plant to perform an ASME Code repair of heat exchanger EEG01A would create a hardship based on the potential risks associated with unit cycling and any

emergent equipment issues incurred during shutdown and startup evolutions, without a compensating increase in level of quality or safety.

#### 4.0 NRC STAFF EVALUATION

The NRC staff reviewed the submittal as a priority due to the operational issues for the unit. The licensee provided a detailed assessment of the structural integrity of the component according to ASME Code Case N-705 with the temporary repair and without the repair (leaving the assumed ½-inch diameter flaw in place). In both cases, the assessment demonstrated that the CCW heat exchanger (EEG01A) can continue to operate until the next refueling outage in October of 2014. Given the postulated gallons per minute ESW leak, a margin still exists between the worst-case condition and the requirements for ESW system operability.

During the coming summer months, the temperature of the ESW system will increase and without a repair, the margin for operability is reduced. In an effort to increase the margin of operability, the proposed alternative would install a temporary mechanical clamping device, which would eliminate the assumed leakage and would be able to be credited as a pressure boundary in the area of the leak. The design of the clamping device follows the requirements of IWA-4133. The licensee has used conservative assumptions regarding the flaw size, stress state, and potential for flaw growth until the next refueling outage, and determined that the postulated flaw would meet the structural margins required by the ASME Code Case N-705 under all normal, upset, emergency, and faulted conditions. Furthermore, the licensee has committed to daily visual inspection for leakage and additional quarterly ultrasonic inspections to demonstrate that the alternative still meets the Code Case N-705 requirements for monitoring and examination of the flaw (pit) that caused the leakage.

The NRC staff has completed its review of the information provided by the licensee and the requirements for use of ASME Code Case N-705. The staff concludes that requiring the licensee to make a permanent Code-required repair to the leaking heat exchanger EEG01A before the next refueling outage would create a hardship based on the potential risks associated with unit cycling and any emergent equipment issues incurred during shutdown and startup evolutions, without a compensating increase in level of quality or safety.

#### 5.0 CONCLUSION

Based on the discussion above, the NRC staff concludes that the alternative proposed in the Relief Request I3R-16, to perform a non-Code repair to the leak found in the train "A" CCW heat exchanger EEG01A is acceptable because compliance with the specified requirements would result in hardship or unusual difficulty without a compensating increase in the level of quality and safety. Therefore, pursuant to 10 CFR 50.55a(a)(3)(ii), the staff authorizes the proposed Relief Request I3R-16 for Callaway Plant until the end of Fuel Cycle 20, which is scheduled for October 2014.

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.

Principal Contributor: P. Purtscher, NRR/DE/EVIB

Date: September 4, 2014

F. Diya

- 2 -

If you have any questions, please contact Fred Lyon at 301-415-2296 or via e-mail at [fred.lyon@nrc.gov](mailto:fred.lyon@nrc.gov).

Sincerely,

*/RA/*

Eric R. Oesterle, Acting Chief  
Plant Licensing Branch IV-1  
Division of Operating Reactor Licensing  
Office of Nuclear Reactor Regulation

Docket No. 50-483

Enclosure:  
Safety Evaluation

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PPurtscher, NRR/DE/EVIB

**ADAMS Accession No.: ML14234A451**

\*memo dated August 21, 2014

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