

December 20, 2005

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 - RE: REQUEST FOR RELIEF FROM CODE
PUMP TESTING REQUIREMENTS FOR THIRD 10-YEAR INSERVICE
TESTING INTERVAL (TAC NOS. MC8173, MC8174, AND MC8175)

Dear Mr. Naslund:

By letter dated August 9, 2005 (ULNRC-05184), Union Electric Company (UEC) submitted relief requests PR-01 through PR-04 for pumps for the third 10-year inservice testing (IST) interval at the Callaway Plant, Unit 1 (Callaway). UEC proposed alternatives to the requirements in the American Society of Mechanical Engineers Operations and Maintenance (ASME OM) Code, 2001 Edition through 2003 Addenda, which is applicable for the third 10-year IST interval. In the letter dated December 15, 2005 (ULNRC-05236), UEC withdrew relief request PR-04.

Based on its review of relief requests PR-01 through PR-03, as discussed in the enclosed safety evaluation, the Nuclear Regulatory Commission staff concludes that the proposed alternatives to the ASME OM Code, 2001 Edition through 2003 Addenda, requirements for the residual heat removal, centrifugal charging, and boric acid transfer pumps in relief requests PR-01 through PR-03 provide an acceptable level of quality and safety. Based on this, pursuant to paragraph 50.55a(a)(3)(i) of Title 10 of the *Code of Federal Regulations*, relief requests PR-01 through PR-03 are authorized for the third 10-year IST interval at Callaway.

Sincerely,

/RA/

David Terao, 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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SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION
RELATED TO THE INSERVICE TESTING PROGRAM IN THE THIRD 10-YEAR INTERVAL

UNION ELECTRIC COMPANY

CALLAWAY PLANT, UNIT 1

DOCKET NO. 50-483

1.0 INTRODUCTION

By letter dated August 9, 2005, Union Electric Company (the licensee) submitted relief requests PR-01 through PR-04 associated with its third 10-year inservice testing (IST) program interval for pumps and valves for its Callaway Nuclear Plant, Unit 1 (Callaway). The licensee proposed alternatives to the requirements of the American Society of Mechanical Engineers Code for Operations and Maintenance of Nuclear Plants (ASME OM Code) for the third 10-year interval IST program at Callaway, which begins on December 19, 2005.

The evaluation of relief request PR-04 will be addressed in a future safety evaluation (SE).

2.0 REGULATORY EVALUATION

For the third 10-year interval for Callaway, Paragraph 50.55a of Title 10 of the *Code of Federal Regulations* (10 CFR) requires that IST of certain ASME Code Class 1, 2, and 3 pumps and valves be performed at 120-month (10-year) IST program intervals in accordance with the ASME OM Code and applicable addenda, except where alternatives have been authorized or relief has been requested by the licensee and granted by the Commission pursuant to paragraphs (a)(3)(i), (a)(3)(ii), or (f)(6)(i) of 10 CFR 50.55a. In proposing alternatives or requesting relief, the licensee must demonstrate that: (1) the proposed alternatives provide an acceptable level of quality and safety; (2) compliance would result in hardship or unusual difficulty without a compensating increase in the level of quality and safety; or (3) conformance is impractical for the facility. Section 50.55a permits the Commission to authorize alternatives and to grant relief from ASME Code requirements upon making necessary findings. The Nuclear Regulatory Commission (NRC) guidance contained in Generic Letter (GL) 89-04, "Guidance on Developing Acceptable Inservice Testing Programs," provides alternatives to Code requirements which are acceptable. Further guidance is given in GL 89-04, Supplement 1, and NUREG-1482, Revision 1, "Guidelines for Inservice Testing at Nuclear Power Plants."

The third 10-year IST interval for Callaway starts on December 19, 2005. The third 10-year IST programs were developed to meet the requirements of the 2001 Edition through 2003 Addenda of the ASME OM Code, pursuant to 10 CFR 50.55a(f)(4)(ii).

3.0 TECHNICAL EVALUATION

This technical evaluation addresses relief requests PR-01 through PR-03.

3.1 Relief Request PR-01

3.1.1 Code Requirement:

Paragraph ISTB-3510(b)(1) of the ASME OM Code, 2001 Edition through 2003 Addenda, requires that the full-scale range of each analog instrument shall not be greater than three times the reference value.

3.1.2 Component Identification:

The components affected by this relief request are the residual heat removal (RHR) pumps as identified in the following Table 1:

TABLE 1

Callaway Plant	Pump Number	Description	Code Class	OM Code Category
Single Unit	PEJ01A	Residual Heat Removal Pump A	2	Group A
	PEJ01B	Residual Heat Removal Pump B	2	Group A

3.1.3 Specific Relief Requested:

In its application, the licensee requested relief from the Code requirements of paragraph ISTB-3510(b)(1) for the RHR pumps listed in the above Table 1. Specifically, this relief is requested for Group A testing for RHR pumps.

3.1.4 Basis for Relief:

The range of the installed discharge pressure gauge for the RHR pumps is 0 - 700 psig. Because the reference values for pump discharge pressure during IST are between 200 psig and 300 psig, the instrument range exceeds the requirement of ISTB-3510(b)(1). Pursuant to 10 CFR 50.55a, "Codes and Standards," paragraph (a)(3), the licensee requested relief from the requirement of ASME OM Code ISTB-3510(b)(1) on the basis that the proposed alternative would provide an acceptable level of quality and safety.

3.1.5 Proposed Alternative Testing and Basis

In its application, the licensee addressed its alternative to the IST requirements as follows:

Pump discharge pressure indication is used along with pump suction pressure indication to determine pump differential pressure. Reference values for the RHR pumps during Inservice Testing are between 200 psig and 300 psig. Based on

ISTB-3510(b)(1), this would require as a maximum, a gauge with a range of 0 to 600 psig (3 X 200 psig) to bound the lowest reference value for pressure.

Applying the accuracy requirement of $\pm 2\%$ for the Group A test, the resulting inaccuracies due to pressure effects would be ± 12.0 psig (0.02×600 psig).

As an alternative, for the Group A test, Callaway Nuclear Plant will use the installed discharge pressure gauge (0 to 700 psig) calibrated to less than $\pm 2\%$ such that the inaccuracies due to pressure will be less than that required by the Code (± 12.0 psig). Use of the installed pressure gauge calibrated to less [than] the $\pm 2\%$ is equivalent in terms of measuring differential pressure.

Using the provisions of this relief request as an alternative to the specific requirements of ISTB-3510(b)(1) identified above will provide adequate indication of pump performance and continue to provide an acceptable level of quality and safety.

The licensee stated that the proposed alternative will be utilized for the entire third 120-month IST interval at Callaway.

3.1.6 Evaluation of Pump Relief Request No. PR-01:

The licensee requested relief from the ASME OM Code instrumentation requirements of paragraph ISTB-3510(b)(1) for pressure gauges which are used to measure discharge pressure of the RHR pumps. The Code paragraph ISTB-3510(b)(1) requires that the full-range of each analog instrument be no greater than three times the reference value. The licensee proposes to use instrumentation that does not meet these Code requirements.

The installed discharge pressure gauge for the RHR pumps has a range of 0-700 psig and an accuracy of ± 2.0 percent. The typical value for the discharge pressure of the RHR pumps during testing is 200-300 psig. Based on ISTB-3510(b)(1), this would require, as a maximum, a gauge with a range of 0 to 600 psig (3 X 200 psig) to bound the lowest reference value for pressure. Applying the accuracy requirement of ± 2 percent for the Group A test, the resulting inaccuracies due to pressure effects would be ± 12.0 psig (0.02×600 psig). As an alternative, for the Group A test, the licensee will use the installed discharge pressure gauge (0 to 700 psig) calibrated to less than ± 2 percent such that the inaccuracies due to pressure will be less than that required by the Code (± 12.0 psig).

The use of the existing gauge is supported by NUREG-1482, Revision 1, Paragraphs 5.5 and 5.5.1, which state that the NRC staff may grant relief when the combination of range and accuracy yields a reading at least equivalent to the reading achieved from instruments that meet the Code requirements. The discharge pressure gauge instruments of the RHR pumps yield readings at least equivalent to the readings achieved from instruments that meet Code requirements and, thus, provide an acceptable level of quality and safety. This request for relief applies only to Group A testing of the RHR pumps for the third 120-month IST interval. It does not apply to digital instrumentation.

3.1.7 Conclusion

Based on its review of relief request PR-01, as discussed above, the NRC staff concludes that the proposed alternative to the ASME OM Code requirements of paragraph ISTB-3510(b)(1) for the RHR pumps may be authorized for the third 120-month IST interval pursuant to 10 CFR 50.55a(a)(3)(i) on the basis that the proposed alternative provides an acceptable level of quality and safety.

3.2 Relief Request PR-02

3.2.1 Code Requirement:

Paragraph ISTB-3510(b)(1) of the ASME OM Code, 2001 Edition through 2003 Addenda, requires that the full-scale range of each analog instrument shall not be greater than three times the reference value.

3.2.2 Component Identification:

The components affected by this relief request are the centrifugal charging pumps as identified in the following Table 2.

Table 2

Callaway Plant	Pump Number	Description	Code Class	OM Code Category
Single Unit	PBG05A	Centrifugal Charging Pump A	2	Group B
	PBG05B	Centrifugal Charging Pump B	2	Group B

3.2.3 Specific Relief Requested:

The licensee requested relief from the ASME OM Code requirements of paragraph ISTB-3510(b)(1) for the centrifugal charging pumps listed in the above Table 2. Specifically, this relief is requested for Group B testing for centrifugal charging pumps.

3.2.4 Basis for Relief:

The range of the installed suction pressure gauge for the centrifugal charging pumps is 0 - 150 psig. Because the reference values for discharge pressure during IST are between 30 psig and 40 psig, the instrument range exceeds the requirement of ISTB-3510(b)(1). Pursuant to 10 CFR 50.55a, "Codes and Standards," paragraph (a)(3), the licensee requested relief from the requirement of ASME OM Code ISTB-3510(b)(1). The basis for relief as stated by the licensee is that the proposed alternative would provide an acceptable level of quality and safety.

3.2.5 Proposed Alternative Testing and Basis

In its application, the licensee addressed its alternative to the IST requirements as follows:

Pump suction pressure indication is used along with pump discharge pressure indication to determine pump differential pressure. Reference values for the centrifugal charging pumps during Inservice Testing are between 30 psig and 40 psig. Based on ISTB-3510(b)(1), this would require as a maximum, a gauge with a range of 0 to 90 psig (3 X 30 psig) to bound the lowest reference value for pressure. Applying the accuracy requirement of $\pm 2\%$ for the quarterly Group B pump test, the resulting inaccuracies due to pressure effects would be ± 1.8 psig (0.02 X 90 psig).

As an alternative, for the Group B quarterly test, Callaway Nuclear Plant will use the installed suction pressure gauge (0 to 150 psig) calibrated to less than $\pm 2\%$ such that the inaccuracies due to pressure will be less than that required by the Code (± 1.8 psig). Use of the installed pressure gauge calibrated to less [than] $\pm 2\%$ is equivalent in terms of measuring differential pressure.

Using the provisions of this relief request as an alternative to the specific requirement[s] of ISB-3510(b)(1) identified above will provide adequate indication of pump performance and continue to provide an acceptable level of quality and safety.

The licensee stated that the proposed alternative will be utilized for the entire third 120-month IST interval at Callaway.

3.2.6 Evaluation of Pump Relief Request No. PR-02:

The licensee requested relief from the ASME OM Code instrumentation requirements of paragraph ISTB- 3510(b)(1) for pressure gauges which are used to measure suction pressure of the centrifugal charging pumps. The Code paragraph ISTB-3510(b)(1) requires that the full-range of each analog instrument be no greater than three times the reference value. The licensee proposes to use instrumentation which does not meet these Code requirements.

The installed suction pressure gauge for the centrifugal charging pumps have a range of 0 - 150 psig and an accuracy of ± 2.0 percent. The typical value for the suction pressure of the centrifugal charging pumps during testing is 30-40 psig. Based on ISTB-3510(b)(1), this would require as a maximum, a gauge with a range of 0 to 90 psig (3 X 30 psig) to bound the lowest reference value for pressure. Applying the accuracy requirement of ± 2 percent for the quarterly Group B test, the resulting inaccuracies due to pressure effects would be ± 1.8 psig (0.02 X 90 psig). As an alternative, for the quarterly Group B test, the licensee will use the installed suction pressure gauge (0 to 150 psig) calibrated to less than ± 2 percent such that the inaccuracies due to pressure will be less than that required by the Code (± 1.8 psig).

The use of the existing gauge is supported by NUREG-1482, Revision 1, Paragraphs 5.5 and 5.5.1, which state that the staff may grant relief when the combination of range and accuracy yields a reading at least equivalent to the reading achieved from instruments that meet the Code requirements. The suction pressure gauge instruments of the centrifugal charging pumps

yield readings at least equivalent to the readings achieved from instruments that meet Code requirements, and thus provide an acceptable level of quality and safety. This request for relief applies only to Group B testing of the centrifugal charging pumps for the third 120-month IST interval. This request does not apply to digital instrumentation.

3.2.7 Conclusion

Based on its review of relief request PR-02, as discussed above, the NRC staff concludes that the proposed alternative to the ASME OM Code requirements of paragraph ISTB-3510(b)(1) for the centrifugal charging pumps may be authorized for the third 120-month IST interval pursuant to 10 CFR 50.55a(a)(3)(i) on the basis that the proposed alternative provides an acceptable level of quality and safety.

3.3 Relief Request PR-03

3.3.1 Code Requirement:

Paragraph ISTB-5121(c) of the ASME OM Code, 2001 Edition through 2003 Addenda, requires that, where it is not practical to vary system resistance, flow rate and pressure shall be determined and compared to their respective reference values.

3.3.2 Component Identification:

The components affected by this relief request are the boric acid transfer pumps as identified in the following Table 3:

Table 3

Callaway Plant	Pump Number	Description	Code Class	OM Code Category
Single Unit	PBG02A	Boric Acid Transfer Pump A	3	Group A
	PBG02B	Boric Acid Transfer Pump B	3	Group A

3.3.3 Specific Relief Requested:

The licensee requested relief from the Code requirements of paragraph ISTB-5121(c) for the boric acid transfer pumps listed in the above Table 3. Specifically, this relief is requested for Group A testing for boric acid transfer pumps.

3.3.4 Basis for Relief:

The normal test loop for the subject pumps consists of fixed resistance flow paths to limit flow; however, flow measuring instruments are not installed. The licensee stated that, because the system resistance is fixed and can be assumed to be constant, pump degradation can be detected by comparing successive measurements of pump differential pressure. Pursuant to 10 CFR 50.55a, "Codes and Standards," paragraph (a)(3), relief is requested from the

requirement of ASME OM Code ISTB-5121. The basis for relief as stated by the licensee is that the proposed alternative would provide an acceptable level of quality and safety.

3.3.5 Proposed Alternative Testing and Basis

In its application, the licensee addressed its alternative to the IST requirements as follows:

An alternate test circuit is available in which flow rate may be measured, however this flow path requires injection of highly concentrated boric acid solution into the reactor coolant system. During the quarterly Group A test at normal power operations, this test is highly impractical since severe power level fluctuations would be created which would lead to a potential transient and subsequent trip of the reactor. Performing this test at cold shutdown intervals would also result in excessive boration of the reactor coolant system resulting in potential difficulties and delays in restarting the plant.

As an alternative to measuring differential pressure and flow during the group A quarterly test, only the differential pressure will be measured and compared to its reference value. Additionally, vibration measurements are also recorded and compared to their reference values. The Group A test will be performed using the fixed-resistance mini-flow path shown on Attachment 1 [to relief request PR-03 in the third attachment to the licensee's application]. The reference value is approximately 112 psig at a flow rate of 15 gpm. At this flow rate, the point on the pump curve is relatively flat such that a $\pm 25\%$ change in flow would result in less than 1 % change in differential pressure. Based on this, it is not necessary to install additional instrumentation to ensure flow is measured and compared to its reference value.

During the comprehensive inservice test when flow may be measured, full-spectrum vibration analysis will be performed which is beyond vibration analysis required by the Code. The vibration measurements will be recorded and compared to their reference values. Thus, when performing the comprehensive pump test, all required parameters will be measured and compared to their reference values.

The performance of full spectrum analysis, in addition to continued quarterly and comprehensive testing, will ensure that an accurate assessment of pump health and operational readiness is determined. This alternative provides an acceptable level of quality and safety.

The licensee stated that the proposed alternative will be utilized for the entire third 120-month IST interval at Callaway.

3.3.6 Evaluation of Pump Relief Request No. PR-03:

The licensee requested relief from the ASME OM Code Group A pump test requirements of paragraph ISTB-5121(c) for flow rate and pressure measurement of the boric acid transfer pumps. The Code paragraph ISTB-5121(c) requires that, where it is not practical to vary system resistance, flow rate and pressure shall be determined and compared to their respective reference values. The licensee's proposal to measure only the differential pressure, does not meet these Code requirements.

Pump differential pressure and flow rate are two parameters that are measured and evaluated together to determine pump hydraulic performance. However, the minimum flow return lines at Callaway used for quarterly Group A testing of the boric acid transfer pumps are of fixed resistance and do not provide the ability to vary flow rate and are not instrumented for flow rate. As an alternative to measuring differential pressure and flow during the Group A test, the licensee proposed that only the differential pressure will be measured and compared to its reference value. The differential pressure reference value is approximately 112 psig at a flow rate of 15 gpm. At this flow rate, the point on the pump curve is relatively flat such that a ± 25 percent change in flow would result in less than 1 percent change in differential pressure. Based on the relationship of flow and differential pressure on the pump curve at the reference value, installation of instrumentation to measure flow rate is not required during quarterly Group A testing. Measurement of the boric acid pump differential pressure and comparing it to the reference value along with vibration measurement during Group A testing will provide assessment of the pump performance.

During Group A testing, vibration measurements are also recorded and compared to their reference values as required by the Code. Also, during the biennial comprehensive inservice test, all required parameters are measured and compared to their reference values. In addition, a full-spectrum vibration analysis will be performed during the comprehensive test which is beyond vibration analysis required by the Code.

The NRC staff considers that the licensee's request to test the boric acid transfer pumps by measuring the differential pressure and comparing it to the reference value, as discussed above, to provide an acceptable level of quality and safety. This request for relief applies only to Group A testing of the boric acid transfer pumps for the third 120-month IST interval.

3.3.7 Conclusion

Based on its review of relief request PR-03, as discussed above, the NRC staff concludes that the proposed alternative to the ASME OM Code requirements of paragraph ISTB-5121(c) for the boric acid transfer pumps may be authorized for the third 120-month IST interval pursuant to 10 CFR 50.55a(a)(3)(i) on the basis that the proposed alternative provides an acceptable level of quality and safety.

4.0 CONCLUSION

A summary of the NRC staff's review of the licensee's relief requests PR-01 through PR-03, as discussed above in Sections 3.1 through 3.3 of this SE, respectively, is given in the table on the next page.

Based on its review of relief requests PR-01 through PR-03, the NRC staff concludes that the proposed alternatives to the ASME OM Code, 2001 Edition through 2003 Addenda, requirements for the RHR, centrifugal charging, and boric acid transfer pumps may be authorized for the third 120-month IST interval pursuant to 10 CFR 50.55a(a)(3)(i) on the basis that the proposed alternatives provides an acceptable level of quality and safety.

Principal Contributor: James Strnisha

Date:

**Summary of Relief Requests
Callaway Nuclear Plant
Third 10-Year Interval Inservice Testing Program**

Relief Request No.	10 CFR 50.55a; ASME OM Code 2001 Edition through 2003 Addenda	Proposed Alternative	NRC Action	Remarks
PR-01	ISTB-3510(b)(1)	Use of existing gauges and accuracy, as supported by NUREG-1482, Section 5.5.1	authorized	10 CFR 50.55a(a)(3)(i)
PR-02	ISTB-3510(b)(1)	Use of existing gauges and accuracy, as supported by NUREG-1482, Section 5.5.1	authorized	10 CFR 50.55a(a)(3)(i)
PR-03	ISTB-5121(c)	Measure differential pressure and not flow during fix resistance Group A test	authorized	10 CFR 50.55a(a)(3)(i)

Callaway Plant, Unit 1

cc:

Professional Nuclear Consulting, Inc.
19041 Raines Drive
Derwood, MD 20855

John O'Neill, Esq.
Shaw, Pittman, Potts & Trowbridge
2300 N. Street, N.W.
Washington, D.C. 20037

Mr. Mark A. Reidmeyer, Regional
Regulatory Affairs Supervisor
Regulatory Affairs
AmerenUE
P.O. Box 620
Fulton, MO 65251

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

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

Missouri Public Service Commission
Governor Office Building
200 Madison Street
Jefferson City, MO 65102-0360

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

Mr. H. Floyd Gilzow
Deputy Director for Policy
Missouri Department of Natural Resources
1101 Riverside Drive
Fourth Floor East
Jefferson City, MO 65101

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

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

Mr. Lee Fritz, Presiding Commissioner
Callaway County Court House
10 East Fifth Street
Fulton, MO 65151

Mr. David E. Shafer
Superintendent, Licensing
Regulatory Affairs
AmerenUE
P.O. Box 66149, MC 470
St. Louis, MO 63166-6149

Mr. Keith D. Young
Manager, Regulatory Affairs
AmerenUE
P.O. Box 620
Fulton, MO 65251

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

Certrec Corporation
4200 South Hulen, Suite 630
Fort Worth, TX 76109

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