

June 22, 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 - RELIEF REQUESTS ISI-24, ISI-25, AND ISI-26
OF THE SECOND 10-YEAR INSERVICE INSPECTION (ISI) INTERVAL (TAC
NOS. MC4435 AND MC4436)

Dear Mr. Naslund:

By letter dated September 3, 2004, with the supplement letter dated February 11, 2005, Union Electric Company (AmerenUE) requested Nuclear Regulatory Commission (NRC) staff review and approval of relief requests ISI-24, ISI-25, and ISI-26 for the second 10-year inservice inspection interval at the Callaway Plant. Relief Requests ISI-24 and ISI-25 address the inability to attain complete examination coverage for one weld in the chemical and volume control system and one weld in the feedwater system, respectively. Request ISI-26 pertains to the implementation of American Society of Mechanical Engineers (ASME) Section XI, Appendix VIII requirements for two welds in the chemical and volume control system.

Based on the information submitted and as discussed in the enclosed safety evaluation, the NRC staff has determined that compliance with the 10 CFR 50.55a requirements is impractical for the subject welds, the licensee has conducted the examinations to the extent practical, and the proposed alternative provides reasonable assurance of structural integrity of the welds. Therefore, the NRC staff concludes that the proposed alternatives in Relief Requests ISI-24, ISI-25, and ISI-26 are 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. Based on this conclusion, the NRC staff further concludes that Relief Requests ISI-24, ISI-25, and ISI-26 are authorized pursuant to Section 50.55a(g)(6)(i) of Title 10 of the *Code of Federal Regulations* 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/

Daniel S. Collins, Chief, Section 2
Project Directorate IV
Division of Licensing Project Management
Office of Nuclear Reactor Regulation

Docket No. 50-483

Enclosure: Safety Evaluation

cc w/encl: See next page

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Based on the information submitted and as discussed in the enclosed safety evaluation, the NRC staff has determined that compliance with the 10 CFR 50.55a requirements is impractical for the subject welds, the licensee has conducted the examinations to the extent practical, and the proposed alternative provides reasonable assurance of structural integrity of the welds. Therefore, the NRC staff concludes that the proposed alternatives in Relief Requests ISI-24, ISI-25, and ISI-26 are 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. Based on this conclusion, the NRC staff further concludes that Relief Requests ISI-24, ISI-25, and ISI-26 are authorized pursuant to Section 50.55a(g)(6)(i) of Title 10 of the *Code of Federal Regulations* 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.

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NRR-028

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SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

RELIEF REQUESTS ISI-24, ISI-25, AND ISI-26

FOR THE SECOND TEN-YEAR INSERVICE INSPECTION INTERVAL

UNION ELECTRIC COMPANY

CALLAWAY PLANT, UNIT 1

DOCKET NO. 50-483

1.0 INTRODUCTION

By letter dated September 3, 2004, as supplemented by letter dated February 11, 2005, Union Electric Company (the licensee) requested relief from the Nuclear Regulatory Commission (NRC) from certain requirements of the American Society of Mechanical Engineers Boiler and Pressure Vessel Code (ASME Code), Section XI, pertaining to nondestructive examinations during the second 10-year inservice inspection (ISI) interval at the Callaway Plant, Unit 1 (Callaway). Of the three relief requests submitted by the licensee, Relief Requests ISI-24 and ISI-25 address the inability of the licensee to attain complete examination coverage for one weld in the chemical and volume control system and one weld in the feedwater system, respectively. Request ISI-26 pertains to the implementation by the licensee of ASME Code, Section XI, Appendix VIII requirements for two welds in the chemical and volume control system.

2.0 REGULATORY EVALUATION

The ISI of the ASME Code Class 1, Class 2, and Class 3 components is performed in accordance with the ASME Code, Section XI, "Rules for Inservice Inspection of Nuclear Power Plant Components," and applicable edition and addenda as required by Section 50.55a(g) of Title 10 of the *Code of Federal Regulations* (10 CFR) except where specific relief has been granted by the Commission pursuant to 10 CFR 50.55a(g)(6)(i). Paragraph 10 CFR 50.55a(a)(3) states in part that alternatives to the requirements of paragraph (g) may be used, when authorized by the NRC, if the applicant demonstrates that: (i) the proposed alternatives would 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.

Pursuant to 10 CFR 50.55a(g)(4), ASME Code Class 1, 2, and 3 components (including supports) will meet the requirements, except the design and access provisions and the pre-service 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 inservice examination 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) twelve months prior to the start of the 120-month interval, subject to the limitations and modifications listed therein. The ISI ASME Code of record for Callaway's second 10-year ISI interval, which is scheduled to end on December 18, 2005, is the ASME Code Section XI, 1989 edition.

3.0 RELIEF REQUEST ISI-24

3.1 ASME Code Components Affected

The component affected is weld 2-PBG05A-SUP-4 which is located on support lug No. 4 of centrifugal charging pump "A" of the chemical and volume control system. This component is part of Examination Category C-C, Item No. C3.30, in subarticle IWC-2500 of the ASME Code, Section XI.

3.2 Applicable Code Edition and Addenda

The applicable code for the second 10-year ISI interval is ASME Code Section XI - 1989 Edition.

3.3 Applicable Code Requirement

The ASME Code, Section XI requires a 100-percent surface examination coverage for components in Examination Category C-C, Item No. C3.30, Figure IWC-2500-5.

3.4 Licensee's Proposed Alternative and Basis for Use

The licensee stated that the pump pedestal and the pump discharge flange prohibit complete access to weld 2-PBG05A-SUP-4. The right side of the weld butts up against the pump discharge flange face, and the gap between the pump and the pedestal does not allow room to examine the bottom portion of the weld. The licensee stated that 100 percent surface coverage of this weld is not obtainable without disassembling the pump.

The licensee proposed to substitute weld 2-PBGO5A-SUP-3 for weld 2-PBG05A-SUP-4 in the ISI program plan's list of welds scheduled for examination. Weld 2-PBGO5A-SUP-3 is on the same pump but is currently not scheduled for examination. The licensee achieved 69 percent surface coverage on weld 2-PBG05A-SUP-4 and 100 percent surface coverage on weld 2-PBG05A-SUP-3 during the Refueling Outage 12 inspection in the fall 2002 refueling outage. The licensee did not find any recordable indications in either examination. These welds have not been examined before as a part of the ISI program plan since they were added during the update of the second interval ISI program plan.

3.5 Duration of Proposed Alternative

The licensee requested that the proposed alternative to be applicable for the remainder of the second 10-year interval which is scheduled to end on December 18, 2005.

3.6 NRC Staff Evaluation

The NRC staff requested that the licensee provide additional information on the examination history and coverage of welds 2-PBG05A-SUP-3 and 2-PBG05A-SUP-4. In its February 11, 2005, letter, the licensee presented photographs of both welds with respect to the pump. Both welds joined the support lugs to the pump shell. The pump is supported by lugs resting on support pedestals. Weld 2-PG05A-SUP-3 is located on the smaller (inlet) end of the "A" centrifugal charging pump so that almost 3 inches of clearance is available below the support lug, thus allowing 100 percent examination coverage. Weld 2-PG05A-SUP-4 is located on the larger (discharge) end of the pump, but the photographs showed that weld 2-PBG05A-SUP-4 is obstructed by a combination of the pump support pedestal, larger diameter shell, and discharge flange. There is inadequate room below the lug to achieve a 100 percent surface coverage on weld 2-PBG05A-SUP-4.

The licensee stated that to achieve full coverage of weld 2-PG05A-SUP-4, the "A" centrifugal charging pump would have to be disassembled and removed from its pedestal. This would be a major evolution requiring personnel protection, draining the pump, uncoupling the pump from the motor, and removal and disassembly of the pump. Following the examination, remounting the pump would require re-balancing as well as re-assembly, re-coupling, filling and venting and clearing of personnel protection.

The required Code inspection for components under Examination Category C-C, including Item number C3.30 (Integrally welded attachments to subject pumps) is a surface examination. However, the NRC staff has approved Relief Request ISI-06 at Callaway that conditionally allows use of Code Case N-509. This Code Case, as conditionally allowed by NRC Letter dated December 20, 1995, "Inservice Inspection Program, Second 10-Year Interval - Callaway Plant, Unit 1 (TAC No. M90859)," modifies the required inspection percentages (10 percent versus 100 percent of the welded lugs), but it does not modify the required surface examination. Of the eight support welds on pumps PBG05A and PBG05B, only weld 2-PG05A-SUP-4 had been selected for examination in accordance with the 10-percent examination selection requirements of Code Case N-509. That is, weld 2-PG05A-SUP-4 was only chosen to meet a percentage requirement and not due to any noted susceptibility to failure.

The NRC staff finds that the licensee has shown sufficient evidence of an existing obstruction to examining weld 2-PG05A-SUP-4. The NRC staff finds that it is acceptable that the licensee performs examination on weld 2-PG05A-SUP-3 in lieu of weld 2-PG05A-SUP-4 because (1) 100-percent examination coverage will be achieved on weld 2-PG05A-SUP-3 whereas the maximum coverage for weld 2-PG05A-SUP-4 is only 69 percent; and (2) weld 2-PG05A-SUP-3 is similar to weld 2-PG05A-SUP-4 in terms of material composition and welding procedures; therefore the examination of weld 2-PG05A-SUP-3 would be the same as the examination of weld 2-PG05A-SUP-4 in terms of monitoring degradation in that weld population. Based on this, the NRC staff concludes that the proposed alternative in Relief Request ISI-24 provides an acceptable level of quality and safety.

3.7 Conclusion

On the basis of the information submitted, the NRC staff finds that a 100-percent surface examination on weld 2-PG05A-SUP-4 as required by the Code would be a considerable burden on the licensee. As a result, the NRC staff has determined that compliance with the Code examination coverage requirements is impractical for weld 2-PG05A-SUP-4. The NRC staff

concludes that the licensee may elect to examine weld 2-PG05A-SUP-3 in lieu of weld 2-PG05A-SUP-4 because the proposed alternative provides reasonable assurance of structural integrity of the welds. Based on this, the NRC staff has determined that this grant 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 and, therefore, Relief Request ISI-24 is authorized pursuant to 10 CFR 50.55a(g)(6)(i) 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.

4.0 RELIEF REQUEST ISI-25

4.1 ASME Code Components Affected

The component affected is weld 2-AE-04-F043 of 14-inch by 3-inch weldolet to a valve of the feedwater system. The weld material is carbon steel and is part of Examination Category C-F-2, Item No. NBZ EXAMS - 1, in subarticle IWC-2500 of the ASME Code, Section XI.

4.2 Applicable Code Edition and Addenda

The applicable code for the second 10-year inspection interval is ASME Code Section XI - 1989 Edition, Appendix VIII to Section XI, the 1995 Edition with the 1996 Addenda.

4.3 Applicable Code Requirement

The ASME Code requires a 100-percent volumetric examination coverage for components under Examination Category C-F-2, Item No. NBZ EXAMS - 1, Figure IWC-2500-7.

4.4 Licensee's Proposed Alternative and Basis for Use

The licensee stated that the configuration of the piping limits the coverage area of the axial ultrasonic scan of a volumetric examination. The pipe on either side of the weldolet tapers down to a flat weld face. The transducer is able to travel from the pipe to the weld and along the surface of the weld, but cannot travel over the interface between the weld and the pipe without transducer liftoff. The angle of the pipe face on the valve side of the weld is too steep to allow a scan from that direction. The licensee obtained 100-percent coverage for the parallel scan in both clockwise and counter-clockwise directions; however, the total coverage is 67 percent of the weld volume. The licensee stated that 100-percent coverage of this weld is not possible without a redesign of the valve and pipe configuration.

The licensee is not proposing any alternative for the subject weld. The licensee stated that, because no indications were detected, the weld integrity has been assured and it is impractical to achieve any additional weld coverage at this time.

4.5 Duration of Proposed Alternative

The licensee requested that the proposed alternative to be applicable for the remainder of the second 10-year interval which is scheduled to end on December 18, 2005.

4.6 NRC Staff Evaluation

The NRC staff requested the licensee to provide information on the examination history and coverage on weld 2-AE-04-F043. In its February 11, 2005, letter, the licensee responded that, in October 1983, the pre-service ultrasonic examination of weld 2-AE-04-F043 was performed without complete coverage due to its complex configuration and that the required coverage was not obtained at the time. In April 1989, the licensee performed a "best effort" ultrasonic examination in the first inspection interval without a complete examination and without estimating percent coverage. In fall 2002, the licensee performed an ultrasonic examination based on available techniques and a best effort, including the use of a 70-degree and 45-degree axial ultrasonic scan to achieve the most coverage possible. The licensee estimated the volumetric coverage was 67 percent.

The licensee stated that a surface examination is not required by the ASME Code, Section XI and, in addition, the subject examination is not required by ASME Code, Section XI. The examination is a No-Break-Zone (NBZ) examination and is an augmented requirement to the Callaway ISI program plan. The licensee stated that it has historically treated augmented examination requirements as though they were ASME Code requirements in examination procedures, personnel qualifications, and coverage. Therefore, when it achieved what it considered less than essentially 100-percent coverage during the examination, the licensee decided to submit a relief request in accordance with 10 CFR 50.55a(g)(5)(iii).

The licensee's interpretation of the NBZ requirements (also referred to in the industry as Break Exclusion Region, or BER) was that 100 percent of the welds within that zone had to be examined. The licensee stated that because 100 percent of the welds were examined, there are no alternative sites to examine. Following Refueling Outage 12, the licensee performed a risk-informed BER (RI-BER) evaluation in accordance with EPRI Topical Report (TR) 1006937, Revision 0-A, "Extension of the EPRI [Electrical Power Research Institute] Risk-Informed Inservice Inspection (RI-ISI) Methodology to Break Exclusion Region (BER) Programs," August 2002. That evaluation determined that no degradation mechanism existed for this weld.

The NRC staff notes that inspection requirements for welds in the BER are covered in NRC's Standard Review Plan 3.6.2. Branch Technical Position MEB 3-1 attached to Standard Review Plan 3.6.2 states that breaks and cracks need not be postulated in break exclusion zone piping provided they meet certain design and inspection criteria. The inspection criterion stipulates that "A 100% volumetric inservice examination of all pipe welds should be conducted during each inspection interval as defined in IWA-2400, ASME Code, Section XI."

Based on the above, the NRC staff finds that the licensee examined weld 2-AE-04-F043 to the extent practical and achieved a volumetric coverage of about 67 percent. Based on the coverage obtained, the licensee's examination should have detected any significant degradation, if present, and provides reasonable assurance of structural integrity of the weld.

4.7 Conclusion

On the basis of information provided, the NRC staff concludes that in order to examine weld

2-AE-04-F043 in accordance with the ASME Code requirements, the weld and piping would have to be redesigned and modified resulting in a considerable burden on the licensee. As a result, the NRC staff has determined that compliance with the ASME Code requirements of 100-percent volumetric examination coverage is impractical for weld 2-AE-04-F043. The licensee has conducted these examinations to the extent practical. The NRC staff, therefore, concludes that the proposed alternative provides reasonable assurance of structural integrity of the weld. Based on this, the NRC staff has determined that this grant 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 and, therefore, Relief Request ISI-25 is granted pursuant to 10 CFR 50.55a(g)(6)(i) 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.

5.0 RELIEF REQUEST ISI-26

5.1 ASME Code Components Affected

The components affected are weld 2-BG-22-F021 on the 3-inch pipe-to-valve and weld 2-BG-22-F022 on the valve to 3-inch pipe, in the chemical and volume control system.

5.2 Applicable Code Edition and Addenda

The applicable code for the second 10-year ISI interval is ASME Code Section XI - 1989 Edition, Appendix VIII to Section XI, the 1995 edition with the 1996 Addenda. Both welds are covered under ASME Code, Section XI, Examination Category C-F-1. These are austenitic stainless welds limited to single-side access and are subject to ultrasonic examination in accordance with Supplement 2 of Appendix VIII to the 1995 Edition with 1996 Addenda of ASME Code, Section XI.

5.3 Applicable Code Requirement

As stated in the licensee's application, paragraph 10 CFR 50.55a(b)(2)(xv)(A) requires the following examination coverage when applying Supplement 2 to Appendix VIII of ASME Code, Section XI:

- (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
- (2) Where examination from both sides is not possible, full coverage credit may be claimed from a single side for ferritic welds. Where examination from both sides is not possible on austenitic welds, full coverage credit from a single side may be claimed only after completing a successful single-sided Appendix VIII demonstration using flaws on the opposite side of the weld

Paragraph 10 CFR 50.55a(b)(2)(xvi)(B) requires that examinations from one side of a ferritic or stainless steel pipe weld be conducted with equipment, procedures, and personnel that have demonstrated proficiency with single-side examinations. To demonstrate equivalency to two-side examinations, the demonstration must be performed to the requirements of Appendix VIII as modified by this paragraph and 10 CFR 50.55a(b)(2)(xv)(A).

5.4 Licensee's Proposed Alternative and Basis for Use

The licensee stated that 10 CFR 50.55a(b)(2)(xv)(A) requires that if access is available, the weld shall be ultrasonically scanned in each of the four directions (parallel and perpendicular to the weld). Full coverage credit may be taken for single side examinations on ferritic piping (when examination from both sides is not possible). However, for full coverage credit from a single side for austenitic piping, a procedure must be qualified with flaws on the inaccessible side of the weld. The licensee stated that there are currently no qualified single side examination procedures that demonstrate equivalency to two-side examination procedures on austenitic piping welds. Current technology is not capable of reliably detecting or sizing flaws on the far side of an austenitic weld for configurations common to domestic nuclear applications.

The industry-established Performance Demonstration Initiative (PDI) Program addresses requirements of 10 CFR 50.55a(b)(2)(xv)(A) regarding single-side access for piping. PDI Performance Demonstration Qualification Summary certificates for austenitic piping list the limitation that single-side examination is performed on a best-effort basis. The best-effort qualification is provided in place of a complete single-side qualification to demonstrate that the examiner's qualification and the subsequent weld examination is based on application of the best available technology. When the examination area is limited to one side of an austenitic weld, examination coverage does not comply with 10 CFR 50.55a(b)(2)(xv)(A) and proficiency demonstrations do not comply with 10 CFR 50.55a(b)(2)(xvi)(B) and full coverage credit cannot therefore be claimed. The licensee proposed that the best available techniques, as qualified through the PDI for Supplement 2 with a demonstrated best effort for single-side examination, are to be used from the accessible side of the weld in lieu of complete or strict compliance with Appendix VIII requirements.

5.5 Duration of Proposed Alternative

The licensee requested that the proposed alternative be applicable for the remainder of the second 10-year interval which is scheduled to end on December 18, 2005.

5.6 NRC Staff Evaluation

The NRC staff requested the licensee to provide additional information on the examination history, coverage, and method applied to welds 2-BG-22-F021 and 2-BG-22-F022. In its February 11, 2005, letter, the licensee responded that the pre-service inspection for both welds performed in June 1983 and the first interval inspection performed in April 1989 showed complete examinations. The licensee stated that these examinations were conducted prior to the required implementation of Appendix VIII to the ASME Code Section XI. In the fall 2002 examination, the licensee estimated a volumetric coverage of 50 percent based on a best effort examination. The licensee stated that all available techniques were used, as recommended by

the PDI program, including the use of a 2.25 megahertz 70-degree shear wave to achieve the best possible coverage of the far side of the austenitic welds.

The subject examination is not an ASME Code-required examination. Rather, it is an NBZ examination and is an augmented requirement to the Callaway ISI program plan. The licensee stated that it has historically treated augmented examination requirements as though they were ASME Code requirements in examination procedures, personnel qualifications, and coverage. Therefore, when it achieved what it considered less than essentially 100-percent coverage during the examination, the licensee decided to submit a relief request in accordance with 10 CFR 50.55a(g)(5)(iii). The licensee's interpretation of the NBZ requirements was that 100 percent of the welds within that zone had to be examined. Because 100 percent of the welds were examined, there are no alternative sites to examine.

Following Refueling Outage 12, the licensee performed an RI-BER evaluation in accordance with EPRI TR 1006937, Revision 0-A, August 2002. This evaluation determined that no degradation mechanism existed for these welds.

On June 27, 2002, the NRC staff approved EPRI TR 1006937, allowing licensees to use the TR to perform risk-informed break exclusion region evaluation at their discretion. The NRC staff finds that the licensee followed the NRC staff approved methodology in the TR to perform the risk-informed break exclusion region evaluation at Callaway.

The NRC staff finds that the licensee examined welds 2-BG-22-F021 and 2-BG-22-F022 to the extent practical. The NRC staff finds that the proposed alternative is acceptable because (1) the licensee has examined all welds in the NBZ and there are no alternative welds to examine; (2) the licensee performed the best effort examination; and (3) it provides reasonable assurance of structural integrity of the welds.

5.7 Conclusion

On the basis of the evaluation provided above, the NRC staff concludes that to provide 100-percent volumetric examination coverage on welds 2-BG-22-F021 and 2-BG-22-F022, the welds would have to be redesigned and modified which would result in a considerable burden on the licensee. The NRC staff has determined that compliance with the 10 CFR 50.55a requirements is impractical for the subject welds, the licensee has conducted these examinations to the extent practical, and the proposed alternative provides reasonable assurance of structural integrity of the welds. Based on this, the NRC staff has determined that this grant 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 and, therefore, Relief Request ISI-26 is granted pursuant to 10 CFR 50.55a(g)(6)(i) 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.

6.0 CONCLUSION

Based on the evaluation given above for Relief Requests ISI-24, ISI-25, and ISI-26, the NRC staff concludes that the alternatives to the ASME Code, Section XI in these relief requests are acceptable in that the 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 and, therefore, Relief Requests ISI-24, ISI-25, and ISI-26 are granted pursuant to 10 CFR 50.55a(g)(6)(i) for the second 10-year ISI interval at Callaway.

Principal Contributor: John Tsao

Date: June 22, 2005

Callaway Plant, Unit 1

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